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PREFACE

In this issue of Apstract we proudly present research on various topical AGRIMBA subjects relating to various countries in the world. We have a paper on the impact of the internet on Hungarian food consumers and a satisfaction analysis of visitors to Debrecen. Two papers deal with higher education education issues: one on relationship between academic and athletic performance,and another one on leisure sports alternatives provided by higher education institutes.

The paper on the history of measurement of business performance is of a theoretical character, just as the paper on the consistency of CAP 2013 program with respect to agricultural challenges and measures.

The three econometric papers in this issue deal with Africa. One paper consists of an analysis of the long run equilibrium between Ghana's exports and imports, whereas the second paper investigates three sorts of efficiency of maize production in subsistence farming in Ethiopia. The third paper focuses on the relation between produce certification and income risk management of cocoa farming households in Nigeria.

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Wageningen, January 2016,

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MODELLING AND ANALYSING AN INNOVATIVE COOPERATION TO SUPPORT OPERATION OF A SCIENCE CENTRE

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Abstract: *A science centre was built in Debrecen with the purpose to extend natural scientific knowledge and increase commitment to science and innovation in an experience-focused way. In addition to science centres' original role of education and scientific communication, their function has been extended for today with showcasing innovation and innovation findings, thereby "grabbing their slice" of the regional innovation process. However, in order to succeed, it is indispensable to maintain these institutions in the long run and to constantly renew their innovation content. By integrating the process established with using the "Triple Helix" approach, it is possible to assure one of the most important principles of the institution in the long run, which is its constant renewal that provides a wide range of the society with experience-based "tangible" knowledge. By following the concept we use, it became obvious that a science centre – as an organisation which creates knowledge – calls for the direct collaboration of the government, science and business actors in order to successfully operate in the long run, to attain its goals and, consequently, to develop the innovation potential of the region. However, the accumulated knowledge as a result of strategic partnerships can only contribute to establishing regional knowledge if the user – the organisation of the Science centre in Debrecen – is able to convey it successfully to the members of the fourth and fifth helix.*

Keywords: *science centre, triple and quadruple helix, innovative cooperation, scientific communication*
(JEL code: R11)

Introduction

In Hungary, the so-called "Pólus Program" provided European Union grants for several large cities to build Science centres. The topicality of this issue is strengthened by the fact that the concept and activity of such institutions – even though they have great traditions in Europe – are considered to be new in Hungary for the time being. Science centres have significant achievements in Europe in strengthening the role of informal education, more specifically in the field of the so-called tangible natural scientific methodology. Due to their novelty, the social scientific and regional economic examinations of these institutions have not been performed.

In 2008, the Local Authority of Debrecen City of County Rank decided to establish a science centre and involved the University of Debrecen into this project as a professional mentor. In the initial phase of the implementation process, the Local Authority and the University participated in a transnational project – namely *'Boosting innovation through capacity building and networking of science centres in the SEE region'* - in order to obtain benchmark observations, knowledge and a system of relations which facilitate them in achieving their goals. In order to develop the innovation culture, the project partners representing seven countries share the goal of raising public awareness for the importance of natural sciences, technology and innovation, which are the key factors of economic growth. The SEE Science project actively participates in redefinition of the roles of Science Centres, using most of the European practice and introducing new approaches.

It was one of the project duties to establish cooperations with regional and Debrecen-based institutions, companies and NGOs supporting and determining local innovation.

This study summarises the concept and methodology of this work, i.e. establishing the strategic system of relations with innovative organisations (stakeholders) in order to involve the "helix of users and the media- and culture-based society", i.e. the fourth helix.

Topic and objectives of the study

A Science Centre is built within the Debrecen Science Park project. The history of such institutions roots back to 1794, when the Louvre switched its functions. The concept of the so-called pure Science Centre model dates back to 1969, the opening of the Expolatorium (San Francisco) (FRIEDMAN, 2010).

The Science Centre is an environment of informal learning, where processes are centred around knowledge, the development of skills and the establishment of positive attitudes towards sciences. The Science Centre is a place where concepts about our natural world can be explored, examined and tested. In this place, knowledge is a unique source for families, students, teachers and the general public (ASTC, 2013). The primary objective of these institutions is to raise the interest of youngsters towards sciences and innovation by means of experience- and observation-based learning. Therefore, Science Centres are the environment of real knowledge establishment with high added value. (DARNAI, 2014).

In addition to science centres' original role of education and scientific communication, their function has been extended for today by showcasing innovation and innovation findings, thereby "grabbing their slice" of the regional innovation process. By virtue of this function, they are based on three main sectors on the regional level (university – government – enterprises), i.e. the central (hybrid) Triple Helix model and they can contribute to creating regional knowledge and developing the innovation capability of the region in the long run. However, in order to succeed, it is indispensable to maintain these institutions in the long run and to constantly renew their innovation content. It is the hypothesis of this study that direct collaboration between the government, science and business actors is necessary in order for the Debrecen Science Centre – as a knowledge conveying organisation – to successfully operate in the long run and to attain its goals and this collaboration can be provided with establishing a Triple Helix-based cooperation. We built the experiences of SEE Science project to establish this innovative cooperation. In addition, our hypothesis actually substantiated by the Economic Development Strategy of Debrecen where the Triple Helix approach has a central role therefore, it should also adapt in the project level.

Technical literature review

In 1956 and 1957, Robert Solow already published studies in which he concluded that long-term economic growth is based on the broadly interpreted technological development, i.e. innovation. Accordingly, an economic system which has significant innovation capability is able to develop and "rebuild itself" following an unfavourable environmental impact (PAKUCS – LÓRÁNT, 2003).

Innovation is the process of applying the attained knowledge, the renewal and improvement of products and services, as well as their markets, the application of new procedures in production, distribution, market work and management, organisation and work conditions, as well as the extension and renewal of the professional knowledge of workforce (PAKUCS – PAPANEK, 2006). Since the key role of knowledge and technology in economic growth became obvious, increased attention was drawn also to understanding the knowledge-based characteristic of the economy (LEYDESDORFF, 2010). In addition, in a knowledge-based economy, there is a close correlation between innovative capability and the regional economic processes which are assumed to be favourable. By means of learning and innovative capability, regions attain unique resources which can help them in regional competition (BAJMÓCY, 2008).

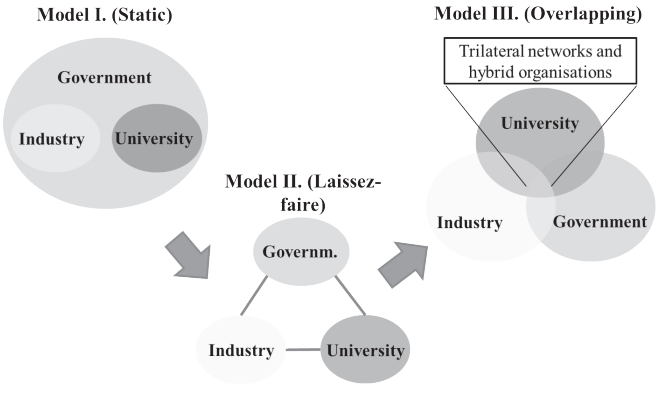
The examination of knowledge, knowledge creation and innovative capability has gained ground in several regional research projects, since there are numerous fields in the world in which the strategies of establishing especially successful leading high technology regions and technologies are built in order to achieve and improve these objectives (BAJMÓCY, 2011). Even though there were no empirical examinations which proved the general validity of these company seat-based local economic development initiatives (BAJMÓCY, 2011), the innovative capability and the resulting economic achievements of numerous technopolises around the world are indisputable. In addition to the Technopolis Framework, the establishment of Triple Helix-based interactions and a network-based character is the most important duty from the aspect of the establishment of these high technology regions, as well as their creative and innovative capability (GIBSON – BUTLER, 2013).

The Triple Helix model of the university-industry-government relations was introduced as a model describing the depth and complexity of the process of innovation and it provides an explanation for the establishment and development of knowledge-based economy by means of the interactions between the three spheres (Etzkowitz – Leydesdorff, 2000).

The main point of the model is the fact that innovation and economic development potential in the knowledge-based economy and society lie in the altered role of universities and also the system of relations of universities, the industry and the government which generates the appearance of new institutional and social forms, thereby contributing to the creation, transfer and use of knowledge (Etzkowitz et al., 2000). Three variants of the model were developed based on the development and nature of the relations between the government, the industry and the university (Figure 1):

- *Model I (Static):* The state has the strongest role, affecting enterprises and scientific institutions, as well as the relations between them. Top-down bureaucratic coordination. The main role of universities is education.
- *Model II (Laissez-faire):* The components are completely separated from each other with borders. Relations between each component are strictly determined. In addition to education, universities also have a main role in basic research.
- *Model III (Overlapping):* Components are partially overlapping each other, i.e. there are common projects, research and associations. The government makes investments and performs regulation activities, the university also establishes enterprises and the industry is responsible for its traditional duties. New organisational forms are established with the aim to facilitate collaboration: industrial parks, venture capital companies, clusters. (PÖRZSE, 2011).

Figure 1. Variants of the Triple Helix model

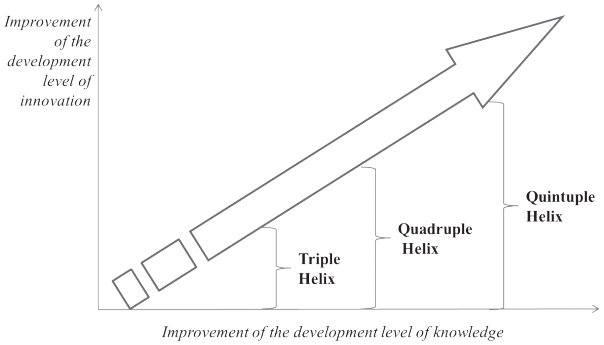


Source: own construction based on PÖRZSE, 2011

In general, it can be established that models II and III are mainly characteristic of modern market economies. In model I, there are few initiatives coming from the industry and universities; therefore, innovation developments cannot undergo at the proper rate (KOTSIS – NAGY, 2009).

Carayannis et al. (2012, 4) consider the "main model" of knowledge creation to be the Triple Helix model which was further developed into the Quadruple Helix model. In addition to the university-industry-government collaboration, this new model added a fourth helix being the media, more specifically the media- and culture-based community space and the medium of the civil society (CARAYANNIS et al., 2012; CARAYANNIS – CAMPBELL, 2012). In addition, the technical literature distinguishes a fifth helix, which is the social and economic (natural) environment, thereby specifying a broader context of the Quadruple Helix as the fifth helix was developed by means of its further examination.

Figure 2. The common development of advanced knowledge systems and innovation systems, from the Triple Helix towards the Quintuple Helix



Triple Helix:	University-enterprise-government relationship (helixes)
Quadruple Helix, the fourth Helix:	Media- and culture-based community and the civil society
Quintuple Helix, the fifth Helix:	Natural environment, the natural environment of the economy and the society

Source: Carayannis–Campbell, 2012

If the Triple Helix, as a framework and the subject of analysis or examination, cannot be neglected, neither can the fourth and fifth helixes, since these provide broader opportunities to sustainable problem solving from the aspect of knowledge and innovation (Figure 2). The more developed a knowledge-focused society is and the more advanced knowledge-based economies are, the more need there is for a shift to systems with broader perspectives (CARAYANNIS – CAMPBELL 2012).

Material and methods

Three main research activities were taken as a basis during the establishment and practical use of the concept. The establishment of the concept was mainly assisted with secondary research, mapping the regional innovative capability and identifying the "Triple Helix"-based innovation model which is the basis of economic development. As a next step, we examined how the Science Centre can be integrated into this model, how to interpret and integrate innovative capacities and what their role is in the regional innovation network. In order to achieve this goal, it is indispensable to survey the regional innovation actors (sectors), as well as the relations and network of these innovation actors in accordance with the "Triple Helix" principle.

The benchmark activity performed during the SEE Science project was an outstanding contribution in this process. During this project, we had the opportunity to observe the activities of several science centres, more specifically their innovative initiatives and enterprise relations, as well as their innovative services to enterprises. These benchmark observations also show that these institutions face an economic deficit due to their non-profit characteristic and their income covers around 40-50% of their expenditures (DARNAI, 2014); therefore, they heavily rely on external financial resources and direct enterprise relations.

Following the survey of the actors of regional innovations, we aimed to determine possible forms of collaboration of the Debrecen Science Centre and the innovative enterprise sector, as well as the form and method of directly involving these actors on the basis of the obtained benchmark observations. This research task was performed with a process-based approach, which facilitates the understanding of the cause and effect system of relations between each activity, and, consequently, the revealing of the sources of problems arising during elaboration, as well as the designation of areas to be developed. (NÉMETH, 2001).

According to our interpretation, a process is the series of activities in connection or interaction with each other which transforms inputs into outputs and values. Processes are planned and implemented under regulated circumstances in order to create values (MSZ EN ISO 9000:2001).

Our goal was to establish a structure which can be sustainable during the operation of a science centre and which creates values both for the science centre and the involved business partners, while also providing a "tangible" experience and knowledge for visitors. Accordingly, we were curious about the opinions of those affected even during the initial phase of establishing the process; therefore, we refined our concept to be presented to partners by means of focus group surveys during roundtable discussions.

In order for visitors to accept a certain product or service,

that given product or service should represent some kind of value to visitors. For this reason, value creation processes implement the conversion of enterprise resources into customer value (IFUA HORVATH & PARTNERS, 2006).

Research results and discussion

Objectives of the Debrecen Science Centre

The Debrecen Science Centre set the following goals:

- to draw the attention of the local community to technical and natural sciences and innovation, since these areas could be the basis of economic growth
- to draw the attention of youngsters to science, technology and innovation by means of making technical and natural sciences more tangible for them.
- to take a role of innovation catalyst due to the fact that the capacity building and knowledge shaping activities of the university are indispensable
- to use the gained experience of the already existing science centres and to enrich the common knowledge with its own findings
- to establish a strategic partnership in order to attain its goals
- to remain open to extending the scientific areas determined at the time of launching by means of constant development
- to overcome reservations against technical and natural sciences by means of everyday experiences and to present scientific novelties and the joys in innovation to visitors
- to inspire and support youngsters in their choice of career in natural science.

These declared objectives can be successful only in the long run; therefore, it was a clearly defined aspect during the formulation of the concept of this study to establish a Triple Helix-based strategic partnership with the aim to create knowledge in collaboration with the affected organisations. It was a further aim to promote the commitment of those affected, to provide the constant renewal of the services provided by the science centre and to contribute to the direct dissemination of the newest scientific and innovation findings of the region.

The concept of attaining the set objectives, involving stakeholders

According to Carayannis and Campbell (2012), the more developed a knowledge-focused society is and the more advanced knowledge-based economies are, the more need there is for a shift to systems with broader perspectives.

In our opinion, this correlation assumes timeliness, since the Science Centre deals with the development of sectorial collaboration along an original and new activity or service; therefore, the involvement of sectors (helixes) can be performed even consequently. Accordingly, the cooperation of the two helixes (sectors), the government (the local authorities of Debrecen) and the university (University of Debrecen) can be perfectly interpreted at the regional level, since it was the pre-requirement of the Science Centre project to be implemented within the framework of the Agóra-PÓLUS project. Furthermore, this cooperation provided an opportunity to involve the third helix in the phase of project implementation and to regionally develop knowledge and innovation in the long run.

Table 1. Organisations playing a key role in the innovation structure of the region

Elements of the Triple/Quadruple Helix		Organisations/Groups
First Helix	Science	University
		Research Institutes
		Knowledge Centres
		Transfer Institutes
Second Helix	Government	Government and Local Authority Organisations
		Organisations of Regional Authority
		Representative Bodies
Third Helix	Industry (enterprise)	Innovative Enterprises
		Spin-Offs
		Clusters
Fourth Helix	Society	NGOs
		Primary and High Schools
		Kindergartens

Source: own construction

Similarly to national systems, it is the basic requirement of the regional knowledge-based economic development to directly involve the third helix, i.e. the enterprise sector. This study considers the following of the triple and quadruple helix principle to be a requirement, according to which the social impact of a Science Centre (fourth helix) could be much more successful if the third – possibly market-based – actor is present even at the beginning in addition to the activity of creating experience and the visitor undergoing this experience. This third actor can present the logical bridge which helps in incorporating the obtained knowledge into people's everyday lives. This process can be manifested by influencing the sphere of interest or even modifying the focus of specific ideas of one's choice of career.

As a first step, the target group was involved by surveying the stakeholders which play a major role in the innovation structure of the region in accordance with the triple helix principle (Table 1). The next step was to involve the fourth helix – the media- and culture-based community and the civil sphere –, i.e. the "users" according to the dynamics of the quadruple helix model.

Potential forms of cooperation

Based on the obtained benchmark observations, European science centres try to establish their long-term partnerships in several ways, as their activities are basically non-profit. Accordingly, in conformity with the local regional circumstances and endowments and – as a matter of course – the efficiency of the Triple Helix principle, the forms of a possible long-term collaboration were identified.

The first and most innovative possibility is for the involved organisations *to integrate into the everyday activities of the*

Science Centre, thereby facilitating the use of the above described principles and to make this institution *perform its work along "their interests". They should establish structures which also formally ensure this criterion*. Usually, a newly launched institution is more open to flexibly modify its program and organisation. Founding documents and regulations governing the operation of the organisations are put together in this phase; therefore, external organisations have the chance to enforce their "interest" in this period. The platforms to do so are the forums where the founder invites the major organisations and institutions of the city to contemplate and come up with collaboration alternatives. However, the institutional forms developed during these ad hoc discussions determine the organisational framework of collaboration in the long run. It is important to integrate this cooperation into the Organisational and Operational Regulations of the operational organisation. The organisational issues of the implementation of the contract to be entered into with the University and the method of involving other strategic partners have to be laid down in this document. In addition to the usual operational and supervision bodies, it is important to establish at least two operational units. One of these is a strategic advisory council with 10-14 members, including representatives of the Local Authorities and the University of Debrecen, as well as all organisations which either represent potential visitors (e.g. Office of Education) or are able to provide help in maintenance (the major high-tech companies in the city/region). The other body should consist of experts who represent various areas of science, such as the six department heads, representatives of partner enterprises/ institutions, or even marketing and communication professionals (local TV and media). It could seem logical to invite the employees of similar organisations (not as competitors, but benchmark partners). It is the best if these two bodies hold their yearly session together.

The second opportunity to collaborate is to *use this space which was introduced to the market for the purpose of communicating their own activities and to raise the attention of visitors*. In practice, this can be done in various ways. It is a possible solution that the Science Centre provides an area for an external partner to showcase its own activity in a form which fits the profile of the "house". This could work as a satellite demonstration and it directs attention to the given professional area through the activity of a specific company. It is another alternative that an external organisation connects to an existing demonstration. Any solution could be viable in the program of the Science Centre as long as the purpose is to promote natural and technical sciences, innovation and innovation findings and at the same time provide experience and help connect these sciences to everyday life by means of life-like appearance.

The third alternative is to *establish a collaboration and generate relevant business models which result in business income for the institution considering mutual benefits and innovative services for the parties involved in the collaboration*. According to the current plans, the Science Centre, as a public educational institution, attracts around 80-100 thousand visitors and has spaces which can be commercially utilised. Based on these two endowments, targeted services can be organised, which may include letting out rooms/spaces, or organising conferences and programs. Large events (innovation day, science days, thematic festivals and exhibitions) can also be organised where attendance fee is an accepted form. Solutions like this could be an outstanding opportunity for the institution to gain awareness and to improve its innovative image in addition to generating income.

Steps of implementation

1. *Determining and putting together the range of organisations planned to be involved into the collaboration*. The selection of organisations already has a background, since the large enterprises in the city are already in an active relationship with the scientific institutions of Debrecen, which is currently being organised along a special system of goals. The *specific task of the pilot project is to identify with the network of relations, as well as to name the organisations to be involved* and to invite them subsequently. As a matter of course, the range of potential actors is extended by the – mostly public utility-focused – companies which are under the proprietary control of the city of Debrecen. During the establishment of the list, the two strategic partners (the Local Authorities and the University of Debrecen) recommended certain organisations which represent the basis. This basis was then extended in accordance with the recommendations of the invitees and professionals. As a matter of course, this group is not closed and there is a possibility for any party which is able to help the operation in the above described spirit to join.
2. *Organising a roundtable discussion in order to communicate the aims and the methodology of collaboration*. This is the most important element of the whole process, since this meeting must convey a message to the participants that it is happening for them and in cooperation with them. This message is a certain form of validation which can be provided with key persons and organisations. In practice, this means that the inviting party should be at least the deputy mayor and the rector of the University of Debrecen, while invitees should be the primary heads of organisations. The discussion should be focused on communicating the aims and getting to know the position of invitees, as well as establishing commitment.
3. *Following the discussion assuring the mutual commitment of parties, each invited organisation will be visited one by one in order to clarify all details of this commitment* and to conduct a first round of discussion about the principles of specific cooperation. We consider it to be important that it should not be a legally interpreted commitment, but rather a conceptual offer which has to be followed by specific planning activities. This work has to be performed in a uniform and adequately documented form. In order to facilitate this process, we have put together a mini-project datasheet which will be filled with data during

the partner visits. These visits have a dual impact as not only do they become a delegated task/project within the partner organisation, but the range of opportunities which help the success of this initiative will also be extended.

4. *Mutual presentation of project ideas*. After each organisation worked out its own mini-project, these should be presented to each other and discussed *at a meeting*. This form provides an opportunity for *each participant to fine-tune their ideas by considering their partners' ideas to be a benchmark*, while this forum is also suitable for establishing collaborations and joint implementation of certain projects.
5. *Agreement*. The project datasheet contains the joint mini-project of the Science Centre and the organisations taking part in the cooperation. Due to the nature of this activity, *the implementation of a project automatically means commitment which should also be laid down in a contract* where the financial and operational issues can be regulated.
6. *Joint efforts were made in the form of workshops. In order to facilitate these meetings in the future, we recommend to organise "legal successor" professional bodies within the framework of the Science Centre.* The involved organisations can also delegate representatives into these bodies and their aim is to perform guidance and advisory functions in professional areas. From the legal point of view, these bodies have to be given a mentorship role instead of a formal management licence. The datasheet filled out by the organisations contains a certain kind of declaration about whether they will take any role in the bodies to be established.
7. *Presenting the services and functions* of the Science Centre, as well as the above described ideas *to the fourth helix* (schools, kindergartens and NGOs). More specifically, *surveying the needs of "users" in order to provide direct feedback* of activities and experiences before implementation. If possible, the form of implementation should be workshops coupled with a tour of inspection.

Conclusions and recommendations

The above described concept and its related implementation process were put together in the form of a pilot work which provides the opportunity to perform the activities described here, but this work – the establishment of long-term partnerships – cannot end here, instead, it is more of a beginning. The continuation of this work could be realised in the form of the bilateral agreement between the operational organisation of the Debrecen Science Centre and the involved institutions and enterprises.

In addition, it is definitely necessary to set up an "internal" professional advisory council that is organised along the above described concept which makes it possible to constantly supervise the launched and implemented mini-projects, as well as to provide feedback in relation to visitors. The systematic collection and analysis of this visitor feedback and the adaptation of these activities as an independent process can itself be a tool for involving or extending the fourth helix.

As a matter of course, the process implemented in accordance with the above described concept can only become successful, i.e. yield a real, "tangible" result if it is transformed into an activity by its integration into the service portfolio of the Science Centre, thereby providing the innovative environment needed for the regular renewal and establishing the constant development of activities, while the good relationship with existing partners is maintained and further partners are constantly being involved.

Last, but not least, the mini-projects resulting from the strategic partnerships established along the Triple Helix-based concept and the accumulated knowledge can contribute to establishing regional knowledge and the long-term development of the regional innovative capability only if the user, i.e. the Debrecen Science Centre is able to convey them to the members of the fourth and fifth helix. In order to do so, it is indispensable to set up an organisation which is adequately prepared professionally and to employ science- and innovation-focused human resources.

Main conclusions of the thesis

One of the most important morals and findings of the establishment of strategic partnerships by means of the practical use of the "triple and quadruple helix"-focused approach of knowledge-based economic development is that the first round of roundtable discussions resulted in 10 specific mini-project ideas which doubled by the time of the next discussion. In addition, the presentation of mini-projects as benchmark also had a significantly positive result, since it motivated new organisations to present their own innovative findings.

The concept had the following positive results:

- the stakeholder organisations became familiar with (and understood!) the functions and aims of the Debrecen Science Centre,
- the invited enterprises were absolutely open to collaboration,
- the invited parties clearly identified with the initiative and they became real "interested parties",
- the existing relationships became even stronger.

We were absolutely convinced that the "Triple and Quadruple Helix" approach can contribute to providing constant renewal, which is one of the key elements of an institution and it can help in giving a broad range of society "tangible" knowledge, thereby contributing to the development of the knowledge-based economy of the region.

By following the concept we use, it became obvious that a science centre – as an organisation which creates knowledge – calls for the direct collaboration of the government, science and business actors in order to successfully operate in the long run, to attain its goals and, consequently, to develop the innovation potential of the region in the long run.

Summary

During the establishment of the Debrecen Science Centre, it was one of the main duties to implement cooperation with regional and Debrecen-based institutions, companies and NGOs supporting and determining local innovation. This study summarises the concept and methodology of this work, i.e. establishing the strategic system of relations with innovative organisations (stakeholders) in order to involve the "helix of users and the media- and culture-based society", i.e. the fourth helix.

On the regional level, the social impact of a Science Centre could be much more successful if the third – possibly market-based – actor is present even at the beginning in addition to the activity of creating experience and the visitor undergoing this experience. This third actor can present the logical bridge which helps in incorporating the obtained knowledge into people's everyday lives.

Along the developed concept and by using benchmark observations, the possible forms of strategic cooperation were determined, similarly to the innovative process of establishing a long-term partnership. It is one of the most important morals and findings of the work that around 20 specific, feasible mini-projects were put together which motivated new organisations to present their own innovative findings.

As a result of the concept, the stakeholder organisations became familiar with (and understood!) the functions and aims of the Debrecen Science Centre. In addition, they clearly identified with the initiative and they became real "interested parties".

It is important to note that the above described concept and its related implementation process were put together in the form of a pilot work which provides the opportunity to perform the activities described here, but this work – the establishment of long-term partnerships – cannot end here, instead, it is more of a beginning.

In order to successfully continue the launched activity, it is necessary to set up a professional advisory council to constantly supervise the launched and implemented mini-projects, as well as to provide feedback in relation to visitors. The feedback system incorporated into the process can itself be a tool for involving or extending the fourth helix.

The process implemented in accordance with the above described concept can only become successful, i.e. yield a real, "tangible" result if it is transformed into an activity by its integration into the service portfolio of the Science Centre.

Last, but not least, the mini-projects resulting from the strategic partnerships established along the Triple Helix-based concept and the accumulated knowledge can contribute to establishing regional knowledge and the long-term development of the regional innovative capability only if the user, i.e. the Debrecen Science Centre is able to convey them to the members of the fourth and fifth helix. In order to do so, it is indispensable to set up an organisation which is adequately prepared professionally and to employ science- and innovation-focused human resources.

The findings of this work show that a science centre – as an organisation which creates knowledge – calls for the direct collaboration of the government, science and business actors in order to successfully operate in the long run, to attain its goals and, consequently, to develop the innovation potential of the region in the long run.

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THE IMPACT OF THE INTERNET ON HUNGARIAN FOOD CONSUMERS' WAYS OF SEEKING INFORMATION FROM THE ASPECT OF HEALTH AWARENESS

András Fehér

INTRODUCTION

Health and its social impact root back several hundred years. Due to modern medical science, today it is easier to become healthier and to maintain this condition. Nevertheless, only very few people can claim that they are completely healthy. This tendency is partially caused by chronic illness and unhealthy lifestyle. People's health status can be controlled and changed mainly by themselves. For this reason, health attitude is especially important. SZAKÁLY (2011) defines the concept of health attitude as "the complexity of health-related attitudes which, as an element of healthy lifestyle, manifests itself as a behaviour resulting from health care needs and health-related motives". According to the approach of BAUM et al. (1997), health attitude involves every action and behaviour with the purpose to establish and maintain healthy conditions.

One of the essential aspects of health awareness is food consumption which has a significant role in converting to healthy lifestyle. However, the question arises which sources consumers can use to obtain the necessary information in the most effective way? Before the millennium, consumers had four main sources of information: specialised textbooks and periodicals, the opinions of relatives and friends, asking the physician or dietitian and relying on previous studies. However, the world has changed fundamentally and digital evolution took place during the last decade. As a result, the sources of information listed above were extended with the Internet.

One of the main components of healthy lifestyle is proper diet. When putting together one's diet, lots of information are needed in order to be able to pick from various foods which contribute to converting to a healthier lifestyle and maintaining it.

The main purpose of this study is to determine and show examples of the characteristics of online marketing which could help consumers in the conscious conversion to healthy lifestyle. Of the various factors, great emphasis is placed on online health-related information.

1. REVIEW OF LITERATURE

1.1. Characteristics of online consumer behaviour

The age of Internet had an especially great impact on consumers who represent one of the main actors on the market. In a 2014 analysis, IBM calls today's average consumers (both foreign and domestic consumers) "digitally enlightened" citizens, explaining this phrase by the fact that the road which leads to obtaining information and purchase has changed as a result of digitalisation (BREUER, 2014).

There have been many Hungarian studies about the process and model of the traditionally interpreted consumer and customer behaviour (HOFMEISTER-TÓTH, 2003; TÖRŐCSIK, 2007; TÖRŐCSIK, 2011), but only a few researchers examined its online forms (ESZES, 2011; BÁNYAI and NOVÁK, 2011). However, it can be stated that there is no significant difference between each step of the processes of online and traditionally interpreted consumer behaviour. All five independent steps of the process (1st step: identifying the problem; 2nd step: looking for information; 3rd step: processing information; 4th step: implementing the decision; 5th step: behaviour following the decision) can be supported also in an online environment.

The second step of the process, i.e. looking or browsing for information is more significant in the online environment in comparison with the traditional customer behaviour. It is enough to point out that most of the time online is spent searching for something (HULLÁMVADÁSZ, 2009). This finding is also confirmed by the 2008 survey of Jupiter Research, stating that 48% of Internet users' activities is spent searching online (ESZES, 2011). The efficiency of looking for online information in comparison with other media was also confirmed by GUO (2001), a marketing professional of the University of Texas: "The Internet is the first information-based platform which is able to provide immediate and basically unlimited amount of information to users in a searchable form, thereby contributing to the rationalisation of consumers' purchase decision processes".

In the following sections, this study aims to briefly describe the typical consumers above referred to as "digitally enlightened" citizens who are also called online or digital

consumers or e-consumers. It is hard to find a more attentive audience than online consumers as they are constantly looking for information, but they can also be convinced with facts and rational arguments. However, they can also be manipulated with pseudo-scientific false doctrines and they consider the classic methods of image establishment-focused promotion to be secondary. Nevertheless, their needs and attitudes are different in each situation, making them difficult to describe. For this reason, the technical literature regards digital consumers as "hybrid consumers" (JANAL, 1998; WALLACE, 2002; WIEDMANN et al., 2004; ZAVODNYIK, 2005; ESZES, 2011).

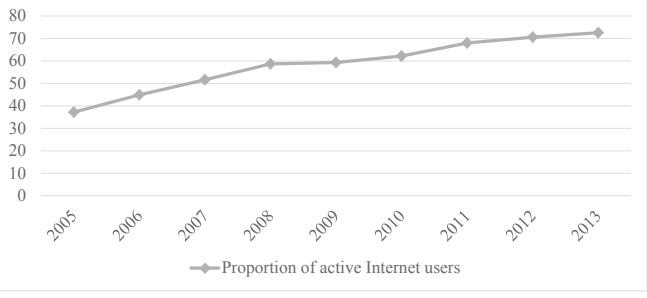
1.2. Examination of the Internet supply level and Internet penetration

This section focuses on the statistical indexes which describe the previously – generally – outlined online consumers both at the world level and in Hungary.

As a first step, the analysis focuses on Hungarian households' supply level of information and communication technologies (ICT). The speedy development of the recent years is shown by the fact that only 38% of households had Internet access in 2007 and broadband access amounted to only 33%. According to the latest data, this proportion increased to 71.5% by 2013 and the percentage of broadband access is 71%. Therefore, it can be concluded that nearly all households are connected to the Internet via broadband access (KSH 2014).

The worldwide proportion of active Internet users (those who used the Internet during the last three months) is 39% in the whole population. This relatively low proportion is greatly distorted by the very low indexes of certain African and Asian countries. The proportion of active Internet users in Hungary (*Figure 1*) is 72.6% (HCSO 2014) which can be compared mainly to the respective value of the EU28 Member States (76.5%). It follows from this comparison that Hungary is close to the EU level in terms of active Internet users and it can be concluded that Hungary does not lack active Internet users (IWS, 2014).

Figure 1. The proportion of active Internet users in Hungary, %



Source: Own edition based on HCSO 2014

1.3. Diet-related information and manipulation on the Internet

The motto of today's consumer society is "Buy, eat, consume!" and it perfectly reflects the intention to constantly maintain people's needs to consume. This state can be reached most effectively if the media generates constant discontent in consumers (FORGÁCS, 2010).

For many years, foods cannot be sold solely based on their taste. Modern consumers decide about what to eat as a result of marketing stimuli rather than hunger (FORGÁCS and FORGÁCS, 2011). It is important to use marketing communication which goes against traditional communication methods and attempts to arouse the interest of the previously mentioned digital consumers. Proper communication is also necessary, since 70% of food purchases are done as a result of impulsive and unconscious impacts (WEINBERG and GOTTWALD, 1982; ROOK, 1987). This way, the overwhelming majority of purchases become easily influenced by marketing experts. According to PACKARD (1971), marketing messages act on the behaviour of consumers with posthypnotic suggestions. People are unable to become aware of or protect themselves from these impacts. For long decades, the rational-verbal suggestions of physicians and dieticians could not overcome the previously mentioned psychological level and convey credible health care information in a proper way to consumers' consciousness (FORGÁCS, 2010). News spread online at unbelievable speed. From this aspect, the Internet could definitely be an effective form of communication in the field of conveying credible health care information. However, for the time being, false news and negative information appear in the online environment with the same tendency as in the case of traditional media. Today's ever-globalising market is full of food scandals which are generated by the media in the majority of cases. In 2006, German papers wrote down the phrase "food scandal" more often than the Iraqi war which was happening at the same time. The increasing food-related risks led to food phobia in lots of consumers. Orthorexia nervosa is a quickly spreading eating attitude and it also became more widespread as a result. Affected consumers tend to dogmatically believe in eating doctrines and they feel obliged to also initiate others to these doctrines. Nowadays, there are many more orthorexics among dieticians, naturopaths and civilians (FORGÁCS, 2010). This fact greatly brands the credibility of diet-related information, as consumers face a huge amount of information full of contradictions.

There is an increasing number of people joining the sects established by anorexics and bulimics (ProAna-proanorexia, ProMia-probulimia, ProEd-proeating) which appear also on forums, blogs and community sites. According to international research, 12.6% of teenage girls (between 13-17 years of age), 5.9% of boys and more than one third (35.5%) of patients suffering from eating disorders visit these sites (CUSTERS and VAN DEN BULCK, 2009; WILSON et al., 2006).

1.4. The future of transferring information: cellular mobile communication

In a previous study, FORGÁCS et al. (2013) already pointed out the significance of cellphones in transferring information by experts. Since 2010, mobile phones have become a significant tool for transferring media and they are frequently referred to as the "fourth display" (following movie theatres, television and the computer screen). The needs and problems of the constantly accessible consumer ("always connectedness") can be fulfilled and solved real time with the help of various mobile applications. Mobile phones have become a convergent tool, since their original and primary function (voice transfer) was gradually pushed into the background. In turn, these devices are able to serve an increasing array of communication forms (payment, motion picture transfer, etc.) (HORVÁTH et al., 2013). The Mobility Report of Ericsson reveals that cellular mobile communication will still develop dynamically in the upcoming years. According to this research, the number of mobile subscriptions will be higher than the population of Earth by 2015. In the first quarter of 2014, 65% of all sold mobile phones were smartphones. The number of smartphone subscriptions will be higher than conventional phones by 2016 (ERICSSON, 2013). QR codes have a similar function as conventional barcodes, but they are able to contain much more information; therefore, they can provide consumers with these information quickly and simply. A smartphone application is needed to read this information. Forgács and colleagues envisioned a method of storing food-related data (consumed amount, ingredients, additives, etc.) of foods whose QR codes were read by the smartphone and these data could be cumulated and then compared with previous data. Smartphones could then provide health care predictions related to proper diet (FORGÁCS et al., 2013). Nowadays, this idea could be easily implemented. There are also attempts to provide solutions like this, such as the "Safebrand" application, which is able to read the QR codes on the packagings of various food products and to provide information based on this code.

1.5. Looking up health-related information on the Internet

The proportion of active Internet users was determined above. If they are viewed from a different perspective, it can be concluded that they are the ones who will most likely look for information online. This section focuses on the EU and Hungarian tendencies of looking for various information related to health, as well as the main sources of health care information.

The first step of analysis is surveying the ways of seeking online health-related information (illnesses, injuries, nourishment, health development, etc., those who were looking for information during the last three months). Special emphasis has to be placed on nourishment, which, even if shown in a differential way during the presentation of results, constitutes a significant part of analyses. Based on the cumulated Eurostat data, around every second Hungarian active Internet user (49%) looks up health-related information online which is more than double of the respective value in 2007 (23%). This percentage is even somewhat higher than the EU28 average (44%) (EUROSTAT, 2014).

The following part of the study focuses on the proportion of Internet among the sources of health care information based on the findings of Szinapszis Market Research and Consultancy Ltd. 44% of respondents mentioned physicians as the primary source of health-related information. Internet is slightly behind this value with its 39% proportion. During the measurement of trust index, respondents rated the various sources of information to be between 1-5. Of these, the Internet had a 3.34 trust index and it was not much behind other categories (physicians – 4.21; specialised textbooks – 3.51; medical assistants – 3.38) which have been widespread among consumers for long decades. The analysis can be narrowed down to online tools (SZINAPSZIS, 2013). The primary source of looking up health care information is general search engines, or the so-called content aggregators (e.g. Google, Bing). The aim of these engines is to rank the content of each website based on various aspects, e.g. the most frequently visited and most often referenced sites (ESZES, 2011). 39% of respondents constantly look for information on these sites, while 42% of them use these search engines very frequently (SZINAPSZIS, 2013). The role of community media should also be emphasised, as these are online platforms and tools (blogs, wikis, community sites, video sharing sites etc.) which make it possible for users to share their opinions with others (ESZES, 2011). 57% of Internet users have browsed these sites (no information about the frequency of browsing) for health-related contents. The most usual site used for this purpose is Facebook (SZINAPSZIS, 2013).

2. MATERIAL AND METHODS

The theoretical background of this research was built on the review of relevant technical literature in which the findings of Hungarian and foreign models and research projects were used. During the secondary research, the process of online consumer and customer attitude was surveyed. More specifically, great emphasis was placed on looking up online information with respect to health-related factors. The various manipulation impacts on online diet-related information was also examined. Special emphasis was put on the survey of cellular mobile communication which can be regarded as one of the most effective future tools of conveying information.

The primary examination was constituted by a nation-wide questionnaire survey which was conducted by Szocio-Gráf Market Research and Public Opinion Pollster Institute in the spring of 2014 involving 1000 people. The questionnaire survey is representative from the aspects of region, settlement type, gender and age. Data collection was done with standard questionnaires during personal interviews at the homes of respondents. The questionnaire is based on closed questions which made it easier to record and analyse data.

In general, the questionnaire focused on the attitudes and purchase habits of online consumers. This paper presents the

online relations of looking for information about food products which is in close connection with consumers' habits of browsing for health care information. Data processing was performed using the statistical and mathematical software SPSS. This paper outlines the analysis of frequency distributions.

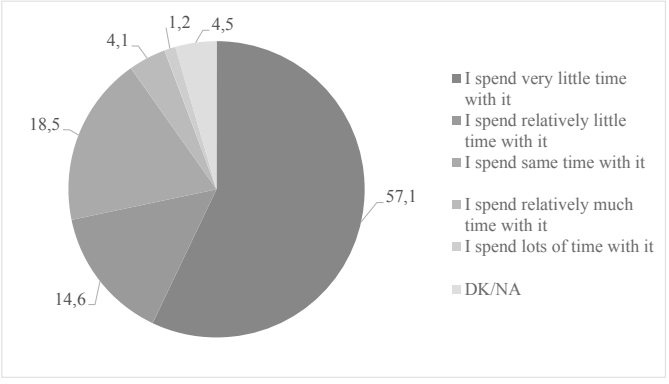
3. RESULTS AND DISCUSSION

This section aims at determining the tendencies of looking up online and offline food-related information based on the findings of the author's own research. As a next step, the study examines the distribution of online tools in searching for food information. The possible motives for searching for online food-related information is differentiated on the basis of the author's review of technical literature and primary research. As a last step, the general search for online food-related information is narrowed down to looking up information related to healthy or conscious food consumption on the basis of current research in this field.

3.1. Examination of searching for food-related information

This research primarily aimed at looking for online food-related information from the aspect of its proportion compared to offline search (conventional media, e.g. radio, television, public domain advertisements) (*Figure 2*). Respondents could provide their evaluation by using a scale from 1 to 5 where only the two extreme values were shown (1 – I spend very little time and 5 – I spend lots of time with looking for online information). Only orders of magnitude were provided for the different categories, no quantification was given in terms of the exact duration.

Figure 2. Comparison of online and offline searching for food-related information, %, N=1000

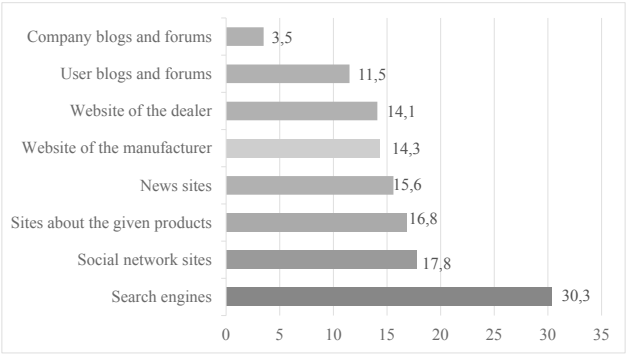


Source: Own edition, 2014

71.7% of respondents spend very little or relatively little time on the Internet looking for food-related information. However, during the analysis of this question, it can also be concluded that around every fourth respondent (23.8%) spends similar or higher amount of time browsing for food-related online information. Therefore, the role of online solutions of looking for information about foods is essential.

Figure 3 shows the distribution of various online tools among the sources of information about foods. When answering the related question, respondents had to judge the listed online tools in terms of whether they use each of them when looking up food-related information in general.

Figure 3. The distribution of online tools in looking up food-related information, %, N=1000



Source: Own edition, 2014

In conformity with the preliminary review of technical literature, search engines (e.g. Google, Bing) were indicated by the highest proportion (30.3%) of respondents. It is important to point out that the second most frequently referenced community sites (e.g. Facebook, Twitter) are slightly ahead of official websites with their proportion of 17.8%. It follows from this finding that the most popular tools for looking up food-related online information are search engines and community sites and the latter of which is only a few years old.

3.2. Examination of searching for information about healthy food consumption

As it was mentioned above, putting together a proper diet is one of the main components of developing and maintaining a healthy lifestyle. Lots of information have to be collected in order to implement this goal. Both the author's previous research findings and other reviews of technical literature support the assumption that people potentially look for online information independently of whether purchase takes place subsequently or not. Therefore, the reasons of looking for online information can be distinguished the following way:

- *Looking for quality-related information* (e.g. reading and following the opinions and ratings of users and relatives on forums and community sites).
- *Searching for general information about foods* (e.g. finding out detailed information about a certain product based on the QR codes detected with a smartphone).
- *Browsing for recipes* (e.g. finding out the proper proportions of raw materials needed for preparing a given

food on dedicated recipe websites (nosalty.hu))
- *Food factors which have positive effect on health* (surveying the health prevention and healing effects of various foods).

The last element of the above list, i.e., browsing for food factors which have positive effect on health, is of key importance from the aspect of this research. This element can be approached in a way that the purpose is to look for information about products which can contribute to healthy food consumption.

In addition to searching for food- and health-related online information, this paper also combines the previously examined factors on the basis of other previous and current research. Consequently, browsing for information about healthy or conscious food consumption is taken as a basis.

MOSKOWICZ et al. (2004) thoroughly examined people's browsing activities for online information about functional foods. Based on a conjoint analysis, it was concluded that Internet sites provide favourable opportunities for obtaining information about functional foods. These foods constitute a so-called virtual food category which cannot be interpreted from the legal aspect (LUGASI 2007 and 2008, LELOVICS 2010). A food product is considered functional if it is proved that it has a beneficial effect on certain functions of the organism (reaching a better health status, reducing the risk of illnesses) in addition to the usual nourishment physiological effects (SZAKÁLY, 2011).

SOÓS (2014) analysed the available information sources of health food consumption and their credibility with three focus group discussions (people satisfied with their body weight, those who wish to gain and those who would like to lose weight) and an online questionnaire survey (non-representative survey with 500 participants). *Based on the outcomes of the focus group discussions*, it can be concluded that one of the most popular methods of obtaining information about healthy food consumption (especially for those dissatisfied with their body weight) is targeted online search and spontaneously reading advertisements which randomly appear on websites, mailing systems and community sites. Consumers consider online information to be credible if they are retrieved by a specialist or dietitian. They think the same way if 8-10 close acquaintances of them suggest the same method (e.g. via Facebook). As regards the *online questionnaire survey*, SOÓS (2014) concludes that respondents mainly use Internet search engines (60.6%) concerning food consumption. They ask for the opinions of friends (50.6%) and acquaintances (40.0%) to a smaller extent. Surprisingly, only 26.6% ask for the expert's opinions of physicians and dieticians. There is a reverse situation concerning the credibility of information sources. Physicians and dieticians were considered to be the most credible sources of information to a proportion of 63.8%, followed by educational and specialised textbooks (41.6%) and friends and acquaintances (26.2%). Search engines which were rated to be the first in the previous category only had a 26.2% proportion in terms of credibility. It is also important to point out that the conventional communication channels such as television, radio and printed media were rated to be among the last ones in both examined categories. Finally, the role of community sites has to be emphasised as nearly one third of respondents consider them to be an effective source of information about healthy food consumption. However, only 11% of the find this source to be credible.

4. CONCLUSIONS

Putting together a proper diet is one of the main components of healthy lifestyle. Lots of information are needed to put together a healthy diet from various foods which can contribute to converting to and maintaining a healthy lifestyle. Consequently, the main objective of this paper is to determine and provide examples of the characteristics of online marketing which can help consumers in consciously converting to healthy lifestyle. Of the various factors, special emphasis was placed on the online appearance of health-related information.

The main conclusions of the research are elaborated as follows:

The Internet can be regarded as an increasingly important and credible source of information when looking for information about healthy/conscious food consumption. It proves the increasingly significant role of the Internet that around one quarter of the respondents taking part in the questionnaire survey browse the Internet for food-related information for similar amount of time or more in comparison with conventional media. Other surveys pointed out the role of online search engines. In addition, it was also specifically pointed out that the credibility of information sources mainly depends on the type of information. Information obtained from physicians or dieticians and close acquaintances was considered to be the most credible.

The role of community sites is increasingly significant, although there is still room for development in terms of credibility. Community sites can be regarded as the second most important source of information following online search engines when it comes to browsing for food-related information on the Internet. During the analysis of searching for information about healthy food consumption, it turned out that one third of those taking part in the online questionnaire survey consider community sites as a significant source of information. However, only one tenth of respondents find these online sources credible.

FEHÉR (2011) had previously examined information consumption's reason for existence. However, most statements referred to the packaging of foods. In the opinion of the author, online information consumption can appear in a specific online environment and the aim is not to buy certain foods but to obtain information about them, especially in terms of health factors.

Altogether, it can be concluded that healthy lifestyle-related information has a significant role in online sources. Consequently, Internet can be regarded as a preferred source of information in terms of the conscious converting to healthy lifestyle.

SUMMARY

One of the main components of healthy lifestyle is proper diet. When putting together one's diet, lots of information are needed in order to be able to pick from various foods which contribute to converting to a healthier lifestyle and maintaining it.

The main purpose of this study is to determine and show examples of the characteristics of online marketing which could help consumers in the conscious conversion to healthy lifestyle. Of the various factors, great emphasis is placed on online health-related information.

Based on the research findings, it can be concluded that healthy lifestyle-related information has a significant role in online sources. Consequently, Internet can be regarded as a preferred source of information in terms of the conscious converting to healthy lifestyle.

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THE CONNECTION BETWEEN ACADEMIC AND ATHLETIC PERFORMANCE AMONG ELITE UNIVERSITY STUDENT ATHLETES

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Abstract: *Athletes in higher education are not only expected to produce high level performance but to find the balance between the preparation for post-athletic life and the requirements of the university. The objective of this study is to explore the connections between academic performance and level of sport. Also, to elaborate on the role of relevant policy regulations and institutional support that help elite athletes meet academic requirements. Data collection was conducted by means of online questionnaires involving athletes receiving sport scholarships at the University of Debrecen (N=159). The data from questionnaires were processed by using SPSS 18. Version software. For data analyse four groups were extracted based on level of sport performance and involvement: international elite, division I, division II, division III. The results indicate that the academic performance on the two international elite of sport did not differ from the average, and that these athletes did not experience any difficulties earning course credits at the university while being engaged in doing sport. In most cases, elite athletes did not apply for the various kind of support instruments, thus, they are able to balance athletic preparation and academic requirements without supportive modifications of university policies. The results also shed light on the fact that the academic performance does not only depend on the level of sport and the chosen major at the university, but it is also influenced by the time devoted to study and training, and the sport type (individual or team sport). There are differences observed between athletes participating in individual or team sport concerning the general average of grades, the effectiveness of earning credits, the number of weekly training, as well as the time devoted to training in preparatory and competitive periods. According to the results, the various amount of time devoted to study or sport does not necessarily result in academic performance decline. In addition, results support that athletes do keep academic studies rather important and they are aware that university years are considered to be a significant period in preparation for post-athletic life.*

Keywords: *athletic performance, academic effectiveness, elite student athlete* (JEL code: Z20)

1. INTRODUCTION

As the result of the social and economic development of the past few decades, career planning and the so-called individual career path development have become more and more significant, with life-long learning playing a key role (Koncz, 2013). Career planning and career path development take the characteristics of various life cycle stages into consideration, thus, help individuals to complete their studies, enter the labour market and then manage an adaptive career development. Individual career pathes are divided in terms of age into different stages (Belcourt "et al", 1996, Dessler-Turner, 1992, Pintér, 2002, Sullivan, 1999, Dalton, 1989). Five stages are distinguished by Belcourt et al. (1996) and Dessler and Turner (1992) seven stages by Pintér (2002). All stages haves their own characteristics. Even if approaches are different, they do agree that there should be a preparatory stage named "preparation for work" before entering athe job market; this is followed by the "early-, mid- and late stages" of a career path. Transitions between stages signal certain stations where progress-aimed decision making is demanded, which takes abilities, skills, motivation and ambition into account and is aimed at progression (Koncz, 2002).

The preparatory stage is essential for establishing a prospective career, in which the time period at the end of the high school years, influenced by future plans and visions, plays a critical role. In the seven stages approach of Pintér (2002), a period between age of 16 and 18 and age of 18 and 24 is defined as fundamental periods in career decisions, preparation for a career path. Hence, these two periods spent in educational institutions are formulate a critical base for post-athletic life preparation as well (Koncz, 2013). Based on previous research considerations and findings on post-athletic careers, it can be concluded that there is a continuous progress of change alongside with life cycles lasting up to the transition to retirement from sport.

As far as elite athletes' careers are concerned, there are two different career paths distinguished. One is the athletic career, which involves sport specific objectives and ambitions. The other is the occupational career that is being developed parallel to the athletic career in order to consciously prepare for the

post-athletic stage. Hence, athletes will have the chance for a normative or predictable transition following the termination of their athletic career (Alfermann-Stambulova, 2007, Stambulova ,,et al.", 2009). One of the basic conditions, though, is an atmosphere from which athletes could benefit - including the educational institution, sport association, connecting social groups or individuals, such as coach, family and peers (Kun-Szretykó, 2011). Due to the special characteristics of high-level sport and especially the relative short length of an athletic career, it is career planning and career management that play a particularly important role in sport. The length of an athletic career is hardly predictable, if one is fortunate enough, it might last until the age of 30-35.

Considering contemporary talent identification systems, the beginning of the athletic career usually overlaps with the beginning of elementary school studies. From that point on, young athletes are required to produce athletic and academic performance parallel; balancing the requirements of sport and school is less challenging at a younger age. However, with age, athletes become more mature and it becomes more and more important to parallel produce a high level athletic performance and maintain studies with preparation for post-athletic life and occupation. The athletic career, high level performance and ever growing results expect athletes to devote every minute and all of their sources to sport which, therefore, progressively becomes a profession (Conzelmann-Nagel, 2003). In addition, it is essential for athletes to build their own life and be aware of the significance created around further studies and professional experience (Kozsla "et al.", 2014). The simultaneous realization of higher education studies and high level athletic activity involve a great deal of responsibility for athletes. Improvement and progress in sport depend not only on athletes but various external factors, whereas in higher education – as institutions tend to give much space for students to meet the academic requirements – students are responsible for their academic success. Depending on the discipline and level of sport, the amount of time devoted to studies by athletes might differ, though, academic performance can not to be well-predicted because of individual differences of athletes.

An educational progress is defined in terms of the requirements completed. In higher education, one of the possible alternatives measuring academic effectiveness is the general average of grades this a dependent variable outlines academic performance together with other variables explaining academic effectiveness[1], according to Di Maggio (1982).

As an athletic career is defined in terms of athletic performance and results, regular performance evaluation is highly emphasized. Athletic results can be measured by successful participation in Olympic Games, European- or World championships, national championships or competitions. In addition, results compared to personal best of athletes is another indicator. These define the measures of realizing pre-set objectives of athletes.

The connection between successful athletic performance and academic effectiveness was already examined in the '60's. Based on the findings, the positive influence of athletic activity on academic performance was concluded. However, another part of the study suggests risks in sport due to possible aggression, excessive alcohol and drug consummation (Pusztai, 2009 on Broh, 2002).

Compared to previous research that concluded different results on different levels of sport, this particular research examine student athletes only in the field of regular, club based and performance oriented competition sport. The objective of the study is to explore connections between academic performance and level of sport based on the results of an online questionnaires. Furthermore, the influence of institutional policies and regulations as well as of supportive instruments is examined in terms of elite athletes' academic effectiveness. With respect to the relevant literature it is assumed that the athletic performance and the level of sport has an influence on academic effectiveness.

2. LITERATURE REVIEW

International research usually focuses on academic performance with a complex approach – studying results, teacher-student relationship, and the role of institutional regulations and support in academic performance (Lannert, 2004). The academic result is considered to be an indicator of effectiveness. Students' academic effectiveness in higher education was measured, which was considered to be an indicator of institutional performance as well (Pusztai, 2010). Academic effectiveness measure by Pusztai (2007) with the following five indicators: future plans after university/ college, extracurricular activities, relation to high culture, altruist work attitude and the intention of taking up a job, respectively.

Research conducted in the United States has examined the field and level of work where athletes find employment after the termination of their athletic career, taking the actual requirements of the labour market into consideration. As the results indicated, the most important factors are the adequate qualification and the level of education. Therefore, it is a significant issue for athletes to properly meet the academic requirements while developing their athletic careers. In connection with this particular topic, many research has been conducted. Espwall (2004) examined the relationship of study and sport in terms of time utilization, and found that the amount of time devoted to sport is around 15-25 hours a week next to school activity which takes 25-35 hours a week. It was also found that the number of hours devoted to sport and study significantly raise during university years (Epswall, 2004). According to David (2005), examining the particular amount of time devoted to study and sport in higher education, student athletes normally devote 30 hours to their studies per week, whereas around 20-30 hours go to sport. These findings prove that adequate time management and commitment are necessary as well as institutional support instruments so that athletes could manage their dual tasks (David, 2005).

1 Variables explaining academic effectiveness: family background variables, type of place of residence, factors characterising the institution, characteristics of educational organisations, attributes of class dynamic (Saha, 1997).

McKenna and Dunstan-Lewis (2004) carried out a research at an English university examining athletes' relation to their studies and their dual priorities. Based on the findings it can be concluded that athletes strive to be successful in both academic and athletic fields (McKenna - Dunstan-Lewis, 2004). Aquilina (2013) reported similar results as it was found that athletes could reach high academic and athletic performance for which an effective time utilization and balance of priorities were essential (Aquilina, 2013).

On international level and also in Hungary, the involvement of educational institutions was articulated in order to support successful academic performance and graduation of elite student athletes' in higher education (EU Commission, 2011). Therefore, the University of Debrecen took steps to help student athletes balance academic studies and high level athletic performance. In the *Studies and Exams Code* (2009) institutional policies and regulations as well as support instruments (individual schedule for class attendance and exams, mentor programmes) are defined (Lenténé-Puskás, 2012). This provides athletes with basic conditions and support for post-athletic life preparation while they still could focus on their athletic career.

3. MATERIAL AND METHOD

As preparation for the online survey, a focus group interview was conducted among national athletes according to a pre-set research protocol targeting the major areas covered in the envisioned questionnaire. As a result, several valuable pieces of information, thoughts and ideas came up that were integrated into the final version of the survey questionnaire. Before finalizing the questionnaire, pilot tests were conducted with 10 athletes.

The questionnaires were sent out to student-athletes applied and received sport scholarships in the second semester of the academic year 2013/14. The subject group involves European champions, World champions, Universiade winners, Olympic ranked athletes and national players. The final version of the questionnaires was sent out via Evasys survey automation software to 207 students. The survey applied a holistic approach; by the time Evasys closed down, a total of 159 completed questionnaires had been sent back which equals an answer rate of 76%. Out of the 159 respondents 114 were male and 45 were female. For assessment of year distribution it was necessary to count BSC training years together with their undivided degree program equivalents. Based on this precondition, 40 respondents as first-year students, 34 respondents as second-year students, 50 respondents as third-year students, 20 respondents as fourth-year students and 15 respondents as fifth-year students were registered. The distribution according to level of sport was the following: the number of athletes on the international elite of sport was 55, in division II was 61, in division III was 16, on regional level was 24 and there were 3 respondents who did not answer to this particular question. The majority of respondents were team sport athletes (N=114), 45 athletes were in individual sport. The distribution of athletes on different faculties justified another merge in the case of public health faculties (ÁOK – Faculty of Medicine, EK - Faculty of Health, FOK- Faculty of Dentistry, GYTK – Faculty of Pharmacy, NK – Faculty of Public Health). It is the Faculty of Applied Economics and Rural Development from which the most athletes responded (N=60).

The survey consisted of five major areas of questions, which included both open and closed questions. The first group of questions related to personal data and university studies. The second group of questions focused on sport, discipline and level of sport. The third and fourth group intended to explore the institutional policies and regulations, and the relationship of the university and the athletes; the final set of questions covered the academic career and post-athletic future plans.

The analysis of academic effectiveness was conducted by pre-set indicators of general average of grades, selected and earned course credits as well as time devoted to study (in term-time and in exam period). In connection with the level of sport, the number of training a week, the number of training a day, the duration of daily training, and the number of competitions and games in preparatory and competitive periods were examined. The group of athletes doing sport on the international elite was determined as reference group of the analysis. In order to define the connection between selected - and - earned credits, and the level of sport, independent component analysis was conducted. The findings were also analysed with respect to support instruments provided by the *Studies and Exams Code* of the University of Debrecen. The data were processed by using SPSS version 18. software.

4. RESULTS AND EVALUATION

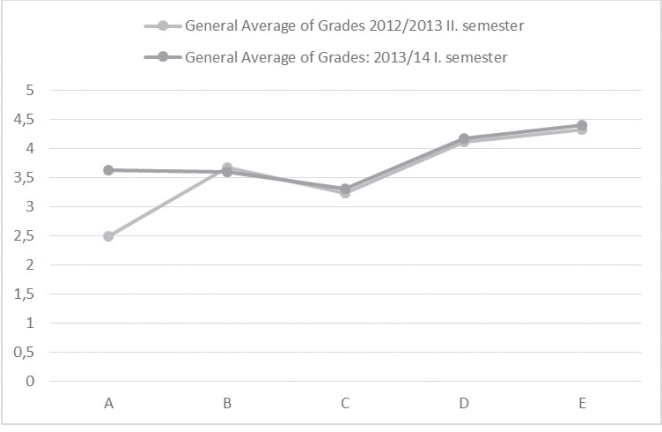
4.1 Connections between Academic Performance and Level of Sport

The general average of grades of athletes was calculated based on the scale of five. The 159 athletes involved in the research had a general average of 3.60 in respect to second semester of the academic year 2012/13, whereas the general average in the first semester of the academic year 2013/14 was 3.66.

The change of academic performance of athletes enrolled in different years is shown in Figure 1. illustrating the differences between academic performances of athletes by semester. BA first-year students showed lower average (2.50) than the athlete group average (3.60) in the second semester of the academic year 2012/13, however, their results (3.63) in the first semester of the year 2013/14 do not show significant differences compared to the group average (3.66). Concerning the results of sophomore students no significant differences can be registered between the two examined semesters. Though, the results of third-year students in both semesters (3.23 and 3.31 respectively) are under the defined group average. This indicates an apparent downward trend of academic performance compared to first- and second-year students. The average grade of I-III years of BSC students (3.12) was, however, not as good as the average grade of I-II MSC students (4.22) in the 2012/13 spring semester. In regards to the autumn semester the BSc

result athletes (3.50) remained below the MSc students (4.28). Based on this observation it can be concluded that the results recorded during master studies compared to bachelor studies show an upward tendency among athletes. In addition, the effectiveness of earning course credits (99% and 97%) also rises during the last part of studies (especially in year IV-V and during MSC studies), which might be related to the particular efforts made to graduation. The findings that support other previous research (Conzelmann-Nagel, 2003) show that younger athletes do more sacrifices for sport, however, they feel less challenge to balance athletic and academic requirements. It is presumed that by age athletes become more mature, therefore, their competencies in creating balance between athletic and academic fields grow, also the preparation for post-athletic life and graduation become more and more important.

Figure 1: General Average of Grades -Year



Source: own resource data

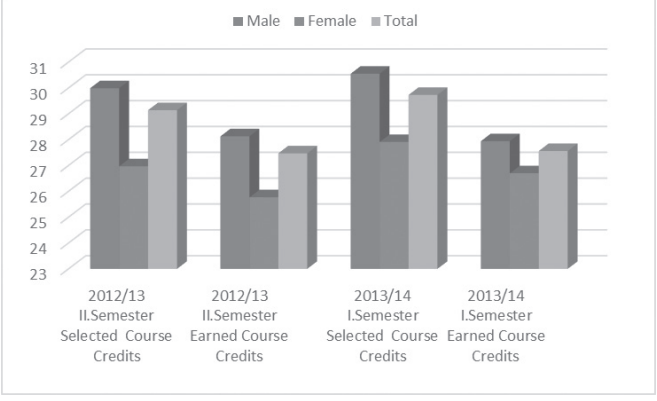
A: BSC I + undivided program year I; B: BSc II + undivided program year II; C: BSc III + undivided program year III; D: MSc I + undivided program year IV; E: MSc II + undivided program year V

As elite athletes do not only attend sport related majors and there are different requirements on different faculties, it worth examining athletes' performances with respect to faculties as well. The findings show significant differences between athletes' results by faculties. It is the Faculty of Humanities and Arts where athletes showed the best academic performance in the two semesters with a grade average of 4.38 and 4.33 (compared to the group average of 3.60 and 3.66), respectively. On the contrary, it is the Faculty of Engineering that shows the weakest performance showed with a grade average of 2.83 and 3.13 in the two semesters, respectively. There is another interesting finding about athletes' performance on public health faculties – these athletes showed the second best results in both semesters. Their grade average of grades was 3.94 in the second semester of the academic year 2012/13 and 4.22 in the first semester of the academic year 2013/14.

After further elaboration on sport related factors, the athletic performance of athletes doing individual or team sport showed some differences. Individual athletes recorded better performance academically than athletes in team sports in both semesters. They selected more course credits and earned these with more efficiency. Therefore, the examination of athletes' general average on different levels of sport is necessary. In the second semester of the academic year 2012/13, the grade average of the group identified on the international elite of sport – also used as reference group - was the same as the group average (3.60), whereas in the first semester of the academic year 2013/14 the athletes' result was 3.69. This result is better than the athlete group average (3.66). Compared to the average result of all the athletes, this group does not show significant differences. The examination of athletes' competing in second divisions similar results, the general average of grades was 3.59 and 3.62 in the two semesters, respectively. Consequently, athletes' performance on the two international elite of sport do not differ from the group average. On the contrary, there are significant differences on the following two levels. Athletes in division III showed lower academic performance compared to the group average; in the spring semester, their general average of grades was 3.21 and in the autumn semester 3.53. Concerning athletes on the regional level, their result of 4.06 in the second semester of the academic year 2012/13 was better than the group average, the result of the other semester was 3.87. As for the level of sport, athletes appear to record better results in the autumn semester that is the first semester of the academic year 2013/14.

From the point of gender distribution, it can be seen that female athletes showed better results in both semesters, a general average of above 4.0. The study also intends to examine the completion of predetermined credit numbers defined in the *Studies and Exams Code*. There was a difference between selected and earned course credits when female and male athletes were separately examined. Male athletes selected more credits than female athletes, in both semesters. However, the success rate of earning selected credits turned the other way round. Male athletes' success rate was 93.80% and 91.47% in the two semesters, whereas female athletes were more effective with 95.55% and 95.66%, respectively. It can be concluded that even though female athletes select less credits, their success rate of earning these credits is higher (Figure 2).

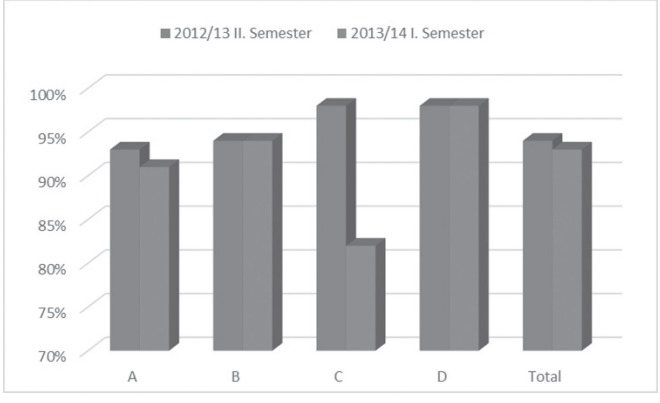
Figure 2: Selected and Earned Course Credits - Sex



Source: own research data

The demonstration of selected and earned course credits in terms of level of sport can be seen in Figure 3. As the results show, athletes on the international elite of sport showed a success rate of 93% and 91% in the two semesters concerning earned course credits. Division II athletes' result was 100% in both semesters. These two groups on the international elites (I-II division) appear to have no particular difficulties with parallel doing sport and earning credits at the university. Athletes in division III reached 98% in the second semester of the academic year 2012/13, however, their result in the first semester of the academic year 2013/14 (82%) was far below the group average (94%). On the contrary, athletes on regional level showed a result of 100%. The connection between selected and earned course credits in both semesters, and the level of sport was examined with help of chi-square test (on significance level of 95%). As the p-value was in both cases higher than 0.05, both variables are independent form each other, which means that the selected and earned course credits, and the level of sport do not show any connections in this sample.

Figure 3: Selected and Earned Course Credits - Level of Sport



Source: own research data

A: International elite; B: division II; C: division III; D: regional competitive

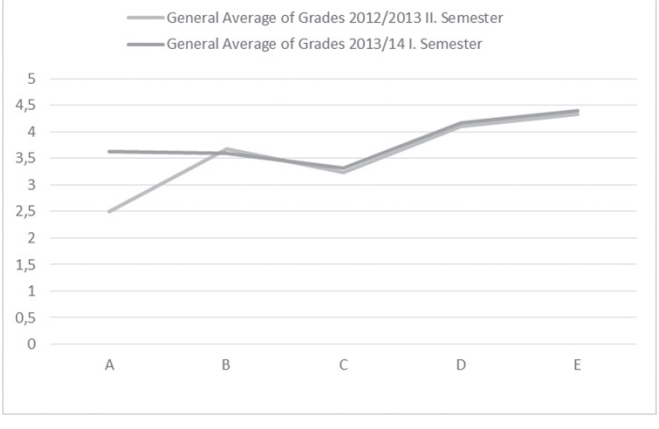
4.2 Connection between Academic Performance and Time Devoted to Academic Activity

Academic performance is also influenced by the daily and weekly number of training, the time of training and the temporal factor defined by the number of competitions/ games which correlates with elite athletes' academic activity on different levels of sport.

The examination of average daily training time with respect to different years show different results concerning both preparatory and competitive periods. First-year athletes train an average of 3.20 hours a day in the preparatory period, but train an average of only 2.00 hours a day in the competitive period. In the case of third-year athletes, however, the amount of time devoted to academic activity is significantly higher than for first-year athletes; it takes 4.24 hours a day in the preparatory period and 2.88 hours a day in the competitive period. This might be explained by athletes' essential adaptation to "university life" in the first academic year; therefore, the amount of time devoted to academic and athletic activities permanently changes.

As for master studies, athletes are presumed to devote less time to athletic activities and focus more on their academic studies - this presupposition is supported by the upward tendency of academic performances. Those athletes, who get closer and closer to the end of their athletic careers, often tend to take up a job to gain useful professional experience and prepare for their post-athletic occupation. This is reflected by the change of time devoted to training. In the case of first-year MSC athletes, time devoted to athletic activity a day (1.75 hours) is significantly below the average (3.19 hours) in the preparatory period, and does not raise in the competitive period either (1.70 hours). This latter value, however, shows significant difference compared to the average (2.30 hours). In the case of second-year MSC athletes, the amount of time devoted to sport in the preparatory period is similar, though, the daily training time in the competitive period (1.27 hours) significantly differs from the average (2.30 hours). So, the amount of time devoted to daily athletic activity is higher in the preparatory period than in the competitive period (Figure 4).

Figure 4: Average Daily Training Time – Year



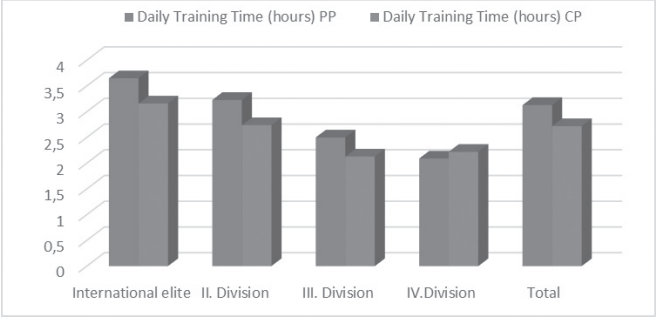
Source: own research data

A: BSc I + undivided programme year I; B: BSc II + Undivided Programme year II; C: BSc III + undivided programme year III; D: MSc I + undivided programme year IV; E: MSc II + undivided programme year V.

Based on the examination of daily training time on different level of sport it can be concluded that the average time of daily training in the preparatory period for athletes on the international elite of sport is 3.65 hours a day, in the competitive period it is 3.16 hours daily. In the case of lower levels of sport, the values examined show a definite downward tendency. In the preparatory period, division II athletes' daily training time takes 3.23 hours, in the competitive period, however, this value is only 2.74 hours a day which shows a significant difference. Compared to the training time of athletes on the international elite (3.65 hours), athletes on regional level have only 2.09 hours training a day in the preparatory period that also differs significantly.

Similar difference can be observed concerning the competitive period (3.16 hours and 2.22 hours). The results indicate some connections between the level of sport and the time devoted to training a day. The amount of training time decreases together with the levels of sport, thus a downward tendency can be seen in the preparatory and competitive periods as well (Figure 5).

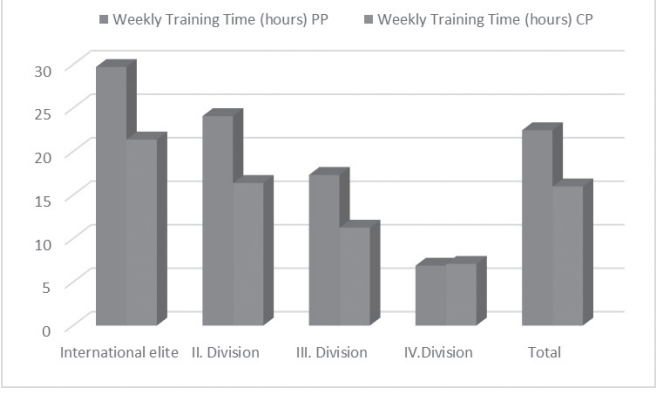
Figure 5: Level of Sport – Daily Training Time (hours)



Source: own research data

The amount of time devoted to training a week was also examined. According to the results, elite athletes on the international elite devote 29.71 hours in the preparatory period and 21.38 hours in the competitive period for training a week. After further analysis, it turned out that the amount of weekly training time in the case of division II athletes differs from the reference group (international elite) and thus takes 24.07 hours a week. In the competitive period, this value takes only 16.38 hours a week which also differs from the reference group. Regional competitive athletes train 17.31 hours in the preparatory period and 11.25 hours in the competitive period a week. Concerning athletes on the regional level, the weekly amount of training time is 6.88 hours and 7.08 hours in the two periods, respectively. Based on the findings it can be concluded that there is a rather significant difference between the training time of athletes on the international elite, and regional competitive athletes or athletes on regional level (Figure 6). Therefore, one of the factors that might influence academic performance mentioned above is the fact that the amount of training time is less on lower levels of sport.

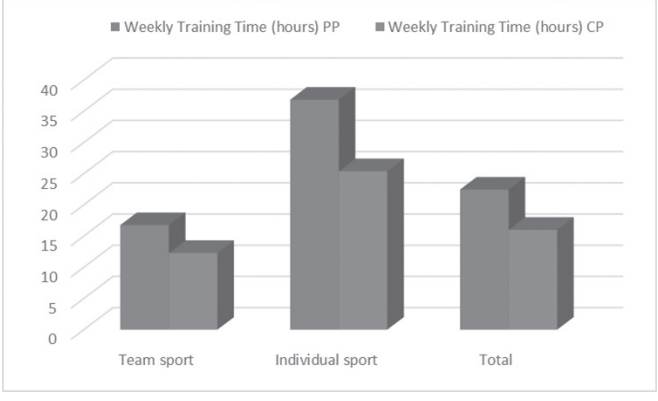
Figure 6: Level of Sport – Weekly Training Time (hours)



Source: own research data

The discipline or type of sport is also important when daily and weekly training time is examined. According to the results, individual athletes on the international elite of sport do have more training a week (9.39 occasions and 7.93 occasions) in both the preparatory and competitive periods than athletes who do team sport. These athletes have an average of 4.81 training in the preparatory period and 4.15 training in the competitive period a week. One reason for this difference might be the fixed schedule of team sport training, another might come from the characteristics of team sports that athletes must train together, in addition, there might be a connection to the fact that team sports have more demand on equipment and installations. Concerning individual athletes, the daily/weekly training is more flexible. In the case of division II and regional level, the results do not show any differences in terms of training numbers in neither of the periods. On the contrary, regional competitive athletes, who do team sport, have significantly more training (6.33 training a week) than individual athletes (4.50 training a week) that is also typical for the competitive period. After further elaboration, it turned out that individual athletes on the international elite of sport devote an average of 4.43 hours a day to training, which is 3.61 hours a day in the competition period. In team sports the average amount of training time is less a day (2.85 hours and 2.70 hours). In other words, the amount of daily training time is higher for division I- and division II athletes than for athletes who do team sport (Figure 7).

Figure 7: Type of Sport- Weekly Training Time (hours)



Source: own research data

The amount of time devoted to athletic activity also depends on the number of competitions and games. In the competitive period, international elite individual athletes participate in an average of 12 competitions. According to further results, on lower levels of sport the number of competitions surprisingly increases which shows an upward tendency in this case. What team sports concerns, the average number of competitions is 21 on international elite, and 25 and 26 in the division II and regional competitive, respectively. This regular participation in championships needs a great deal of time sacrificed on athletes' side.

One of the most important factors influencing academic effectiveness is time devoted to study. As the results showed, the majority of athletes typically does not study every day

during term-time, they mostly prepare for exams. In the exam period, the amount of time devoted to study is typically higher – athletes study every day, most athletes on different levels of sport devote more than 4 hours a day for study.

The examination of time devoted to study concerning male and female athletes - in term-time, the results were similar among international elite athletes. Typically, they do not study every day but for exams. As for division II athletes, the result showed that male athletes study rather for exams, whereas 21% of female athletes study 1-2 hours a day. Regarding athletes on regional level, the majority of male athletes study on a daily basis. However, in the exam period, there is no significant difference between male and female athletes in terms of study time – all athletes study more than 4 hours a day, normally. The results of the examination in terms of discipline indicate that in first- and second class, both individual and team athletes usually study for exams, though, occasionally they might devote time for 1-2 hours of study. Many athletes on regional level answered that they studied every day. Based on the examination of time devoted to study and training it can be concluded that athletes, who study more than 4 hours a day, train the most on a daily basis.

4.3 Role of Institutional Policies and Regulations in Successful Academic Performance

Further elaboration is needed to explore in what extent institutional policies and regulations contribute to the realization of athletes' dual career objectives. The majority of respondents is aware of the possibility of individual schedule for class attendance, however, 79% have not applied for individual schedule so far. The most athletes -19 out of 60 respondents-, who sent an application for individual schedule, study on the Faculty of Applied Economics and Rural Development; concerning the Faculty of Humanities, 3 out of 10 respondents used this opportunity. The majority of student athletes studies sport organisation on the Faculty of Applied Economics and Rural Development, which explains the high number of applicants for individual schedule. None of the respondents used this possibility on medical faculties where individual schedule cannot be implemented due to the characteristics of medical studies. An interesting fact is that 11 out of 55 international elite athletes and 12 out of 61 division II athletes applied for individual schedule which is about 20% of the respondents. More male athlete (26/114) applied for individual schedule than female athlete (4/45). Regarding the discipline, significant differences can be observed; 22 team athletes and only 9 individual athletes made use of this option. Athletes with individual schedule showed a general average of 3.56 and 3.46 in the two semesters compared to the patter averages (3.60 and 3.66). Those athletes who did not apply for individual schedule reached an average of 3.52 and 3.69 in the two semesters, thus no significant differences can be observed.

As for the individual exams, most of the athletes (94.4%) could not and therefore did not make use of the option. The majority has heard about the mentor programme at the university, which intends to help elite athletes balance sport and studies, but they are not aware of how this programme works. Since most of the athletes do not use the support instruments provided by the university, they cannot judge whether these institutional support instruments are of any help in balancing academic and athletic fields; only 10% indicated that these instruments provide a great deal of help. Based on these findings it can be concluded that elite athletes, in most cases, manage to balance academic and athletic requirements without applying for any support provided by the university.

5. CONCLUSIONS

The study aimed to explore the connection between the balance of academic and athletic performance. The subjects in this particular research were athletes receiving sport scholarships at the University of Debrecen, of whom the majority taking up non-sport-related majors. Noticeable results were found in the two examined semesters related to academic performance and effectiveness in connection to earning course credits as the best academic results were found of student athletes majoring in humanities, followed by athletes in public health faculties. The results also show that the general grade point average do not differ significantly on the first- and second level of sport. Athletes tend to reach better academic performance in the autumn semester in comparison to the spring semester. According to the results, first year student-athletes do not have any difficulties earning selected course credits beside maintaining their athletic engagements. The research also shed light on the fact that academic performance is not only influenced by the level of sport and the major chosen, but the time devoted to study or athletic activity, and the sport discipline as well. There are some differences observed between individual and team sport athletes in terms of general average of grades, effectiveness of earning course credits, weekly training numbers as well as time devoted to training. The weekly number of training, and the time devoted to training a week and a day in both preparatory and competitive periods show significant differences between individual athletes and athletes doing team sports on the highest performance oriented level.

Based on the findings it can be concluded that international elite and national elite athletes do reach less academic performance than the average. Hence, these athletes are able to devote as much time to study as needed to successfully meet the academic requirements. The majority of elite athletes manage to balance athletic activities and academic requirements without using for any supportive instruments provided by the university. This bolsters the fact that in the period of athletic career overlapping the years of university studies, high level of athletic and academic performance can be realized.

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MULTI-LEVEL ANALYSIS OF VISITORS' SATISFACTION FLYING TO DEBRECEN – MAIN ASPECTS OF THE RESEARCH

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Abstract: *This paper presents the non-exhaustive description of the main characteristics of visitors based on the filled out questionnaires during five months following the test month. These characteristics will serve the basis of a satisfaction analysis to be described in the future and they provide guidance for later analyses. I performed the testing of my questionnaire in January 2014. It turned out even from the data collected in the test phase that there were services which did not meet the expectations of visitors several times as it was worse than what they expected. This study focuses on the questionnaire research conducted among foreign visitors coming to Debrecen by flight. The main aspects were to determine foreign visitors purpose of travel to Debrecen, how many times they had already been to Debrecen, how many days they spent in the city, what kind of services did they use and whether the quality of used service met their expectations. As a result of the following five months research, I obtained input data which make it possible to examine real problems with background data. It calls for further examination to determine whether there was any difference in the extent of services living up to visitors' expectation and visitors' level of satisfaction.*

Keywords: *satisfaction analysis, questionnaire, services, visitors' expectation*

Introduction

The main purpose of my research work is to find a proper measurement methodology of serving foreigners coming to Debrecen by flight and to use this method during the examination of services utilised by them. The future step of this research is the development of a process structure which contains the services used by foreigners flying to Debrecen, points out problematic areas and provides guidance in terms of the possible reorganisation of problematic processes with the aim to increase the satisfaction of visitors. The aim of this study is to introduce the main aspects of the questionnaire research conducted among foreign visitors coming to Debrecen. This paper presents the non-exhaustive description of the main characteristics of visitors based on the filled out questionnaires during five months following the test month. Various research findings showed that there is a strong correlation between the quality of services and the intention of consumers, as the quality of services have a direct and/or indirect impact on consumers' willingness by means of the intention of consumers (Zeithaml et. al 1996; Cronin et. al 2000).

I perform my examination at the Debrecen Airport, where passenger flow began to increase during the last two years due to the scheduled flights of Wizz Air. By the end of 2013, the yearly passenger flow was nearly 130 thousand people, which can be considered a significant increase compared to the nearly 48 thousand passengers in 2012. According to Veres et al. (2012), the quality of an airport greatly contributes to the view of an entire region, since the first and last impressions of a city are strongly bound to the airport. Furthermore, friendly service, accurate organisation, attentiveness and the atmosphere of the airport play an important role in making visitors return to a given destination or even to recommend it to their acquaintances.

1. Research objectives

I broke down my research to different sections. This study focuses on the questionnaire research conducted among foreign visitors coming to Debrecen by flight. More specifically, the survey focuses on their characteristics and their satisfaction with reference to the services used during their stay. All these information provide guidance for the second section.

As regards the composition of passenger flow, no one has ever collected any data other than citizenship (HCSO, Debrecen Airport). There is no data about the demographic composition, the motivation to travel, the length of stay in Debrecen and the services used. For this reason, I decided to get to know the population in addition to performing the satisfaction analysis. In 2005, a similar research was conducted at the departure side of Terminal 2B of Budapest Airport. Foreign tourists coming to Budapest with discount flights were involved in the primary research. The number of interviewed passengers was 414 and data collection was conducted in April 2005. (Mundruczóné

2005). It is not clear from the published study how large population these 414 people were selected from and how many flights were involved in the analysis. In this analysis, it was my purpose to clarify the methodological basics.

2. Material and methods

I performed the examination with using a questionnaire. The questionnaire consists of open, closed and evaluative questions. I used a scale from 1 to 5 to examine the opinions and satisfaction level of respondents. The value scale makes it possible to perform comparative analyses (Babbie 2008). The five level intensity scale is the most useful, since adding more levels to the rating does not result in a more accurate evaluation. Scoring is an ordinal method which provides a rank which is the most frequently used qualification system, according to Tomcsányi (2000). Researchers use a scale technique to evaluate the quality of tourism services, as it makes it possible to subsequently rank services and to compare competitors (Pénzes 2011). The location of the primary questionnaire research was the waiting hall of the Debrecen Airport, in the way authorised by the airport management. However, complying with safety regulations caused difficulty during the research. It was the basic requirement of entering the research location to obtain a personal border crossing permit issued by the Border Service. This paper presents the non-exhaustive description of the main characteristics of visitors based on the filled out questionnaires during five months following the test month (February, March, April, May and June). These characteristics will serve the basis of a satisfaction analysis to be described later and they provide guidance for further analyses.

2.1. The range of examined people

It is important to make a distinction between the concept of tourists and visitors. According to the definition of the Hungarian Central Statistical Office (HCSO), a visitor stays in the visited place for less than 12 months and the main purpose of their visit can be any activities unless they get remunerated for performing that activity in the visited place. Tourists can be defined as a narrower concept. Visitors can be considered tourists if they visit the destination for tourism purposes. During this research, I used the concept of visitors, since it comprises both those who come to Debrecen for tourism purposes (leisure tourism, business tourism) and for non-tourism purposes (learning, purchasing services, performing work or other travel purposes). Traveller is a concept with an identical meaning as a visitor.

The range of examined people was composed of visitors with foreign citizenship who spent a certain amount of days in the city. Based on this criterion, people of Hungarian, Romanian, Ukrainian and Slovakian citizenship were excluded from the passenger flow data, since they only passed through Debrecen to travel to their destination country and city. *Table 1* shows the groups created in order to be easier to understand the departing passenger flow, in which the group of "travelling abroad" consists of the nationals who were excluded from the research. Despite all my efforts, I could not completely exclude people only passing through Debrecen, since there were several cases when the destination of a British citizen was not Debrecen. According to the definition of HCSO, "people passing through" are foreign visitors who leave the country through a different country border within 24 hours upon arrival.

It was a commonly observed problem during the definition of the sample that there were no data about the composition of citizenships of passengers with reference to flights between Debrecen-Eindhoven. However, this shortcoming is problematic also in research performed by others. According to Kovács (2012), since there are no border inspection within the EU, the reliability of these data is restricted due to the estimation-based determination of the volume of passenger flow and they are not suitable for characterising the extent of tourist flow, especially due to the fact domestic tourism is not taken into consideration. In this case, domestic tourism is irrelevant from the aspect of the performed research. Due to the problem describe above, I restricted my research to the London-Debrecen flights, in which, due to passport handling, I could determine the citizenship composition of passenger flow on the basis of quarterly HCSO data.

Gilyán (2008) refers to the fact that commuting, cross-border and pass through passenger flow is not characteristic of flight passenger flow as one of its favourable features. However, upon examining the passenger flow of Debrecen Airport, I observed the opposite of this conclusion. The passenger flow in 2013 can be greatly characterised by pass through and cross-border passenger flow, representing 85-90% of the number of passengers. The number of visiting foreigners for either tourism or non-tourism purposes represented only 10-15% of the passenger flow between Debrecen and Luton during the last year. The same conclusion can be drawn from the first half of 2014. As regards the five examined months of 2014, *Table 1* shows the nationality-based distribution referring to the passenger flow between Debrecen and Luton.

Table 1. Nationality-based composition of the departing passenger flow between January and June 2014

	January	February	March	April	May	June
Traveling abroad	2541	2200	2434	3801	4456	5226
Hungarian	1609	1750	1918	2790	3179	4024
Romanian	915	429	507	990	1214	1161
Slovak	7	17	7	19	55	36
Ukrainian	10	4	2	2	8	5
Traveling to Debrecen	244	278	281	612	513	526
British	193	207	209	469	396	372
Other	51	71	72	143	117	154
Total	2785	2478	2715	4413	4969	5752

Source: OWN CONSTRUCTION BASED ON HCSO DATA, 2014

The low proportion of foreigners in 2013 can also be observed in 2014. In the examined months, the number of visitors travelling to Debrecen for tourism purposes is 8-14% of the passenger flow between Debrecen and Luton.

I performed the testing of the questionnaire in January 2014 and I spent the subsequent five months with the examination. During these five months, I conducted the questionnaire survey among the passengers of 39 flights departing to London-Luton. *Table 2* shows the characteristics of the questionnaires collected in each month.

Table 2. The number and characteristics of questionnaires filled out during the examined months

Examined month	Number of examined flights	Filled out questionnaires	Evaluated	Cannot be evaluated	Did not fill it out	Refused to fill it out	Returning
February	9	52	47	5	28	3	2
March	8	34	30	4	30	4	4
April	8	50	45	5	32	3	6
May	8	42	38	4	25	2	4
June	6	32	30	2	29	2	3
Total	**39**	**210**	**190**	**20**	**144**	**16**	**19**

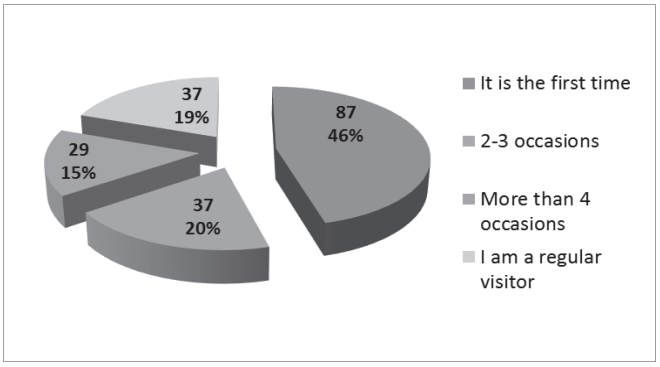
Source: OWN RESEARCH, 2014

Altogether, 210 questionnaires were filled out, 20 of which could not be evaluated. Furthermore, there were 144 visitors who could not be interviewed because they arrived into the waiting hall just minutes before take-off. 16 people did not want to comply when inquired and did not wish to fill out the questionnaire. 6 of these 16 people had British citizenship, but Hungarian nationality and they did not wish to take part in the survey of foreign visitors due to their Hungarian nationality. 19 of the respondents had already taken part in the data collection between January and June; therefore, they did not fill out the questionnaire again either. Altogether, I managed to get to know 389 foreign visitors during the five months. Furthermore, 38 visitors were either infants or underage minors.

The shortage of time available for performing the survey is one of the key restraints of this research. More specifically, data collection was bound to a certain time frame each day, as questionnaires could only be filled out in the waiting hall. The foreign passengers who arrived at the waiting hall after the security check directly before take-off could not fill out the questionnaire. Furthermore, it was not possible to perform data collection among the passengers of all flights in a given month.

Figure 1 shows respondents' distribution by age. The largest age group of the sample was those between 18-30 years of age, representing 38% (73 people) of the sample. The second largest group (19%) was those between 51-60 (36 people). The proportion of women was 39.5% and that of men was 60.5%.

Figure 1. Age composition of respondents (number of people, %) N=190



Source: OWN RESEARCH RESULTS, 2014

81% of foreign visitors interviewed in the survey had British nationality and I classified 37% of them into the group of other nationalities due to their low occurrence. The group of other nationalities contained one individual from each of the following countries: Ireland, Brazil, Australia, Japan, China, Ghana, the Netherlands, Malta, Nepal, Poland, Spain, Sweden and Portugal. 88.32% of visitors came from Europe, but a small number came from non-European countries, such as Nepal, Australia or Brazil.

2.2. Brief description of the questionnaire

The questionnaire which was first used in January can be divided into two main parts. The first part focuses on the travelling characteristics of visitors. Altogether, this questionnaire part contains eleven (both open and closed) questions. Of these questions, it is important to point out the motivation to travel which determines the range of services used by the given visitor, since these motivations are different in the case of a tourist who arrived into Debrecen for the purpose of sightseeing or a businessman with the aim to attend a conference.

The second part of the questionnaire was dealing with the measurement of visitors' satisfaction in terms of the service processes used by them. I divided satisfaction to nine dimensions and each of them represents one service. All nine dimensions can be described with indicators. According to Hofmeister et. al (2003), a dimension is a variable which can be described with several realistic and measurable indicators. The sum of these indicators provides the set of statements which respondents classify by using the selected evaluative scale. For example, the dimension established for evaluating the services in connection with accommodation contains indicators such as room equipment, the language skills of the hotel staff and other similar factors. Philip Kotler (2001) described satisfaction the following way: "satisfaction is a person's joy or disappointment which results from the comparison of the performance of a product with his/her expectation from that product. Customers are satisfied if a product lives up to their expectations. If a product exceeds customers' expectations, they are very satisfied, but if it does not live up to their preliminary expectations, they are dissatisfied." It comes from this definition that expectation is also important in addition to satisfaction, as satisfaction is

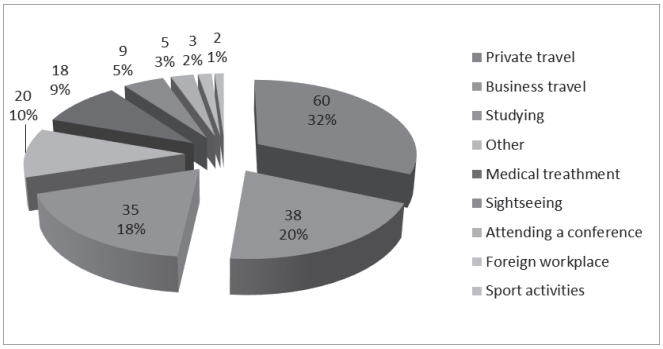
based on expectations. For this reason, I used two types of measurement in the questionnaire. The first type serves the purpose of measuring visitor satisfaction using the indicator of the service used by them while the second one measures how much the service lives up to visitors' expectations.

I performed the testing of my questionnaire in January 2014. In January, there was a total of sixteen flights to London-Luton, and the passengers of seven of these flights were asked to fill out the questionnaire. It turned out even from the data collected in the test phase that the airport service did not live up to the expectations of visitors several times as it was worse than what they expected. In most cases, the airport service was not a lasting experience, but it lived up to visitors' expectations. In order to eliminate the possibility of obtaining questionnaires which cannot be evaluated in advance, I made the necessary corrections to the formulation and I extended the questionnaire with all important explanations and instructions referring to filling it out. Following the test phase, data collection took place between February – late September 2014.

3. Main conclusions of the research

The first aspect of the research was to determine foreign visitors' purpose of travel to Debrecen. The concept of travel purpose can be defined as the motivation of the visitor, e.g. spending free time, health tourism, conference or a business travel, without which the travel would not have taken place. *Figure 2* shows the distribution of respondents in terms of their purpose and motivation to visit the city. Based on the filled out questionnaire, the most typical travel purpose of foreign visitors coming to Debrecen with the London-Luton/Debrecen flights of WizzAir is "private travel" which was indicated by 60 people. This group of visitors consists of parents and friends who visited a relative or acquaintance studying at the University of Debrecen. Business travel was indicated by 38 people, making it the second most frequent motivation to travel. The third largest proportion was studying, which was indicated by 18% of visitors (35 people). The proportion of visitors flying to Debrecen due to another motivation to travel is relatively high (10%). Other travel purposes included charity work, attending a wedding or funeral, education or travelling to Romania. During the six examined months, 18 people flew to Debrecen in order to use medical services which represent 9% of the whole sample. The least frequent purpose of travel was sightseeing (9 people), attending conferences (5 people), foreign workplace (3 people) and sports activities (2 people). In order to facilitate further analyses, the distinguished groups will make it possible to separately examine the services used by students, businessmen, those seeking medical treatment and further groups, as well as the level of satisfaction while using the given services. As a result of classifying visitors based on their motivations, it will be possible to compare the different levels of satisfaction of each group.

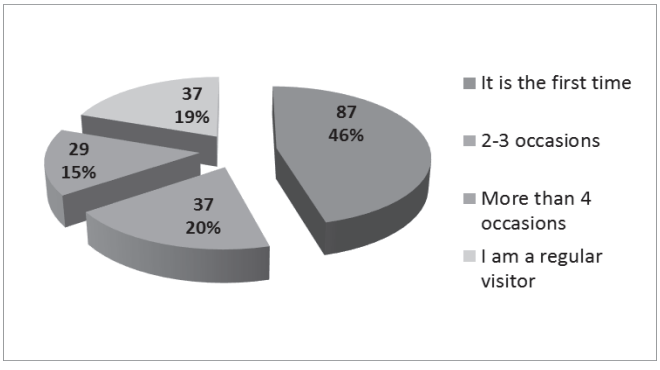
Figure 2. Distribution of respondents in terms of their purpose of travel (number of people,%), N=190



Source: OWN RESEARCH RESULTS, 2014

The second aspect of the research was to determine how many times foreign visitors had already been to Debrecen. Most of them (87 people – 46% of the sample) said it was their first time. 37 people said that they had been to the city 2-3 times and also 37 people responded that they were regular visitors in Debrecen. Furthermore, 27 people had been to the city more than four times. It is a surprising research finding that 64% of the visitors who did not come to Debrecen for the first time had been to Debrecen for more than four times (66 out of 103 people). Based on the responses to my questions, further examinations will make it possible to determine whether there is any difference between first time and non-first time visitors in terms of using services.

Figure 3. Distribution of respondents in terms of the frequency of visiting Debrecen (number of people, %), N=190

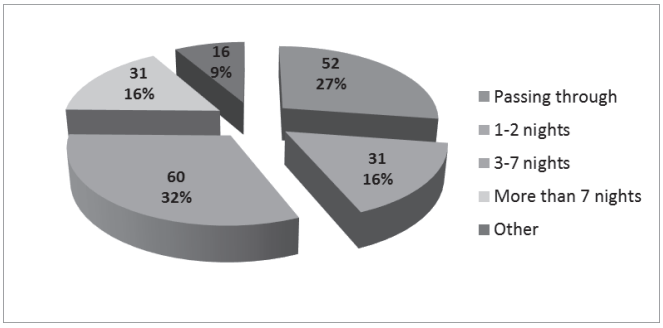


Source: OWN RESEARCH RESULTS, 2014

In addition to motivation and the frequency of visiting Debrecen, the third most important aspect was to determine how many days visitors spent in the city. *Figure 4* shows the distribution of the sample based on the number of days spent in Debrecen. The largest proportion is represented by visitors who spent 3-7 days in Debrecen (60 people). The second largest group of people are those who pass through without spending a night in the city (52 people, 27% of the sample). The range of examined people consisted of visitors with foreign citizenship who spent a certain number of days in Debrecen. The appearance of a high number of people only passing through Debrecen shows that I could not exclude all

of these visitors from the sample and it happened on several occasions that Debrecen was not the destination of British nationals. In the sample, 31 people spent more than 7 nights in Debrecen, while 31 visitors spent only 1-2 nights in the city. The smallest group consists of 16 people who spend several months in Debrecen. Based on the obtained information, future analysis will make it possible compare the groups established on the basis of various motivations in terms of the number of days spent in the city.

Figure 4. Distribution of respondents based on the number of days spent in Debrecen (number of people, %), N=190



Source: OWN RESEARCH RESULTS, 2014

The fourth aspect of the research was to determine how many people used each service. *Table 3* shows the various services based on the number of occasions they were used. It can be seen in the table that airport services were used by all respondents since departure from the airport is inevitable. 129 people used transport services such as taxi, bus or tram. The remaining 61 people travelled with their own cars or company cars. The visitors who did not book any accommodation (118 people) and did not arrange meals (91 people) lived and ate at their acquaintances, relatives or friends while the group of visitors passing through also belongs to this category. Medical services involved previously planned arranged dental treatment (18 people) and 8 people requested medical treatment without any previously negotiated appointment. Of all respondents, 13 people attended conferences and also 13 people used sports-related services or attended sports events. By means of quantifying the use of services, it will become possible to examine whether the use of a given service depends on the travel motivation of visitors coming to Debrecen. In other words, I will be able to decide whether travel motivation determines the range of services used by them.

Table 3. Using services (number of people, %), N=190

	Used the service		Did not use the service	
	Number of people	%	Number of people	%
Airport	190	100.00%	0	0.00%
Transport	129	67.89%	61	32.11%
Accommodation	72	37.89%	118	62.11%
Eating	99	52.11%	91	47.89%
Recreation	30	15.79%	160	84.21%
Health	29	15.26%	161	84.74%
Conference	13	6.84%	177	93.16%
Sports	13	6.84%	177	93.16%

Source: OWN RESEARCH RESULTS, 2014

The fifth aspect of the research was to determine whether the used service lived up to visitors' expectations. According to Morvay and Daruka (2009), in the case of tourism services, the sense of risk is high both in the case of the service provider and those using the service, as the service itself cannot be improved while in use and it cannot be repeated either. For this reason, the expected results, i.e. achieving the satisfaction of the visitor is a much more difficult duty in the case of services than physical products. According to the definition by Kenesei and Kolos (2007), the fundamental difference between services and physical products is the fact that services cannot be taken in one's hand as they are not physical objects, but performances, processes and actions.

Table 4. How much do the used services live up to visitors' expectations? (number of people, %), N=190

	It was worse than I expected		It was just as I expected		It was better than I expected	
Airport	35	18.42%	142	74.74%	13	6.84%
Transport	17	13.18%	96	74.42%	16	12.40%
Accommodation	16	2.78%	44	61.11%	12	36.11%
Eating	13	13.13%	65	65.66%	21	21.21%
Recreation	7	23.33%	20	66.67%	3	10.00%
Health	9	31.03%	12	41.38%	8	27.59%
Conference	0	0.00%	11	84.62%	2	15.38%
Sports	2	15.38%	9	69.23%	2	15.38%

Source: OWN RESEARCH RESULTS, 2014

Table 4 contains the findings related to how much the used services lived up to visitors' expectations. It can be seen in the table that certain services did not live up to visitors' expectations on several occasions as they were worse than visitors expected. Consequently, it is important to identify which indicator caused visitors' dissatisfaction. In most cases, the used service was not a lasting experience, but it lived up to their expectations. Based on the extent to which a given service lived up to visitors' expectations, it is possible to select the service processes that will be analysed in detail.

Summary

My research objective was to examine the travel habits of foreigners visiting Debrecen by flight, as well as their level of satisfaction concerning the city. 90% of the passengers in the airport did not use any services. The low proportion of foreign citizens in 2013 could be also observed in 2014. The number of foreigners visiting Debrecen during the examined months was 10-13% of passenger flow between Debrecen and Luton. There has not been any information about the tourism-related consumption characteristics of foreigners flying to Debrecen. As a result of the questionnaire survey, I obtained input data which make it possible to examine real problems with background data. Due to the established database, these real problems can be supported with proper data. It happened several times that the organisation/enterprise conducting the service did not manage to perform at the level expected by the visitor and the result was underperformance. Based on the gained experience, visitors could possibly conclude that they were provided a worse service than they had expected, which makes it necessary to analyse the various indicators in detail. The detailed results of the satisfaction analysis will provide a proper basis during the establishment and examination of the process structure of services. Exploring the connection between the number of days spent in Debrecen and the used services is a further aspect of analysis. In addition, it calls for further examination to determine whether there was any difference in the extent of services living up to visitors' expectations and visitors' level of satisfaction.

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EXAMINATION OF LEISURE SPORTS ALTERNATIVES PROVIDED BY HIGHER EDUCATION INSTITUTIONS

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Abstract: *It is one of the main duties of sports in higher education to provide health conscious and sports-loving managers to the society. University years are a good opportunity to do sports in an organised framework, as well as lifestyle consultancy and to make use of the preventive function of sports. In this environment, the approach of students can still be shaped within a formal framework and their level of interest towards sports can still be increased. Furthermore, they can be motivated and become committed to sports if they have positive experiences. The aim of my analysis is to explore and describe the characteristics, peculiarities and current situation of higher education leisure sports. In this study, I present the results of the analysis of data collected with the first eight questions of the situation assessment part of the questionnaire survey. More specifically, I examined the evaluation of leisure sports activities, free sports opportunities and the branches of sports in which these are provided. I was also looking to find out where these sports opportunities are available for students inside or outside the institution and who they are organised and managed by. At the same time, I examined sports opportunities whose costs are paid by the student and analysed which branches of sports are available. Based on my results, I concluded that the sports opportunities of students are especially good according to the managers. This statement confronts the research findings which suggest that the sports activity of students is very low.*

Keywords: *university, sports managers, leisure sports*
(JEL code: Z20)

Introduction

Theoretically, competitive sports and leisure sports can be distinguished in the sports life of a community, a country, or a society, but in reality, these two areas are closely linked to each other. In the long run, competitive sports cannot be successful without leisure sports done by massive amounts of people, while the achievements of the best athletes of a nation in various world competitions could be a pull factor for those doing leisure sports. In the vision of an ideal sports nation, the youngsters who get to know the experience of sports and are given the opportunity to develop their skills are at the bottom of an imaginary pyramid. Top athletes are selected from these youngsters at the end of a lengthy selection process. Young people who continue to do sports as adults because they love sports and in order to benefit from the favourable effects of doing sports will also raise their children in this spirit. This system can be maintained if those falling out of competitive sports will still continue to do sports and become leisure sportsmen. For this reason, it is the fundamental duty of sports policy at all times to broaden the bottom of this pyramid and to guide the widest possible range of those falling out of competitive sports during the selection process to leisure sports.

It is one of the main duties of sports in higher education to provide health conscious and sports-loving managers to the society. University years are a good opportunity to do sports in an organised framework, as well as lifestyle consultancy and to make use of the preventive function of sports.

Higher education mass sports and leisure sports are outstanding opportunities to shape the sports focus of higher education students, as well as their attitude towards sports; i.e., their positive evaluation and approach regarding sports. In this environment, the approach of students can still be shaped within a formal framework and their level of interest towards sports can still be increased. Furthermore, they can be motivated and become committed to sports if they have positive experiences. Higher education is basically a last chance to develop conscious, organised sports values and establish a similar socialisation environment for students. This is a dual impact due to the improved quality of life of students who were socialised this way and do sports, while there is also a multiplicative effect in that the leading intellectual class of the future has a key role in raising the generations to come and shaping their views, which is even more important than the former element. The government realised the significance of

this aspect when they introduced programs such as the Alfréd Hajós Plan in 2012, which can be regarded as the official sports program of higher education and it lays great emphasis on promoting leisure sports by launching various programs. It is one of the key objectives of this program to double the number of students who regularly do sports.

One of the components of the TÁMOP project entitled "Sports in higher education" focuses on the development of sports services provided by institutions within the framework of student services. It is one of the main purposes of the project to establish an integrated sports office with the primary aim to increase the number of students engaged in leisure sports, focusing on students who have not taken part in sports programs and championships.

The aim of my doctoral research is to explore the situation of higher education leisure sports and to accordingly examine the areas to be developed, as well as the fundamental concepts which the sports managers of higher education consider to be important. I perform multilateral data collection in the course of examining this topic. The target group of my survey is the affected group itself, i.e. students, but I extended my analyses to the managers dealing with the organisation of leisure sports. This paper presents the situation assessment research findings obtained as a result of the survey conducted among the sports centre and sports office managers in higher education institutions.

1. Material and methods

Based on previous research, a high percentage of competitive sportsmen in higher education institutions participate in university sports life as leisure sportsmen and the main aspect of regular physical activities is easy access (*Szabó* 2006 and *Neulinger* 2007). For this reason, providing university-organised leisure sports alternatives in as many branches of sports as possible is of chief importance.

I conducted the examinations with own-constructed printed questionnaires. The standardised questionnaire contained 29 closed and open questions which were classified into three main groups. Questions in the first group focused on the leisure sports opportunities of institutions and the related financing issues, the second group of questions were dealing with the development alternatives of higher education leisure sports activities, while the third group contained questions about the socio-demographic data of sports managers. Respondents answered to open questions freely with their own words. As for closed questions, respondents could choose from previously provided alternatives. Questionnaires were filled out in writing, followed by personal negotiation. Questionnaires were filled out voluntarily. Due to the length constraints of this study, only the results of the situation analysis, i.e., the first group of questions are presented.

My comparative analysis covers 18 higher education institutions. The sports centre and sports office managers and head trainers of these institutions filled out the questionnaire about the leisure sports organising opportunities and background. The questionnaires were filled out during the further education programme for sports managers organised at the University of Debrecen on 2nd – 3rd – 4th October 2014. The research sample is constituted by the 42 sports managers (Table 1) who took part in the further education training and answered the questions in the questionnaire. No exclusion criteria were used.

Table 1. Sample description

Gender		**Higher Education Institutions in Budapest**	**Higher Education Institutions Outside the Capital**
Male	28 Ppl	9 Ppl	19 Ppl
Female	14 Ppl	3 Ppl	11 Ppl
Total	42 Ppl	12 Ppl	30 Ppl

Source: own construction

Currently, there are 69 active higher education institutions in Hungary, of which 29 are state financed, 15 are funded by foundations and 25 are financed by churches. Of the total 240 000 students, nearly 200 000 full-time students study at the higher education institutions represented by the interviewed managers. Therefore, the sports managers of higher education institutions with high student numbers participated in the survey and data collection. Sports managers of 18 out of the 29 state-run higher education institutions (62%) responded to the questions in the questionnaire. Table 2 shows the breakdown of the 42-person-sample per institution and the student number of the given institution.

Table 2. Number of managers and full-time students of the examined higher education institutions

Higher education institutions	**Number of people taking part in the survey**	**Number of full-time students (rounded)**
1. Corvinus University of Budapest	1 person	13 000 people
2. Budapest Business School	2 people	13 000 people
3. Budapest University of Technology and Economics	2 people	20 500 people
4. University of Debrecen	4 people	24 500 people
5. College of Dunaújváros	3 people	1900 people
6. Eötvös József College	2 people	700 people
7. Eötvös Lóránd University	3 people	23 500 people
8.Eszterházy Károly College	3 people	4200 people
9. University of Miskolc	3 people	8300 people
10. College of Nyíregyháza	3 people	3500 people
11. University of Western Hungary	3 people	7700 people
12. Óbuda University	2 people	8000 people
13. University of Pannonia	1 person	6500 people
14. University of Pécs	3 people	18600 people
15. Semmelweis University	1 person	9500 people
16. Széchényi István University	2 people	7500 people
17. University of Szeged	3 people	21 000 people
18. Szent István University	1 person	9800 people
Total:	**42 people**	**201 700 people**

Source: own construction

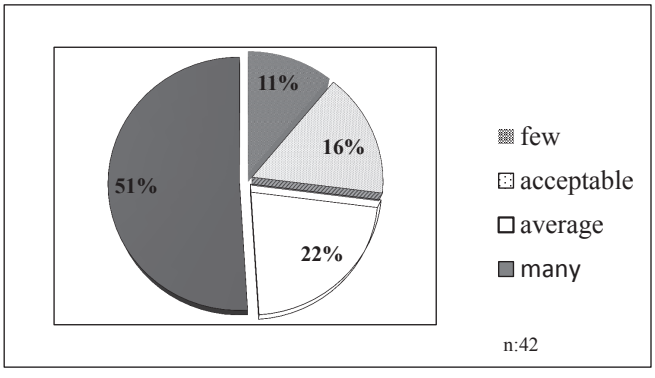
It can be seen from the data that the higher education institutions which participated in the survey represent 83% of the total number of full-time students. This proportion gives a proper overview of the situation of leisure sports. University sports managers took part in data collection; therefore, the ratings definitely represent managerial judgment. As regards the distribution of managers per workplace, the responses were obtained from sports managers of six universities in Budapest and twelve universities outside the capital. The sample represents the main Hungarian higher education institutions and more than four fifths of the higher education student population.

2. Results

The main objective of examining the opportunities of doing leisure sports was to explore the sports activities which are properly facilitated in the given institutions.

Furthermore, I examined how satisfied the interviewed sports managers are with these opportunities. The opportunities of higher education leisure sports services were rated on a scale from 1 to 4. The majority (51%) of the managers of the examined higher education institutions rated students' opportunities to do leisure sports (Figure 1).

Figure 1. Managers' evaluation of students' leisure sports opportunities



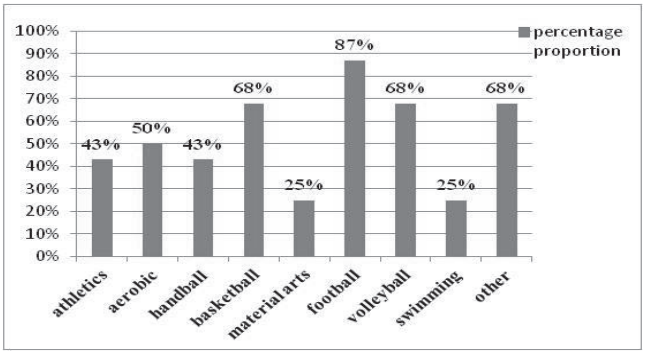
Source: own construction

The opinions of managers tend to be positive, 89% of them considered students' leisure sports opportunities acceptable or even better. Only 11% of them considered leisure sports alternatives to be few. This rating was provided by the sports managers of universities in Budapest.

The large sample research called "Ifjúság" (meaning "youth") (**Ádám** et al.2013) which is performed every four years focuses on the age group between 15-29 from the aspect of their approach to sports, among others. The research conducted in 2012 revealed that 35% of youngsters reported that they were regularly doing sports in addition to the obligatory physical education courses. The research results in 2008 also show that the physical activity of youngsters decreases from year to year. Today's youngsters stop doing regular physical training earlier than younger generations. They start giving up regular physical exercises during their high school years. 34% of those between 20-24 years of age and 29% of respondents between 25-29 were physically active in 2012 (**Ádám** et al. 2013). These published findings seem to be in contradiction with the judgment of sports opportunities, as four fifths of managers considered them to be average or better. Therefore, according to the evaluation of sports managers, the amount of leisure sports programs provided by higher education institutions is acceptable, but technical literature data show decreasing number of students doing sports. This problem calls for further research as it is also necessary to examine the topic from the aspect of students. It is probable that students' leisure sports habits are also changing. Exploring these habits in the exact age group is also a part of my doctoral research program.

I examined whether there are free organised leisure sports opportunities in higher education institutions with a simple yes/no question and I also probed for the branches of sports (Figure 2).

Figure 2. Free leisure sports opportunities in the examined higher education institutions



Source: own construction

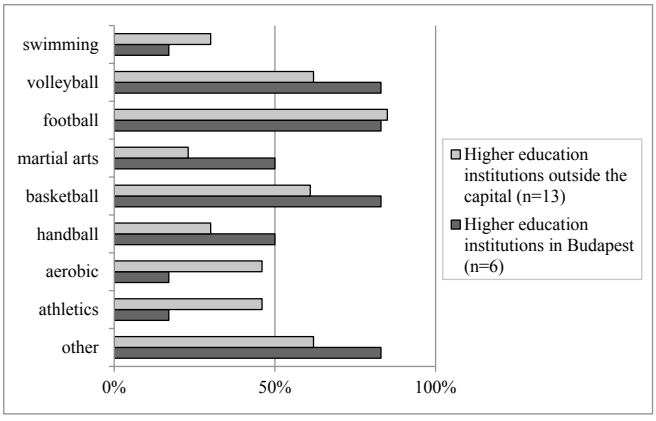
With one exception, the representatives of the interviewed universities responded that there were free organised leisure sports activities.

Based on the obtained results, football is provided in the highest percentage (87%) in most institutions. The research of Szabó (2006), Szonda Ipsos (2003) and Neulinger (2007) also show that football is students' most preferred branch of team sports, most of them regularly do this type of sports during their university years. Football is a branch of sports whose location can be provided both outdoors and indoors. In the case of outdoor football, artificial grass fields made this type of sports opportunity to be even more easily accessible. As a matter of course, all other team games (basketball, volleyball) are provided in a significant proportion of higher education institutions. These institutions provide sports opportunities in the branches of sports which attract many people. Swimming and martial arts have the lowest proportion among the various alternatives. Swimming calls for a certain infrastructural background which few higher education institutions have. Individual leisure sports opportunities are provided to a lesser extent, only aerobics are provided by every second higher education institution. The "other" free sports opportunities show a wide scale. Several higher education institutions provide their students with opportunities of pilates, yoga, floorball, indoor climbing, tennis, table tennis and badminton. Table tennis was mentioned by the representatives of three higher education institutions, while the other branches of sports were referred to

by one institution manager each. During a previously performed survey among research universities, I concluded (*Pfau* 2012) that the appearance of project grants improved the free sports opportunities for students which could have a positive impact on students' habits of doing sports.

The performed data collection made it possible to evaluate universities both in Budapest and outside Budapest and various analyses could be conducted based on this distinction. Therefore, I had the chance to compare sports opportunities in universities in the capital and those outside the capital (Figure 3).

Figure 3. Free leisure sports opportunities in higher education institutions in Budapest and outside the capital



Source: own construction

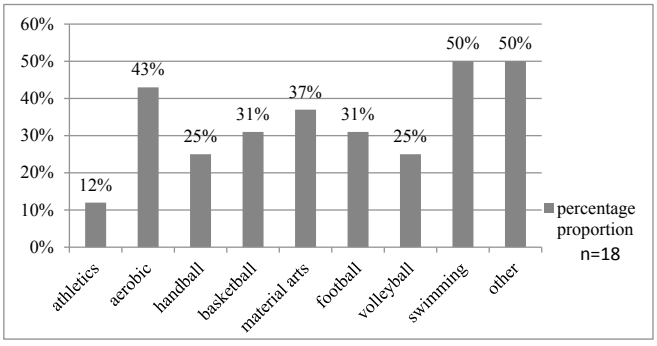
There is a marked difference in athletics and aerobics which were represented to a higher extent among the free sports opportunities provided by universities outside the capital. On the contrary, martial arts can be performed in 50% of higher education institutions in the capital. 83% of sports managers of higher education institutions in the capital mentioned "other" sports opportunities, while this proportion was 62% in the case of managers in institutions outside the capital. These branches of sports provide multiple opportunities for students in Budapest campuses, as opposed to those outside the capital. It is probable that these differences are also due to infrastructural background, since every institution has different facilities.

I examined where free leisure sports activities are provided inside or outside the campuses of higher education institutions. The students of higher education institutions who took part in the survey were able to live an active sports life both inside and outside the campus, but physical activities inside the campus were more frequent (74%). This finding is also supported by surveys conducted among students which resulted in the conclusion that easily accessible leisure sports opportunities are the most attractive (*Szabó* 2006). Leisure sports can be done within the campus of all examined higher education institutions in Budapest, while there was only one institution which provides free sports opportunities outside the campus. Of the twelve higher education institutions outside the capital, 91% provides opportunities to perform leisure sports within their campuses and 25% outside the university campus.

In a separate question, I examined the organisations and persons in connection with the higher education institutions that take part in organising and supervising free leisure sports activities. Based on my examinations performed at six research universities (*Pfau* 2012), the physical education teachers, the student self-government (HÖK) and associations related to the university take care of organisation tasks. According to the responses of the interviewed managers, the organisation duties of free sports opportunities are performed by physical education teachers, the representatives of the student self-government, the sports office and various associations. However, there are higher education institutions where leisure sports are organised entirely by the student self-government. Self-government members responsible for sports are in direct connection with students; therefore, they can assess student needs sooner than sports managers or physical education teachers. The sports office is a new organisational form with its main duty to organise leisure sports for students. Student self-governments play an active role in the life of sports offices as they help with organising and assessing student needs. A sports office manages the leisure sports services in higher education institutions in cooperation with the manager of the sports centre and the physical education teachers.

I also wanted to know whether leisure sports opportunities whose costs are paid by students are available in higher education institutions (Figure 4). Four institutions do not provide such services.

Figure 4. Student-financed leisure sports opportunities in the examined higher education institutions



Source: own construction

In the other universities, swimming, aerobics and body building (others) are available to students to the highest proportion. The optional branches of sports are costly in terms of the necessary facilities, sports equipment or the trainer. Body building in fitness rooms can only be performed in a student-financed form, since these sports equipment have maintenance and renovation costs. Team sports are provided by every higher education institution as a free service; therefore, their percentage proportion is much lower. The percentage proportion increased mostly in the case of individual sports.

Based on research performed among students (*Szabó* 2006; *Kovács* 2011), leisure sports are becoming more individual, which puts the emphasis on individual sports, especially in the case of women. According to the responses of the interviewed sports managers, it can be concluded that the leisure sports organisers of various higher education institutions take these

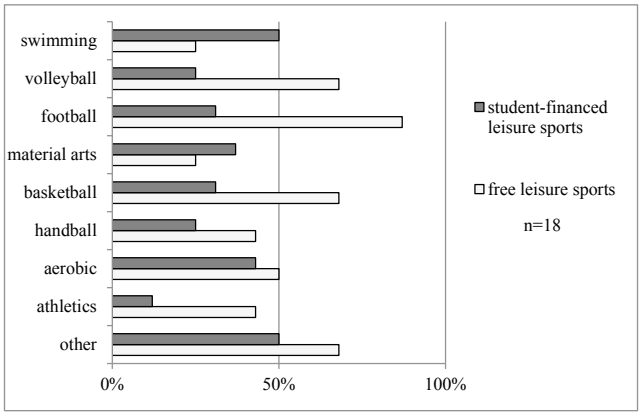
needs into consideration and these branches of sports are available to students.

There are branches of sports in the "others" category which became popular during the recent years among leisure sports (floorball, dragon boating, squash, tennis, indoor climbing, dynamic yoga).

Based on the comparison of free and student-financed leisure sports opportunities (Figure 5), it can be concluded that 50% of institutions can provide swimming only in a student-financed form, the main reason for which lies in the infrastructure of higher education institutions. Only a few universities have their own swimming pool; therefore, financial contribution is necessary to provide these sports.

Despite the fact that football is the most general freely available branch of sports, there is still a need for organising student-financed championships and programs.

Figure 5. Percentage proportion of free and student-financed leisure sports activities in the examined higher education institutions



Source: own construction

Those who wish to do individual sports can perform martial arts mostly in a student-financed form, one of the reasons for which is that few of the full-time physical education teachers of these higher education institutions deal with the various forms of martial arts; therefore, new teachers have to be employed which is costly.

The various forms of aerobics show similar distribution between free (50%) and student-financed (43%) forms. Based on various research findings (*Neulinger* 2007 and *Szabó* 2006), aerobics are the most popular form of physical activities among women. Therefore, providing the opportunity of aerobics could contribute to increasing the number of students taking part in leisure sports. For this reason, it is important to provide easy access to this branch of sports in an organised framework. Higher education institutions can provide the various forms of athletics for free, as they can be performed outdoors without any facilities.

Summary

I interviewed sports managers to examine the current situation and organisation of leisure sports activities in higher education institutions, as well as the various development possibilities. In this study, I present the results of the analysis of data collected with the first eight questions of the situation assessment part of the questionnaire survey put together by me. More specifically, I examined the evaluation of leisure sports activities, free sports opportunities and the branches of sports in which these are provided. I was also looking to find out where these sports opportunities are available for students inside or outside the institution and who they are organised and managed by.

At the same time, I examined sports opportunities whose costs are paid by the student and analysed the distribution of the various branches of sports. Based on my results, I concluded that the sports opportunities of students are especially good according to the managers. This statement confronts the research findings which suggest that the sports activity of students is very low. I will clarify this contradiction in a subsequent research. I concluded that the leisure sports opportunities provided by universities in Budapest and outside the capital are differentiated depending on the infrastructural background and sports traditions. The comparison of free and student-financed sports also resulted in differences, the fundamental reasons for which possibly lie in infrastructural backgrounds and physical education teachers' preference of a given branch of sports. Based on the percentage distribution, higher education institutions tend to provide free access to team sports, while individual sports can be performed in a student-financed way. New branches of sports also appear among university leisure sports, thereby trying to meet students' demands.

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HISTORICAL OVERVIEW OF THE LITERATURE ON BUSINESS PERFORMANCE MEASUREMENT FROM THE BEGINNING TO THE PRESENT

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Abstract: *The paper summarizes the concept of business performance and the performance measurement. The concept of business performance has changed a lot over the past decades. The managers have understood that in order to achieve organizational goals, more emphasis should be placed outside the owners, on other market participants, on the stakeholders (eg: customers, clients, employees, suppliers and other partners, local communities, ...). The '90s are also called „The performance measurement revolution", because a lot of new performance measurement methods, systems appeared. The performance measurements have the prominent role: to collect information about where we are going to achieve the goals, if needed for intervention.*

Keywords: *effectiveness, efficiency, business performance, performance measurement*
(JEL code: B40)

1. The concept of business performance

Performance is very important in all areas and activities. It is easy to determine the performance of certain activities, but it can be more difficult in others. There may be psyhical, mental, work, study, sport, artistic, scientific and many other types of performance. The concept of performance shows a quite different character in each country and it is different in each language, not to mention the performance in different disciplines, and the individual interests.

In economic activities, performance is a crucial issue. The economic (business) performance is affected by many factors, and different economic actors are interpreted differently the concept of business performance (according to their expectations).

In the Hungarian language, the performance term appeared first in the Hungarian Language magazine in 1853 (BÁRCZI, 1991). Later it was defined in various fields, such as pedagogy (NAGY, 1979), sports (NÁDORI, 1986), economics (ÁKOS, 1968), physics (J. JUHÁSZ et al., 2001) too (SAJTOS, 2004).

According to the **Hungarian Concise Dictionary** (1985), the performance is „the measurable result of an activity".

According to the **Hungarian Science and Every Day Language Concise Dictionary (***www.meszotar.hu***)**, the performance is: „How the business effectively implements the action program in the business life, according to the previous formulated plans, which leads to business effectiveness". We can see that in this case, the performance means to achieve the goals, and if those are realized, it will mean the effectiveness too. In my opinion, achievement of the goals, may not always be effectiveness. For that purpose the company should use resources, and their efficiency shows how really effectiveness were they. Efficiency is the first step to effectiveness.

According to the **Romanian Concise Dictionary** (DEX, 1998): „outstanding achievement in a particular area of activity". This definition suggests that the given company achieves good performance, who would reach better results than the other competitor companies.

1.1 The concept of business performance in the international literature

There are a number of interpretations for the concept of **BUSINESS PERFORMANCE**. Most definitions focus around the **efficiency** and **effectiveness**. However, other frequent terms used to define the business performance, don't always have the same content: **productivity**, **efficiency**, **economic efficiency**, **profitability** and **effectiveness**.

According to the Organisation for Economic Co-operation and Development (OCED), the **productivity** term is defined as follows: the productivity is the quotient resulted by the output and the input of a component. But there are discussions about the output and the input definitions too. The basic concept of productivity measurement methods and developments are binds to SOLOW (1957), ABRAMOVITZ (1962) and JORGENSON – GRILICHES (1967).

By PRITCHARD (1990), the **efficiency** is the ratio of

the output and the input. The **effectiveness** is the ratio of the actual output and the expected or a standard output.

According to SAMUELSON and NORDHAUS (2005) the **productivity** is equal to the costs per unit of the output, or otherwise the efficiency of resource used.

The **effectiveness** of the operation means that you can do similar activities better than the competitors. The effectiveness of the operation includes the efficiency, but it is not limited to it. The effectiveness provides a better utilization of the resources (PORTER, 1998).

During the calculation of **profitability,** certain categories of income are compared to a reference base (balance sheet value or income value). This can signal a change in the level of profitability, enabling for comparison with other companies (KOROM, 2008).

NELLY, GREGORY and PLATTS (1995) defined the **performance** with two dimensions:

- Effectiveness, compliance to the organization goals
- Efficiency, expresses the economic efficiency of the resources used to reach the goals.

SINK (1985) as well as SINK and TUTTLE (1989) supplemented the concept of effectiveness and economic efficiency by additional elements: quality, productivity, quality of work, innovation and profitability, as the ultimate goal of every organization.

In ROLSTADLS's (1995) opinion, the business performance has three dimensions: the effectiveness which shows the consumer needs satisfaction degree, the economic efficiency shows how efficiently the company uses its resourses, and the changing ability indicates how much the company is prepared for the future.

The absence of international consensus is indicated by two French authors JACOT and MICAELLI (1996) for performance interpretation, showing the difficulties in coordination with the English terminology. The categories they propose are:

- The efficiency of the assets used („effectivité"),
- The relationship between the assets used and the results obtained („efficience"),
- The relationship between the used assets, the results obtained and the predetermined goals („efficacité").

According to LEBAS (1995), the content in English and French is the same: „efficacité" can be determined by conforming with the goals and „efficience" can be determined by studying the resources used.

In RAPPAPORT's (1998) opinion, business performance has a value-creating interpretation: „The only social responsability for business enterprises in the private property appreciated economic markets is: to create value for shareholders with lawful and fair tools". He is the main representative of the shareholders' value creation aspect. It is clear that shareholders' value can be created only with effectiveness and efficiency.

We can meet the performance value based approach in LORINO works (1995, 1997) too. According to the author:

- business performance can be considered only that which contributes to the value/cost ratio improvement (LORINO, 1997),
- business performance can be considered only that which contributes to the achievement of strategic objectives (LORINO, 1997).

Lorino indicates that the enterpriese's goals are the value creation. Because it is about business performance, Lorino's insights should be clarified: businesses can aim to create value, but only shareholders' value! The other value creation is only the road leading towards the target.

1.2 The concept of business performance in the Romanian literature

Many people deal with the issue of business performance also in the Romanian literature:

Business performance is defined by RISTEA (2003) using three factors: efficiency + economic efficiency + effectiveness.

According to NICULESCU and LAVALETTE (1999) business performance shows the company's competitive position reached with productivity and efficiency, and that will ensure long-term survival.

In VERBONCU and ZALMAN's (2005) view, the performance is determined by the whole coordinated activity of the enterprise.

According to ALBU and ALBU (2005), performance is an abstract expression, and its definition is linked to other concepts: efficiency, economic efficiency and value.

1.3. The concept of business performance in the Hungarian literature

According to KOROM (2007) performance means: the difference between the starting point and the target point in the dimensions of capabilities, opportunities, organization, activities, space and time.

According to BÖCSKEI and FEKETE (2012), business performance is determined by the economic efficiency. And generally, the economic efficiency will lead to efficiency. But, in certain cases, the economic efficiency is not connected to efficiency: it is possible that some economic efficiency companies do not reach their goals, because there is no demand for their product. However, it is also possible for an economically inefficient company to achieve its goals (BÖCSKEI, 2012).

SZŰTS (1983) interprets the efficiency of business performance with two components: **achievement of the goals** like the quality component, and the **ratio of the results-expenses** like the quantitative component. In his view, the activity has efficiency if the goals are reached.

Similar ideas are formulated by DOBÁK et al (1996) in relation to business performance. The effectiveness of the organization suggests that the organization follows the correct goals, and the organizational efficiency indicates its ability to achieve its objectives and the available resources are used efficiently.

WIMMER (2000, 2002) connects the business performance

with the organizations capability of value creating. It is important to create value, but not only shareholder value. The consumer value creation will lead to increase in the shareholder value.

In my opinion, the value creation is a tool to achieve the objectives. If we create value, we can get to the goals. Basically, all business purpose has a financial nature: to reach higher profits.

In our opinion, the business performance express how much we reached the beforehand exactly determined goals (the level of the goals achievement).

2. Performance measurement processes, models

2.1. The concept of business performance, historical overview

It is worth mentioning a few well-known words about performance measurement:

The most known word about the busines performance are linked to the name of Lord Kevin: „When you can measure what you are speaking about, and express it in numbers, you know something about it ... otherwise your knowledge is of a meager and unsatisfactory kind...". (NEELY et al., 1995)

According to NEELY et al (2002), the role of performance measurement is: „to support the well-informed decisions and actions, by providing with appropriate data collection, processing, organizing, analyzing and interpreting quantify the efficiency and effectiveness of past actions".

The performance measurement area has quickly changed and significantly improved in recent years. The beginning of the performance measurement can be put to the first accounting activities (about the years of 1300-1400 at Genoa; the first accounting balance was prepared at 1511 – by the Fugger family from Venice; we can speak about financial and management accounting about the end of the XIXth century). Over the years the performance measurement was equal to the accounting records. Over time, more and more performance measurement indicators appear, such as ROE – Return on Equity, ROA – Return on Assets, ROI – Return on Investment. The increasing competition and the need for information, made it necessary to change the traditional performance measurement. This meant that, compared to the previous practice, new approaches have appeared, the traditional performance measurement indicators did not satisfy the requirements (the 1980s). If we look at the countless new measurement frameworks and methods like the Balanced Scorecard, performance prism, economic value added, etc., we can see that the scientific literature and experts attributed an increasing importance to this area.

JOHNSON and KAPLAN (1987) showed that the traditional performance measurement indicators do not reflect the changes that appeared in the competitive conditions and strategies of the modern organizations (JOHNSON, – KAPLAN, 1987).

The accounting information cannot emphasize those microelements, which leads to favorable or unfavorable future financial results. One of the main problems whith the accounting information is that the economic events time horizont is not extended to their financial consequences (HOPWOOD, 1972; RAPPAPORT, 1983; KAPLAN, 1984; DEARDEN, 1987).

The '90s began with radical changes in the performance measurement. Those views come to the forefront, according to which, the main goals of the stategic planning of the companies is the **value creation**. Value creation is primarily for the shareholders, but also to the other stakeholders, too. Based on the principle of the value maximization, managers should focus all their decisions to increase the value of the company (RAPPAPORT, 1981).

- The value creation, as the main objective, is achieved through the value creation factors. Every company must identify their own value creation factors. However, the list of value creation factors may change over the time, so this should be reviewed periodically (PORTER, 1985).
- According to RAPPAPORT, it is not possible to define a generally applicable „shareholder value mesh" to all companies, but he recommended a seven-factor model based to requirements of yield growth–risk, can be determined the value of the companies (RAPPAPORT, 2002).

In the European practice, the concept of value creation is also adopted, but the shareholder value approach is not so emphasized such as in the Anglo-Saxon countries. One of the reasons is the tradition for indicators based on accounting information.

In the middle of the 1980s appear the theories and empirical studies that have shown that the long-term succes and survival of companies cannot be confined only to maximize the shareholder value. The companies have a number of stakeholders and it is necessary to create value for them too (DONALDSON – PRESTON, 1995; CLARKSON, 1995).

The stakeholder conception theory is closely related with the social changes that are determined changes about the business organization image. The approach which considered important only the owners demands was gradually pushed into the background and other social views, theories came to foreground. It is generally defined as „stakeholder is who can influence the organization's aim-attainment leads, or who is involved in" (FREEMAN, – REED, 1983).

Within a few years, so the beginnings of the 1990s came with new performance measurement systems. An efficiency performance measurement system must based on relevant indicators, and must be related to the company's strategy (DRUCKER, 1990). The performance measurement must incorporate financial and non financial indicators too, because the companies have not only financial goals (KAPLAN, 1984). The indicators should be applied to the organizational mission and goals, to reflect the company's external competitive environment, the customer's requirements and internal targets (KENNERLEY – NEELY, 2003).

The '90s are also called: **„the performance measurement's revolution"**: between 1994 and 1996 were published 3.615 articles about performance measurement topics (NEELY,

1999). Several authors have developed and introduced new performance measurement system or method.

Performance measurement is the process of measuring the efficiency and effectiveness of an activity (NEELY et al. 1995). Its aim is to support the decisions and actions by collecting, processing and interpreting the information. Performance measurements quantify the efficiency and effectiveness of past decisions. Effectiveness means to achieve the objects, and the economic efficiency means the quality of resource used (WIMMER, 2004).

2.2. Performance measurement processes, models

Management by Objectives (MBO) was first popularized by DRUCKER (1954) in his book The practice of management. The essence of MBO is participative goal setting, choosing course of actions and decision making. An important part of MBO is the measurement and the comparison of the employee's actual performance with the standards set. The purpose is to increase the organization's performance through a set of sub-goals continuous reach them.

The late 1950s also popularized the **Hoshin management system**: it is a Far-Eastern method, the method focuses on systematic review, on cyclicity, which can be symbolized by PDCA (Plan, Do, Check, Act) cycle (SHIBA, et al. 1995, MULLIGAN, et al. 1996, WITCHER – BUTTERWORTH, 1999).

Beginning with the 1980-1990s, many well proven methods were published and spread.

The **Skandia Navigator** method was developed by Swedish Skandia insurance and financial service company in the first half of the 1990s, first putting focus on the measure of intellectual capital. The model was developed by Leif Edvinsson. The model focuses on the people. The explanation for this is the recognition that behind every change, learning or development is the person. No organization would be able to comply with the outside world, to environment, to customers' changing needs, if the employees were not able or willing to change. The model uses five factors: people, customers, finances, processes, innovation and development. They use different scales for each factor, and the purpose is to monitorise the changes. So, they produced 91 intellectual capital indicators and also used 73 traditional indicators (BÍRÓ, 2007).

The **Intangible Assets monitor, IAM** model was development by KARL ERIK SVEIBY, in the second half of the 1990s. It is an attempt to measure the „invisible capital" of the organization. The „invisible capital" is defined by three elements:

1. organization capital – internal structure
2. client capital – external structure
3. human/knowledge capital – skills

The model offers different indicators to measure the elements' efficiency and stability. The companies can choose the best indicators which can be applied for their companies.

The **Performance measurement and management model** developed by KURSTEDT, SINK and TUTTLE helps us to realize the true importance of measurement in the development processes. The model defines performance as a complex interrelationship of seven criteria: effectiveness, efficiency, quality, productivity, quality of work life, innovation, and profitability. According to Performance Centre: „using the measurement, can be describe the gap that is between, which we have now and what we want...".

At the end of the 20th century, appeared the so-called „self-assessment models", such as the **EFQM** model **(European Foundation for Quality Management)**, which also contributed to the changes in performance measurement approach.

In the middle of the '90s in Scandinavia, Denmark, Sweden, and Iceland, but in Austria, Germany and Spain too, spread the techniques as „**Wissensbilanz**". The „Wissensbilanz" is focused at the companies knownledge strategic point of view. The „Wissensbilanz" model deals whith the strategic importance of the knowledge, skills and value creating power of companies (LERNER, 2007).

In France the **Tableau de Bord** (TdB) system is widely used. The meaning is „dashboard". Like the Balanced ScoreCard, the connection with the corporate strategy is important and the exploration of the cause and effect relationship. The steps are determined by the so-called OVAR method: O - Objectifs, VA - Variable d'action, R – Responsable, those are followed by „dashboard".

A new performance measurement system is developed in 1991 by LYNCH and CROSS, named **Performance Pyramid System (PPS)**. It is a system with different performance variables, which are supervised by different organizational levels. The strategic objectives flow down over the organization, while it is present an upward information process. The four level of PPS are: the corporate vision, the corporate units accountability, the competition dimension, special actions criterion. With this pyramid can be described how the objectives are communicated down to the operational level, and the indicators will return to higher levels. The use of the PPS also defines the context of feedback. In this context, the PPS is used specifically to monitor the organization's performance (LYNCH – CROSS, 1991).

Without doubt, the most widely used performance measurement system is the **Balanced Scorecard System**. It was originated by Robert Kaplan and David Norton as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics. Accordind to those two authors, the managers are aware of the impact of performance measurement, yet rarely considered the measurement system as an integral part of their strategy (KAPLAN – NORTON, 1993).

The Balanced Scorecard (BSC) translates the organization's vision and strategy in a comprehensive balanced scorecards, which also has a performance appraisal and management system. The focus is still to achieve the long-term financial goals, but includes also the other factors needs to achieve the financial goals. The BSC works with four equivalent criteria: financial performance, customers, operational processes, and learning and development. The system puts more and more emphasis on the management of non-material resources. The

Balanced Scorecard System keeps the focus on financial ratios. However, only the financial approach itself, is not capable to evaluate successfully the organization's activities. So, the traditional indicators were complemented with indicators that provide informations about the factors that affect the performance. The BSC indicators must be derived from the company's well-established vision and strategy. Using the BSC, the managers could understand how the company can create value in the future for consumers. So, the BSC system defines the value creating activities which are in the focus of organizations, and reveal the factors that contribute most to the achievement of long-term financial success and competitiveness. The BSC is based on indicators which are at all levels of the organization and they are part of an information system accessible to all employees. The BSC is not only a system with financial and non-financial indicators. The indicators are derived from the organization's mission and strategy in a top-down process of the organization, so, the system is a conversion of the missions and strategys into goals and indicators. The system is a balanced scorecard, because it both contain the indicators about the past performance and the factors which influenced it the most (SZÍVÓS, 2007).

„The Balanced Scorecard is more than a simple set of financial and non-financial indicators. The BSC is a translation of the organizational strategys to such indicators, which can determine as well the long-term goals such as the mechanisms for achieving those goals" (SZÍVÓS, 2007).

The performance prism authors (NEELY et al., 2004) offers a thourough guide built on the stakeholder approach, to what, why and how it should be measured in order to manage and improve the organization. According to authors: „the performance prism is built on three fundamental assumptions: first, it is not acceptable any more for companies to focus on only one or two stakeholders (typically the owners and customers) interests; secondly, an organization can provide value for all of their stakeholders, if the strategies, processes and capabilities are integrated with each other; thirdly, the organizations and the stakeholders should recognize the nature of mutual relations; all stakeholders must also contribute to the functioning of the organization, in addition to have expectations from the organization..." (NEELY et al., 2004).

The three dimensional model has been designed to be sufficiently flexible to all needs of organizations. The bottom of the prism is the **Stakeholder Contribution**, and on the top is the **Stakeholders Satisfaction**. The sides of the prism are: **stategies, processes and capabilities**. The performance prism system captures the performance concept by five logically interrelated points of view. For long-term success it is essential to have a clear overview of the organization's most important stakeholders' expectations and needs. The basic assumption of the model is that not only the owners and the customers are important to organization, the other stakeholders are very important too. The stakeholders are: investors, customers, agents, employees, suppliers, regulators, communities, interest groups, strategic partners and allies.

Another new instrument is **benchmarking**. Benchmarking is the process of comparing one's business processes and performance metrics to industry bests or best practices from other companies. Dimensions typically measured are quality, time and cost. In the process of best practice benchmarking, management identifies the best firms in their industry, or in another industry where similar processes exist, and compares the results and processes of those studied to one's own results and processes. In this way, they learn how well the tragets perform and, more importantly, the business processes that explain why these firms are successful (*http://en.wikipedia.org/wiki/Benchmarking*).

Performance evaluation is an important, ongoing development tool, which helps to remain competitive and plays an essential role in the company's growth. Performance evaluation and benchmarking actually strengthen continous development of any business unit, to ensure their survival. Through performance evaluation, the companies can reveal the strengths and weaknesses of the business activities, and they can prepeare better to meet the customer's needs and determine the opportunities that will help their development (ZHU, 2009).

We can distinguish parametric and non-parametric, deterministic and stochastic methods among the methods used in the performance evaluation. Taking into account the economic characteristics of the production, it is obvious that the non-parametric methods are the most flexible, while the stochastic methods are more flexible for the data quality's assumptions (FENYES, 2014).

A new non-parametric deterministic method, the **DEA (Data Envelopment Analysis**) is inncreasingly gain ground. This method is still less used in profit-oriented business, mostly we can see exemples in the service sector.

The DEA creates relative efficiency scores, while taking into account a number of inputs and outputs. There is not need to specify a specific function for input and output characteristics. The DEA efficiency or inefficiency is characterized by a value between 0 and 1 (MOHAMAD - SAID, 2013).

The DEA model – building on the earlier work of FARELL (1957) – was presented by CHARNES, COOPER and RHODES in 1978 (CHARNES et al., 1978). Farell recommended to use an activity analysis method to correct the traditional performance indicators deficiencies. The main problem was to create a general used performance measurement tool which allows us to measure, using multiple inputs and outputs (FARELL, 1957). CHARNES et al. (1978) described the DEA method, like a mathematical programming model, which – using practical informations - ensure new options, to do empirical estimates, taking into account certain relations. The DEA creates a borderline based on the input and output data. The studied units will be compared with this borderline and a relative performance point will determined (CHARNES et al., 1995). The detailed mathematical programming model is described in each of the referenced books. According to COOPER et al (2007) the DEA is a performance evaluation model, which calculates efficiency points with the so called Decison Making Units – DMU. The DEA method instead of central tendencies, focuses on the limit values. Researchers from different research areas quickly realised that the DEA

is an excellent method for modeling the operational processes in all areas of the economy, such as the profit oriented sector and the non profit oriented sector, too (COOPER et al., 2007).

The international literature on DEA – from its birth in 1978 – has a very long history. TAVARES (2002) collected between 1978 and 2001 more than 3000 publications about DEA, EMROUZNEJAD et al (2008) in their publication about the DEA's 30 year old history, mentioned more that 4000 publications. The number of publications about the DEA increased year after year, a lesser extent at first, but from the middle of '90s, an average of 200-250 articles have been appeared annually. In 2004 close to 400 articles appeared (FENYVES, 2014).

In foreign practice, we can see countless examples of DEA successful application: in the United Kingdom, the effectiveness of the public schools performance, in the United States comparing the efficiency of the heath institutions, in the Far East optimization of activities for the police, fire stations, hospitals, libraries, services (SOMOGYI, 2013).

The DEA is less used in Hungary by profit-oriented companies. Here dominate the applications in services areas, but today we can find some applications for profit-oriented companies too (FENYVES, 2014). We can see positive exemples for using DEA method in logistic areas too (MARKOVITS – SOMOGYI – BOKOR, 2010).

A fair number of writings from Romanian literature deal with the use of DEA method for profit-oriented companies. We can mention the studies made by CIOANGA and LUCA in the agriculture (CIOANGA – LUCA, 2008), the successful application of DEA method in the banking sector (MUNTEANU et al., 2013), as well as measuring the sports club managers' performance with this method (JURUBESCU, 2009).

3. Conclusions

The literature on this topic is very rich and comprehensive. Experts see and interpret the concept of the business performance differently.

My opinion is that business performance must be connected to the organizational goals. Performance can be interpreted only as function of the goals. There is no performance if the goals are not determined. Those companies are performing who reach their goals. If the companies reach or don't reach the goals, we can speak about the level of performance. The performance doesn't exist in itself, only if it is referenced to something. Of course, in the business world, the objectives can be achieved only with efficiency, effectiveness, and economic efficiency. But those are already the processes' quality characteristics.

The goals can be short or long-time goals, which can be achieved in one or more phases. We think that, the business performance measurement method should be chosen according to the tools and actions that we use to achieve the goals. Performance measurement is extremely important, because in this way we can compare the results achieved and the predetermined goals.

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CAP 2013 REFORM: CONSISTENCY BETWEEN AGRICULTURAL CHALLENGES AND MEASURES

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Abstract: *The latest reform of the Common Agricultural Policy has just been accepted, identifying important challenges for EU agriculture but proposing only limited changes to the previous CAP. Now it is time for the implementation of the new measures. However, from a theoretical point of view, it seems that the CAP can hardly meet the challenges it faces due to the inconsistencies between the predefined challenges and the measures proposed to meet them. The aim of the paper is to analyse the consistency between the challenges of European agriculture and the policy measures aimed at meeting them. It seems that not all measures are consistent with the challenges.*

Keywords: *CAP, challenges, measures, consistency*

1. Introduction

The Common Agricultural Policy (CAP) is still at a crossroads. On the one hand, globalisation is changing the role of rural communities. On the other hand, CAP reform, budgetary constraints and WTO negotiations affect the support of agricultural communities. In general, CAP reform is perceived in the EU as being driven by the larger Member States which account for the majority of agricultural production in the EU. Several Member States (MS) still receive a lower rate of direct support per hectare under Pillar 1 of the CAP than others. It is commonly thought that disparities in rates of CAP support between MS have contributed to the cessation of agriculture in more marginal regions of Europe with subsequent concentration of production in other parts of Europe where CAP payments are higher (*Herzon, 2008*).

European agriculture faces many challenges in the 21st century, from which the following were identified by the *European Commission* (*2010*): food security, environment and climate change and territorial balance. Three main objectives are derived from these challenges (*2010*): viable food production, sustainable management of natural resources and climate action and balanced territorial development. To meet these challenges seems to require a radical change in the CAP. However, the new reform package largely maintains the status quo and does not resolve the fundamental incoherence, illegitimacy and unsustainability of the CAP. This paper provides an analysis of the challenges European agriculture faces and we question whether the reformed measures are even consistent with the EC's own objectives.

The Communication of the European Commission published in 2010 identifies three key challenges for European agriculture (*European Commission, 2010*):

Food security. As the world's population is expected to grow to around nine billion by 2050, global demand for food will significantly increase, resulting in a measurable growth in world food production. Over the next 40 years, agricultural production will have to increase by some 60%. The traditional CAP objective of food security will remain in place, although there is an increasing acknowledgement of the need to address social and environmental values too. The EU should be able to contribute to world food demand by preserving and improving its agricultural production capacity while meeting the high safety, quality and welfare standards required by its citizens as well. In order to meet this challenge, the CAP has to stabilise incomes and markets as well as improve the international competitiveness of its agricultural sector and the functioning of the food supply chain in times of greater market uncertainty, increased price volatility.

Environment and climate change. Farmers work close to nature and to living things but face increasing competition in a globalised agricultural food system. But food is more than just a commodity. European consumers demand healthy and safe food produced with respect for the environment and for animal welfare according to sustainable development criteria. The major challenge for the food system – and thus for farmers – is to make itself visible and recognisable to all European consumers for its quality, its safety, the diversity of its products, its capacity to adapt to changing demand and for being different to products that come from outside the EU. Furthermore, agricultural policy will need to respond to public demands linked to the maintenance of landscapes, the conservation of natural resources and biodiversity, food safety and sustainability. Farming practices can have beneficial (e.g. organic agriculture) or harmful (e.g. intensive agriculture) effects on the environment, while the provision of public goods can potentially offer several environmental benefits (e.g. biodiversity, climate stability, resilience to natural disasters, etc.). At the same time, climate change can have various effects on agriculture in the long run (e.g. flooding, drought, etc.) Therefore, the future CAP should help agriculture mitigate climate change through reduced greenhouse gas (GHG) emissions and various measures to increase production efficiency (e.g. energy efficiency, carbon sequestration, etc.).

Territorial balance. Agriculture is still an important sector in the rural economy, offering job possibilities and income to rural residents and generating many additional economic activities (e.g. food processing, tourism and trade). However, many territorial imbalances, mainly between Old and New Member States, exist in the EU. The CAP should tackle these imbalances by improving the vitality and economic potential of all the rural areas inside the EU.

Three main objectives are derived from these challenges, according to the Communication (European Commission, 2010):

Viable food production. In order to reach this objective, the future CAP should (1) contribute to farm incomes and limit their variability, (2) improve the competitiveness of the agricultural sector and enhance its value share in the food chain and (3) compensate for production difficulties in areas with specific natural constraints.

Sustainable management of natural resources and climate action. This objective also contains three elements: (1) enhancing sustainable production practices and securing the provision of environmental public goods, (2) encouraging green growth through innovation and (3) pursuing climate change mitigation and adaptation actions.

Balanced territorial development. The third objective is also made up of three policy sub-objectives: (1) supporting rural employment, (2) improving the rural economy and promoting diversification and (3) encouraging structural diversity in farming systems by improving conditions for small farms and developing local markets.

In order to meet these challenges, various measures are proposed in the latest CAP reform. It is worth while analysing whether these proposals are consistent with the challenges.

2. Material and Methods

This paper is based on publications addressing consistency between agricultural challenges and measures of CAP 2013 reform. Data published by the European Commission were used in the analysis. The database of the Food and Agriculture Organization of the United Nations has also been used in the examination. The literature on the possible impacts of CAP 2013 reform is already substantial. Several reports have addressed the challenges of European agriculture. However, the consistency between agricultural challenges and measures have received much less attention. Furthermore, there is a lack of available publications related to the consistency of economic, environmental and social challenges and CAP measures. The use of individual studies is furthermore hampered by the fact that these studies might use different motivations to assess consistence between agricultural challenges and measures. In addition, results are potentially biased because studies might differ in their focus on how to meet the challenges European agriculture faces.

3. Results

3.1. Consistency of economic challenges and measures

The EU should be able to contribute to world food demand and agriculture should therefore maintain its production capacity and improve it while respecting commitments in international trade and policy coherence for development. However, the EU is affluent and has the purchasing power to source supplies from the world market, even when world prices are high. Food security is thus not currently threatened in the EU. Poor households may still be hurt by periods of high prices but the best way to help them is through social welfare schemes. Moreover, the EU could take measures to increase its own production if a future need arose. In response to rising prices, farmers would expand cultivated areas, use more intensive farming methods and shift production patterns to increase yields. Targeted payments – for instance to preserve soil fertility and water resources, and maintain a critical level of farming activity – would be more effective than blanket subsidies to maintain existing levels of agricultural production or employment. Furthermore, money intended to reduce hunger and poverty abroad would be better spent by investing in agricultural research and infrastructure in developing countries rather than by giving it to European farmers.

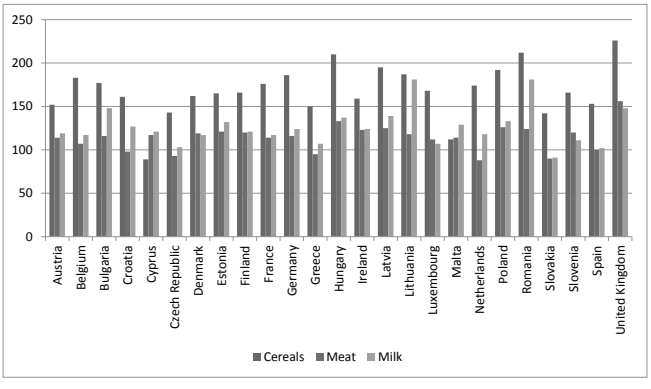
Economic efficiency and competitiveness: This challenge is to be met via various measures among which probably the most important is the continued provision of direct payments. Established in 1992, and significantly changed in 2003, direct payments are now decoupled from production and alert to "green box" (non-distorting subsidy) requirements of the WTO.

Europe spent 70% of the CAP budget on direct payments in 2012 (*European Commission, 2013*), aiming to stabilize incomes of farmers. Direct payments were received by 5.4 percent of the EU's population and accounted for 0.3 percent of its GDP (European Commission, 2013). Generally, well-functioning markets rather than state intervention are the best way to attain a demand-oriented, innovative and competitive farm sector. But the EU has a legitimate role to play in encouraging research and development in both public and private sectors, since the benefits of research and development are often shared across borders, and Member States can gain by pooling their research endeavours.

The current decoupled income aid suffers from substantial legitimacy problems. It is still calculated formally based on historical production references and it establishes the various levels of support that existed in the past according to sectors and territories. Furthermore, it does not reflect the changes recorded in the orientations of farms after decoupling, once flexibility to produce is established, and this distorts the markets. And it also does not reflect the changes in the prices or market costs recorded in recent times, consequently overcompensating producers of cereals and oilseed (direct beneficiaries of the price increases of agricultural commodities), while abandoning livestock producers (who are suffering from an increase in the cost of feedstuffs). Compensation for past price cuts is no longer necessary. Generalised per hectare payments are not targeted, whatever name is given or conditions attached to them (*Tangermann, 2011*).

Meanwhile, there is no evidence that farm households in industrialised OECD countries have systematically lower incomes than other households, so policies to support incomes across the whole sector are unjustified (*Swinnen, 2009*). Agricultural income per work unit is not an appropriate indicator of standard of living as it depends on total household income of the family concerned. This means that farm income support has to be based on overall incomes of farm households where income from other sources often complements agricultural income. Direct payments have limited potential for supporting farm income, which is the official motivation of the support. If support was eliminated, land values would fall, structural change speed up and incomes from other sources grow, leaving the total income of farm households (remaining in the sector) more or less unaffected (*Sahrbacher et al., 2007*). Besides all these, it is pretty hard to understand why the CAP subsidises farmers' incomes in times of increasing food prices. As evident from Figure 1, producer prices have increased for almost all countries and products concerned in the European Union from 2004-2006 to 2011. Cereals prices have experienced the biggest increase, followed by meat and milk prices (*Figure 1*). As price increases have reached 100% in many cases, direct payments contributing further to farmers' incomes seem obsolete.

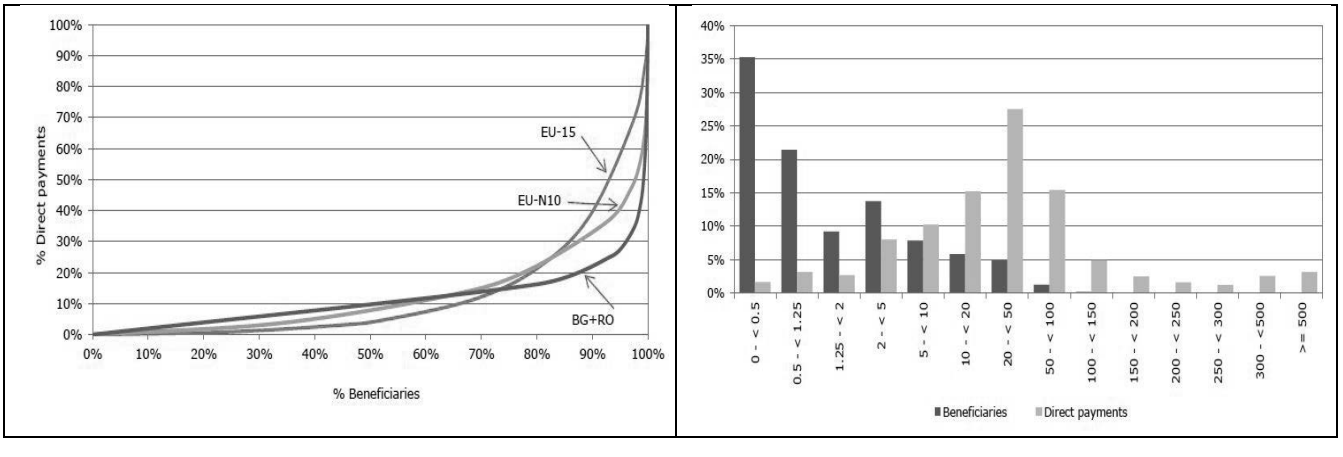
Figure 1: Producer price indices for selected products in the EU27 in 2011 (2004-2006=100, %).



Source: Own composition based on FAO, 2014

Direct payments are neither equitably distributed by farm size, nor by geographical location (*Figure 2*). The 80/20 rule applies – approximately 80 per cent of the support goes to 20 per cent of farmers (recipients). Small farmers, especially, are handicapped in many ways. Though they are eligible for direct payments, due to the small farm size and administrative procedures, most receive marginal amounts or do not even participate in the system. As *Zahrnt* (*2009*) and others have also emphasised, payment rates per hectare are also widely dissimilar, ranging from €500+ in Greece to €174 in Portugal. Furthermore, following the EU Copenhagen agreement, direct

Figure 2: Distribution of direct payments by member state and beneficiary in 2012.



Source: European Commission, 2013

payments were introduced at lower initial rates in the New Member States (NMS), which have still not reached the level of EU15 in Romania, Bulgaria and Croatia. However, the EU10 reached the 100 per cent payment level in 2013. Indeed, the NMS complemented for the transitional period of 10 years EU-funded direct payments with national supplements to make good the difference between their own payment rates and those of the Old (and largely richer) Member States.

Based on these critiques, the 2013 CAP reform changed the former system of direct payments and introduced various novelties (e.g. greening, small farm scheme, internal and external convergence, active farmers, etc.). However, it seems that even the modified system of direct payments is not consistent with the challenge to secure food supplies.

First, as the current system of decoupled direct support suggests, a farmer need not even produce to receive a fixed income. However, the fact that a farmer does not need to produce does not lead to the conclusion that he/she will not produce. There is no evidence that the reformed CAP will lead to a significant reduction in production due to the withdrawal of land from farming. It still needs to be kept in condition suitable for production which is not a cost free condition in the absence of agricultural activity. On the other hand, if a farmer does not produce agricultural commodities, it is hard to imagine how he or she contributes towards ensuring global food security. Consequently, stabilising farmers' incomes does not necessarily mean guaranteeing food security. By seeking to stabilise all farmers' incomes, current direct payments seem to focus on social and environmental issues instead of focusing on enhancing the competitiveness of farms.

Second, greening is also against food security – by introducing super-cross-compliance type measures (*Matthews, 2011*), the competitiveness and profitability of farms is decreasing. In addititon, greening is a high-cost policy compared to payments directly targeting public goods. Moreover, many farmers treat ecological focus areas as a resurrection of set-aside abolished in 2008, while diversification of crops may lead to economies of scale being unrealised (*Matthews, 2011*). Even profit maximizing behavior is constrained to meet a minimum of environmental conditions. However, other elements of CAP reform permit measures aimed directly at enhancing competetiveness. Third, the maintenance of coupled subsidies might help achievefood security in specific regions, though the magnitude of its impact is doubtful. Fourth, specific programmes for small scale farms, on the one hand, decrease administrative costs of small farms, though on the other hand, it does not encourage creating efficient scale. Fifth, redistribution of direct payments helps decrease inequalities, though its extent is dubious as direct payments overall may exascerbate inequalities between farms in terms of incomes.

On the whole, it is pretty evident that problems raised above are partly treated by the new system of direct payments but not solved. The reformed policy seems to be an improvement on what went before. In addititon, CAP limits the scope for interventions that address the economic challenges facing European agriculture. It is an interesting question whether direct payments will exist even after 2020.

Besides direct payments, according to the European Commission (*European Commission, 2010*), food security should be reached via the stabilization of agricultural markets. However, emphasis now is on a market orientation while maintaining market management tools that would be deployed in times of crisis. It is a serious concern for the future whether the CAP can really stabilize agricultural markets. The economic and food crisis of 2008 and 2011 highlighted that the issue of food security, which seemed to have been already solved since the 1970s, is now back to the policy agenda. Extreme price volatility, experienced in global markets since 2008, has serious consequences for the stabilisation of agricultural markets. Furthermore, it seems that food prices will remain at a generally higher level in the future.

In addition to the stabilization of farm incomes, the European Commission seeks to increase the competitiveness of European agriculture, thereby meeting the challenge of global food security. However, its policy lacks coherence. First of all, the enhancement of competitiveness pertains to the second pillar of the CAP, though some elements (market stabilization, direct payments, etc.) will remain in the first pillar. It is a question, therefore, as to whether measures in the two pillars collectively target this issue.

Enhancing competitiveness has implications for trade policy. EU agriculture as a whole is required to compete in the world market, and trade policy determines the way it does so. In order to enhance the competitiveness of its farmers, the EU has many trade policy tools, from increasing import tariffs to banning imports of specific agricultural products coming from outside the Community, but only a limited use of these mechanisms is respected by the WTO. However, competitiveness can also be strengthened by further reform in case EU tariffs remain in place as they are unlikely to disappear anytime soon.

One option for increasing farm profitability in the short-term is to further increase subsidies to farmers, thereby reducing their already high costs of production. However, in the long-run this is likely to damage competitiveness as subsidies artificially shield farmers from healthy competition hindering the evolution of a more modern, more efficient agriculture. Direct payments may allow farmers to withstand international competition. However, such "artificial" competitiveness keeps agriculture dependent on government payments.

Increasing European food safety standards are also against the competitiveness of EU agriculture. Cross-compliance, greening requirements as well as plant and animal welfare measures imply additional costs for European farmers compared to their third country counterparts. Therefore, it is dubious how the CAP, based on high standards, will increase competitiveness in the long run as Europe faces increasing competition in the globalised agricultural and food system. However, imported foods have to meet the EU's food safety standards, and in that regard face the same costs. Surely the logical response is to ensure competitors meet these standards and therefore it is legimimate to use the CAP, in combination with the instruments and institutions to achieve a level playing field.

Furthermore, food is more than just a commodity. European consumers demand healthy and safe food and thus a major challenge for European farmers is to make their products visible and recognisable to all European consumers for their quality, safety and diversity and thereby making them different to products coming from outside the EU.

Moreover, genetically modified organisms (GMOs) issues are also on the table when talking about agricultural competitiveness in Europe. Do GMOs have a European future, or will they continue to be marginalized by many European consumers and governments? And if so, will this be accepted by the EU's major trading partners, or will it lead to trade conflict and new disputes in the World Trade Organization? As the share of genetically modified products is increasing in world trade, agricultural competitiveness is largely determined by the decision on their use.

Successive reforms of the CAP since the 1980s have introduced a more market oriented focus and the results have led to an improvement in underlying equilibrium between supply and demand. The CAP sets no target for production and simply recognizes that the EU should be able to contribute to world food demand.The CAP is far from perfect but it is changing in a way that is more economically rationale but the financial burden of the CAP on EU taxpayers and consumers has not changed very much.

3.2. Consistency of environmental challenges and measures

The rationale for rural development and environmental payments must also be re-examined as most of them are not sufficiently linked to public goods. In order to strengthen multifunctionality, present rural development and agri-environmental payments have to be linked more closely to genuinely European public goods. This will enhance transparency, the public legitimacy of the CAP, underline MS' solidarity towards the provision of public goods and lower its profile in the budget review. Agriculture is more than about producing food, it manages the landscape. People in the EU not only demand good food, but that they also want biodiversity to be protected and they want rural areas to remain sustainable in every sense The EU therefore must ensure that it provides a future for rural areas, both economically, but also in terms of biodiversity and renewable natural resources. There is a fundamental jointness in land management between the agricultural (or other marketed outputs) and environmental services. So farm products could be the principal output and environment the by-product, co-product or vice versa. The production of marketed and non-marketed goods and services has a specific relationship in their production, being complementary or substitutes. It is important to make a distinction – in a very articulated way – between public goods (non-excludable and non-rivaled) and externalities (effect outside the market mechanism affecting output or wellbeing).

The CAP is faced with numerous environmental challenges, including, *inter alia*, GHG emissions and climate change, soil depletion, water/air quality, habitats and biodiversity. These challenges are best tackled by focusing on the sustainable management of natural resources and climate action with three-sub-objectives: sustainable production practices and the provision of environmental public goods, green growth through innovation and climate change mitigation and adaptation actions (*European Commission, 2010*). The long run sustainability of agriculture in the EU depends on maintaining the underlying natural resource (soil, water, air and biodiversity) base. Although farmers are the managers of the majority of land and water resources across the EU, agriculture provides a modest or even declining share of economic activity in most rural areas (*Cunha and Swinbank, 2011*). In practice, the latest CAP reform elaborates greening measures, while green growth and climate change mitigation and adaptation actions seem to remain merely as high-sounding rhetoric.

At least some environmental public goods should justify EU support. For example the fight against climate change, which is a global challenge justifying a supranational response. Monitoring greenhouse gas emissions in order to apply cap-and-trade schemes or carbon taxes is difficult in agriculture. Payments for climate-friendly farming practices may well be needed to induce farmers to go beyond minimum legal requirements. The protection of biodiversity also warrants EU support because animals, ecosystems and biodiversity-threatening pollution cross borders. Similarly, keeping water clean and preventing water scarcity as well as floods is an EU concern because Europeans share rivers, lakes and seas.

In the current system, cross-compliance represents the compulsary basic layer of environmental requirements and obligations to be met in order to receive full CAP funding. On top of this, from 2015 onwards, the CAP introduces green direct payment rewarding farmers for respecting three obligatory agricultural practices, namely maintenance of permanent grassland, ecological focus areas and crop diversification. At least 30% of the budget of each rural development programme must be reserved for voluntary measures that are beneficial for the environment and climate change (agri-environmental- climate measures, organic farming, areas for natural constraints, Natura 2000 areas, forestry measueres, and investments which are beneficial for the environmnet or climate. However, still greening measures have many deficiencies.

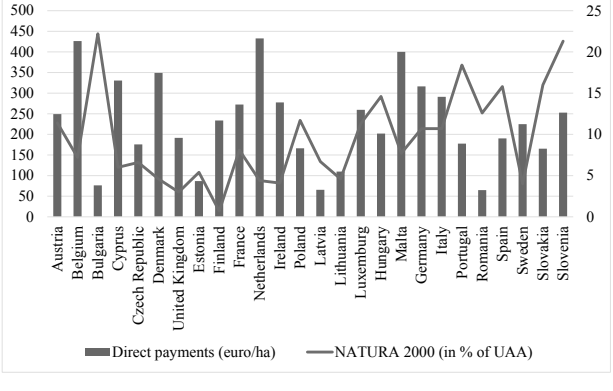
First, linking direct payments to the provision of public goods is an "inefficient approach" as money is paid to individual farmers and not for the provision of public goods. Since 1992, direct payments have been given for many reasons but it is clear that the system is still based on the reference yields of 1986-1990 (2000-2002 for the new members). Thereby it implicitly assumes that those receiving a high amount of direct payments (e.g. those had high yields in the reference period) provide numerous public goods, which is not the case. In marginal regions, where the costs of production are high, direct payments can contribute to maintaining biodiversity and landscape preservation (*Brady et al., 2009*), though these payments are the highest in fertile regions due to their origin as compensation for price cuts. As evident from *Figure 3*, there is no clear relationship between direct payments and NATURA 2000 areas (as a proxy for measuring agri-environmental status). We cannot state that those regions with higher environmental values receive more direct payments. Actually, the correlation between the two indicators is negative at the EU27 level (-0.29) (*European Commission, 2013*).

Secondly, the Communication seems to neglect the fact that one of the biggest problems with the provision of environmental public goods in agriculture lies in the insufficiency of measurement methods. If we are to achieve global objectives for halting/slowing down biodiversity loss, it is important that we demonstrate the economic value of ecosystem goods and services. However, the value of a landscape or the value of biodiversity is hard to measure, and it is unclear what kind of methods the Commission proposes for solving this problem. Over the past decade, progress has been made in understanding how ecosystems provide services and how service provision translates into economic value. Yet, it has proven difficult to move from general pronouncements about the tremendous benefits nature provides to people to credible, quantitative estimates of ecosystem service values. Spatially explicit values for services across landscapes that might inform land-use and management decisions are still lacking (*Balmford et al., 2002*).

However, if we are to achieve global objectives for halting/slowing down biodiversity loss it is important that we demonstrate the economic value of ecosystem goods and services. . It is possible to develop economic tools and to build policies which take proper account of the real value of biodiversity. Ecologists and economists can work in an interdisciplinary manner to improve our understanding of the way that ecosystems function and how this relates to the flow of benefits to mankind. However, it will be a political choice as to whether to use these tools and to apply these policies. Searches have revealed a disappointingly small set of attempts to measure and value these services (*Constanza et al. 1997; United Nations, 2003; Reid, et al. 2005; Stern, 2006; WWF, 2008, European Commission, 2008; Parker et al., 2008*). Nevertheless, the question remains: If these services are valued by society, why are there no markets for environmental services (*Ribaudo et al. 2008*). Once they are produced, people can "consume" them without paying a price. Most consumers are unwilling to pay for a good that they can obtain for free so markets cannot develop.

Note: Direct payments are calculated per hectare (based on UAA data).

Figure 3: Relatonship between direct payments and NATURA 2000 areas in EU27 in 2012.



Source: Own (Authors') composition based on European Commission, 2013

One important characteristic of most markets for environmental services is that government or some other authority plays a central role in setting them up. The reason is that environmental services, to varying degrees, defy ownership – they are public goods. One way to get around this is to create a good related to the environmental service that has private-good characteristics, as has been done for markets in carbon and water quality trading, and wetland damage mitigation. These markets would not exist without government programmes that require regulated business firms (such as industrial plants and land developers) to meet strict environmental standards. In essence, legally binding caps on emissions (water and carbon) or mandatory replacement of lost biodiversity (wetland damage mitigation) create the demand needed to support a market for environmental services (*Ribaudo et al. 2008*).

Thirdly, the CAP seems to do little to meet the EU's overall objective in its Biodiversity Strategy for 2020 - to halt the loss of diversity and to restore degraded ecosystems. Ecological Focus Areas (EFAs) are limited to less than 50% of the EU arable area and permanent crops, grasslands or pastures do not need EFA. EFAs can also include land uses with doubtful benefits for biodiversity. In the absence of specific management guidelines, EFAs will likely contribute little to biodiversity. Cultivating three crops on large, intensively managed farms is unlikely to enhance biodiversity and these targets are currently lower than existing average crop diversity in many Member States. In addition, the new regulation did not do more to improve the cost-effectiveness of Pillar 2 schemes in terms of uptake and biodiversity outcomes (*Pe'er et al., 2014*).

Fourthly, the provision of public goods requires significant institutional and administrative infastructure for the effective management. It is doubtful that these programmes can be well-administered without a measurable increase in bureaucracy both at the EU and national level. However, such an increase would result in cost increases and work against the "cutting the red tape" principle, as indicated in *European Commission* (*2010*).

Fifthly, the relationship between greening and current agri-environmental programmes remains unclear. The question is what the greening component could potentially deliver that cannot yet be delivered by the existing instruments. It is unclear as to why the respective set of agri-environmental actions should be moved from the second pillar to the first pillar with its implications for decision making and financing. As the payments under the greening component will be financed out of the EU budget, without any national co-financing, member states will not feel the needMember States are likely to try to maiximise such payments to their farmers. So the choice of actions, chosen from the menu for implementation of the greening component, in the individual Member States is not primarily based on the most needed and effective agri-environmental policy but on what promises the largest transfers to domestic farmers (*Tangermann, 2011*).

Sixthly, it is not clear whether subsidies from the first pillar are more efficient than those from the second. It is well known the t the difference between the two pillars is that Pillar 1 measures apply to everyone, Pillar 2 are self-selected by a

minority of farmers. As the principle of equivalence, developed by the latest CAP reform, suggests, farmers participating in specific agri-environmental programmes (organic production, Natura 2000 etc.) automatically meet greening requirements, implying that second pillar instruments are better serving the environment than first pillar ones. As a consequence of the CAP 2013 reform the share of first pillar funds are increasing at the expense of the second. Based on these problems, another question arises as to what effect the "greening component" would have on the expenditure balance between the two pillars.

Innovation, green growth and climate change mitigation are also important objectives of the CAP, though the 2013 CAP reform did not elaborate measures in this regard. We are not aware of the exact places and the magnitude of impacts of climate change, for instance, nor is it clear how the CAP would tackle the obvious challenges in this regard. Although the fifth priority of the second pillar is related to climate change, implementation remains opaque.

3.3. Consistency of social challenges and measures

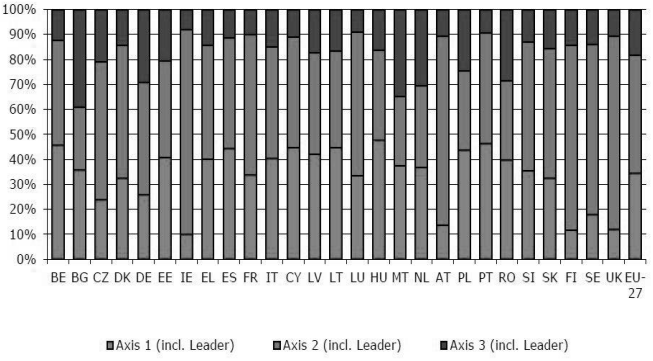
European society is becoming increasingly urban and people in rural areas are at risk of becoming social minorities with reduced political and electoral clout. Rural industries have to diversify into new areas such as green tourism and farming itself is now often a part-time occupation. Many farmers have to juggle other jobs just to make ends meet. However, many of those living in rural areas are responsible for managing the land and sustaining their most valuable natural resources, such as water, soil and wildlife biodiversity. They are also responsible for the development of renewable energy sources including biomass, wind and solar power.

The objective of balanced territorial development is planned to be tackled by supporting rural employment, improving the rural economy and promoting diversification and encouraging structural diversity in farming systems by improving conditions for small farms and developing local markets. Measures elaborated for reaching these aims are the Common Strategic Framework, the new rural development priorities, the simplification of rural development subsidies, the introduction of minimum spending requirements (agri-environment 30%, Leader (or CLLD) 5%) and the introduction of European Innovation Partnerships. Although these measures bring new concepts to European rural development policy, several concerns emerge regarding their effectiveness. First and foremost, it is still not clear what rural development is about in the CAP. On the basis of the former four axes, the current six priorities and their associated funding, rural development is mainly about agricultural competitiveness enhancement and agri-environmental support.

Increasing quality of life, creating jobs, alleviating rural poverty, decreasing the urban-rural income gap or developing rural infrastructure remain just slogans without any clear measures for reaching them. This argument is also strengthened by the fact that of the 20% of the CAP budget is spent on rural development, only 20% is spent on classical rural development – so that just 4% of the CAP budget is spent on core rural development issues. As *Figure 4* suggests, that vast majority of rural development funds were spent on the first two axes in the EU in 2007-2013, while classical rural development played just a marginal role in most member states.

The exact place of rural development within the EU policy framework is also unclear. On the one hand, the CAP has recently expanded its traditional agricultural focus to a broader array of rural actors via Axis 3 and 4 (territorial approach, though many measures of the other axes (sectoral approach) also have a number of second order effects (e.g. enhancing local agricultural employment, tourism retaining people in rural areas). This process strengthens the retention of rural development policy inside the CAP together with the fear that cohesion policy would be more likely to focus on urban centres rather than rural areas. On the other hand, there are also strong grounds for arguing that rural development should be reallocated into Cohesion Funds. One of the strongest arguments, put forth by DG Regio, is that such a shift would bring increased coherence in rural development at the EU level. Given the birth of the Common Strategic Framwork, it seems that rural development will still be funded as part of the CAP, though the effectiveness of rural development programs is a key question for the future.

Figure 4: Relative importance of the 3 thematic axes by Member State (2007-2013).



Source: European Commission, 2013, pp. 303.

4. Discussion

Regarding the future of the CAP, several general dilemmas emerge, having impacts on economic, environmental and social measures. First of all, it is questionable to what extent national agricultural policies will increase their role inside the CAP. Several signs of the latest reform indicate that Member States get more freedom in the implementation of the CAP (distribution of the different components of direct payments, defining national rural development priorities, etc.) This is an important issue as different national implementations might alter the overall consistency between challenges and measures.

The second dilemma is raised in connection with the structure of the two pillars. Although the first pillar has traditionally dealt with agricultural markets (and direct payments later) and the second with rural development, many measures are questioning this divison of tasks (e.g. greening in the first

pillar, payments for young farmers and LFA from both pillars, competitiveness enhancement from the second pillar, etc.). A consistent CAP would require a clear division of work. Maintaining two pillars, one requiring co-financing and the other not, will also maintain the bias against rural development payments, which need to be matched with domestic funds.

Last but not least, it is still questionable whether the "one size fits all"' approach is working for the CAP. Can we apply the same policy for different regions? The current CAP has been planned for meeting the needs of the founders and Old Member States, though needs of the new members are hardly touched upon (*Gorton et al., 2009*). This issue might also alter the CAP's capacity to meet the challenges European agriculture faces, especially considering possible new accession rounds.

Based on the arguments above, it seems that European agriculture will hardly meet the challenges it faces as there exists just a partial consistence between agricultural challenges and measures. It is doubtful how the CAP meet the challenges it faces. The EU needs an agricultural policy, but it needs one that focuses on areas where European action creates the greatest value. The first pillar should be phased out, and new schemes designed in which aids are granted not on past, but on future behaviour. Under the second pillar only those policies that promote genuine European public goods, are efficiently targeted at their objectives, and avoid excessive payments, should be retained.

We believe that fundamental challenges are needed in the future, addressing the key challenges as follows:

Phase out the system of direct payments. Direct payments are not effective in making European agriculture more food secure nor are they capable of making efficient contributions to the provision of public goods. Better targeted policy instruments are needed to make European agriculture food secure and competitive. Innovation based on research and development, education and training, advisory services and appropriate institutions serving agriculture are the major means of raising productivity, thus enhancing competitiveness. From the food security side, there is no need to make direct payments in order to stimulate extra production in Europe. In response to the challenge of global food security, more food production in Europe cannot make a contribution to that goal as it would make it more difficult for developing country agriculture to create income and employment opportunities (Tangermann, 2011). Europe has to concentrate on competitiveness and productivity.

Invest in climate smart agriculture. Greening, as we suggest, is not an efficient policy instrument in meeting the environmental challenges European agriculture faces. The future CAP should focus on adapting European agriculture to climate change by heavily investing in research and technology. Conducting research and developing tools for quantifying environmental impacts of farming practices is of great importance as well. A proper monitoring and evalutation system should be created for measuring environmental impacts on the farm level and giving feedbacks to policy makers on the efficiency of environmental instruments.

Create a real rural development policy. The future CAP should clean rural development policy by focusing solely on classical issues of rural development like poverty reduction, job creation and investment in rural infrastructures with the overall aim of increasing rural quality of life. It is a reasonable objective for a common policy for agriculture to contribute to reduction of poverty and cohesion.

Build the CAP on one pillar. All challenges should be associated with a single pillar, thus creating a food, an environmental sustainability and a territorial balance pillar. Such a system would be more transparent and better focused as well as it would create a better division of consistency and challenges.

5. Conclusion

The latest reform of the Common Agricultural Policy has just been accepted, identifying important challenges for EU agriculture but proposing only limited changes to existing policy. Now it is time for the implementation of new measures. However, from a theoretical point of view, it seems that the CAP can hardly meet the challenges it faces due to the lack of consistency between economic, environmental and social challenges, and CAP measures proposed to meet them. Economic, environmental and social challenges, identified by the European Commission, do not seem to align with the measures proposed to meet them. Therefore it is questionable how European agriculture will meet the challenges it faces in the future. However, Horizon 2020, the biggest EU Research and Innovation programme with nearly □80 billion of funding available for the period of 2014-2020 may contribute substantially to innovation making it easier for the public and private sectors to work together in delivering innovation. Reconciling production with the sustainable management of land and other natural resources is the major challenge for agriculture. Research and innovation are crucial to support the move towards more sustainable primary production taking into consideration economic, social and environmental objectives. Research and demonstration activities are supposed to encourage cooperation across basic and applied research disciplines, as well as between researchers, practitioners, businesses and other stakeholders. The expected results in relation to CAP should benefit a diverse primary production sector and ensure that high quality products and services continue to be delivered in sustainable ways.

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AN APPLICATION OF THE ERROR CORRECTION MODEL IN ANALYZING THE LONG RUN EQUILIBRIUM BETWEEN GHANA'S EXPORTS AND IMPORTS

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Abstract: *This study investigates the long-run relationship between Ghana's exports and imports for the period of 1948 to 2012. Using the Engle Granger two-step procedure we find that Ghana's exports and imports are cointegrated. However, the slope coefficients from the cointegration equations were not statistically equal to 1. Furthermore, application of the error correction model reveals that 1% increase in the imports will significantly result in 0.56% increase in exports, suggesting that the exports' responsiveness to imports is low. The estimated error correction coefficient suggests that 32% of the deviation from the long run equilibrium relation is eliminated, leaving 68% to persist into the next period. These results suggest persistence in the trade deficit and an option of curbing the deficit is to re-order the relationship between imports and exports with a view to reducing imports demand. These results imply that though Ghana's past macroeconomic policies have been effective in bringing its imports and exports into a long run equilibrium, it is yet to satisfy the sufficient condition for sustainability of foreign deficit.*

Keywords: *Foreign deficit, sustainability, exports, imports, cointegration.*

Introduction

Recent empirical studies analyzing the sustainability of external deficits have focused their attention on the long run relationship between imports and exports. This is because the presence of a long run equilibrium relationship between exports and imports indicates that trade deficit is only a short run phenomenon that is sustainable in the long run. Cointegration of exports and imports is desirable by countries since this knowledge can be employed in the design and evaluation of macroeconomic policies aimed at achieving external trade balance. Fundamentally, a stable long run equilibrium relationship between imports and exports implies that the economy is not in violation of its international budget constraint as its macroeconomic policies have been effective in keeping exports and imports in equilibrium.

However, little is known about the exports and imports of Ghana. In order to shed light on the exports and imports of Ghana, Annan and Acquah (2011) analysed the long run equilibrium relationship between the exports and imports of Ghana using nominal annual time series data for the period of 1948 to 2010. The analysis specifically examined whether there is cointegration between exports and imports. Though the study found cointegration, it failed to include the long run equilibrium in modeling the relationship between the exports and imports. However, when two variables are cointegrated, it is important to include information on the long run equilibrium when modeling the relationship between the two variables. This study extends the work on exports and imports cointegration by Annan and Acquah (2011) to include error correction modeling of the exports and imports which allows the inclusion of the long run equilibrium, when explaining the relationship between the exports and imports. The current research seeks to add to existing knowledge about the exports – imports relationship in Ghana. One way in which the current study differs from previous study (Annan and Acquah, 2011) is that the issues of causation and error correction modeling which has not been considered in the previous study has been given ample attention using an extended data from 1948 to 2012. The focus of this study is therefore to examine the nature and direction of the relationship between exports and imports and explore the policy implication for managing trade deficit in Ghana.

Long run relationship between exports and imports

Numerous researchers have investigated the issue of long run equilibrium relationship between exports and imports of countries. Noticeably, the different methods employed by researchers' leads to different conclusions.

For example, in the US, Husted (1992) estimates the long run relationship between exports and imports using quarterly US trade data between 1967 and 1989. He finds a long-run relationship between US exports and imports pointing that its trade balances are sustainable in the long run. However,

Fountas and Wu (1999) studying US data ranging between1967 and 1994 and applying a different methodology found that the hypothesis of no cointegration between exports and imports cannot be rejected. Their finding suggests that US trade deficit was not sustainable and conflicts with the earlier findings of Husted (1992). Bahamani-Oskooee (1994) used cointegration technique and tested long run relationship between Australian exports and imports. He found out that they will converge in the long run.

Using the bounds testing approach to cointegration, Narayan and Narayan (2005) explore the possibility of a long-run relationship (cointegration) between exports and imports for 22 least developed countries (LDCs). They found that exports and imports are cointegrated only for six out of the 22 countries, and the coefficient of exports is less than one. Konya and Singh (2008) explore the presence of an equilibrium relationship between the logarithms of Indian exports and imports between 1949/50 and 2004/2005, using unit-root, cointegration approach. The results obtained point to no-cointegration between exports and imports. They therefore conclude that Indian's macroeconomic policies have been ineffective in bringing exports and imports into long-run equilibrium and that India was in violation of her international budget constraint.

Arize (2002) used cointegration technique and tested the long run relationship between exports and imports for quarterly data for the period 1973–1998 from 50 OCED and developing countries. The results obtained suggest that for 35 of the 50 countries there was evidence of cointegration between exports and imports; and 31 of the 35 countries had a positive export coefficient.

Similarly, Tang and Mohammad (2005) investigated the presence of a long run relationship between imports and exports for 27 Organization of Islamic Conferences (OIC) member nations. The results of unit root and cointegration tests indicate that only four of them, namely Benin, Burkina Faso, Cameroun, and Guyana show a long run relationship between imports and exports. They conclude that exchange rate and macroeconomic policies may be effective to improve the countries' trade balances in the long run. For the other countries, they find no cointegration between their imports and exports, and conclude that they are in violation of their international budget constraint, and that other macroeconomic policies are unfavorable to the countries' external balances in the long run. Similarly, Erbaykal and Karaca (2008) examined the long run relationship between Turkey's exports and imports and find that although there is a cointegration relationship between imports and exports, the slope coefficients obtained from the equations derived from exports and imports series is statistically not equal to one. They assert that it is doubtful that the foreign deficit of Turkey is sustainable. These findings suggest that the existence of a cointegration relationship between imports and exports is necessary but not sufficient to state clearly that the foreign deficit is sustainable. In order to be conclusive about this matter, when there is a cointegration relationship between imports and exports series, it is also necessary that the slope coefficients obtained from the equations derived from these series should be statistically equal to 1.

Methodology

The methodology describes the time series data and the econometric techniques employed in the study. Econometric techniques such as the Augmented Dickey Fuller and the Philips- Perron tests are used to test for the order of integration of the export and import data. Granger causality test is useful in resolving the problem of causal direction between exports and imports. Engle-Granger two-step procedure is employed to test for cointegration in the long run equilibrium between Ghanaian exports and imports. The Husted econometric model and the error correction model are employed to model the relationships between exports and imports.

Data

This study employed nominal annual time series data for the period of 1948 to 2012. The datasets were obtained from the statistics database of World Trade Organization (WTO). Specifically, total merchandise annual imports and exports data (measured in US $ value) of Ghana were used for the study. The variables of study are transformed into natural log form prior to the estimation process.

Data Analysis Techniques

Numerous tests have been developed and applied to time series data in order to test for the existence of a unit root. This section discusses commonly used test for stationarity such as the Augmented Dicky Fuller test and the Philips- Perron statistic. In addition, the Engle-Granger cointegration test is presented and sequentially utilized to model the export and import series for further examination. We also discuss the Husted econometric model and the error correction model that are employed in the study.

Unit Root Test

A series is considered non-stationary if it follows a unit root process, that is, it exhibits time varying characteristics (e.g. mean, variance and covariance). Alternatively, a stationary series is one that does not follow a unit root process. If a series is non stationary and the first difference of the series is stationary, then the series is said to contain a unit root or is referred to as integrated of the order one [I(1)] . In order to test for unit roots, the widely used Augmented Dickey Fuller test (ADF), is applied. Following Dickey and Fuller (1981), the ADF setup is specified as:

$$\Delta x_t = \delta_t + \eta t + k x_{t-1} + \sum_{k=1}^{n} \beta_k \Delta x_{t-k} + \varepsilon_t \qquad [1]$$

Where: Δx_t is the first-differenced (variable growth overtime) value, $k x_{t-1}$ is the first-lagged value and $\sum_{k=1}^{n} \beta_k \Delta x_{t-k}$ corresponds to the first to nth – lagged of first – differenced values of the series, x_i . ε_t is white noise error term.

However, the ADF test is unreliable in the presence of serial correlation and heteroskedasticity. A well known unit

root test that overcomes the possible weaknesses of the ADF test is the Philips-Perron statistic or test (PP). Similarly, the PP test is computed as:

$$x_t = \delta_t + \eta_0 x_{t-1} + \eta_1 \Delta x_{t-1} + \ldots + k\Delta x_{t-k} + u_t \quad [2]$$

Granger Causality

If changes in X precede changes in Y, we can rule out Y causing X. Based on this, we can estimate a regression of the following form:

$$Y_t = \beta_o + \sum \beta_j Y_{t-j} + \sum c_j X_{t-j} + u_t \quad [3]$$

If past values of X help determine current values of Y, we say X Granger causes Y. The test of H0: ci = 0 can be undertaken with an F test. The number of lags may be chosen using the Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC).

Cointegration Analysis

Cointegration refers to the linear combination of integrated (i.e. non stationary) variables that is stationary. For cointegration to exist, between two variables, the variables should individually have a unit root (i.e. non stationary) or integrated of the same order. For example, integrated of the order one [I(1)]. In order to test for cointegration, the Engle and Granger (1987) two-step procedure is employed to analyze the long run relationship between the exports and imports. First, the long run relationship between exports and imports is estimated in the equation below using the ordinary least squares technique.

$$y_t = \alpha + \beta x_t + v_t \quad [4]$$

And the residuals from this cointegration regression, defined by:

$$\hat{v}_t = y_t - (\hat{\alpha} + \hat{\beta} x_t) \quad [5]$$

Where: β is the equilibrium parameter, α is intercept and v_t is the error term or residual.

In a second step, a Dickey Fuller test is conducted on the estimated residuals as follows:

$$\Delta v_t = k v_{t-1} + \sum_{k=1}^{n} \beta_k \Delta v_{t-k} + \varepsilon_t \quad [6]$$

When the null hypothesis of no cointegration is rejected, it implies that the residuals in the above equation are stationary. The rejection of the null hypothesis indicates that the imports and export series are cointegrated. The statistical inferences are based on MacKinnon (1991) critical values.

Husted's Econometric Model

Husted (1992) develops a framework that shows the long run relationship between imports and exports. His starting point is a current budget constraint for a country and is given by:

$$C_o = Y_o + B_o - I_o - (1+r)B_{-1} \quad [7]$$

Where: C_o is the current consumption, Y_o is output, I_o is investment, r is the one-period world interest rate, B_o is the international borrowing and $(1+r)B_{-1}$ is the initial debt. Based on the budget constraint equation, Husted (1992) makes several assumptions to derive the following testable model:

$$\text{Export}_t = a + b\text{Import} + e_t \quad [8]$$

Arize (2002) suggest an alternative approach to Husted model, which is given by:

$$\text{Import}_t = a + b\text{Export} + e_t \quad [9]$$

For an economy to maintain inter-temporal budget constraint in the context of this model, two conditions must be met: a cointegration relationship must exist between the import and export series; the slope coefficients from the cointegration equations should also be statistically equal to 1 (Erbaykal & Karaca, 2008).

Error Correction Model

A simple homogeneous Granger and Lee (1989) Error Correction Model data generating process can be specified as follows:

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 (y - x)_{t-1} + \varepsilon_{2,t} \quad [10]$$

$\varepsilon_{2,t} \sim N(0, \delta^2)$

where y and x are export and import series. If y and x are typically I (1) processes that are cointegrated, then there exists an equilibrium relationship between y and x which is defined by an error correction term ($(y-x)_{t-1}$). The long run dynamics captured by the error correction term are implicitly symmetric.

Results and Discussion

In this study, both the ADF and PP tests are used to model stationarity of the import and export series. The empirical results of the ADF and PP tests on each variable in levels and in first differences are presented in Table 1.

Table 1: ADF Unit Root Test and Philips-Perron Unit Root Test

ADF Unit Root Test				
Variables	**Levels**	**P-Value**	**First Difference**	**P-Value**
ln Exports	-0.8653	0.9511	-3.5306	0.0463*
ln Imports	-0.7592	0.9604	-4.3420	0.01**
Philips-Perron Unit Root Test				
Variables	**Levels**	**P-Value**	**First Difference**	**P-Value**
ln Exports	-6.2605	0.7468	-82.3552	0.01**
ln Imports	-14.1168	0.2735	-75.8983	0.01**

*'***', '**' and '*' denotes 0.1%, 1% and 5% levels of significance respectively.*

With regards to the variables in levels the null hypothesis of non-stationarity cannot be rejected for any of the series on the basis of the ADF and PP tests. These findings suggest that the levels of the series are non-stationary. Applying the same unit root test to the first differenced series, they are found to be stationary, as null hypothesis of non-stationarity is rejected on the basis of the p-values. These results suggest that the variables are individually integrated of order one. For cointegration to exist, the two variables should be I(1) processes. Given that the variables are integrated of the same order, we proceed to test for cointegration between the exports and imports using the Engle-Granger two-step procedure. The results for the cointegration tests are presented in Table 2.

Table 2: Cointegration Test Results

Model	**R^2**	**ADF**	**P-Value**
Residual i. Exports = f(Imports)	0.9572	-4.2019	0.01**
Residual ii. Imports = f(Exports)	0.9572	-3.9653	0.0168**

*'***', '**' and '*' denotes 0.1%, 1% and 5% levels of significance respectively.*

ADF test statistics for both error equations have smaller p-values as indicated. This leads to the rejection of non-stationarity of the residuals. These findings suggest that both export and import series are cointegrated.

Table 3 presents the results of Wald test which was used to examine whether the slope coefficients are statistically equal to one. The magnitude of the slope coefficients from equations [8] and [9] i.e. either $b > 1$ or $b < 1$ show how much a country imports per dollar unit of export and vice versa.

The cointegration regressions in Table 3 suggest that a 1 percent increase in dollar-denominated imports raises the long run value of dollar-denominated exports by 0.81 percent (see equation i), while a 1 percent rise in exports elicits 1.18 percent increase in imports (see equation ii). These observations suggest that Ghana's exports responsiveness to imports is low but imports responsiveness to exports is high. This situation implies persistence in the trade deficit and that one sure way of curbing the deficit is to re-order the relationship between imports and exports with a view to reducing imports demand. Furthermore, there seems to be a positive relationship between exports and imports in the long run, as indicated by the estimated cointegrating regressions for both cases, which are 0.81 in (i) and 1.18 in (ii). Given that the estimated cointegrating vectors are positive and close to unity, these findings are interpreted as Ghana's adherence to the international budget constraint. However, in order to confirm this assertion, it is important to conduct the restricted cointegration test to examine the one-on-one ordering between imports and exports. Erbaykal & Karaca (2008) assert that when there is a cointegration relationship between imports and exports series, it is also necessary that the slope coefficients obtained from the equations derived from these series be statistically equal to 1. However, the F statistics lies within the rejection region of 0.1 percent significance level. This leads to the rejection of the null hypothesis that each slope coefficient for both cointegration equations is statistically equal to 1. These findings are consistent with the findings of Erbaykal & Karaca (2008), and Narayan and Narayan (2005).

Using the Granger causality test, we test for causation between exports and imports in the Granger sense. The result of the Granger causality test is displayed in Table 4. The p-value of 0.2011 fails to reject the null hypothesis that imports granger-causes export, whilst the p-value of 0.0079 rejects the null hypothesis that export granger-causes import at the 1% significant level. In summary a unidirectional causation is supported between the exports and imports.

Table 3: Cointegration Equations and Wald Test Results

Equation	**Coefficient $\hat{\beta}$**	**Null Hypothesis**	**F Statistic**	**P-Value**
i. Exports = 1.18 + 0.81 Im	0.81	$H_o : \hat{\beta}_{ex} = 1$	79.41	9.2×10^{-13}***
ii. Imports = -1.10 + 1.18Ex	1.18	$H_o : \hat{\beta}_{im} = 1$	34.18	1.9×10^{-7}***

*'***', '**' and '*' denotes 0.1%, 1% and 5% levels of significance respectively.*

Table 4: Granger Causality Test Results

Model	F-test	P-Value
Exports = f(Imports)	1.6703	0.2011
Imports = f(Exports)	7.5544	0.0079**

*'***', '**' and '*' denotes 0.1%, 1% and 5% levels of significance respectively.*

The result of the error correction model is presented in Table 5. The error correction equation is specified below. Noticeably, changes in imports have both immediate and long term effect on exports. ECT is the error correction term.

Table 5: Error Correction Modeling Results

Response Variable: (Δ ln Exports)

Variable	Estimate	Std. Error	P-Value
Intercept	0.0178	0.0215	0.4092
Δ ln Imports	0.5627	0.0855	1.21×10^{-8}***
ECT_{t-1}	-0.3225	0.1007	0.0022**
Breusch Pagan Test		0.7287	0.6946
Shapiro Wilk Normality Test		0.9832	0.5338
Durbin-Watson Test		2.0142	0.5049

*'***', '**' and '*' denotes 0.1%, 1% and 5% levels of significance respectively.*

$$\Delta \text{ In Exports}_t = 0.0178 + 0.563(\Delta \text{ In Imports}_t) - 0.322\ ECT_{t-1} + \varepsilon$$

In the short run, 1 % increase in the imports will significantly result in 0.56% increase in exports, suggesting that the exports responsiveness to imports is low. This situation implies persistence in the trade deficit and that option of curbing the deficit is to re-order the relationship between imports and exports with a view to reducing imports demand. As the results show, 32% of the disequilibrium in the exports and imports in the previous time period is eliminated in subsequent time period. The negative coefficient on the error correction term indicates that if export is above its long run equilibrium relationship with imports, it will decrease to return to equilibrium. The error correction term in the model is statistically significant, confirming the existence of long run steady-state equilibrium between exports and imports. The short term disequilibrium that is adjusted by the error correction term could result from structural or institutional break or macroeconomic policy failures among others.

The diagnostic statistics indicate that model assumptions are not violated. Noticeably, all the p-values for the various test (Breusch-Pagan test, Shapiro-Wilk Normality test and Durbin-Watson test) used in evaluation of model assumptions are large. This is in support of the fact that all the assumptions hold and the model satisfied the conditions of no autocorrelation, no heteroskedasticity and the normality of the disturbance terms.

Conclusion

Using cointegration techniques, the study investigated the long run relationship between nominal exports and imports for the Ghanaian economy for the period of 1948 to 2012. The results of the ADF and PP tests for the order of integration of the exports and imports indicated that the exports and imports are non stationary and integrated of the order one. Using the Engle-Granger two-stage cointegration procedures, we found that Ghana's exports and imports will converge in the long run. However, the slope coefficients obtained from the cointegration regression equations derived from exports and imports series is statistically not equal to one. In the light of the assertions of Erbaykal & Karaca (2008), this suggests that it is doubtful that the foreign deficit of Ghana is sustainable. Though Ghana's past macroeconomic policies have been effective in bringing its imports and exports into a long run equilibrium, the sufficient condition for sustainability of foreign deficit of Ghana has not been met. The policy implication for Ghana is that trade policy focus should be on reducing imports and raising exports in order to control the trade balance (deficits) at least in the short run. Direction for future research will be to investigate the long run equilibrium of the export import relationship using threshold cointegration techniques.

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MEASURING TECHNICAL, ECONOMIC AND ALLOCATIVE EFFICIENCY OF MAIZE PRODUCTION IN SUBSISTENCE FARMING: EVIDENCE FROM THE CENTRAL RIFT VALLEY OF ETHIOPIA

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Abstract: *This study measured the technical, allocative and economic efficiencies of maize production in the central rift valley of Ethiopia using cross sectional data collected from randomly selected 138 sample households. The estimated result showed that the mean technical, allocative and economic efficiencies were 84.87%, 37.47% and 31.62% respectively. Among factors hypothesized to determine the level of efficiency scores, education was found to determine allocative and economic efficiencies of farmers positively while the frequency of extension contact had a positive relationship with technical efficiency and it was negatively related to both allocative and economic efficiencies. Credit was also found to influence technical and economic efficiencies positively and distance to market affected technical efficiency negatively. The model output also indicated that soil fertility was among significant variables in determining technical efficiency in the study area. The result indicated that there is a room to increase the efficiency of maize producers in the study area.*

Keywords: *Maize, Efficiency, Cobb-Douglas, Stochastic Frontier, Tobit*
(JEL Classifications: C67, D24, D61, L23, Q12, Q18)

1. INTRODUCTION

Ethiopia is one of the most populous counties in Africa with the population of 73.75 million in 2007 with an annual growth rate of 2.6% CSA (2008). The projected figure for the year 2012 was 84.32 million CSA (2012). This growing population requires better economic performance than ever before at least to insure food security. Yet achieving higher and sustained agricultural productivity growth remains one of the greatest challenges facing the nation Spielman *et al*. (2010) and the country is known for being the recipient of more food aid than any other country in the world Kirwan and Margaret (2007). As indicated by Goshu *et al*. (2012), the depth and intensity of food insecurity in the country are high.

In the country, agriculture contributes about 41% of GDP, employs 83% of total labor force and contributes 90% of exports EEA (2012). However, its performance has been disappointing and food production has been lagging behind population growth. For instance, from the late 1980's to 2005, population has grown by 97%, but production has increased only by 59% EEA (2006). This incompatibility in the growth clearly requires the import of food and/or food aid unless the country improves its productivity by applying improved agricultural technologies and increases production efficiency Haji (2007).

Nevertheless, as indicated by Torkamani and Hardaker (1996), in areas where there is production inefficiency, trying to introduce a new technology may not have the anticipated impact if the existing knowledge is not efficient. Because, improvement in efficiency is a potential source of productivity growth and embarking on new technologies is meaningless unless the existing technology is used to its full potential Kalirajan *et al*. (1996). Thus, increasing the efficiency in production assumes greater significance in attaining potential output at the farm level Anuradha and Zala (2010). Therefore, it is important to determine if the actual production process follows the economic rationality criterion and, if not, by how much farmers are operating off the efficiency frontier Bonabana-Wabbi *et al*. (2012).

In a poor country such as Ethiopia where technology introduction and increasing inputs are hardly possible, the identification of the extent of inefficiencies in production given the existing technology and input levels are crucial and relevant policy issues Haji (2007). In line with this, a large number of studies on farm productivity in Ethiopia have found that inefficiency exists. Seyoum *et al*. (1998); Arega, *et al*. (2006); Haji and Andersson (2006); Haji (2007); Kassie and Holden (2007); Gelaw (2013) and Ahmed *et al*. (2014) are few to mention. However, the majority of farm efficiency studies in agricultural economics focus on Technical efficiency, which

is just one component of economic efficiency. In particular, no studies had been conducted in the area of economic efficiency of maize production in the study area. The extent, causes and possible remedies of inefficiency of smallholders are not yet given due attention. The purpose of this study is, therefore, to estimate the level of technical, allocative and economic efficiencies of maize producing farmers in Central Rift Valley of Ethiopia and to identify factors that determine efficiencies of smallholder farmers in maize production in the study area. This study also has policy implications because it not only provides empirical measures of different efficiency indices, but also identifies key variables that are determining the efficiency scores.

As far as maize production is concerned, it is a significant contributor to the economic and social development of the country. As indicated in CSA (2011) it is a cereal with the largest smallholder coverage with 7.96 million holders, as the vast majority of Ethiopian farmers are small-scale producers, it has a significant impact on the livelihood of smallholders in Ethiopia Rashid (2010). This role can be expanded as maize is the crop with the highest current and potential yield from available inputs, at 2.2 tons per ha in 2008/09 with a potential for 4.7 tons per ha according to field trials IFPRI (2010). According to CSA (2011), in 2010/11 production year, maize covered 1.96 million ha of land at national level. The total output of maize in the same year at national level was 49.86 million qt. This accounted for about 25% of the total crop production in the same year.

2. ANALYTICAL FRAMEWORK

2.1 Concept and Measures of Efficiency

Economic efficiency refers to the complete minimization of economic waste either, for any observed level of output, inputs are minimized, or for any observed level of inputs, outputs are maximized, or some combination of the two Coelli *et al*. (1998). Economic efficiency (EE) consists Technical and allocative efficiencies. Technical efficiency (TE) measures the ability of a farmer to produce the maximum feasible output from a given bundle of inputs or produce a given level of output using the minimum feasible amounts of inputs Bradley *et al*. (2014). According to Koopmans (1951) a producer is technically efficient if, and only if, it is impossible to produce more of any output without producing less of some other output or using more of some input. As indicated by Fraser and Cordina (1999), TE can also be defined in terms of the production function that relates the level of various inputs. It is a measure of a farm's success in producing maximum output from a given set of input. According to Farrell and Fieldhouse

Table 1. Recent Studies regarding the Efficiency of Agricultural Products

	Author(s)	Country	Mean Efficiency [a]	Data set	Approach
1	Udayanganie *et al*. (2006)	Sri Lanka	TE = 0.37	Cross Sectional	SFA
2	Karthick *et al*. (2013)	India	TE = 0.841	Cross Sectional	SFA
3	Hardwick (2009)	Malawi	TE = 0.53 AE = 46 EE= 0.38	Cross Sectional	SFA
4	Boubaker (2007)	Tunisia	TE =0.67	Cross Sectional	SFA
5	Berdikul *et al*. (2014)	US	TE = 0.84	Cross Sectional	SFA
6	Gelaw (2013)	Ethiopia	TE = 0.628	Cross Sectional	SFA
7	Stefanos *et al*. (2012)	EU	TE_{VRS} =0.664	Cross Sectional	DAE
8	Krishna *et al*. (2014)	Philippines	TE = 0.54.	Panel Data	SFA
9	Bonabana *et al*. (2011)	Uganda	TE = 0.697	Cross Sectional	SFA
10	Boubaker *et al*. (2012)	Tunisia.	TE = 0. 77	Cross Sectional	SFA
11	Kularatne *et al*. (2012)	Sri Lanka	TE = 0.72	Cross Sectional	SFA
12	Jean-Paul *et al*. (2005)	Gambia	TE =0.952 AE =0.567	Cross Sectional	DAE

Legend

AE, Allocative efficiency
TE, technical efficiency
EE, economic efficiency
DAE, Data Envelop Analysis
SFA, stochastic frontier analysis
VRS, variable return to scale
CRS, constant return to scale

(1962), Allocative efficiency (AE) involves the selection of an input mix that allocates factors to their highest valued uses and thus introduces the opportunity cost of factor inputs to the measurement of productive efficiency. TE and AE are then combined to give EE Coelli *et al*. (1998). A firm that is not efficient is wasting inputs and hence the possibility of reducing average costs Awudu and Hendrik (2007).

Parametric and nonparametric techniques are the two approaches that have been used to obtain estimates of farm efficiencies. The choice of which approaches to use is unclear Olesen *et al*. (1996). Studies on efficiency measurements argue that a researcher can safely choose any of the methods since there are no significant differences between the estimated results Abdourhmane *et al*. (2001).

The nonparametric method initiated as Data Envelopment Analysis (DEA) by Charnes *et al*. (1978) builds on the individual firm evaluation of Farrell (1957). In this case, Efficiency is defined in a relative sense, as the distance between observed input–output combinations and a best practice frontier Färe *et al*. (1994). DEA is nonparametric and does not require any parametric assumptions on the structure of technology or the inefficiency term Amin and Michael (2011). The nonparametric approach has the advantage of imposing no a priori parametric restrictions on the underlying technology. They also have some drawbacks: the traditional DEA approach does not have a solid statistical foundation behind it and is sensitive to outliers. Indeed, a deterministic frontiers statistical theory is currently accessible Simar and Wilson (2000) and Cazals *et al*. (2002) developed a robust nonparametric estimator.

The parametric approach consists of specifying and estimating a parametric production function representing the best available technology Jean-Paul *et al*. (2005). Stochastic frontier approach (SFA) is one of the parametric approaches used to measure farm efficiency. The primary characteristic of a stochastic frontier model is that it envelops rather than intersects data Kumbhakar and Knox Lovell (2000). While a typical least squares regression consists of a deterministic component and a random noise component, the stochastic frontier model is based on the premise that a production frontier cannot be generated from the deterministic component of a least squares linear regression because not all firms operate efficiently Matthew and Danny (2007). This approach provides a convenient framework for conducting hypothesis testing. Its main weakness is the assumption of an explicit functional form for the technology and the distribution of the inefficiency terms Hjalmarsson *et al*. (1996).

2.2 Specification and Estimation of the Empirical Model

This study employed stochastic efficiency decomposition method of Bravo-Ureta and Rieger (1991) to decompose TE, EE and AE. SFA was used for its ability to distinguish inefficiency from deviations that are caused by factors beyond the control of farmers. Farmers possess the potential to achieve both TE and AE in farm enterprises, but inefficiency may arise due to a variety of factors, some of which are beyond the control of the farmers Ogunniyi (2008). The assumption that all deviations from the frontier are associated with inefficiency, as assumed in DEA, is difficult to accept, given the inherent variability of agricultural production due to many factors like climatic hazards, plant pathology and insect Coelli (1995) and Kirkley *et al*. (1995).

SFA was first proposed in independent papers by Aigner *et al*. (1977) and Meeusen and van den Broeck (1977). This model can be Vanressed in the following form.

$$Y_i = F(X_i;\beta)\exp(V_i - U_i) \quad i = 1, 2, 3... \ n \qquad (1)$$

Where is the production of the i^{th} farmer, X_i is a vector of inputs used by the i^{th} farmer, is a vector of unknown parameters, V_i is a random variable which is assumed to be N () and independent of the U_i which is nonnegative random variable assumed to account for technical inefficiency in production. The variance parameters for Maximum Likelihood Estimates are expressed in terms of the parameterization

$\sigma_s^2 = \sigma_v^2 + \sigma^2$ and

$$\gamma = \sigma^2 / \sigma_s^2 = \frac{\sigma^2}{\sigma_v^2 + \sigma^2} \qquad (2)$$

Where,

σ^2 is the variance parameter that denotes deviation from the frontier due to inefficiency

σ^2_v is the variance parameter that denotes deviation from the frontier due to noise

σ_s^2 is the variance parameter that denotes the total deviation from the frontier

The g parameter has a value between 0 and 1. A value of g of zero indicates that the deviations from the frontier are due entirely to noise, while a value of one would indicate that all deviations are due to inefficiency. Battese and Coelli (1988) pointed out that in the prediction TE which is the best predictor of exp ($-U_i$) is obtained by:

$$E\left[\exp(-U_i)\middle/ e_i\right] = \frac{1+\phi(\sigma_v + \gamma e_i/\sigma_v)}{1-\phi(\gamma e_i/\sigma_v)}\exp(\gamma e_i + \sigma^2/2) \qquad (3)$$

Where

$e_i = \ln(Y_i) - X_i b$

f(.) is the density function of a standard normal random variables.

2.3 Selection of the Functional Form

As SFA requires a prior specification of the functional form, given the assumption of self-duality Xu and Jeffrey (1998), Cobb-Douglas production function was selected. This nature of the Cobb-Douglas production and cost functions provides the computational advantage in obtaining the estimates of TA and EE. As indicated by Arega and Rashid (2005), inadequate farm level price data together with little or no input price variation across farms in Ethiopia precludes any

econometric estimation of a cost function. A Cobb–Douglas production is also preferable due to collinearity and loss of degrees of freedom caused by the multiple interaction terms included in the translog function. In addition, variable returns to scale are likely to be rare in subsistence farming, making the homothetic assumption appropriate Catherine and Jeffrey (2013). As indicated by Bravo-Ureta and Evenson (1994) this functional form has also been widely used in farm efficiency analyses for both developing and developed countries. A study done by Kopp and Smith (1980) suggests that functional specification has only a small impact on measured efficiency. Ahmad and Bravo-Ureta (1996) also indicated that efficiency measures do not appear to be affected by the choice of the functional form.

Sharma *et al*. (1999) indicated that the corresponding dual cost frontier of the Cobb Douglas production function could be rewritten as:

$$C_i = C\ (W_i,\ Y_i^*;\ \alpha) \tag{4}$$

Where i refers to the i[th] sample household; C_i is the minimum cost of production; W_i denotes input prices; Y_i* refers to farm output which is adjusted for noise v_i and α's are parameters to be estimated. To estimate the minimum cost frontier analytically from the production function, the solution for the minimization problem given in Equation 5 is essential Arega and Rashid (2005).

$$\underset{x}{Min} C = \sum_n \omega_n x_n$$

$$\text{Subject to} \quad Y_k^{i*} = \hat{A} \prod_n x_n \hat{\beta} n \tag{5}$$

Where $\hat{A} = \exp(\hat{B}_0)$
ω_n = input prices
$\hat{\beta}$ = parameter estimates of the stochastic production function and
Y_k^{i*} = input oriented adjusted output level from Equation 1.

The following dual cost function will be found by substituting the cost minimizing input quantities into Equation 5.

$$C(Y_k^{i*}, w) = H Y_k^{i*\mu} \prod_n \omega_n^{\alpha_n} \tag{5}$$

Where $\alpha_n = \mu \hat{\beta}_n$, $\mu = (\sum_n \hat{\beta}_n)^{-1}$, $H = \frac{1}{\mu}(\hat{A} \prod_n \hat{\beta}_n^{\hat{\beta}_n})^{-\mu}$

The economically efficient input vector for the i[th] firmer derived by applying Shepard's Lemma and substituting the firms input price and adjusted output level into the resulting system of input demand equations.

$$\frac{\alpha C_i}{\alpha \omega_n} = X_i^e(\omega_i, Y_i^{i*}; \theta) \tag{6}$$

Where θ is the vector of parameters and n = 1, 2, 3, ..., N inputs.

The observed, technically and economically efficient cost of production of the i[th] farm are equal to, $\omega_i' X_i$, $\omega_i' X_i^t$ and $\omega_i' X_i^t$. Those cost measures are used to compute technically and economically efficient indices of the i[th] farmer as follows:

$$TE_i = \omega_i' X_i^t \Big/ \omega_i' X_i \tag{7}$$

$$EE_i = \omega' X_i^t \Big/ \omega_i' X_i \tag{8}$$

Following Farrell (1957), allocative efficiency index of the i[th] farmer can be derived from Equations 7 and 8 as follows;

$$AE_i = EE_i \Big/ TE_i = \omega_i' X_i^t \Big/ \omega_i' X^t{}_i \tag{9}$$

2.4 Determinants of Efficiency Scores

To determine the relationship between socioeconomic and institutional factors and the computed indices of efficiencies, a two-limit tobit model was utilized. The model was adopted because the efficiency scores are double truncated at 0 and 1 as the scores lie within the range of 0 to 1 Greene (1991). Estimation with OLS regression of the efficiency score would lead to a biased parameter estimate since OLS regression assumes normal and homoscedastic distribution of the disturbance and the dependent variable Greene (2003). The following relationship expresses the stochastic model underlying tobit Tobin (1958):

$$y_i^* = \beta_0 + \sum \beta_m z_{jm} + \mu_j \tag{10}$$

Where y_i^* = latent variable representing the efficiency scores of farm j,

β = a vector of unknown parameters,

Z_{jm} = a vector of explanatory variables m (m = 1, 2, ..., k) for farm j and

μ_j = an error term that is independently and normally distributed with mean zero and variance σ^2

Denoting y_i as the observed variables,

$$y_i = \begin{cases} 1 & if\ y_i^* \geq 1 \\ y_j^* & if\ \ 0 < y_i^* < 1 \\ 0 & if\ y_i^* \leq 0 \end{cases} \tag{11}$$

Following Maddala (1999), the likelihood function of this model is given by:

$$L(\beta,\sigma/y_j,.Z_jL_{1j},L_{2j}) = \prod_{y_i=y_{1j}} \varphi\left(\frac{L_{1j}-\beta'Z_j}{\sigma}\right)\prod_{y_i=y^*_j} \frac{1}{\sigma}\phi\left(\frac{y_j-\beta'Z_j}{\sigma}\right)\prod_{y_i=L_{2j}} 1-\varphi\left(\frac{L_{2j}-\beta'Z_j}{\sigma}\right)$$

(12)

Where $L_{1j} = 0$ (lower limit), $L_{2j} = 1$ (upper limit); and $\phi(.)$ and $\varphi(.)$ are normal and standard density functions. In practice, since the log function is monotonically increasing function, it is simpler to work with log of likelihood function rather than likelihood function and the maximum values of these two functions are the same Greene (2003).

2.5 Description of the Study Area

This study was undertaken in the central rift valley of Ethiopia, explicitly in Arsi Negelle district. Geographically, the district is located from 38^0 25' E to 38^0 54' E longitude and 07^0 09' to 07^0 42' N latitude. Except for the Southeastern part, most of the district's elevation is between 1500 and 2300 meters. The topography of the area is a gentle slope or flat and the soils of the area are lightweight, friable loam and clay loam. The main crops grown in the area include wheat, maize, teff, barley, sorghum, onion and potato. Annual crops accounted for 95% of all croplands in the district. *Andosol* soil type covers about 52.2% of the district, while *Nitosols* cover the remaining 47.8%. The temperature of the area ranges from 16°c to 25°c and annual rainfall ranges between 500-1150 mm. Livestock are an important component of the farming system and a source of intermediate products in the district. The area is intensively cultivated and private grazing land is unavailable. Communal pasture and straw from crops are the main source of feed for livestock production. According to CSA (2012), the district has a total population of 303,223 of which 150,245 are male and 152,978 are females. The average family size for the district was 5.2 (5.3 for urban and 5.1 for rural).

2.6 Sampling Technique and Sample Size

A two stage random sampling technique was used to select sample households for this study. In the first stage, three kebeles that produce maize were selected randomly. In the second stage, 138 sample farmers were selected using a simple random sampling technique from each kebeles proportional to the total number of households of the kebeles.

3. EMPIRICAL RESULT

3.1 Socioeconomic Characteristics of the Sample Respondent

The mean age of the sample farmers was about 42 years with a range of 22 to 70 years. The family size of the sample farmers ranged from one to 13 with a mean of 5.73 person per household. Concerning their literacy level, only 6.52% of the household heads were illiterate while the remaining 93.48% of the respondents were at least capable of reading and writing. Out of the total sample household heads, 63.04% have attained formal education while 30.43% of them were able to read and write though they did not attain formal education. Regarding the sex of respondents, 93.48% of the sample households were male-headed households.

The minimum land holding of the respondents was 0.50 ha while the maximum size was 4.25 ha. The mean land owned by the sample farmers was 1.81 ha. About 11% of the sample farmers owned land not more than 0.5 ha whereas 18.12% of the sample farmers had more than two ha of land.

The farming system in Ethiopia is mainly based on plough by animal draught power that has created complementarity between crop and livestock production for centuries. About 46% of the sample farmers had a pair of oxen and 12.32% of the sample farmers had two pair of oxen. On average, respondent farmers owned livestock of 8.07 TLU ranging from zero to 81.11 TLU.

The survey result showed that 44.20% of the sample farmers accessed credit from different sources. From the total of sample household interviewed for this study, 47.10% of them indicated that they have received training which is specific to maize production. All of the sample respondents reported that they received extension services though the frequency of contact differs. About 65% of respondents have indicated that they had extension contact on a weekly basis. While nearly a quarter of the sample respondents had contact with extension workers twice a month.

3.2 Econometric Results

3.2.1 Production and Cost Function Parameter Estimates

The dependent variable of the estimated model was maize output (qt) produced in 2011/12 production season and the input variables used in the analysis were area under maize (ha), animal draught power (oxen-days), labour (man-day in man-equivalent), quantity of seed (kg) and inorganic fertilizers specifically DAP and urea (kg). To include those farmers who did not apply DAP and urea in the estimation of the frontier a very small value that approach zero was assigned for non-users of fertilizer.

Prior to model estimation, a test was made for multicollinearity among the explanatory variables using the Variance Inflation Factor (VIF). In a production function analysis, correlation between some of the explanatory variables is expected and collinearity among economic variables is an inherent and age-old problem leading to problems of multicollinearity. However, the values of VIF for all variables entered into the models were below 10 (Appendix Tables 1 and 2), which indicate the absence of multicollinearity among the variables.

Efficiency score are sensitive to specification errors that may lead to hetroskedasticity. As measures of inefficiency in SFA are based on residuals derived from the estimation of a frontier, those residuals are sensitive to specification errors that may passed on to the efficiency scores Hadri *et al* (2003). Breusch-pagan test was then used to detect the presence of

hetroskedasticity and the test indicated that there was no problem of hetroskedasticity in the models.

The result of the model showed that DAP, area under maize, oxen power, labour and seed had positive and significant effect on the level of output. The increase in these inputs would increase output of maize (Table 2).

Table 1. Estimates of the Cobb Douglas frontier production function

Variables	Coefficients	Std. Err.
DAP	0.05036***	0.0077
Urea	0.00471	0.0291
Seed	0.52897***	0.0843
Land	0.23204**	0.0906
Labour	0.12092*	0.0598
Oxen	0.17006**	0.0595
Constant	1.06943**	0.2988
Lambda	1.94304***	0. 0520
Sigma square	0.05976***	0.0125

Source: own data
****,** and * represents significant levels at 1%, 5% and 10% respectively*

The ratio of the standard error of u (σ_u) to the standard error of v (σ_v), known as lambda (λ), is 1.943. Based on λ, gamma (γ) which measures the effect of technical inefficiency in the variation of observed can be derived (i.e. $\gamma = \lambda^2/[1+\lambda^2]$) Bravo-Ureta and Pinheiro (1997). The estimated value of γ is 0.7906 that indicates 79.06% of total variation in farm output is due to technical inefficacy.

The dual frontier cost function derived analytically from the stochastic production frontier shown in Table 2 using Equation 5 is given as:

$$\ln C_i = 4.087 + 0.903 \ln Y_i^* + 0.2096 \ln \omega_{land} + 0.478 \ln \omega_{seed} + 0.0455 \ln \omega_{dap} + 0.004 \ln \omega_{uria} + 0.154 \ln \omega_{\alpha} + 0.109 \ln \omega_{labour} \quad (13)$$

Where C is the minimum cost of production of the i^{th} farmer, Y^* refers to the index of output adjusted for any statistical noise and scale effects and stands for input prices.

3.2.2 Tests of Hypothesis

Before proceeding to the estimation of the parameters from which individual level of efficiencies are estimated, it is essential to examine various assumptions related to the model specification. To do this, two hypotheses were tested. The first test was to verify whether there exists considerable inefficiency among farmers in the production of maize in the study area (to examine whether the average production function (OLS) best fits the data). The other hypothesis that was tested was that all coefficients of the inefficiency effect variables are simultaneously equal to zero. (i.e H_o: $= \delta_0 = \delta_1 = \delta_2 \ldots = \delta_{13} = 0$). The test was done based on the log likelihood ratio test (Table 3) which can be specified as:

$$LR = \lambda = -2\ln[L(H_0)/L(H_1)]$$
$$\lambda = -2[\ln L(H_0) - \ln L(H_1)] \quad (15)$$

The λ value obtained from the log likelihood functions of the average response function and the SFA was found to be greater than the critical value. Hence, the null hypothesis that states the average response function (OLS) is an adequate representation of the data was rejected and the alternative hypothesis that stated there exists considerable inefficiency among sample farmers was accepted. The other hypothesis was also tested in the same way by calculating the λ value using the value of the log likelihood function under the SFA (without explanatory variables of inefficiency effects, (H_0)) and the full frontier model with variables that are supposed to determine the inefficiency level of each farmer, (H_1). The λ value obtained was again higher than the critical c^2 value at the degree of freedom equal to the number of restrictions. As a result, the null hypothesis is rejected in favour of the alternative hypothesis that the explanatory variables associated with the inefficiency effects model are simultaneously different from zero.

3.2.3 Efficiency Scores

The model output presented in Table 3 indicates that farmers in the study area were relatively good in TE than AE or EE. The mean TE was found to be 84.87%. This means in the short run there are opportunities for reducing input used for maize production proportionally by 15.13% to produce the current level of output.

Table 3. Summary of descriptive statistics of efficiency measures

Type of efficiency	Minimum	Maximum	Mean	Std. Deviation
TE	0.561	0.974	0.84868	0.0819
AE	0.187	0.553	0.37472	0.0555
EE	0.164	0.504	0.31620	0.0456

Source: own data

The mean AE of farmers in the study area was 37.47% indicating there is a need to improve the present level of AE. The estimates depicted that the farmers have ample opportunities to increase their AE. For instance, farmer with an average level of AE would enjoy a cost saving of about 32.24% derived from (1 – 0.37472/0.553)*100 to attain the level of the most efficient farmer.

The mean EE showed that there was a significant level of inefficiency in the production process. That is the producer with an average EE level could reduce current average cost of production by 68.38% to achieve the potential minimum cost level without reducing output levels. It can be inferred that if farmers in the study area were to achieve 100% EE, they would experience substantial production cost saving of

Table 4. Frequency distribution of efficiency estimates of sample farmers

Efficiency level	TE		AE		EE	
	N	Percent	N	Percent	N	Percent
00-09.999	0	0.00	0	0.00	0	0.00
10-19.999	0	0.00	1	0.72	3	2.17
20-29.999	0	0.00	5	3.62	44	31.88
30-39.999	0	0.00	94	68.12	87	63.04
40-49.999	0	0.00	35	25.36	3	2.17
50-59.999	1	0.72	3	2.17	1	0.72
60-60.999	8	5.80	0	0.00	0	0.00
70-79.999	22	15.94	0	0.00	0	0.00
80-89.999	62	44.93	0	0.00	0	0.00
90-99.999	45	32.61	0	0.00	0	0.00

Source: own data

68.38%. This implies that the reduction in cost of production through eliminating resource use inefficiency could add about 68.38% of the production cost to their annual income. The result also indicated that the farmer with an average level of EE would enjoy a cost saving of about 37.26% derived from (1-0.31620/0.504)*100 to attain the level of the most efficient farmer. From these results, it is observable that *EE* could be improved significantly, and that allocative inefficiency constitutes a more serious problem than technical inefficiency. The level of TE, AE and EE at which sample households operate is presented in Table 4.

3.2.4 Determinants of Efficiency Differentials among Farmers

After measuring levels of efficiency and determining the presence of efficiency difference among farmers, finding out factors causing efficiency disparity among them was the next most important step of this study. To see this, efficiency levels of sample farmers were regressed on factors that were expected to affect efficiency levels. These variables were selected based on previous studies and socioeconomic conditions of the study area (Table 5).

Table 5. Maximum likelihood estimates of the tobit model

Variables	TE		AE		EE	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Education	0.00448	0.00482	0.0087***	0.0032	0.00937***	0.00264
Family size(adult-eqt)	-0.00363	0.00323	0.0032	0.0022	0.00122	0.00177
Experience	0.00005	0.00062	0.0006	0.0004	0.00052	0.00034
Cultivated land	-0.00018	0.00769	-0.0051	0.0051	-0.00415	0.00421
Crop rotation	0.01337	0.01215	-0.0061	0.0081	0.00185	0.00665
Livestock (TLU)	0.00012	0.00090	0.0004	0.0006	0.00037	0.00049
Extension contact	0.00065*	0.00034	-0.0011**	0.0002	-0.00056***	0.00018
Training	-0.01153	0.01394	-0.0074	0.0093	-0.00989	0.00763
Credit	0.04747***	0.01490	0.0064	0.0100	0.02458***	0.00815
Distance to market	-0.00730**	0.00349	0.0021	0.0023	-0.00126	0.00191
Home to farm distance	0.00418	0.00663	-0.0023	0.0044	0.00002	0.00363
Off/non-farm activity	0.02416	0.01451	-0.0041	0.0097	0.00461	0.00794
Soil fertility	0.00731*	0.01661	0.0097	0.0111	0.00741	0.00909
Cons	0.79409***	0.03675	0.3806***	0.0246	0.29721**	0.02012

Source: own data

****,** and * represents significant levels at 1%, 5% and 10% respectively*

The coefficient for educational level was significant and was positively related to AE and EE at one percent. The positive sign indicates that an increase in human capital enhances the efficiency of farmers. Similar results were obtained in the works of Himayatullah and Imranullah (2011). Ahmed *et al*. (2001) indicated that education enhances farmers' ability to interpret and make good use of information about markets and prices in environments.

Frequency of extension contact had significant positive relationship with TE at 10% significance level. The frequent contact facilitates the flow of new ideas between the extension agent and the farmer, thereby giving a room for improvement in farm efficiency. Advisory service rendered to the farmers can help farmers to improve their average performance in the overall farming operation as the service widens the household's knowledge with regard to the use of productivity and input allocation. This result is also similar to those obtained by Jude *et al* (2011) and Mbanasor and Kalu (2008). However, the negative coefficient of extension contact, which is significant in AE and EE, indicates that efficiency in resource allocation is deteriorating as the frequency of extension contact increases. This may be due to the fact that extension workers are basically trained to solve the problem of food security and they have limited knowledge for appropriate resource allocation. In addition to this, as Haji (2007) indicated extension workers in the country devotes ample of their time for nonfarm activities such as credit application processing, input distributions and collection of loans and taxes.

The results also indicated that access to credit had a positive and statistically significant effect on both TE and EE at one percent significant level, which indicates that farmers with access to credit tend to exhibit higher levels of efficiency. Credit availability shifts the cash constraint outwards and enables farmers to make timely purchases of those inputs that they cannot provide from their own sources. This result is in line with the argument of Jude *et al*. (2011).

Distance from home to the nearest market was also significant in determining TE. Farmers far from markets are less technically efficient compared to their counterparts who reside nearby markets. This might be due to the fact that as farmers are located far from the market, there would be limited access to input and output markets and market information. Moreover, higher distance to market leads to higher transaction cost that reduces the benefits that accrue to the farmer. More importantly, longer distance from market discourages farmers from participating in market-oriented production.

The result also indicated that soil fertility was positively and significantly related to TE. This implies that farmers who allocated a land that was relatively fertile were good in TE. Therefore, decline in soil fertility could be taken as cause for significant output loss.

4. CONCLUSIONS AND RECOMMENDATIONS

The result of the analysis showed that maize producers in the study area are not operating at full TE, AE and EE levels and the result indicated that there is opportunity for maize producers to increase output at existing levels of inputs and minimize cost without compromising yield with present technologies available in the hands of producers. Those findings stresses the need for appropriate policy formulation and implementation to enable farmers reduce their inefficiency in production as this is expected to have multiplier effects ranging from farm productivity growth to economic growth and poverty reduction at the macro level.

Education was very important determining factor. Thus, government has to give due attention to training farmers through strengthening and establishing both formal and informal type of framers' education, farmers' training centers, technical and vocational schools, as farmer education would reduce both allocative and economic inefficiencies.

The study also revealed that distance to market has a significant influence on the TE of smallholders. Therefore, farmers have to get inputs easily and communication channels have to be improved to get a better level of TE.

Appropriate and adequate extension services should be provided. This could done by designing appropriate capacity building program to train additional development agents to reduce the existing higher ratio of farmers to development agents as well as to provide refreshment training for development agents.

Extension agents have to give due attention for appropriate input allocation and cost minimization in addition to their acknowledgeable effort to increase production. This calls for the need to more effective policy support for extension services and additional efforts need to be devoted to upgrade the skills and knowledge of the extension agents.

Better credit facility has to be produced via the establishment of adequate rural finance institutions and strengthening of the available micro-finance institutions and agricultural cooperatives to assist farmers in terms of financial support through credit are crucial to improve farm productivity.

Farmers have to work to improve the fertility status of the farm. Though it is difficult to achieve this in the short run, farmers can do this by applying fertilizers (organic or inorganic) that are suitable for the farm and practicing soil conservation practices.

Thus, the results of the study give information to policy makers and extension workers on how to better aim efforts to improve farm efficiency as the level and specific determinant for specific efficiency types are identified. This could contribute to compensation of high production cost, hence improve farm revenue, welfare and generally help agricultural as well as economic development. Those findings stresses the need for appropriate policy formulation and implementation to enable farmers reduce their inefficiency in production as this is expected to have multiplier effects ranging from farm productivity growth to economic growth and poverty reduction at macro level.

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Appendix Table 1. VIF for the variables entered in to the stochastic frontier model

Variable	VIF	1/VIF
Land	8.5	0.117647
Seed	8.32	0.120192
Oxen power	3	0.333333
Labour	2.84	0.352113
DAP	1.42	0.704225
Urea	1.29	0.775194
Mean VIF	4.228333	

Appendix Table 2. VLF for the continuous variables entered in to the efficiency model

Variable	VIF	1/VIF
cultivated land	2.26	0.442119
Livestock	2.2	0.454481
Family size	1.41	0.71001
Experience	1.27	0.784836
extension contact	1.22	0.820667
distance to mkt	1.22	0.820771
plot to home distance	1.07	0.933107
education	1.04	0.963307
Mean VIF	1.46	

Appendix Table 3. Contingency Coefficients of the dummy variables entered in to the efficiency model

	Crop rotation	Training	Credit	Soil fertility	Off/nonfarm activity
Crop rotation	1.0000				
Training	-0.0780	1.0000			
Credit	0.0104	-0.0341	1.0000		
Soil fertility	-0.0543	0.0923	0.1514	1.0000	
Off/nonfarm activity	-0.0950	0.0027	-0.1330	-0.1781	1.0000

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PRODUCE CERTIFICATION AND INCOME RISK MANAGEMENT STRATEGIES OF COCOA FARMING HOUSEHOLDS IN SOUTH-WEST NIGERIA

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Abstract: *Agricultural produce certification is synonymous to farm assurance of which cocoa certification is an example; dealing with issues of Good Agricultural, Environmental and Social Practices (GAP, GEP and GSP) in cocoa production. Essentially, GAP, GEP and GSP packages had in-built mechanism that can aid farmers mitigate factors that could lead to farm income risks in cocoa production. Consequently, this study examined the influence of cocoa certification on income risks of cocoa farming households in South-west Nigeria. A multistage sampling technique was used to select 180 cocoa farming households from whose heads data were obtained with interview schedule in Southwest Nigeria. Data were analyzed with Chi-square Statistic, Income Risk Management Diversification Index (IRD) and Mann-Whitney-U Test Statistic. Chi-square analysis shows that (52.3%) certified cocoa farming households employed more risk management strategies than (94.2%) uncertified cocoa farming households ($p < 0.01$).*

The Mann-Whitney-U test revealed a significant difference ($p > 0.05$) between the income risk management practices of certified and uncertified cocoa farming households. Therefore, produce certification has been helping cocoa farming households in mitigating farm income risk in cocoa production through the employment of diverse (risk) management strategies. Hence, stakeholders should intensify efforts in encouraging farming households to embrace (cocoa) produce certification.

Keywords: *cocoa, produce certification, South-west Nigeria, household, income risk.*

Introduction

Produce certification can be defined as a procedure of validating that a particular product satisfies specific requirements and ensuring that the produce meets acceptable standards for quality (EPA, 2012). According to European Union's scheme on food quality certification (EU, 2013), certification of agricultural produce ranges from compliance with required production standards and environmental protection. Cocoa certification programme ensures good agricultural, environmental and social practices (GAP, GEP and GSP) in cocoa produce production (i.e. cocoa beans production). This is to ensure sustainable cocoa production with increased productivity and produce quality as well as improved livelihood of smallholder cocoa producers. The farmers therefore benefits from a higher income based on the principle "a better price for a better product". Certification verifies that cocoa is produced in a way that is good for farmers, the environment and the industry. Certification criteria aim to go beyond existing international standards by introducing productivity measures that will ensure certification directly increases growers' incomes. The World Cocoa Foundation (WCF) supports programmes that engage West and Central African cocoa farmers, their families and communities and the institutions that impact their wellbeing to further the economic, social and environmental sustainability of cocoa production. In order to keep up with consumer demand and avoid decline of this raw material, the Cocoa Plan Initiative (of WCF) is to essentially encourage and help farmers improve the quality and quantity of their cocoa harvests.

Problem statement

Globally, small-holders are the main producers of cocoa and a substantial proportion of this population is in the West African countries of Nigeria, Cameroon, Ghana and Cote d'Ivoire. Nigeria has a global market share of about 6% and rank fourth after Cote d'Ivoire, Ghana and Cameroun in cocoa export (WCF, 2010; Oguntade, 2012). The growth rate of cocoa production has been declining in major producing countries, which has led to a fall in the fortunes of the subsector and income of around 2.5 million small-holder cocoa farming families. Cocoa business is extremely risky, leading to price speculations with consequences such as improperly dried beans as a result of unreliable and unfavorable prices which discourage farmers in investing in cocoa farms due to cocoa price volatility. This predisposes farmers to income unpredictability and instability. Consequently, the farmers

mostly suffer from income risk whereby the farmers are at the risk of earning negligible or zero income. Many (of the farmers) embark on various strategies to manage this income risk with little success due to the prevailing circumstances in which they operate such as vagaries of weather, socio-economic pressures as well as lack of awareness of improved technology and practices. Certification was evolved in order to address most of the issues predisposing cocoa farming to risks i.e. income risks the producers are experiencing.

Justification

Cocoa certification has a number of in-built mechanisms, via its components i.e. GAP, GEP and GSP, which tremendously impact on cocoa production practices by drastically reducing (if not eliminating) the attendant challenges associated with cocoa production. For instance, if a farmer wants to establish new cocoa trees, the prevalent practice is either the farmer uses seeds from high yielding tree on own farm or that of a fellow farmer. Unfortunately, due to problems associated with inbreeding, the cocoa trees emanating from this type of propagation method may be susceptible to a number of diseases and pests leading to lower yields that reduces or wipe out farmer's income. However, under cocoa certification programme, the farmer is mandated to obtain cocoa seeds from certified suppliers such as extension agencies and research institutes. This eliminates the attendant inbreeding problems, thus leading to a good farm yield and consequently appreciable cocoa farm income. Some farmers are yet to embrace the certification scheme but usually employ several strategies in managing challenges in the production of the crop – cocoa, which is a very important crop in the economy of Nigeria.

In Nigeria, cocoa production offers a great opportunity to diversify the economy and improve the livelihoods of the producers if carried out efficiently. Prior to the 1970s, the crop was a major agricultural commodity export in the western part of Nigeria. Adegbola and Abe (1983) reported that Nigeria was rated the second largest world producer of cocoa in the 1960s and, for a long time, the crop has been generating substantial foreign exchange earnings for the country before the discovery and large scale exploration and exploitation of crude oil. This has encouraged a near neglect of the cocoa sub-sector of the Nigerian economy with attendant ills like falling quality, excessive price speculations, reduced yield (per land unit) and dwindling production. Although its contribution to the total export earnings of Nigeria during the past three decades has dropped considerably, cocoa still remains one of the major agricultural export crops in Nigeria (Osun, 2011). Statistics by ICCO (2010) puts cocoa production in Nigeria for 2009/2010 season at 260,000 tons. CRIN (2008) and Osun (2011) stated that cocoa is being produced in 14 out of 36 states in Nigeria with 70% of the production taking place in the South-western States.

Against this background, the introduction of certified cocoa development program is regarded as a tool to transform the cocoa sub-sector in Nigeria using sustainable (cocoa) production practices and supply chain approach which ensures a fair deal amongst the key players in the value chain. The quality issue may either be stated in the trade contract or in quality certifications and the benefit of certification is usually better prices and premium prices for producers (Koekoek, 2003) as well as traceability for the industry. Therefore, this paper examined the effect of produce certification on income risk management strategies employed by cocoa farming households in South-west Nigeria.

Methodology

Study Area

This study was conducted in South-west Nigeria which is one of the three geo-political zones in Southern Nigeria. The area lies between longitude 2^0 31' and 6^0 00^1 East and Latitude 6^021^1 and 8^0 37^1N (Agboola, 1979) with a total land area of 77,818 km^2 and a projected population of 28, 767, 752 in 2006 (NPC, 2006). South-west Nigeria is predominantly agrarian having notable food crops cultivated to include cassava, maize, yam and cowpea as well as cash crops such as cocoa, kolanut, coffee and oil palm. The study area is bounded in the East by Edo and Delta States, in the North by Kwara and Kogi States, in the West by the Republic of Benin and in the south by the Gulf of Guinea. The climate of South-west Nigeria is tropical in nature and is characterized by wet and dry seasons. The temperature ranges between 21^0C and 34^0C while the annual rainfall ranges between 150 mm and 3000 mm. The wet season is associated with the south-west monsoon wind from the Atlantic Ocean while the dry season is associated with the north-east trade wind from the Sahara desert. The vegetation in South-west Nigeria is made up of fresh water swamp and mangrove forest at the belt and low land in forest stretching inland to Ogun State and part of Ondo State while secondary forest is towards the northern boundary where derived and southern Savannah exists (Agboola, 1979). This study area was chosen because South-west Nigeria is an important cocoa producing area of Nigeria that accounts for 68.52% of cocoa hectrage and about 70% of total national cocoa production (CRIN, 2008; Oguntade, 2012).

Data Sources and Collection

The data for this study were obtained through primary source with the aid of a pre-tested questionnaire in interviewing cocoa farming household heads. Data collected include socio-demographic variables such as age, sex, household size and level of education as well as (farm) production variables such as farm size, output, price per unit of inputs and output (cocoa beans) and income risk management strategies.

Sampling Procedure and Size

Based on Cocoa Research Institute of Nigeria (CRIN) and National Cocoa Development Committee (NCDC) categorization of cocoa producing States and Local Government Areas (LGAs) in Nigeria into high, medium and low producers

(CRIN, 2008), 180 cocoa farming households were selected for this study using a multistage sampling technique. The first stage was purposive sampling of the high producing States category in Southwest Nigeria. The second stage involved a simple random selection of one State (Ondo) from the category. The third stage also involved a random selection of six LGAs in Ondo State. The fourth stage was a random selection of two communities from each of the selected LGAs. The fifth stage involved simple random sampling of fifteen (15) cocoa farming households from each of the communities.

Analytical Technique

The tools used for analysis are: Chi-Square and Mann-Whitney-U test.

Chi-square Analysis

Chi-square statistic was used to test the difference between by certified and uncertified groups of cocoa farming households in terms of income risk management strategies diversification employed. The statistics operates with the formula enumerated below:

$$X^2 = \sum \left[(O_i - E_i)^2 / E_i \right] \quad \text{(i)}$$

where:
X^2 = chi-square statistic;
$\sum$ = summation of
O_i = observed frequency of income risk management strategies diversification employed
E_i = expected frequency of income risk management strategies diversification employed

Mann-Whitney-U Test

This was used to determine the influence of produce certification on income risk management strategies of cocoa farming households. An income risk management diversification index (IRD) was computed for the individual farming households in the two groups i.e. certified and uncertified cocoa farming households.

The IRD is given as:

$$IRD = \sum Y_{ij} / \sum X_{ij} \quad \text{(ii)}$$

where:
$\sum$ = summation of
Y_{ij} = total number of income risk management strategies employed by farming household
X_{ij} = total number of income risk management strategies available to farming household

If IRD > 0.5 high diversification and IRD ≤ 0.5 low diversification. A sample of Nx observations {IRD_{x1}, IRD_{x2} ...IRD_{xn}} were aggregated into one group (i.e. certified farmers) and a sample of N_y observations {IRD_{y1}, IRD_{y2}...IRD_{yn}} in another group (i.e. uncertified farmers).

where:

IRD_{x1}, IRD_{x2}...IRD_{xn} and IRD_{y1}, IRD_{y2},.....IRD_{yn} are the income risk management strategies diversification index (IRD) by each category of farmers.

The income risk management strategies are:

X_1 and Y_1 = source of planting materials (1 if yes and 0 otherwise)
X_2 and Y_2 = land suitability (1 if yes and 0 otherwise)
X_3 and Y_3 = land use maintenance (1 if yes and 0 otherwise)
X_4 and Y_4 = sharing risk within a social network (1 if yes and 0 otherwise)
X_5 and Y_5 = crop diversification (1 if yes and 0 otherwise)
X_6 and Y_6 = income diversification (1 if yes and 0 otherwise)
X_7 and Y_7 = precautionary savings (1 if yes and 0 otherwise)
X_8 and Y_8 = insurance cover (1 if yes and 0 otherwise)
X_9 and Y_9 = planting of hybrid cocoa seedlings (1 if yes and 0 otherwise)
X_{10} and Y_{10} = diversification into non-farm activities (1 if yes and 0 otherwise)
X_{11} and Y_{11} = regular cocoa spraying (1 if yes and 0 otherwise)
X_{12} and Y_{12} = participation in certification program (1 if yes and 0 otherwise)

The Mann-Whitney-U test is based on a comparison of every observation xi in the first sample with every observation y_j in the other sample. Therefore, the total number of pair wise comparisons that can be made is nxny.

Total number of times $x_i > y_j$ — denoted by U_x.
Total number of times $y_j > x_i$ — denoted by U_y.

Hence:

$$U_x + U_y = n_x n_y \quad \text{(iii)}$$

Under the null hypothesis, it is expected that $U_x \approx U_y$.
H_o: P ($x_i > y_j$) = ½
H_a: P ($x_i > y_j$) ¹ ½

The null hypothesis was not accepted when p ≤ 0.05.

Result

Produce Certification and Income Risk Management Strategies

This study classified cocoa farming households into high and low diversification income risk management strategies group. The cocoa farming households were classified into aforesaid groups by their income risk management diversification index (IRD).

Among those employing high level of income risk management diversification, 95.7% were certified cocoa farming households while 4.3% were uncertified (Table 1). On the other hand, among those employing low level of income risk management diversification, 55.5% were certified household while 44.5% were uncertified (Table 1).

Table 1: Household Distribution by Income Risk Management Strategies Diversification

Status	High diversification	Low diversification	Total
Certified	67 (95.7)	61 (55.5)	128 (71.1)
Uncertified	3 (4.3)	49 (44.5)	52 (28.9)
Total	70 (100.0)	110 (100.0)	180 (100.0)

Most (61.7%) of the households employed low level of income risk management diversification while 38.3% employed high level of income risk management diversification (Table 2). About half (52.3%) of certified cocoa farming households employed high level of risk management diversification strategies in coping with income risk while majority (94.2%) of uncertified cocoa farming households employed low level of risk management diversification strategies (Table 2). However, almost half (47.7%) of certified cocoa farming households employed low level of risk management diversification strategies (Table 2).

Table 2: Distribution of Income Risk Management Strategies Diversification

Level of diversification	Certified	Uncertified	Total
High diversification	67 (52.3)	3 (5.8)	69 (38.3)
Low diversification	61 (47.7)	49 (94.2)	111 (61.7)
Total	128 (100)	52 (100)	180 (100)
Chi-Square Statistic	123.11***		0.0001+

Figures in parenthesis are Percentages, + ®p-value
Source: Field Survey, 2013

Influence of Produce Certification on Income Risk Management Strategies

Chi-square analysis (X2 = 123.11) shows that a significant difference ($p<0.01$) existed between the income risk management strategies employed by certified and uncertified cocoa farming households (Table 1). The Mann-Whitney-U test was used to determine the influence of certification program on income risk management practices of cocoa farming households in the study area. Results on Table 2 shows that a significant difference ($p>0.05$) existed between the income risk management practices of certified and uncertified cocoa farming households.

Table 2: Mann-Whitney U Test of Income Risk Management Strategies of Cocoa Farming Households

Category	N	Mean rank	Mann-Whitney test	p-value
Certified	128	110.69		
Uncertified	52	40.81	744.000	0.000
Total	180			

Discussion

Results have shown that cocoa farming households participating in produce certification programme actually employed diverse income risk management strategies more than non-participant households in averting/reducing any risk occurrences. Although more participant households employed high level of income risk management strategies, cocoa farming households in general employed low level of income risk management strategies.

Albeit, from the results obtained, the more households participating in produce certification, the more the tendency of employing a high level of income risk management strategies. Consequently, produce certification has considerable influence on the use of income risk management strategies by cocoa farming households in South-west Nigeria.

Conclusion and Recommendation

Income risk has been a major problem facing cocoa farming households in Nigeria due to some factors ranging from farmers production practices, market and human factors which has led to low cocoa income generation which in turns led to neglect of cocoa farms. In view of this, some non-governmental organizations deem it fit to proffer solutions to persistent income risk faced by cocoa farming households through setting of certain standards in cocoa production to enhance income generation and production sustainability. Cocoa certification program incorporates risk management strategies in the code of conducts ranging from sufficient knowledge on how to spray agrochemicals, child labour, proper storage and transport of cocoa produce among others. From this study, it was apparent that most (61.7%) of the farming households employed low risk management strategies in managing income risks associated with cocoa farming. However, farming households participating in cocoa certification accounted for about half (55%) of the farming households who employed low risk management strategies in managing income risks associated with cocoa farming. Hence, produce certification has been helping cocoa farming households in reducing the probability of an adverse event and the potential impact of income risk in cocoa production through the employment of diverse (risk) management strategies. In view of this, stakeholders should intensify efforts in encouraging farming households to embrace (cocoa) produce certification to be able to effectively manage income risk associated with cocoa farming.

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