Journal of Economic Development, Environment and People

(online) = ISSN 2285 - 3642
ISSN-L = 2285 - 3642
Volume 2, Issue 3
2013
http://jedep.spiruharet.ro

(online) = ISSN 2285 – 3642
ISSN-L = 2285 - 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Table of content

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Foreword

The current economic crisis started in a developed country and more or less affected countries all over the world due to the globalisation process. It is no longer possible to ignore a certain economic event taking place in one part of the world, without thinking to what extent it will impact the others.

A deeper insight into the globalisation process reveals us that people and communities come to experience an increasigly common economic, social and cultural environment.

Studying the effects of globalisation is tremendously important for the scientific community as much as for the business environment.

Research has definitely revealed the strong inderdependence between globalisation and environment. A fact is certain, the net effect of globalisation on the environment has matured, although there are still many outstanding questions that researchers and practitioners are invited to answer.

Nevertheless, an integrated world doesn't bring only benefits, it comes with problems too - the economic / political balance between nations, communities or individuals is affected, sometimes leading to damaging effects at social level.

Journal of Economic Development, Environment and People aims at providing a vivant forum for discussions on the direct and indirect impacts of globalisation on the environment and people's life.

The current issue gathers papers "coming" from different parts of the world: from EU countries to India, and it provides a methodological approach in social sciences along with practical results on assesing the globalisation impact on the economies of the developed countries. One of the papers presents the Industrial pollution regulations which are important not only in the EU countries but also in the neighboring countries, just because pollution has a cross-border nature. Fertilisation systems and the global climate change are brought to the readers' attention from the perspective of crops and food production, and the changes under drought conditions in the Republic of Moldavia are assessed using simulation models.

We hope you will find the reading interesting enough to boost your ideas and to guide your research into a deeper approach of the glabalisation consequences on the environment.

Prof. Manuela Epure, PhD
Editor in-chief

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

An Exposition of Research Methodology in Management and Social Sciences

Dr Sorab Sadri
Professor of Political Economy and Management Sciences
Director, School of Humanities
JECRC University, Ramchandrapura, Jaipur 303905, Rajasthan
sorab.sadri2010@gmail.com

Abstract.
In writing this paper the author has consciously stood apart from his earlier works and attempted to dispassionately review his own position so that some degree of clarity of thought might emerge in the process. The paper is based on the author's contribution between 1992 and 2012 to this subject and which has been used as the basis for several doctoral level investigations under the author's guidance. They had played a major role in helping the author to crystallize his views. To these scholars, therefore, the author's gratitude is unflinchingly extended. Management has been described as being concerned with and based on the science of decision making and operating from the foundations of the art of decision executing. Hence, research in the area of modern Human Resources Management, especially, is both interesting and challenging having its one foot planted in industrial sociology and industrial psychology while the other placed in supply chain management and organisational restructuring. Hence, the argument of this paper is more relevant to serious research scholars and to those management teachers who wish to pursue rigorous academic research. This is not meant for those in the cut-copy-paste league, which unfortunately is, of late, becoming quite prevalent within the Indian academia.

Keywords: management, human resources, human resources management, research

JEL Codes: J 24, J 53, O 15,

1. The Philosophical Underpinning

Whereas polemical and descriptive papers have their own domain of importance, this author opines that there is a crying need for papers based on strong empirical research to come out of B-Schools especially in the area of Human Resources Management. With this need in view the author euphemistically has put finger to keyboard to come up with this paper addressed to research scholars in B-Schools in general. Essentially a B-School is not an academic institution *per se* but one where an environment is created so as to enable learning in a professional specialisation to take place. Invariably research methodology is one of the subjects the student has to clear. There are a number of fundamental issues that need to be clarified before embarking on such a course. Let us at the outset clarify that research is not everyone's cup of tea and the proportion of B-Schools carrying the words "of management and research"

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

where actual research takes place is miniscule. Many scholars and especially corporate managers who try to enter the world of academia believe that imparting practical information about business and industry through anecdotes, case studies or just references is enough to educate the student.

This is unfortunately not the case. It is very much like soft skills like oral communication, group discussion, presentation and interview techniques that can help a student in a B School to go up to the final interview. That is all. After that it is the *domain/subject knowledge* that will actually land him/her the job. So too is the case with knowledge about managerial sciences. One therefore just cannot dispense with theory and yet claim to have knowledge of the subject.

So, beginning with basics let us pose the question: what is theory? (Cairns) Methodologists in social science, such as this author, maintain that *theory is an abstraction of reality that seeks to explain reality. If a theory does not explain reality it is a quasi theory, a Meta theory or not a theory at all.* What does this mean? This means that the *distinction* between theory and practice disappears and *you cannot say,* "such and such thing will work in theory but not in practice". What is true in practice must be true in theory too. If not it is not a theory and that is why the terms *tendency* or *hypothesis* is increasingly used to replace theory in advanced economics. (Althuser)

That brings the discussion to *paradigm,* a term increasingly used in management and social science literature. The *Oxford English Dictionary* defines the basic meaning of the term *paradigm* as "a pattern or model, an exemplar". Thomas Kuhn the great historian of science gave it its contemporary meaning when he adopted the word to refer to the set of practices that define a scientific discipline at any particular period of time. In his book *The Structure of Scientific Revolutions* Kuhn defines a scientific paradigm as: "universally recognized scientific achievements that, for a time, provide model problems and solutions for a community of researchers, i.e., (i) *what* is to be observed and scrutinized, (ii) the kind of *questions* that are supposed to be asked and probed for answers in relation to this subject, (iii) *how* these questions are to be structured, (iv) *how* the results of scientific investigations should be interpreted, and (v) h*ow* is an experiment to be conducted, and *what* equipment is available to conduct the experiment

How does theory differ in natural sciences (physics, chemistry, medicine and engineering) from social sciences (economics, politics, sociology and psychology)? For Karl Raimund Popper the distinction lies in the fact that in physical sciences a theory can be *falsified* in that you can maintain that it is wrong based on the evidence. In social science one can at best say that a theory is *refuted* in that one can maintain that one disagrees based on the interpretation of the evidence. This is essentially because of the mutable (ever changing) nature of social reality, which allows you to interpret the same *facts* differently. Hence interpretation is often person specific, context specific and environment specific as is the case in the evaluation of an *ethical dilemma* in the 1999 and 2007 works of Sadri and Jayashree. This dilemma arises out of interpretation of facts and assumption of truths. Greek scholars like Plato, Aristotle and Xenophon do not differentiate between fact and truth. (Copleston) This distinction comes to the fore only later on when Marx responds to the position taken by Comte (Cooper and Schindler, Hubbard, Chisholm).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

According to post 19th Century scholarship, facts are *not* truths necessarily. A *fact* is a thing known to have occurred, to exist or a datum of experience often followed by an explanation. In a way it is a piece of evidence. A *truth* is more fundamental. It is the quality or state of being. Hence while facts can be verified through methodology (as Ludwig Wittgenstein and Bertrand Russell held) all truth is relative (as Georg Hegel had advocated) except the *Almighty*, which is the only absolute truth. And, as Emile Durkeim has added, nothing in this world is definite except *death.* This author strongly opines that the author must always remember this and to facilitate the research scholar a brief paragraph on each of these four great thinkers (Wittgenstein, Russell, Descartes and Hegel) is given in the notes.

This brings the discussion to *hypothesis,* which is a proposition made as a basis of reasoning *without* the assumption of its truth. A hypothesis is a supposition that can only be the starting point of an investigation based on known facts; it has to be validated empirically. Every hypothesis can thus be proved or disproved. Hence when a hypothesis is stated, the null hypothesis must be stated alongside and their notations conventionally being H_a and H_o. Once a hypothesis has been tested and proved it becomes a theory. (Lehmann Gupta and Steckel)

The process of converting a hypothesis into theory is fundamental to political economy, is known as *praxis* and forms the backbone of Research Methodology. And this process itself has a sequence known as the core methodology or method. It is called *the 5 D Method*, used in Human Resources Management and Organisational Development and is named after Sadri and Jayashree who first used it in 2002. A *method* is a sequential process whereas *methodology* is the science of method. (Sadri and Makkar). [That is why the reader will not find a treatment of issues like sampling validation and testing in this paper since they form a part of method and this discourse is on methodology.]

The first D stands for *definition*. Here the position of the investigator, the subject to be studied, and the ambit of inquiry, the purpose of the study and the limitations of the investigator are stated. This is needed in the interest of clarity and cogency. Definition, moreover, helps to hone in a direction of inquiry and avoids fuzziness. (Russell)

The second D stands for *diagnosis.* The investigator must diagnose the internal environment of business and the external environment of business using qualitative and quantitative techniques. Just as a doctor uses the thermometer, the stethoscope *and* the blood sample test to determine what kind of fever one is afflicted with, so too, the investigator uses a set of methods to arrive at a finding. Cross-referencing of data is very important and so is correlation of identified and defined variables. (Popper)

The third D stands for *design* and here the investigator makes the research design i.e. how the study will proceed. This is the stage from where the pilot study is launched within a restricted physical domain and when the environment is controlled to the best possible extent. (Bottomore)

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The fourth stage is called *development.* Based on the results of the pilot study the hypothesis is reformulated and the direction of the inquiry is finalized. Here the investigator *develops* the study itself and collection of facts begins only to be followed by their systematic documentation. (Hubbard)

The fifth stage is called *delivery* when the study analyses the facts and arrives at a conclusion, which has some social, political, economic or technological significance. The delivery stage is also called actualizing the findings or implementing the intervention. (Berger and Luckmann)

However, Jayashree in 2005 had first talked of a sixth or *Hidden D*, which stands for *data and documentation*. So important is data and documentation that it needs to be singled out. Many Indian scholars traditionally do not maintain data and often massage existing data. Both practices are scientifically untenable. We need to realize that data does not mean numbers. It could very easily be qualitative as gleaned in the case of participant observation. It is known to be the product of scientifically conducted *focused interviews* of respondents during an inquiry.

This leads to an examination of an *axiom*. It is a widely accepted principle usually used in investigations. Every investigator consciously or otherwise must take care that these axioms are followed scrupulously. Not following an axiom creates a *fallacy* and this Quite simply this (fallacy) is a mistaken belief based on unsound assumptions e.g. the earth is the centre of the universe. (Keynes)

There are, moreover, three fallacies that are borrowed from the Economic Science and increasingly used in cautioning investigators against committing in management as well as in social science research. (Weber, Durkheim, Hobbes) These are:

i. *The fallacy of composition*. What is true of a part is not necessarily true of the whole.
ii. *The fallacy of accident*. What is true of the whole is not necessarily true of the part.
iii. *Post hoc sed non-proctor hoc*. Any occurrence after an event is not necessarily because of the event.

In addition scholars need to take account of two homilies: (a) *Correlation is not causation*. Because two variables are statistically correlated, it does not follow that one causes the other or is caused by it. (b) One must never forget that *mathematics is a language* albeit a scientific language just as music is an artistic language. These days no subject can be excelled in without the use of mathematics and hence it cannot be wished away as some so called *practical thinkers* seem to do. This is particularly true of managers who come to teach HR in B Schools mistaking it for a soft option. The author opines that mathematics is important and must be both taken and used seriously. Usually research scholars use statistics heavily in their research work and many user-friendly statistical software packages (SPSS, RATS to name a few) are available making it easy for a researcher to use statistics. Unfortunately, once again, scholars in HR seem to be falling behind researchers in other management specializations in this regard. Qualitative research does have its merits, should be used not descriptively but through sustained inquiry, participative research, and focused interviews (as in sociology and anthropology).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Statistics must always be used to support an argument or buttress an opinion propounded. It should not be used for its own sake or as a superficial embellishment so as to give the paper an academic look. Quoting statistical data as some HR specialists do does not amount to using statistical tools and the moot difference must be noted. (Sadri and Jayashree) . And it is here the words of caution by the great grammarian George Bernard Shaw must be remembered when using statistical analysis of data. He said that *statistics is akin to a blind man looking for a black cat in a dark room that does not exist.*

After all common sense is neither common nor really sense! Unfortunately many people who claim to be into doing serious research tend to either *over use* statistics to the point of stupidity or *do not use* statistics at all, rely on intuition and thereby miss the wood for the trees. The first characteristic can be found amongst people who specialise in subjects like econometrics and psychometrics and who confuse between statistics as a *means to* with statistics as an *end of* any investigation. The second tendency can be found amongst people who claim to know something about media and communications research when all they have done is looked at data somewhat logically but often cursorily without using any statistical instruments. Their innate confusion and inaccuracy springs from the fact that they can never have all the facts at their disposal and yet think they are being objective. Objectivity is like a rainbow – it can be approximated only with the use of scientific methodology. That is all. To take the argument further, it is posited that the very claim to being objective is but a subjective one!

Management is concerned with people and production of value. In that respect it is only a factor of production. Management as was shown above is also concerned with the science of decision-making and the art of decision executing. Hence we use linear logic (*a la* Descartes) in decision-making but dialectical or circular logic (*a la* Hegel) in decision executing. This understanding is important especially in dealing with case studies. A case study can be any of these:

i. A *case history* or a chronological statement of events.
ii. A *case analysis* when data is given to enable one to conclude there from and arrive at a theoretical construct.
iii. A *case example* when events and data are given to enable one to convert a theoretical construct into practical situations.

Whatever it may be, facilitators and students of management who seem to swear by the fact that what is needed is practical knowledge and not theory must ever forget the advice of Aldous Huxley, *without theory facts shall continue to fall on the plains of human ignorance.* Finally, let the facilitator first and the student later be introduced to (what was mentioned earlier), *Praxis*, which is nothing but the process of converting theory to practice. To emphasise the argument further, reality cannot be understood without praxis and a scientifically sound research methodology is the basis of arriving at praxis. Without knowledge of research methodology the executive will be taking decisions based purely on enlightened guesswork. He would never be like a passerby who just throws a stone at a tree and hopes that a fruit will fall. His aim

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

must be accurate and for this to happen, the mass (data), magnitude (scope) and direction (goals) must be absolutely clear. The three Ms of research: *meaning, method* and *measurement* then become inextensible instruments for the scholar. Rigour is an indubitable factor in all serious research and this is often given the slip even by those who claim to have a Doctoral Degree in Management. That is why the indubitable question is posed during oral defence of theses: *what is your contribution to the corpus of thought?* Unless the investigator has been fair and rigorous at the same time the answer to this question remains vague and often even incompressible. In a forthcoming book (2014) this point is being elaborated upon.

2. The Quest for Accuracy

Rigour leads to accuracy. Research especially in management sciences is not abstract but empirical and hence depends heavily on data and documentation (Jayashree's sixth D). Data is first collected, and then analysed and finally a conclusion emanates there from. Data comes in many forms and is collected in several ways. We shall take up the major ones that concern a B-School academic and the doctoral degree scholar in management in this section. It would be proper to sequence the steps involved in research methodology and highlight the possible pitfalls hampering the accuracy-quest so that the ensuing discussion becomes meaningful. In the subsequent section this author will outline ways and means to overcome the pitfalls helping the scholar to ensure veracity of the research process and data. The research process is normally seen to be a seven stage process outlined here-in-under with the possible pitfalls encountered by researcher at each of this stage being duly highlighted.

1) Problem formulation: The author opines that *stating the research question* is too crucial to be taken lightly. During the course of this phase the researcher is expected to formulate his problem statement. This formulation is expected to be preceded by exploratory research and some review of literature to find out gaps in literature on which the researcher aims to work and bridge it through the research work. The *gap* in literature gives birth to the *research question* and signifies the contribution of the researcher to the existing body of knowledge. If the researcher ignores this exercise, there is a possibility that the work could end up being a mere repetition of same or similar work already done, thus defeating the very purpose of research. The exploratory research is not done properly could lead to erroneous statement of the problem.

2) Extensive Review of literature: This step involves extensively going through the literature available on the topic This helps one to consolidate the topic and helps the researcher know what body of knowledge exists on the topic and what research techniques have been previously used. A critical analysis of the methodologies used also helps him to choose the appropriate methods for his research work. Inadequate review of literature may lead to erroneous choice of topic and methodologies. Without a comprehensive literature review the scholar will be unable to identify the *research gap* and this lacuna will water down the work considerably.

3) Research Design: This step involves preparation of plan (even a Gantt Chart) as to how and at what pace the research work would be conducted and outlines the following: (a) Participant Involvement. (b)

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Survey Design. (c) Sampling Plan. (d) Data Sources. (e) Statistical Analysis Tools and (f) Questionnaire Design. In short, it is a blue--print of how the research work would proceed. The commonly observed pitfalls in this step are improper choice of data collection instruments, erroneous sample choice, inadequate sample size, improper questionnaire design and wrong choice of statistical tools. Some researchers tend to use conceptual relationship diagram but these diagrams often have inbuilt identification problems. The lack of validity and reliability of the research instruments to the given context often leads to research deviating form its proclaimed objectives. This tends to hamper the quest of researcher to get accurate data and correct information and knowledge based on the data analysis.

4) Field work: Here the researcher collects data from the predefined sources using specified tools. During this phase 1) medium used for data collection, 2) sincerity of the respondent and 3) the respondents' ability and willingness to share the data tend to affect the accuracy of the data collected. Meticulous notes and cataloguing observations are the basic ingredients of proper field work. To avoid untoward bias creeping into the study it is advisable to cross reference responses and keep the research question in mind at all times.

5) Data Analysis and Findings: Unclear knowledge of the analysis tools and their limitations can lead to inappropriate choice and use of tools which can adversely affect the accuracy and predictive or descriptive informative value of the research project and may lead to any or all of the fallacies mentioned above. Testing for statistical significance, for instance, is an important component of analysis but unfortunately is also one of the most misunderstood terms and can have implications for the interpretation of the analysis. (Hubbard)

6) Interpretation of data and drawing conclusions: It is absolutely crucial that the assumptions made and constraints (limitations) outlined are adhered to when data is interpreted. If not, the researcher will easily commit either the fallacy of composition or the fallacy of accident. Generally speaking the fewer the assumptions are the greater is the chance of getting a realistic conclusion.

7) Writing the report: Poor language has more than often spoilt the quality of an otherwise good work. More often than not, the researcher's biases and prejudices also come into play. This marks the quality and the authenticity of the report, making it purely ideological and/or journalistic. Presenting the findings and presenting the same in a compressible manner is an art and often sways the judgement in favour of the researcher especially when future funding is sought. However, it would a heinous offence if the researcher were to doctor his/her findings to gain the funding and/or peer-acceptance. A balanced view based on data and their logical interpretation is the safest option available to the researcher especially in issues involving people like performance management systems and industrial relations in management science and in class and property relations in social science.

The author in the tradition of Peter Berger has sketched seven stages of research and hinted at the pitfalls in each case. Needless to say, the researcher needs to take due care to avoid these pitfalls. Some of the important yet rarely used tools and methodologies that, it is believed, will go a long way in avoiding

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

these pitfalls are outlined below. Every researcher must ideally acquaint himself/herself with these tools to guide him/her in his pursuit of the objective if he/she is to make a mark and not just be someone 'who also ran'. This author (using forward reference) shall in the rest of this paper try to briefly introduce the techniques which a researcher should use to overcome these pitfalls.

3. Soft Systems Methodology:

Research into HR issues invariably involves a social, cultural, ideological and political angle. Soft Systems Methodology (SSM) as developed by Peter Checkland is a way of dealing with problem situations in which there is a high social, political and human activity component. This distinguishes SSM from other methodologies which deal with hard problems which are more technologically oriented. Soft problems, exemplified by most of the management research problems are difficult to define. They have a large social and political component. Following SSM when a researcher thinks of soft problems, he doesn't think of problems but of problem situations. He knows that things are not working the way they are expected and he wants to find out why and see if there is anything he can do about it. It is the classic situation of it not being a "problem" but an "opportunity". SSM is divided into seven distinct stages. Parsons and Smelser, in a manner of speaking, used soft systems methodology to posit their systems view of organisations and many structural functionalists are known to tow this line. The use of soft systems methodology is unfortunately remains limited to a few scholars especially those who have attained an academic pinnacle. The reason is simple. It requires a high level of understanding of the subject being written about. Many writers unfortunately feel that using abstract formulations and abstruse logic is a sign of profundity. Nothing could be farther from truth. Using soft system methodology helps the writer to remain *simple* (so that his/her thought goes from the writer's mind into the readers mind), without being *simplistic* (so that a fundamental concept is not trivialised).

Stage 1: Unstructured problem situation: This stage involves fundamental research into the problem area. It addresses questions such as: Who are the key players? What are their roles? How does the process work now? It takes a review of the problem situation. Essentially soft system methodology takes the term 'problem' as inappropriate because this might narrow the view of the situation. Soft system considers the phrase 'the problem situation' to be more appropriate since there might be many problems which are not perceived and yet need to be solved

Stage 2: Problem situation expressed through Rich Pictures. This stage attempts to express the problem situation through pictorial presentation called *rich pictures* using the principle that more knowledge can be communicated visually and a picture is often worth more than a thousand words. The researcher in this stage attempts to sort and present the information in the form of a *rich picture* along the following parameters. (a) Structure of the organization: factors that do not change easily (e.g. buildings, locations, and environment); (b) Processes or transformations which are carried out within the system: many of these are changing constantly; and (c) Issues that are expressed or felt by organizational members (complaints, criticisms, suggestions, endorsements).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The astute researcher employs various formal and informal tools to collect information about the problem situation e. g. Interview, Observation, Questionnaire, Discussions etc. The objective here is to present the richest possible picture and collect as much information as possible about the problem situation and avoid narrowing the scope of the problem too early before the situation is well understood. Therefore, unstructured tools are preferred by scholars at this stage. The richer the picture the more explicable is the argument.

Stage 3: Root Definitions: This stage involves naming the relevant systems also termed as giving the root definition of the relevant systems. The root definition expresses the core purpose of some purposeful activity system. Properly written root definitions provide a much simpler insight into building system models. Root definitions are written in such a way such that a model could be built based on them. A root definition is expressed as a transformation process that takes some entity as input, changes or transforms that entity, and produces a new form of the entity as output. Producing a root definition is a two step process that consists of: (i) An issue or task is chosen from a rich picture and (ii) a system is defined to carry out the task or address the issue. Root definitions are usually written as sentences that elaborate a transformation. There are six elements that make up a well formulated root definition, which are summed up in the mnemonic **CATWOE**.

1. **Customer:** Everyone who stands to benefit from a system is considered as a customer of the system. If the system involves sacrifices such as layoffs, then those victims must also be counted as customers. If one considers metropolitan public transport system as a system, passengers are the customers. However, in a B-School the student is *not* a customer but a product that is purchased by a customer i.e. the industry or business that employs the graduate.
2. **Actor:** As Dunlop and Flanders had argued in their Industrial Relations Systems the actors perform the activities defined in the system. The organisations and government agencies involved in the passenger transport business are actors.
3. **Transformation process:** This is shown as the conversion of input to output. The efficient commutation of passenger from any part of the city to their desired destination is an example of transportation process. If the process is opaque it is referred to as the "black box".
4. ***Weltanschauung**:* This is the classic German expression for world view. This world view makes the transformation process meaningful in context. Taking an example from a road leading from a housing colony to a factory site the commuting employees would see it as a means of reaching the desired destination without hassles while the traffic management authorities would see it as a way to avoid traffic congestion. Environmentalists would view the system as a way to reduce pollution effectively while the IR Manager would look closely at safety and legal hazards of driving along the designated road.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

5. **Owners**: Every system has one or a set of proprietors, who have the power to start up and shut down the system. This is why decision makers talk of taking ownership of the decision and that is also why modern writers argue for power to be based at the point of decision making (sales or production).The government which has the power to shut down the system would be the owner of the system.

6. **Environmental constraints:** External elements exist outside the system which it takes as given. Internal elements exist within the systems which are overlooked for want of rigour. These constraints include organizational policies as well as legal and ethical matters. These could be endogenous such as structure, culture and workers collectivity. These could be exogenous such as state policy, market forces and political environment. Economic and physical geography of the city, political system are examples of the environmental constraints for the metropolitan passenger public transport system. In the not so recent past the examples of Singur and Nandigram have highlighted other socio-cultural constraints relating to land acquisition for SEZs. This is a moot point conveniently missed by the bourgeois press and sometimes not even understood by writers who present papers on SEZ.

CATWOE could be used as a building block for the scholar to derive the root definition. Knowing the CATWOE elements, although its main use is to analyse root definitions, it lends clarity and rigour to the scholar. Different world views may lead to formation of different root definitions and at this point Checkland comes quite alarmingly close to the Ricardo – Marx – Sraffa position that different world views create systems that generate the seeds of their own disintegration. However, Checkland does not take the Ricardo-Marx-Sraffa route and his argument goes somewhat as follows.

A system has two critical components viz. transformation and world view that constitute the essential component of system definition. The SSM revolves around how best the transformation can be achieved in accordance with the world view and employs the process of iterative modelling. This is also referred to in literature as *formal system thinking*.

Stage 4: Building conceptual models: This stage deals with development of conceptual models based on the root definitions. A conceptual model is a human activity model that strictly conforms to the root definition using the minimum set of activities. The formal Systems thinking is applied in this development. The Formal System Model serves as a guideline for checking the conceptual model drawn. If a system represents a human activity system, under the Formal System Model, it is a formal system *if and only if* it meets the following eight criteria: (a) It must have some mission. (b) It must have a measure of performance. (c) It must have a decision making process. (d) It must have components which interact with each other such that the effects and actions are transmitted through the system. (e) It must be part of a wider system with which it interacts. (f) It must be bounded from the wider system, based on the area where its decision making process has power to enforce an action. (g) It must have resources at the

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

disposal of its decision making process. (h) It must either have long term stability, or the ability to recover in event of a disturbance.

Systems as a concept are ubiquitous and exist in the mind of the beholder. *Components* of the system, therefore, must be systems having all the properties of the system (subsystems). The conceptual model is similar to a PERT chart. *Nodes* in the graph are activities that need to be done and can be written as a directed graph. *Verbs* in the root definition are used to describe these activities. *Logical dependencies* are used to describe the structure of the system. The conceptual model is incomplete unless the monitoring standards are set in terms of efficiency, effectiveness and efficacy and control measures are given. Career planning and performance management systems fall into this description neatly.

Stage 5: Comparison of the conceptual models with the real world: This stage involves comparison of the results from stage 4 (Conceptual Model) and 2 (Rich Picture) and location of the similarities and differences if any between the two. While the conceptual model presents a possible ideal state, rich picture is a reflection of reality as perceived by the researcher. This comparison leads to identification of feasible and desirable changes. The researcher at this point would like to know if there are ways of improving the situation. More often than not, it has been found that these comparisons lead to iteration of the steps 2, 3 and 4. After these iterations and in step 5 the desirable changes are identified. The purpose of the comparison stage is to generate debate about possible changes which might be made within the perceived problem situation. This is akin to stage 3 in the Sadri-Jayashree model i.e. design of the system or the proposed intervention.

Stage 6: Identification and recommendation of feasible and desirable changes: Any model that is worth its salt must lead the researcher towards his/her final objective. The comparison made in stage 5 leads to identification of desirable changes and recommendations of how these changes can be implemented. The outcome of this stage is creation of a desirable system by contemplating changes in the problem situation, which can be structural, process related or attitude or behavioural. The researcher is now ready to move from step 4 to step 5 of the Sadri-Jayashree model i.e. from development to delivery.

Stage 7: Implementation of the changes: The researcher's job at stage 7 is to implement changes and put the findings and the system into action like the delivery in the Sadri-Jayashree model. When action is taken, it might even be a straightforward one. However, other situations may be encountered that impede straight forward activation. The introduction of the action may change the situation such that although the originally perceived problem has been eliminated, new problems could emerge. Often it is recommended that a temporary system be used to carry out the task under the supervision of the analyst, followed by a transition to the operation of the new system. Checkland pointed out that this methodology has in fact not emerged as a once-and-for-all approach to something *sharply defined* as a problem, but rather one that is *perceived* as a problem. The importance of the feedback loop in any systems model is thus highlighted yet again. This is especially important for persons who are working in the area of change management and organisation restructuring.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

One important feature of SSM is that it is goal-driven, focuses on a desirable system and how to reach it. Checkland indicated that the changes must be systemically desirable as result of the insight gained from selection of root definitions and conceptual model building, and they must also be culturally feasible given the characteristics of the situation, the people in it, their shared experiences and their prejudices. It is hard to find any changes which do not meet both criteria.

Checkland found out from one of his case studies that it is important to move quickly and lightly through all the methodological stages, *several times if necessary***,** in order to engineer a bridgeable gap between 'what is' and 'what might be'. Having explained how the problem will be defined one could go on to examine other issues which this author feels are germane to the researcher and which he now seeks to address. Sampling is an important aspect of the research design and one needs to be careful in employing or implementing a sampling design. Many a time, for instance, student feedback on faculty performance is taken only from those who are perceive to the close to the Director of a B School and the sample is poorly selected and so not representative enough. Hence the feedback is flawed and any action taken thereupon is vitiated.

Sampling Techniques: Many a time, errors occur in the data on account of the wrong choice of sample. Ideally the sample should be free from any sort of bias in order to ensure that it truly represents the population. Estimation is based on the sampling of data and these needs to be truly representative of the population. The *under-estimators* and *over-estimator* elements in the sample population should ideally balance each other so that the sample is accurate. This also obviates any possible variation in the measures due to some known or unknown influences that cause the sample score to lean in one direction or the other. This variation is referred to as systematic variance. The sample data, to be accurate, need to be free of systematic variance. In order to ensure the precision of the estimate based on the sample, the sample size should be appropriate. More often than not, the sample size is compromised upon by researcher in favour of cost consideration, speed of research work and ease of the work. This invariably has the potential to play havoc with the quality of data and the subsequent research results.

In order to avoid this pitfall, it is important that the researcher asks the right question and get satisfactory answers to them while deciding upon the sampling design in terms (a) relevance, (b) parameters of interest, (c) sampling frame, (d) type of sample, and (e) sample size. It is not just the choice of the sampling method but its implementation that is also critical. For instance, if random sampling is chosen as a sampling method during implementation of the plan a researcher is tempted to alter the randomly chosen sample to facilitate ease and convenience. The common problems in adhering to the random sampling norm are the not at home responses, (that which requires additional effort in terms of follow up), temptation to add elements to the sampling frame and to substitute sample elements ignoring the predetermined decision rules. This should be strictly avoided especially in respect of issues relating to the mutable nature of social reality.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

There are some myths prevailing about the sample size calculations e.g. the sample must be large else it is not representative; a sample should necessarily bear some proportional relationship to the size of the population. In reality, a researcher must understand and appreciate that the size of the sample should be a function of the variation in the population parameters under study and the estimation of the precision needed by the researcher. In fact statistically, the sample size determination is a function of the variance in the population parameter under study, precision level needed (standard error of the estimate), confidence level of the estimate, the narrowness of the interval range, the number of subgroups within the sample. The higher their score is the larger is the sample size required. So this author strongly urges the researcher to consider all these aspects before the sample size is fixed. Since sampling design is an art and science as well, all statistical calculations apart, (which any standard research methodology book would have them elaborately explained), an experienced hand can always add value to the same and a quick second opinion would never go waste. In fact the author recommends this very highly.

Measurement: An ideal study, it is further opined, should be designed and controlled for precise and unambiguous measurement of the variables. Data accuracy can be compromised during the measurement process on account of the following factors that invariably crop up during the measurement process

- The respondent's ignorance of the issues in question coupled with his reluctance to admit the same; Central tendency of the respondents; other temporary factors like fatigue, boredom
- Situational factors sometimes puts strain on the measurement or response gathering session affecting the data quality
- The measurer if not diligent or adequately trained or is biased can contaminate the data.
- A defective instrument can cause distortion in the data quality

While a researcher can minimize the first three by ensuring adequate checks in the process, to ensure that error does not creep in the data on account of the fourth, he/she needs to ensure a defect free measurement instrument. Validity and Reliability of the instrument used are the two most important means to ensure the same. Many scholars use the *Chronbach Alpha* and an equal number of scholars use *qualitative validation* through (a) expert opinion (b) comparing collected date with results of focused interviews and (c) peer review.

It pains the author to see several doctoral studies that have not bothered to validate the instrument used for data collection and rely purely on subjective perceptions of objective reality to conclude the findings. A brief discussion below will hopefully clarify the point that this author seeks to make.

Validity: This is an indicator of the extent to which an instrument measures what a researcher actually wishes to measure. Although a reference made to many kinds of validity measures can be found in the literature, they can be segregated under the all-encompassing terms: (i) external Validity (Data's ability to be generalised) and (ii) internal validity (Ability of the instrument to measure what it is supposed to measure). External validity is critical when a researcher intends to extrapolate beyond the sample and inductively generalises for the total population. The external validity can be improved if the researcher is

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

mindful of the factors which are ignored during the study and which interact with the variables under study. The internal validity is of three types (a) Content (b) Criterion Related and (c) Construct Validity.

Content validity: is the degree to which the content of the measurement instrument represents the universe of all the relevant items under subject matter of the study. Content validity being judgemental, in addition in using his/she expertise in the area to define the topic carefully, the researcher should ideally determine the items to be scaled and the scales to be used, he/ she should refer the instrument to a panel of experts to judge how well the instrument meets the standards. These experts would asses each item in the instrument independently and classify them into essential, useful and not necessary items. The response from each panel member on each item is evaluated by content validity ratio and those meeting statistical significance should be retained.

Criterion related validity is a measure of the degree to which a predictor variable is capable of capturing the relevant aspects of the criterion. This could be either predictive validity or concurrent validity depending upon whether a researcher wants to use the variable to predict or to describe the behaviour. The essential difference between the two is the *time perspective.* It is important for the researcher to ensure that the criteria set captures the behaviour and also the variable chosen (Predictive or Descriptive) captures the essence of the criterion. By carrying out the test and finding out the scores on criteria, variable and the actual behaviour, the researcher can easily find out the degree of correlation between them to conclude about the criterion related validity. The statistical tool which comes handy here is the correlation.

Construct Validity attempts to identify the underlying constructs being measured and how well the instrument represents them. In judging the construct validity, the researcher needs to consider both the theory and the measuring instrument. One can use the convergent validity technique where the scores on the construct under study are correlated with the outcomes of some pre-developed established construct if there is any; else the discriminent validity technique is employed where one separates it from other constructs which are available in related theories. The widely used techniques for the discriminent validity are factor analysis and multi-trait – multi-method analysis.

Reliability: This refers to the degree to which the instrument provides consistent results. It is concerned with the estimates of the degree to which a measurement is free of random or unstable error. There are three frequently used perspectives on reliability based on time and condition: stability, equivalence and internal consistency.

(i) Stability takes care of the personal and situational factors and indicates the extent to which the instrument is able to produce consistent results with the same person at different times. A test – retest method is applied to measure stability of the instrument. The stability scores are often affected by several factors like time between the two tests, topic sensitivity and extraneous factors affecting the respondents' opinion. The alertness of the researcher and manoeuvring the time between measurements is critical to ensure the veracity of the test scores

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

(ii) Equivalence is concerned with the variations at one point in time among both the observers or interviewers and different samples of items being studied. A good way to test equivalence of the measurements by different observers or interviewers is to comparing their scores on the same event. Measures of iterative reliability can be obtained in such cases where a panel of judges is involved, by finding correlation in their observations. The researcher can rank observations and find out the rank correlation coefficient to judge the equivalence. The objective in judging equivalence is to find out how a given set of items will categorize the individual. Variations in responses apart, if a person is classified in the same way by each test, the test is deemed to have high equivalence. In order to judge the equivalence one administers the alternative or parallel forms of the test to the same person either simultaneously or with certain time gap between the two to avoid impact of fatigue or boredom on the test result. The scores are then correlated to judge equivalence.

(iii) Internal consistency refers to internal consistency or homogeneity among the items. The split half technique can be used when there are several similar questions or statements in the instrument. The instrument is administered only once and the results are separated into odd and even items or randomly split into two sections. The correlation between the results of the two halves indicates the degree of internal consistency. To adjust for the reduced length due to the splitting of the test, the spearman – Brown formula is used. As was alluded to above there are some tests which do not require the splitting of the instrument and are quite frequently used by researcher the *Kunder–Richardson Formula 20* (KR20) for dichotomous items and *Cronbach's coefficient alpha* for multi item scales.

Correlation and Causation: The fallacy of *Post hoc sed non-proctor hoc* occurs when correlation between variables is confused with causation. Determining the nature of causation is very difficult. Sometimes a cause and effect are closely related - spatially, temporally or both - but sometimes they are not. However, most investigators seem to be inclined to assume that events which are closely connected either spatially or temporally are also connected causally. This problem is commonly known as the difference between *correlation* and *causation*. Just because two events correlate (are close in time or space) does not mean that one has caused the other. Scientific method demands that any correlation to be attributed to causation, it has to testable and one must remember that science forces us to remain open to the possibility that new evidence will cause a change in what we know and believe. With enough information, one can justify concluding that a strong correlation between two events is indicative of a causal relationship. The author strongly opines that a researcher should be mindful of the fact that when all reliable evidence points to one conclusion while no reliable evidence indicates points to anything else, then we don't commit the fallacy of confusing correlation with causation by concluding that we have likely identified the cause of the phenomenon in question.

Significance Test: The term significance is one of the most misunderstood terms in statistics. The normal process for testing significance is that the investigator specifies the null (Ho) and alternate hypotheses (Ha) and the level of significance alpha. Then he finds out the p value form the sample and

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

compares it with the predefined type I error (α). Statistical significance is then established by using the $p < \alpha$ criterion; if $p < \alpha$, a result is deemed statistically significant and if $p > \alpha$, it is not. A researcher must understand that alpha and p values are completely different entities with completely different interpretations. The p value is now associated in researchers' minds with the type I error rate, α. Since, both concepts are tail area probabilities, the p value is erroneously interpreted as a frequency-based "observed" type I error rate, and at the same time as an incorrect (i.e., $p < \alpha$) measure of evidence against Ho. While the p value from Fisher's significance testing procedure measures the probability of encountering an outcome (x) of this magnitude (or larger) conditional on a true null hypothesis of no effect or relationship, or Pr (x | Ho), the significance level, or Type I error, α, is the false rejection of Ho, while a Type II error, β, is the false acceptance of Ho. The perspective of finding p value is to gather evidence against the null hypothesis. The perspective of specifying α value is to minimize error in the decision. The researcher must realise that while α is a pre-determined value, p is an observed value. The former takes a decision perspective to minimise error while the latter gathers evidence against null hypotheses. Furthermore, a researcher should be clear on these two perspectives, α and p which has been assimilated to give what most books refer to as *a theory of statistical inference*. Particularly, the researcher should refrain from using the terms such as roving alpha and very highly significant relationships. This is because Fisher did not speak of the alternative hypothesis while proposing the concept of p value while Newman – Pearson gave the concept of type I error i.e. α and they did not speak of p value in their concept of hypothesis testing. Hence it would be unwise to mix oranges and apples.

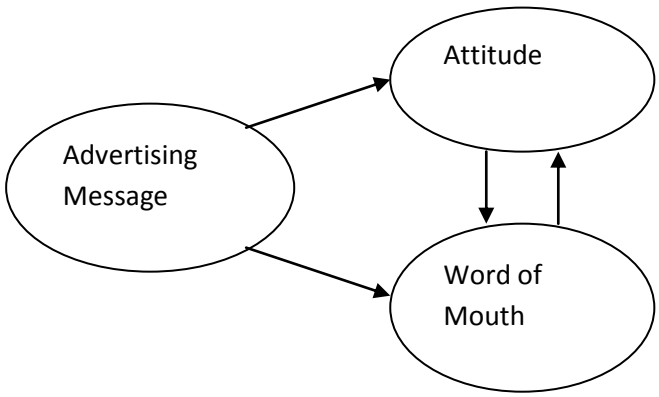


Fig. 1: Problem identification

If the arrow indicating relationship between advertising message and word of mouth is removed, the diagram would be free of identification problems.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

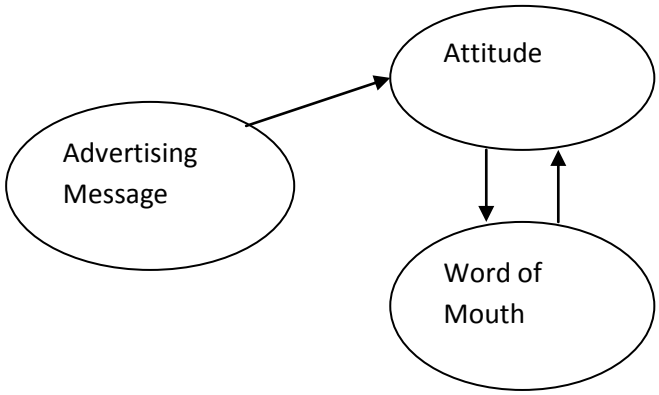


Fig 2: Adjusted conceptual diagram without the Identification problem

Relationship diagrams: Conceptual models (as shown above) are the backbone of empirical and theoretical marketing. They must be treated with the same care as we do our questionnaire construction, purification of our measurement scales, design of experiments. More often than not the conceptual models are marred by the problem of identification. Sometimes it becomes impossible to "identify" the true relationships in the conceptual model, no matter how much data has been gathered. This inability to uniquely determine the model parameters is nothing but the identification problem. The theory incorporated in the conceptual model is insufficient to identify the structural coefficients and leads to erroneous conclusions. To take an example of marketing a newly formulated VRS scheme, the following diagram is marred with the identification problem as the relationship coefficient between advertisement expenditure and word of mouth and advertising message and attitude cannot be determined conclusively as the variables word of mouth and attitude also interact with each other making it difficult to estimate the coefficient of the true relationships.

A researcher in management sciences must thus be mindful of the relationships outlined in the conceptual model and also ascertain if they can be truly identified. This is because every functional are has its own set of goals, its preferences and its agendas. The lack of identification in the conceptual diagram often leads to erroneous measurement tools and consequent erroneous interpretations of the same under such circumstances. A researcher in the author's opinion may employ the following tactics as suggested by Hess to overcome this problem

1. *Erase Theoretical Linkages*: The arrows missing in a conceptual model are equally as important arrows present or the predicted sign is of correlations. Superfluous linkages should be eliminated.

2. *Add an Exogenous Variable Exogenous:* variables that "shift" other equations around but do not affect the equation in question help identify this questionable one's coefficients.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

3. *Split Exogenous Variables*: If one has multi-item measures of an exogenous variable, he can create extra movement in some equations by not collapsing all the items into a single scale. This can be done only if suggested by factor analysis.

4. *Catalogue Missing Variables* if the *Model is partially recursive*: If the model is partially recursive, then one needs to think carefully about the missing variables that are "not" in the equations. If the list of missing variables for each equation is unique, then one can plausibly assume that the disturbances are independent, making the model fully recursive and thus identified.

4. Conclusion:

Hard core research is often the bane of academicians who are brought up on the cut-copy-paste work culture. For them real research is anathema**.** The gift of the gab and playing institutional politics becomes the *sine qua non* of their existence. Others openly state that "copying from one book may be plagiarism but copying from many is research." They are quick to offer opinions without having the humility to first listen to the views of others or the patience to think through their own logic. Students innocently ape these wrong traits to their own detriment. In summarily debunking these positions, therefore, this paper began by introducing the readers in B-Schools to the philosophical underpinnings of research in social and management sciences. In the process the author took them through a historical journey of philosophy on the one hand and introduced them to the epistemology of research on the other. Having done that, the author emphasised on two things: clarity of definition and scope of inquiry on the one hand, and accuracy of data to facilitate conclusions on the other. In order to facilitate clarity and accuracy the quest of the researcher was directed towards identifying and avoiding selected pitfalls in their research. To that extent it is polemical in the first part, instructional in the second and pedagogical all through.

5. References

[1] Aaker, David A. and Richard P. Bagozzi (1979), Unobservable Variables in Structural Equation Models with an Application in Industrial Selling, *Journal of Marketing Research,* 16 (May).
[2] Althuser Louis (1976): *Essays in Self Criticism*, London, New Left Books. 31.
[3] Aquinas St Thomas, (1948): *Summa Theologica*, 3 Vols., New York and Boston, Benzeiger Brothers Inc. (Reprint)
[4] Austin Cline *http://atheism.about.com/library/FAQs/skepticism/blfaq_fall_correlation.htm*
[5] Bentham Jeremy, (1843): John Bowring (ed.) *the Works of Jeremy Bentham* Edinburgh, William Tait.
[6] Berger Peter, (1977): *Pyramids of Sacrifice*, Penguin, Harmondsworth.
[7] Berger Peter and Luckmann, Thomas, (1971): *The Social Construction of Reality*, Penguin Harmondsworth
[8] Bottomore Tom (1975): *Sociology as Social Criticism*, London, George Allen and Unwin.
[9] Cairns, Huntington (1949): *Legal Philosophy from Plato to Hegel*, Baltimore, Johns Hopkins Press
[10] Checkland, P B (1999): *Soft Systems Methodology: a thirty year retrospective,* Chichester, John Wiley and Sons Limited,
[11] Chisholm, R N (1977): *The Theory of Knowledge*, New Delhi, Prentice Hall.
[12] Comte, Auguste (1853): *The Positive Philosophy* Trans Harriet Martineu 2 Volumes, London, Toubner.
[13] Cooper, Donald R., and Pamela S. Schindler (2006), *Marketing Research,* New York: McGraw–Hill.
[14] Copleston, Frederic S J (1946) (1950)(1953): *The History of Philosophy* in three volumes, New York, Doubleday

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[15] Descartes Rene' (1965): *A Discourse on Method and Other Works*, New York, Washington Square Press.
[16] Durkheim, Emile (1950): *The Rules of Sociological Method*, Chicago, Chicago Press
[17] Hegel, G F W (1953) (1988): *Reason in History,* (Reprint), London, Macmillan.
[18] Hegel, G F W (1956): *The Philosophy of History*, New York, Dover Publication.
[19] Hess James D. (1998), *Unidentifiable Relationships in conceptual Marketing Models* (quoted elsewhere)
[20] Hobbes, Thomas (1909): *Leviathan,* New York, Oxford University Press.
[21] Hubbard R. (2005), We Don't Really Know What "Statistical Significance" Means: A Major Educational Failure, *Working paper,* The Wharton School University of Pennsylvania, Philadelphia, July.
[22] Huxley, Aldous (1969). In Grover Smith. *Letters of Aldous Huxley*. London: Chatto and Windus.
[23] Jayashree S (2005): *What Every MBA Should Know About HRM*, Himalaya Publishing House, Mumbai.
[24] Jayashree S, Sadri S and Dastoor D S (2008) *Theory and Practice of Managerial Ethics,* 2nd Edition, Jaico Publishing Co., Delhi.
[25] Jayashree S, Sadri S and Nayak N (2009): *A Strategic Approach to Human Resources Management*
[26] Kant, Immanuel (1936): *Critique of Pure Reason*, (Reprint) London, Everyman's Library.
[27] Kant, Immanuel (1980): *Critique of Practical Reason*, Indianapolis, (Reprint) Bobb – Merrill Educational Publishing.
[28] Keynes, John Maynard (1998). *The Collected Writings of John Maynard Keynes* (30 Volume Hardback). Cambridge: Cambridge University Press.
[29] Kuhn, Thomas S. (1966) *The Structure of Scientific Revolutions*, 3rd Ed. Chicago and London: Univ. of Chicago Press,
[30] Lehmann, Donald R., Senil Gupta, and Joe H. Steckel (1998), *Marketing research*, New York: Addison–Wesley.
[31] Malhotra, N.K. (2004), *Marketing Research: An applied orientation,* Upper Saddle River, NJ: Prentice Hall, Fourth Edition.
[32] Marx, Karl (1961): *Economic and Philosophical Manuscripts of 1844*, Moscow, Foreign Language Publishing House.
[33] Parsons, Talcott and Smelser, Neil J (1984) : *Economy and Society : a Study in the Integration of Economic and Social Theory,* London and new York, Routledge,
[34] Patinkin, Don (1987). "Keynes, John Maynard", *The New Palgrave: A Dictionary of Economics*. v. 2, New York, Macmillan
[35] Plamenatz, John (1971): *Ideology,* London, Macmillan.
[36] Plato (n.d): *The Republic,* London, Heron Books, and Translated by W H D Rouse, New American Library.
[37] Plato (1956): *The Great Dialogues of Plato*, translated by W H D Rouse, Holland, New Amsterdam Library.
[38] Popper, Karl Raimund (1961): *The Property of Historicism*, London, Routledge and Kegan Paul.
[39] Popper, Karl Raimund (1962): *The Open Society and Its Enemies,* London Routledge and Kegan Paul.
[40] Popper, Karl Raimund (1963): *Conjectures and Refutations,* London, Routledge and Kegan Paul
[41] Russell, Bertrand (1930): *The Conquest of Happiness*, London, Routledge.
[42] Sadri S, Jayashree S and Ajgaonkar M (2002): *Geometry of HR,* Himalaya Publishing House, Mumbai.
[43] Sadri S and Jayashree S (2011); *Business Ethics and Corporate Governance,* Current Publications, Agra.
[44] Sadri S and Makkar U (eds) (2012) *Future Directions in Management,* Bharati Publications, Ghaziabad
[45] Sadri S and Jayashree S (2013): *Human Resources Management in Modern India: concepts and cases,* Himalaya Publishing House, Mumbai
[46] Shanker, S., and Shanker, V. A. (1986), *Ludwig Wittgenstein: critical assessments*. London: Croom Helm.
[47] Shaw, Bernard (1972). In Dan H. Laurence. *Collected Letters, 1898–1910*. New York: Dodd, Mead & Company.
[48] Tull, Donald S. and Del I. Hawkins (1993), *Marketing research: Measurement & method,* New York: Macmillan, Sixth Edition.
[49] Voltaire (Francois Marie Arouet) (1964): *Philosophic Dictionary*, quoted in Lord Morley: Voltaire, London, Foreign Classics for English Readers Series.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[50] Weber, Max (1933): *The Methodology of Social Sciences,* New York, the Free Press of Glencoe.
[51] Weber, Max (1947) *The Theory of Social and Economic Organisation,* New York, Free Press.
[52] Wittgenstein, Ludwig: (1989), Diamond, Cora, ed., *Wittgenstein's Lectures on the Foundations of Mathematics*, Chicago, University Of Chicago Press,

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The Impact of Globalization on Economies of Developed Countries

Mgr. Lenka Pelegrinová, PhD.[1], Ing. Martin Lačný, PhD.[1]

[1]University of Prešov, Slovakia

Abstract.
The concept of globalization is interpreted by various authors in terms of its importance or content. Thisarticlepresents results of an analysis of the influence of globalization trends on important macroeconomic indicators of selected countries. An examination of the level of globalization as a quantitative marker was enabled by the KOF Index of Globalization, which provides an indication of the economic, political and social globalization at global level. Research methods included time series analysis, trend analysis and nonparametric regression model (regression of panel data).

Keywords: Economic Globalization, Political Globalization, Social Globalization, KOF Index of Globalization, Open Economy

JEL Codes: F01, F21, F43, F62, F63

1. Introduction

An often inflected term *globalization* is associated principally with spontaneous and uncontrolled process that affects events at a global level, while also transforming a daily life of individuals. In a globalizing world, in a time full of paradoxes and unprecedented dynamics we are drawn into events that cannot be avoided. The character of society is changing and it is not reducible to a certain territory, nation or culture anymore. Therefore, globalization is usually understood as a process of integration at a higher quality level, compared with previous historical stages of the society development. It identifies the fact that there is a level of the global interdependence, integration and organization that covers existing national, regional and local systems.

Globalization refers to the process of the gradual disappearance of borders of nation-states, while economic globalization represents the pinnacle of this process. The evidence can be found in the interdependence of economies around the world, where each economy is sensitive to fluctuations and changes in other economies. This sensitivity is naturally determined by the intensity of market coupling. However, also a low intensity of market coupling may have indirect effects through the global economy

[+] Corresponding author – Tel.: + 421 (0)51 772 43 80 *E-mail address*: martin.lacny@unipo.sk

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

network. Economic globalization is thus a process in which national markets and economies gradually open up to competition, capital, technology and information. It means also introduction of general rules and laws regulating national economies. From the perspective of political globalization, one can perceive in particular the impact of international organizations on the national legislations. Social and cultural globalization is being considered also as a significant aspect, which is intensified by the growing trend of using the internet and social networks within the last decade.

The debate about globalization is facing various opinion streams that perceive the process of globalization in positive or negative terms. Despite the different opinions all parties agree that globalization is an intensifying and inevitable phenomenon. According to Shangquana (2000) globalization presents increasing interdependence of world economies as a result of the growth of cross-border flows of goods, services, international capital and quickly spreading technologies. Acceleration of the economic globalization in recent years is related to the rapid development of science and technology, which caused a continuous cost reduction in transport, communication, international trade and investment, thus enabling the organization and coordination of global production.

Heterogeneity of the perception of globalization is presented e.g. by Baylis and Smith (2008), who divided various debates on globalization into four groups of international politics theories: realism, liberalism, Marxist theory and social constructivism. The diversity of views on globalization is highlighted also by Heldand McGrew(1999), who distinguish three main theoretical streams: hyper-globalism, skepticism and transformationalism. Among the frequentlycited authorswe reflect also Scholte(2000), who offers a different perception of globalization as he distinguishes authors, who see globalization in terms of its origin, influence and impact on society.

The consequences of globalization are perceived especially in terms of the traditional conflict between developed and developing countries. For the least developed countries it becomes difficult to identify the causes of their failure and inability to take advantage of globalization processes as well as the developed ones. Therefore, we aimed our research on smaller and larger national economies, focusing on the impact of the globalization on the development of selected macroeconomic indicators during the 15-year period. The aim of the research is to verify the impact of globalization on economic development in selected countries through panel data regression.

2. KOF Index of Globalization

A quantification of the level of globalization was enabled at the global scale by the KOF Index of Globalization, which was first introduced in 2002 and updated in 2012 to its current form. Data of the KOF Index of Globalization are now available on a yearly basis for 208 countries over the period of 1970-2009. Authors of the KOF Index of Globalization perceive globalization as a process of networking and building relations between actors across continents through various streams: people, information, ideas, capital, products and services. Globalization is thus the process of erosion of national boundaries that integrates

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

national economies, cultures, technologies and governments, forming a complex system of interdependent relations. (KOF Index of Globalization, 2012)KOF Index of Globalization is the only leading index, which provides indications of the level of globalization in different countries in three main areas:

- Economic globalization;
- Social globalization;
- Political globalization.

Economic globalization is characterized by flows of products, services, capital and information flows relating to market activity over a longer distance. On the other hand, social globalization concerns mainly a dissemination of ideas, information, and people in particular. Globalization at the political level characterizes the dispersion and linking of government policies.

The calculation of three sub-indices in these three areas (economic, social and political) forms the basis for the calculation of the overall index of globalization level, which covers:

- Actual economic flows;
- Economic constraints;
- Data on information flows;
- Data on personal contacts;
- Data on cultural proximity.

A graphical representation of the KOF Index of Globalization is presented on the Figure 1 and exact values of the index for each country during the period of 1995-2009 are shown in the Table 1.

KOF Index of Globalization

Economic globalization		36%
Sub-index	*Cathegory*	*Value*
Actual flows		**50%**
	Trade	21%
	Foreign direct investment	28%
	Portfolio investment	24%
	Income payments to foreign nationals	27%
Restrictions		**50%**
	Hidden import barriers	24%
	Mean tariff rate	27%
	Taxes on international trade	26%
	Capital account restrictions	23%

Social globalization		37%
Sub-index	*Cathegory*	*Value*
Personal contacts		**34%**
	Telephone traffic	25%
	Transfers	4%
	International tourism	26%
	Foreign population	21%
	International letters	25%
Information flows		**35%**
	Internet users	33%
	Television	36%
	Trade in newspapers	32%
Cultural proximity		**31%**
	Number of McDonald's restaurants	44%
	Number of Ikea	45%
	Trade in books	11%

Political globalization		26%
Sub-index	*Cathegory*	*Value*
Political engagement		**26%**
	Embassies in country	25%
	Membership in international organizations	28%
	Participation in U.N. Security Council missions	22%
	International treaties	25%

Fig. 1: Structure of KOF Index of Globalization
(Own processing according to KOF Index of Globalization, 2012)

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Table 1: Values of the KOF Index of Globalization in selected countries during the period 1995-2009
(Own processing according to KOF Index of Globalization, 2012)

Code	Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CZE	Czech Republic	72.95	73.70	75.40	76.69	78.55	80.03	81.38	82.39	82.32	84.62	85.40	85.34	86.48	86.00	85.76
FIN	Finland	76.89	82.68	83.65	85.10	85.96	87.24	87.13	86.25	85.90	86.76	85.17	85.67	86.62	85.70	84.34
FRA	France	78.56	78.51	79.72	81.05	81.41	83.39	82.27	82.55	82.73	83.85	83.45	84.03	84.68	84.34	84.11
DEU	Germany	74.29	75.55	77.10	78.71	79.95	81.70	81.47	82.13	82.17	81.99	82.22	82.47	83.02	82.09	81.52
HUN	Hungary	74.93	76.49	78.24	79.86	80.49	80.87	81.95	80.92	80.91	84.62	85.29	86.57	86.90	86.90	87.37
IRL	Ireland	82.46	83.73	84.13	85.58	85.85	86.75	87.23	86.30	86.26	86.00	86.88	86.19	86.48	86.01	91.95
NLD	Netherlands	88.36	88.54	89.02	89.87	91.13	91.81	91.38	90.44	91.29	90.52	90.52	91.00	91.93	91.50	90.94
NOR	Norway	81.10	82.09	82.57	83.22	82.65	83.15	82.96	81.75	83.31	81.70	80.36	81.76	82.56	82.29	83.19
RUS	Russian Federation	51.68	52.52	53.84	56.37	57.80	63.80	64.95	66.29	66.93	66.84	67.05	66.99	68.01	65.65	67.34
SVK	Slovak Republic	63.36	65.31	67.29	68.75	70.26	72.88	74.01	72.80	72.98	80.62	82.35	83.41	83.85	84.05	83.83
GBR	United Kingdom	83.97	84.33	85.07	85.64	86.43	87.04	86.58	86.53	86.90	85.96	86.45	86.16	85.99	85.62	85.53
USA	United States	74.94	75.39	75.75	75.93	76.37	76.86	76.11	75.09	75.54	76.24	76.29	77.07	77.53	76.40	74.87

3. Aims and Methods of Research

Globalizationpresents a controversial issue inprofessional, scientific, orpolitical discourse. It is mainly seenin terms of positive, respectivelynegative impacton thesocietyin particular countries. Forourresearchwe selectedso called developed countriesin the EuropeanandNorth Americancontinentwith comparableeconomicandpolitical systems. We worked at our researchwith the basic assumptionthat the level ofglobalizationisreflectedpositivelyin the context of economicdevelopment of selectedcountries.

Aim of the research

The aim of research was to verify the relationship between the level of globalization and economic indicators in selected countries of the research sample. The performance criterion of the main aim is to verify scientific hypothesis (H):

The higher the level of globalization in selected countries, the more positively manifested selected macroeconomic indicators in countries in the research sample.

Research sample

For the purpose of research, we selected twelve countries of the European and the North American continent that could be divided into three basic groups:

1. World powers with significant economic and political engagement at a global level: United States of America (USA), Russian Federation (RUS), Germany (DEU), United Kingdom of Great Britain and Northern Ireland (GBR), French Republic (FRA).

2. Economically and politically developed European countries with influence mainly at a regional level: Finland (FIN), Netherlands (NLD), Ireland (IRL), Norway (NOR).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

3. Smaller post-socialist economies of Central Europe: Czech Republic (CZE), Slovak Republic (SVK), Hungary (HUN).

In the terms of representativeness, the research sample represents 6.2% of the overall number of countries, if we take into account the number of UN members (193 countries). However, in terms of the global economy, selected countries represent a significant share of global production, according to the IMF about 80% of the world production.

Research methods

For the research, in addition to basic theoretical and logical methods (analysis, synthesis, deduction, induction, comparison, analogy, abstraction, and concretization), there were used also basic methods of descriptive statistics (linear graphs, tables), time series analysis through trend analysis and nonparametric regression model (regression of panel data).

As a matter of the panel data regression we worked with the analysis of time series (1995-2009) and with a sample of 12 countries, representing a set of 180 observations. Panel data are combined time and spatial data that are expressed as time series of observations for each country in the period 1995-2009. For the basic regression model of panel data we consider following model (Lukáčik, Lukáčiková, Szomolányi, 2010):

$$y_{it} = ß_1x_{it1} + ß_2x_{it2} + ... + ß_kx_{itk} + \alpha_1z_{i1} + \alpha_2z_{i2} + ... + \alpha_qz_{iq} + u_{it}$$

The index i denotes the cross-sectional dimension i = 1, ..., n, that are 12 countries of the research sample and the index t denotes the time dimension t = 1, ..., T, that is the time period from 1995 to 2009. Variables x_1 to x_k are explanatory variables that do not include units vector and variables z_1 to z_q representing individual effects - diversity, which may differ a country or a whole group from other entities - are classified here as the units vector. Individual effects do not change with time. U_{it} are independent and equally distributed errors with zero mean and dispersion σ_2 (homoskedasticity assumption).

Panel regression allows us to determine the relationship between KOF Index of Globalization (KOF) as the explaining variable and explanatory variables that represent foreign direct investments (FDI), balance of payments (B) and GDP per capita. All economic indicators are expressed in U.S. dollars according to the current exchange rate.

Foreign direct investment represents a category of international investment expressed as an absolute value of the current USD. It expresses the intention of an entity residing in one economy (direct investor) to obtain a lasting interest in an enterprise residing in another economy (direct investment enterprise) (International Monetary Fund, 1993, p.93).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Balance of payments is defined as a statistical summary of capturing economic transactions between residents of one country and residents of the rest of the world during the reference period. The balance of payments is compiled on a monthly basis in cumulative form in the current absolute value of USD (International Monetary Fund, 1993, p. 10-19).

GDP per capita is gross domestic product (GDP) divided by the average annual number of inhabitants of the country, allowing efficient comparison of the performance of economies of selected countries, irrespective of their size or population.

As mentioned above, we worked with an assumption that globalization has a positive impact on all selected economic indicators. By opening up to globalization the country should become more attractive for foreign investors (FDI growth), the volume of exports to other countries should increase (growth of B) and the overall economic situation of the country should improve (growth of GDP per capita).

4. Results of the Research

The research was aimed to identify the relationship between globalization and selected economic indicators, while we would like to answer questions about the impact of globalization on the economic development of countries. First, it was necessary to determine the mode that should properly quantify the level of globalization. As the most appropriate we consider the KOF Index of Globalization, which takes into account not only economic, but also political and social sphere of globalization. Data on the development of the KOF Index of Globalization in selected countries of the research sample for the period 1995 - 2009 are shown in Table 1.The values of the explanatory variables (FDI, B, GDP per capita) were obtained from publicly available databases (World Trade Organization, World Bank, International Monetary Fund). They were subsequently used in the panel regression (regression of panel data), which allows to determine the linear relationship between explaining and explanatory variables.

For the purposes of scientific research, we reformulate the scientific hypothesis H to three alternative statistical hypotheses H1 - H3:

H1: *There is a statistically significant relationship between the KOF Index of Globalization (KOF) and foreign direct investments (FDI).*

H2: *There is a statistically significant relationship between the KOF Index of Globalization (KOF) and balance of payments (B).*

H3: *There is a statistically significant relationship between the KOF Index of Globalization (KOF) and GDP per capita.*

The verification of statistical hypotheses H1-H3 took place at the chosen significance level α (0,05). For the adoption of statistical hypotheses we consider as a guideline if the *p-value* (Probability Level) is less than the significance level α.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Statistical hypotheses were tested in EViews program using the Fixed Effect Model (FEM), which provides diversity of cross members in absolute units. Statistical hypothesis test results are shown in Table 2.

Table 2: Results of the statistical test of H1, H2, H3 *(Own processing)*

Dependent Variable: KOF Method: Panel Least Squares Total panel (balanced) observations: 180		
Variable	t-Statistic	*p-value*
FDI	2.206328	**0.0287**
Balance	0.728138	0.4675
HDP per capita	3.481122	**0.0006**

The result of the testing of statistical hypotheses points to a statistically significant linear relationship between the KOF Index of Globalization and foreign direct investment. Similarly, the test confirmed a significant linear relationship between the KOF Index of Globalization and GDP per capita, where the testing result shows almost zero probability of a random effect. In both cases it is a positive dependence, so at the growth of KOF there is an evident increase of FDI and GDP per capita in selected countries. The testing of the hypothesis H2, however, did not point to the relationship between the growth of KOF and the balance of payments of countries.

Based on the results of testing, we are able to confirm the scientific hypothesis H. Despite the statistical analysis has not confirmed relationship between an increase of the KOF Index of Globalization and the balance of payments, we assume that this indicator has no direct positive or negative impact on the national economies. By contrast, GDP per capita shows the performance of national economies independent on their size (land area, population). Foreign direct investments (FDI) also have a direct impact on the national economies, and their increased occurrence is considered a positive economic phenomenon.

Opening up to globalization represents an effort to minimize the economic, political, or cultural barriers. The result of the opening up should be a closer cooperation with other actors beyond national borders. Therefore we have chosen indicators which could confirm our assumption. Openness to globalization trends should attract foreign investment actors and it should be reflected in increasing foreign direct investments (FDI) into the country. Panel regressions confirmed this assumption and therefore we can conclude that increasing the level of globalization has a positive effect on increasing foreign direct investment.

Countries' participation on the process of economic globalization should increase their productivity and enable them to expand into foreign markets. The expansion is reflected in particular in improving their balance of payments. The testing of this hypothesis doesnot confirm our assumption. As a final indicator we

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

have chosen GDP per capita, which captures the most realisticallythe economic situation in the country. Openness to globalization promotes, as stated by many authors, an economic growth of developed economies, and thus the ratio of GDP per capita should grow. At the sample of countries we have successfully tested this statistical hypothesis and confirmed this conclusion, since the ratio of GDP per capita increased with the increasing of the KOF Index of Globalization, which points to the openness of countries to globalization.

5. Discussion – Globalization and Slovak Republic

Based on the research we confirmed the positive effect of globalization on foreign direct investment and GDP per capita. Thus, we can formulate a recommendation that the opening up to globalization has positive effects on national economies. From that perspective, we focused on the openness of the Slovak Republic to globalization, while considering the KOF Index of Globalization, as well as its sub-indices.

At detailed look on the results of Slovakia we can monitor the level of development of globalization during the period 1995-2009 on the following charts. Figure 2 shows the evolution of KOF indicator, the globalization index and its sub-indices, that reflect globalization in economic, political and social spheres. We notice that all indicators were rising continuously, while a significant breakthrough occurred in 2004, which is probably due to the entry into the European Union. We register the most significant jump in the sphere of economic globalization. Since 2004, no major breakthrough occurred in the development of globalization in Slovakia.

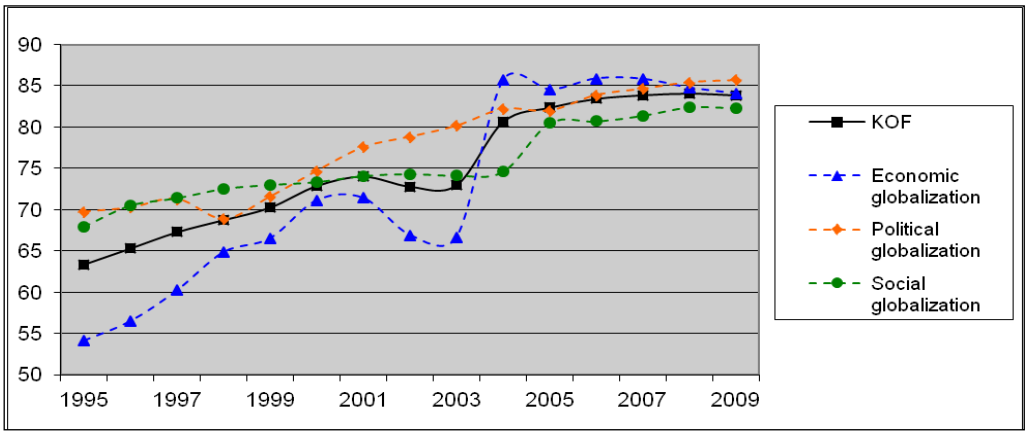


Fig. 2: Development of KOF Index of Globalization in Slovakia (1995 – 2009)
(Own processing)

On the basis of the globalization index for the period 1995 - 2009 we were able to simulate the development of indicators through trend analysis for the next five years. Thus, Figure 3 shows the expected development indicators in the period 2010-2015 in Slovakia. The development of indicators during the 15-year period after the application of trend analysis points to continuous gradual growth of the globalization

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

index and its sub-indices in the next 5-year period. Economic globalization is expressed most significantly and social globalization lags behind. Political globalization follows the predicted trend of the overall KOF Index of Globalization. As the trend analysis highlights the continued opening of Slovak republic to globalization in all fields, we can assume the main effect of this trend on the domestic economy.

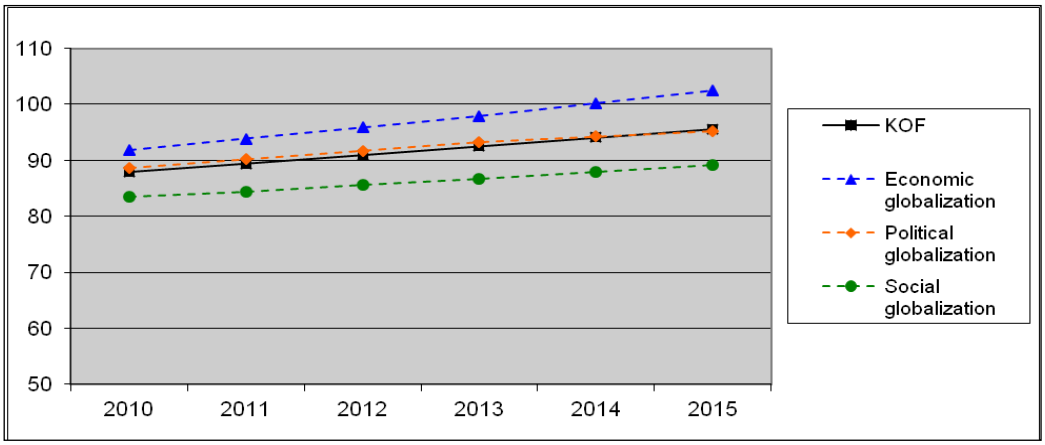


Fig. 3: Trend analysis of KOF Index of Globalization in Slovakia for the period 2010 - 2015
(Own processing)

6. Conclusion

The main aim of the research was to verify the relationship between the level of globalization and the development of selected macroeconomic indicators. An examination of the level of globalization as a quantitative marker was enabled by the KOF Index of Globalization, which provides an indication of the economic, political and social globalization at global level. KOF Index of Globalization has enabled us to follow the evolution of globalization in selected countries for the period of 1995 - 2009.

While studying the impact of globalization, we have chosen as explanatory variables the amount of foreign direct investments, which show the attractiveness of countries for foreign investors. At the same time, we focused on the balance of payments, which demonstrates the ability of the economy to succeed in foreign markets, as well as GDP per capita, which compares the gross domestic product of countries, regardless of their size. We assumed that globalization will have a positive impact on the development of these indicators.

Based on statistical hypothesis testing through regression panel data in EViews program, we were able to adopt statistical hypotheses, which predicted a statistically significant relationship between the KOF Index of Globalization and foreign direct investments (FDI) as well as GDP per capita. We could not, however, accept the hypothesis of a statistically significant relationship between the KOF Index of

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Globalization and the balance of payments of selected countries. Overall, we have adopted the assumption of a positive impact of globalization on the economies of selected countries.

In the end, we have focused on the development of the level of globalization in Slovakia. Values of the KOF Index of Globalization and its sub-indices gradually increased, with the greatest breakthrough occurred after the accession to the European Union. Trend analysis highlighted the continuing upward trend of opening up to globalization in all areas.

7. References

[1] J. Baylis, J.,S. Smith, S. et al.*The Globalisation of World Politics*. New York: Oxford University Press, 2008, 623 p. ISBN 978-0199297771.

[2] E. Cihelková, J. Křížková, H. Kunešová andD. Martinčík.*Světová ekonomika- nové jevy a perspektivy*.Praha: C.H. Beck, 2001, 257 p. ISBN 80-7179-311-6.

[3] A. Giddens.*The Consequences of Modernity.* Cambridge: Polity Press, 1990, 188 p. ISBN0-7456-0923-6.

[4] R. Gilpin. *The Political Economy of International Relations.* Princeton: Princeton University Press, 1987, 472 p. ISBN: 9780691022628.

[5] D. Held, A. McGrew, et al. *Global Transformations: Politics, Economics and Culture*. Stanford: Stanford University Press, 1999, 540 p. ISBN 0804736278.

[6] International Monetary Fund. [online, quoted to 10.1.2013] Available at <http://www.imf.org>.

[7] KOF Index of Globalization. [online, quoted to 10.1.2013] Available at <http://globalization.kof.ethz.ch/>.

[8] O. Krpec, P. Pšeja, et al.: *Mezinárodní politická ekonomie*. Brno: IIPS MU, 2006, 164 p. ISBN-10: 80-210-4121-8.

M. Lukáčik, A. Lukáčikováand K. Szomolányi. *Panelové dáta v progeme EViews*. Bratislava: Fakulta hospodárskej informatiky, Ekonommická univerzita v Bratislave, 2010. [online, quoted to 31.3.2011] Available at <http://www.fhi.sk/files/katedry/kove/veda-vyskum/prace/2010/Lukacik-Lukacikova-Szomolanyi2010b.pdf>.

[9] P. McMichael. Globalisation: Trend or Project?In:R. Palan,et al. *Global Political Economy*.London: Routledge, 2000, 286 p. ISBN 0-415-20489-5.

[10] G. Shangquan. Economic Globalisation: Trends, Risks and Risk Prevention. In: *Economic & Social Affairs*, CDP Backround Paper No.1, 2000. [online, quoted to 10.1.2013] Available at <http://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2000_1.pdf>

[11] J. A. Scholte. *Globalization – a critical introduction.* New York: Palgrave Macmillan, 2000, 520 p. ISBN 978-0333977026.

[12] G. Smith and G. Naím. *Altered states: Globalisation, Sovereignty and Governance*. Ottawa: International Development Research Centre, 2000, 79 p. ISBN 0-88936-917-8.

[13] The World Bank. [online, quoted to 10.1.2013] Available at <http://data.worldbank.org>.

[14] World Trade Organisation. [online, quoted to 10.1.2013] Available at <https://www.wto.org/>.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Industrial Pollution Regulation in the EU and in Macedonia, Serbia and Croatia

Prof. Aleksandar Chavleski, PhD
FON University, Skopje, Macedonia

Abstract.
Industrial pollution control has substantial impact in the protection of the environment. In the European Union, there's vast legislation in this field consisting mainly of the Directive on industrial emissions of 2010 aimed at consolidating the so far existing legislation in this field. The new Directive on industrial emissions aims to establish an integrated prevention and control of the pollution arising from industrial activities and it lays down rules designed to prevent or, where that is not practicable, to reduce emissions into air, water and land and to prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. Macedonia, Serbia and Croatia have made significant progress in this field in the recent years as part of their obligations under the Stabilization and Association Process. The purpose of this particular article is to evaluate the degree of alignment and implementation of the environmental legislation in this particular area with the legislation of EU as well its practical application, and to identify the existing deficiencies and necessary steps for action

. **Keywords:** industrial installations, emission limit values, integrated control and prevention

JEL Codes: Q56, Q58

1. Introduction

Industrial installations are largely responsible for the most of the total amount of industrial in the air, water and soil, and generate significant quantities of waste. Although their activities are important in order to provide economic well - being, an account must be taken on the effects on the environment and people's health. That's why since the 1970s in EEC and later the European Union the industrial emissions were subject to regulation by several directives, which were finally replaced by single Directive on industrial emissions in 2010. The new Directive also sets new stricter values for certain polluting substances, a time frame for their reduction, new revision procedures for the integrated permits, better procedures for public participation, access to justice etc. The new Directive puts new obligations for the Member States and dynamics for their implementation. The alignment and effective implementation of the legislation in the area of Industrial pollution control and risk management (as a important component of the overall Environmental Policy of the European Union) in Macedonia, Serbia and Croatia is an ongoing process. This article will give comparison between the regulation of industrial pollution control in EU and in Macedonia, Serbia and Croatia, and will identify potential disparities in the process of alignment of the legislation in these countries.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

2. Industrial pollution regulation in the European Union

In the 1970s the concerns over the acid deposition in the EEC begun to rise. Since then, vast array of secondary legislation has been passed in order to tackle this problem. The Large Combustion Plant Directive 88/609/EEC targeted the reduction of sulphur and nitrogen oxides from the plants more powerful than 50 MW burning fossil fuel. In 2001 this Directive was revised and promoted combined generation of heat and power, putting an emission limit values for using biomass as fuel[1]. Also, the other relevant legislation in the field include Solvent Emissions Directive 1999/13/EC, the 1996 IPPC Directive, then Landfill Directive 1999/31/EC, Waste Incineration Directive 2000/76/EC, as well as the three existing directives on Titanium dioxide on (i) disposal (78/176/EEC), (ii) monitoring and surveillance (82/883/EEC) and (iii) programs for the reduction of pollution (92/112/EEC).

In 2005 European Commission started a process of revision of the existing legislation on industrial emissions with an aim to promote clearer environmental benefits, to eliminate the existing ambiguities and to encourage technological innovation. In December 2007 a proposal of the new Directive was launched by the Commission and in June 2010 a political agreement between the Member States was reached.

In November 2010, the new Directive on industrial emissions[2] was enacted consolidating most of the existing legislation in the field. The new Directive is directed at prevention and control of the pollution from the industrial activities through a system of permits for operation of the installations or combustion plants, waste incineration plants or waste co-incineration plants. The Member States are obliged that all industrial installations are operated in line with several general principles like: 1) all appropriate measures for prevention of pollution are taken; 2) application of BAT; 3) there will be no significant pollution from the operation of the plant; 4) generation of waste will be prevented in accordance with the Directive 2008/98/EC; 5) efficient use of energy and 6) all necessary measures to prevent accidents are taken and their eventual consequences are limited, etc.[3] Also, where an environmental quality standard requires stricter conditions than those achievable by the use of the Best available techniques, additional measures shall be included in the permit.

Furthermore, the Directive sets these minimum conditions for granting the permit by the Member States' competent authority: emission limit values for polluting substances listed in Annex II of the Directive, and for other polluting substances, which are likely to be emitted from the installation concerned in significant quantities, that appropriate arrangements ensuring protection of the soil and groundwater and measures concerning the monitoring and management of waste generated by the installation are

[1] Tiwary, A., Colls, J., Air Pollution: Measurement, modeling and mitigation, Abingdon, Routledge, 2010, p. 467.
[2] Directive 2010/50/EU, Official Journal of EU, L 334/50, 17.12.2010.
[3] Art.11.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

taken; suitable emission monitoring requirements are set; the competent authority is supplied regularly, and at least annually, with: information on the basis of results of previously mentioned emission monitoring and other required data that "enables the competent authority to verify compliance with the permit conditions ...", measures relating to conditions other than normal operating conditions such as start-up and shut-down operations, leaks, malfunctions, momentary stoppages and definitive cessation of operations, provisions on the minimisation of long-distance or trans-boundary pollution, conditions for assessing compliance with the emission limit values or a reference to the applicable requirements specified elsewhere etc.

Also, Member States' competent authorities can set stricter conditions for the permit than the standards achievable through the use of BAT described in the BAT conclusions. All operators are obliged to inform the competent authority of any planned change in the nature or functioning, or an extension of the installation which may have consequences for the environment. In such cases, the competent authorities should update the previous permit. These changes would be deemed to be substantial if the change or extension in itself reaches the capacity thresholds set out in Annex I of the Directive.[4]

Once granted the permits are subject to reconsideration and updating by the competent national authority every 4 years from the date of the publication of the BAT conclusions. On this occasion, all permit conditions are reconsidered and updated if necessary, and that the installation complies with those updated requirements. The Permit conditions are always reconsidered in a event of: 1) pollution caused by a installation is of such significance that the existing emission limit values of the permit need to be revised or new such values need to be included in the permit, 2) the use of other /new techniques is necessary for the reasons of operational safety of the facility and 3) where it is necessary to comply with a new or revised environmental quality standard.[5]

For the purposes of the assessment of the environmental effects, the Member States are obliged to carry on inspections according to an enacted plan for such inspections on national, regional and local level. Those inspections should be carried out at least on every 3 years for installations posing the lowest risk and at least every year for installations posing highest risk. Also, non-routine environmental inspections may be carried out in a event of serious complaints, accidents, incidents and occurrences of non-compliance as soon as possible and, if it is possible before the granting, reconsideration or update of a permit.[6]

The new Directive obliges the Member States to ensure their public has early and effective possibility to participate in the decision – making process for granting the permits to industrial installations, or any substantial change to an installation. Also, the public should take part in the process of reconsidering or updating permits where the competent authority has set less strict emission limit values for certain

[4] Art.20.
[5] Art.21
[6] Art.23

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

installation and where in an event of a pollution resulting in a significant excess of the existing emission limit values the permit needs to be revised or new such values need to be included in the permit.[7] Once the decision to grant the permit is taken, the public must be informed inter alia of its content, including the copy of the permit, the consultations held and the way those consultations were incorporated in the decision, the BAT reference documents and the manner of determination of permit conditions including the emission limit values, in relation to the Best available techniques and emission levels associated with the BAT.[8]

Also, the public must be entitled to judicial review or review by other impartial body of the issued permits. The conditions for locus standi of the applicants are: 1) to have a sufficient interest; 2) to maintain the impairment of a right, where administrative procedural law of a Member State requires this as a precondition. While determining more concretely these conditions in national law, the Member States should have in mind the "objective of giving the public concerned wide access to justice."[9]

The Directive itself prescribes that the interest of any non-governmental organizations promoting environmental protection and meeting any requirements under national law shall be deemed sufficient for meeting the criteria of locus standi for these review procedures. In order to facilitate the access of the public to these review procedures, Member States are obliged to ensure that practical information is made available to the public for that purpose.

Moreover, the public of a neighbouring Member State of EU is entitled to have (for an appropriate period of time) access to applications for permits in Member States where installations are located if they are going to have trans-boundary effects on the environment. Any remarks by the public should be taken in account when reaching the decision on the granting of permit by the competent authorities of the Member State where the installation is located. Once the decision is made, the competent authority shall inform the neighbouring Member State(s), who is responsible to ensure that that information is made available in an appropriate manner to the public concerned in its own territory.[10]

Besides these general provisions, the Directive contains special provisions regarding Large Combustion Plants. Waste Incineration and Waste Co-Incineration Plants, Installations and Activities using Organic Solvents, and on Installations producing Titanium Dioxide.

For the purpose of the Directive, Large Combustion Plants are all plants who are the total rated thermal input is equal to or greater than 50 MW, irrespective of the type of fuel used. For these plants, emission limit values are set in the part 1 of Annex 5 of the Directive. All permits granted before 7 January

[7] Art.24
[8] Art.24
[9] Art.25
[10] Art.26

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

2013 should include conditions these values not to be exceeded, provided that such large combustion plants are put into operation before 7 January 2014.

All permits for installations which had been granted an exemption as referred to in Article 4 (4) of Directive 2001/80/EC shall include conditions emission values not to exceed the emission limit values set out in Part 2 of Annex V of the Directive (provided such installation continue to work after January 1, 2016). All other permits concerning other installations should ensure that emissions into the air from these plants also do not exceed values set out in Part 2 of Annex V.

Under the Directive, the Commission was tasked inter alia to report to the European Parliament and Council by 31 December 2013 on the possibilities to establish Union – wide emission limit values on: diesel engines; recovery boilers within installations for the production of pulp; combustion plants within refineries firing the distillation and conversion residues from the refining of crude-oil; combustion plants firing gases other than natural gas and combustion plants in chemical installations using liquid production residues as non-commercial fuel for own consumption. Commission can produce a legislative proposal to this effect.[11]

The Directive provides for a possibility for Large Combustion Plants that have obtained first permit before 27 November 2002, to be exempted from the compliance with the emission limit values referred to in Article 30(2) for the pollutants which are subject to the plan or, where applicable, with the rates of desulphurisation referred to in Article 31 of the Directive. This could be done by means of transitional plans for those plants, and such plans can be adopted between years 2016 and 2020. Each transitional plan shall set a ceiling defining the maximum total annual emissions for all of the plants covered by the plan on the basis of each plant's total rated thermal input on 31 December 2010, its actual annual operating hours and its fuel use. The transitional plans should contain provisions on monitoring and reporting in accordance with Article 41 (b) of the Directive, and also should enlist all the foreseen measures for the plants in order to fulfil the requirements regarding emission values that will apply from 1 July 2020. These plans should be communicated to the European Commission by 1 January 2013. The Commission has a right to raise objections to the plan within 12 months from the receipt, and, if it does, the Member State concerned should make appropriate changes. If there're no objections in the prescribed time-limit, the plan is considered accepted.[12]

The Directive also provides for limited lifetime derogation for certain plants provided inter alia that the operator undertakes obligation in written form not to operate the plant for more than 17 500 operating hours, starting from 1 January 2016 and ending no later than 31 December 2023.[13] Also, exemption is foreseen for the combustion plants that were part of a small isolated system as they may be exempted from compliance with the emission limit values set by the Directive, but they should at least maintain the

[11] Art.30
[12] Art.32
[13] Art.33

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

emission values in accordance with the requirements of Directives 2001/80/EC and 2008/1/EC.[14] District heating plants can also be exempted by 31 December 2022, provided that inter alia their thermal output does not exceed 200 MW, minimum 50 % of the heat production is delivered in a form of steam through a public network and the emission limit values for sulphur dioxide, nitrogen oxides and dust are maintained until 31 January 2022 in accordance to Directives 2001/80/EC and 2008/1/EC.[15]

The Member States are obliged to carry out monitoring of the emissions of polluting substances especially f SO2, NOx and CO and dust, continuously on plants whose thermal power is 100 or more MW. According to these measurements, the competent national authority verifies the compliance of these emissions with the permit conditions.

Regarding the waste incineration and co-incineration plants, they should also obtain a permit by the competent authority. The permit should contain inter alia the types and quantities of the waste that will be treated, the capacity of the plant, to set the limit values of emission in the air and the water, the requirements for the pH, temperature and flow of waste water discharges and the maximum permissible period of any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices. For the incineration of co-incineration of hazardous waste, the permits must contain additional conditions regarding the list of quantities of different hazardous waste that will be treated and the minimum and maximum flows of the hazardous waste and their maximum contents of polluting substances. These permits are subject to periodic revision and updates by the competent authority.[16]

The Directive sets emission limit values for waste incineration plants in Part 3 and 4 of Annex VI, and also for plants where more than 40 % of the produced heat comes from hazardous waste, only emissions set in Part 3 of Annex VI. The report of Article 72 of the Directive regarding the waste incineration plants or waste co-incineration plants with a nominal capacity of 2 tonnes or more per hour, shall contain information on the functioning and monitoring of the plant and give account of the running of the incineration or co-incineration process and the level of emissions released into the air and water in comparison with the emission limit values. That information shall be made available to the public. The Member States' competent authorities should make available to the public a list of all such plants that have such capacity.

The installations and activities using organic solvents are also subject to special regime under the Directive. Each such installation should not produce emission over the limit values in waste gases and the fugitive emission limit values, or the total emission limit values, and other requirements laid down in Parts 2 and 3 of Annex VII of the Directive; or; 2) should respect the reduction scheme set out in Part 5 of Annex

[14] Art.34
[15] Art.35
[16] Art.45

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

VII provided that an equivalent emission reduction is achieved compared to the previous condition. The conditions for limit values of waste gases are set in Part 8 of Annex VII. The operator of the plant should report to the competent national authority on its request on: 1) emission limit values in waste gases, fugitive emission limit values and total emission limit values; or 2) on the requirements under Part 5 of Annex VII of the Directive or 3) the derogations under Art. 59 (2) and (3). Also, the Directive prescribes that in a event of a substantial change of an existing installation the part that undergoes substantial change will be treated either as a new or either as an existing installation, provided that total emissions of the whole installation do not exceed the potential emissions that would have been released if the substantially changed part have been treated as a new installation. In such cases, the competent national authorities should assess the compliance of their emissions by the plants with the requirements posed by the new Directive.[17]

With a purpose of promoting environmental protection, the Member States, the industry and non - governmental organizations and the European Commission are obliged to exchange information on the potential substitutes of the organic solvents and techniques that have less harmful effect on air, soil, ecosystem and human health. Those consultations inter alia should take special account of potential health risks for humans and environment, as well as the economic consequences.[18]

The public here also should be informed for every decision of the competent national authority including the permit and its eventual updates, as well as the list of all installations obliged to be registered and granted a permit and results of the monitoring of the emissions.[19]

Under the special provisions regarding the installations producing titanium dioxide, Member States are obliged to prohibit on their territory the disposal in the air, sea or the ocean of: 1) solid waste, 2) liquors arising from filtration phase of the hydrolysis of the titanyl sulphate solution from installations applying the sulphate process; 3) waste from installations applying the chloride process containing more than 0,5 % free hydrochloric acid and 4) filtration salts, sludge and liquid waste arising from the treatment of the previous processes.[20] The Directive sets limit emissions for these pollutants in the water and in the air in Part 1 and 2 of the Annex VIII respectively. The monitoring of these emissions should be ensured by the Member States and competent national organs should check compliance with the limits of the emissions set by this Directive.

The Member States also are obliged to provide the Commission with the relevant information regarding the implementation of the Directive, to send reports on the on representative data on emissions and other forms of pollution, on emission limit values, on the application of Best available techniques in accordance with Articles 14 and 15, in particular on the granting of exemptions in accordance with Article

[17] Art.63
[18] Art.64
[19] Art.65
[20] Art.67

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

15(4), as well as the progress on new emerging techniques in accordance with art. 27 of the Directive.[21] The European Commission in the implementation of this Directive is assisted by a special committee.[22]

3. Regulation of industrial pollution in Macedonia

Similar like Croatia, Macedonia has not passed a special Law on Industrial Pollution Control, but has regulated that issue under the general Law on Environment.[23] This Law has special provisions regarding the industrial pollution control and the system of integrated permits. According to the Law, all new industrial installations or changes to the existing installations can be exercised and done only after an integrated ecological permit is obtained from the competent state organ. There are two types of this permit: Type A, which is issued by the central government – the Ministry on Environment, and Type B which is issued by the local authorities.[24] The types of industrial activities requiring A or B – type integrated permit were determined in 2005 by the Government, as well as the dynamics of application for such permits.[25]

The request for Type A Integrated Ecological Permit is submitted to the Ministry of Environment, and from there to the local authorities and to the general public who can submit their opinions and suggestions. All suggestions and remarks must be taken into account by the Ministry and the decision on the request must state the reasons what remarks were taken into account and which aren't.[26] The conditions of the A Integrated ecological permit regarding the Best available technologies are set by the Scientific and technological Commission in the Ministry of Environment. On this Commission 's proposal the Ministry sets the national reference documents on the BAT, which represent instructions on the application of the BAT in the individual industrial sectors.[27]

Their ministries of environment will be informed of the project if it is considered that the project can produce significant impact on the environment in another country or countries, than. If the concerned states respond to the notification, then the Macedonian Ministry sends all information regarding the project and its impact on the environment as well as the timetable for submitting the information and places where that information will be available. With the competent ministry of these countries the

[21] Art.72
[22] Art.75
[23] Law on the Environment, Official Gazette of the Republic of Macedonia, 53/05, 05.07.2005.
[24] Art.95
[25] Regulation on the determination of the activities of the installations subject to integrated ecological permit or a permit for harmonization with a operational plan and timetable for submitting applications for permits for harmonization with a operational plan, Official Gazette of Republicof Macedonia, 89/05, 21.10.2005.
[26] Art.103
[27] Art.104 (5), Law on the amendment of the Law on Environment, Official Gazzete of Republic of Macedonia, 24/07, 01.03.2007.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Macedonian ministry can engage in direct contacts or even to conclude bilateral agreements on the consultation process concerning the project.[28]

Even if the competent organ of certain state was not officially informed by Republic of Macedonia for concrete project that in opinion of that country would have significant environmental impact on its territory, the Macedonian Ministry of Environment is obliged to include the competent organ of that state in the consultation procedure on its request. The public on the concerned states must obtain equal right to give comments and remarks on the project as well the domestic public in Macedonia. The Ministry of Environment when deciding on the application will take into account the remarks of the public in these countries.[29]

The study on the environmental impact of the project is communicated to the competent organ of the other states. The Ministry of Environment opens consultations with an aim to reduce or eliminate the consequences of the trans-boundary pollution. The possible alternatives to the proposed project including its non - approval will be discussed, as well as other forms of mutual assistance, in order to reduce the possible harmful impact of the project. The final decision on the project should be transmitted to the competent organ of the concerned states, accompanied with the key reasons underpinning it, as well as list of the foreseen measures on the eliminating or reducing the harmful effects of the project.[30]

If there's project in another country that can have environmental impact in the Republic of Macedonia, and if the Ministry of Environment receives such notification, then it will respond to the notification and it is obliged to inform the Macedonian public for the project. Also, if from another source there's information about of such project in another country, the Ministry of Environment will take all necessary measure to participate in the procedure. The relevant institutions and the public will be notified for the project in order to submit their observations in certain timeframe.

The A - Ecological Permit is based on BAT. It must contain inter alia obligatory conditions regarding the emission limit values, protection measures for the air, water and soil, as well as the monitoring that will be conducted by the operator of the installation. In 2010 a Rulebook was adopted on emission limit values for substances which are obligatory in the Type A Integrated ecological permit.[31]

The operator is obliged to regularly update the Ministry of Environment on the results from the monitoring concerning the fulfilment the obligatory conditions contained in the permit. Also, every malfunction that could have or had significant impact on the environment should be reported as well every

[28] Art.93
[29] Art.93a
[30] Art.93
[31] Rulebook on the on emission limit values for substances which are obligatory in the A integrated ecological permit, Official Gazette, 72/2010, 27.05.2010.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

change in the operation. The operator must comply with the emission limit values set in the A integrated permit, application of BAT, and is obliged to prevent or to reduce to the largest possible extent the impact of the installation to the to the environment, including the impact in the other countries.[32]

The Conditions of the Type A permit can be changed ex officio by the ministry, or on a request by the operator of the installation itself. The Ministry ex officio changes the conditions of the permit if newer BAT are available, the use of new technologies is essential to provide safer working conditions, because of the increased pollution of the environment that has harmful consequences for the people's health and in a event of changes in the legislation or general ecological revision prompts such changes.[33]

If the operator itself requests changes in the Type A permit, it must provide information regarding the changes in the operation, the extent of such changes as well as the impact that those changes will have on the environment. If the Ministry considers that the proposed changes to the operation of the plant will not result in excess of the negative pollution of the environment, it will accept the request. The procedure for amendment of the permit is the same as the procedure for granting the permit, so the participation of the public and the local authorities must be secured.[34]

The granted permit can be withdrawn by the Ministry if the operator has continuously more than three times infringed the conditions of the permit had made changes in the operation of the plant without the proper authorization from the Ministry of Environment or it operates outside the limits and timeframe set by the integrated permit. If the operator decides to cease the operation of the plant permanently, then it is obliged to inform the Ministry of that intention as well to propose a plan for rectification of the changes to the environment that resulted from its operation. This plan must be accepted by the Ministry of Environment.[35]

All other new plants emitting harmful emissions for the people's health and environment not covered by Article 95 of Law should obtain a Type B Integrated Ecological permit. The list of these installations is adopted by the Government. These permits are issued by the mayors of the municipalities. If the installation is located in a protected area, then the permit is issued by the Ministry of Environment. The permit must list the installation and its operator and especially the requirements that the operator must fulfil in order to start operation of the plant, inter alia with regard to the monitoring of the emissions and the frequency of the measurements. The permit will be issued if the competent authority finds that the operation of the plant will not exceed the set limit values for emissions. The obtaining of the B Integrated permit is pre – condition for obtaining the permit for operation of the installations, so the competent authority will not produce operation permit without the Type B Integrated permit. The compliance with the

[32] Art. 107 (8), Law on the amendment of the Law on Environment, Official Gazette, 24/07
[33] Art.115
[34] Arts.116-7
[35] Art.120

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

conditions set in the permit must be checked previously by the competent local authority by performing checks on the operation of the installation.[36]

The Law prescribes the obligations of the operators and other natural or legal persons regarding the measures for prevention of the accidents and mitigating their impact on the environment. The operator must report to the competent organ every change to the quantities of dangerous substances, as well as the changes in the operation and technological process of the plant. Also, it is obligated to report to the competent organ any case of an accident, contingency plans that should be prepared by the operators, and the obligations of the competent state organs, including in a event of a accident with trans-boundary effects.[37]

According to the European Commission, Macedonia hasn't made much progress in the field of industrial pollution control and risk management. So, the 2009 Progress Report on Macedonia has noted little progress in this. The progress on the transposition of the Seveso II directive was noted, but much critic was directed of the lack of administrative capacity at local level, under training of the environmental inspectors, which resulted in delay in the issuance of the integrated ecological permits. The operators of the industrial installations have not provided contingency plans, although there's clear obligation in this regard set by the Law.[38]

The 2010 Report widely replicated the conclusions of the 2009 Report. The Commission noted that the Convention on the trans-boundary effects of industrial accidents was ratified and implementing legislation for control of major accident hazards involving dangerous substances and for eco-labelling was adopted. The critics were directed at the lagging with the legislation for Large Combustion Plants and the delays in the issuing of integrated permits as well as the procedures for consultation of the public. The need to strengthen the administrative capacity, particularly of the inspection services was stressed.

4. Regulation of industrial pollution in Serbia

The industrial pollution control in Serbia is regulated by the Law on Integrated Prevention and Control of Pollution.[39] Primary industrial activities that are subject of this Law are energy, chemical industry, metal industry, cement industry, waste management facilities and other installations that have significant negative influence on environment or human health. The Law is postulated on several principles: Integrated and individual approach, Best Available Techniques, flexibility and access to information and the decision – making process for the public.

[36] Art.127
[37] Arts. 145– 156, Law on the Environment, cit.supra.
[38] Macedonia 2009 Progress Report, SEC(2009) 1335, http://ec.europa.eu/enlargement/pdf/key_documents/2009/hr_rapport_2009_en.pdf.
[39] Official Bulletin of Republic of Serbia, No.135/2004.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The integrated permit is granted by the competent authority to the industrial installation only after it has established the overall influence of that installation on the air, soil and water through its emissions, the consumption of raw materials, energy efficiency, the prevention of accidents and sanitation of the site in a event of a closure.[40]

The competent organ is obliged to inform the wider public as well organs and organizations in the field of agriculture, forestry, physical planning, energy sector, mining industry, and the local self-government on whose territory the installation will operate, for the request for obtaining integrated permit. These subjects can give their opinions to the competent organ for issuing the permit in a time – limit of 15 days from the receipt of the documentation. These opinions are taken into account during the preparing of the Draft – permit, and again at the request of these organizations and members of the public, the Draft -permit is subject to new cycle of considerations and opinions, which are then submitted to the Technical Commission, which will assess the conditions in the Draft permit.[41]

The issuance of the permit requires complying with concrete conditions as well as respect of the Best Available Techniques. The competent organ enjoys certain degree of flexibility regarding the conditions of the permit, allowing in some cases less strict criteria for emissions.

The permit contains specifically conditions regarding Best available techniques, the emission limit values for the facility, measures for the protection of the air, water, soil, waste from the facility, reducing the vibrations and noise, prevention of accidents, methodology for measuring the emission limit values, the frequency of reports to be submitted, measures for start of the operation, cessation of operation in case of an accident, restoration of the environment after permanent cessation of activities of the plant etc.[42] Like the relevant Macedonian Law, this Law provides a framework for consultations with another state, whose environment will suffer significant impact from the operation of a plant on the territory of the Republic of Serbia. In these cases, or when the competent authority of those concerned states make a formal request to such end, the Ministry of Environment communicates to this organ all relevant information regarding the project and provides a possibility for remarks and suggestions by the public in the State (s) concerned. The Framework for these consultations is arranged between the two states with bilateral agreements based on reciprocity and equal treatment. The competent authority of Republic of Serbia is obliged to inform the domestic public of the remarks and suggestions from the public of the concerned state, as well as to communicate to the concerned state the decision to grant or not to grant the permit and the reasons for such decision.[43]

[40] Cf. Dušan Damjanović, Nikola Mikašinović (urednici), Izazovi evropskih integracija u oblastima zaštite životne sredine i održivog razvoja lokalnih zajednica, [The Challenges of European Integration in the areas of Environmental Protection and Sustainable Development], Palgo, Beograd, 2010, p.52.
[41] Art.11-13 of th e Law on integrated prevention and Pollution Control cit. supra.
[42] Art.16
[43] Art.24

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The operator of the plant must fully comply with the conditions set in the permit, to report to the competent organ all changes in the operation and accidents that may have significant impact on the environment, submit an annual report on the activities of the plant, every change of the operator of the plant and to execute all measures prescribed by the competent organ after the cessation of activities. The Law provides for public access to the information regarding the issuance of the permit, participation in the decision – making process as well as access to justice/ judicial control of the process of issuance of integrated permits. In a event, that the BAT criteria cannot be satisfied in the moment of issuance of the permit, the competent organ will issue a permit containing additional requirements with a goal of complying with those standards. The existing industrial installations have a obligation to obtain an integrated permit until 2015 at the latest.

The competence for issuance of integrated permit is shared between central, county and local organs. The competent organ must ensure that all industrial installations under its territorial jurisdiction have an integrated permit, to follow the development of new technologies, to ensure monitoring of the facility, to revise of the integrated permit and updating of the conditions, to ensure information for the public regarding the conditions of the permit, the draft version of the permit, the register of issued integrated permit and the results of the revisions and monitoring of the facility.

The permit is subject to revision at least two times during its period of validity. The revision is always carried out by the competent organ if there is a need to establish new limit values for emissions, or a pollution has occurred that requires a revision of the set values in the permit, if the pollution can cause harm to the environment or to people's health, there has been substantial changes in the BAT than can provide significantly less emission values, in a event of a change in the environmental legislation or that is required for the purpose of safety of operation of the plant.

Similar with the Macedonian Law, this Law provides a possibility to terminate the permit inter alia if the permit expires, the operator stops to comply with the conditions of the permit, if the competent organ has found out that the permit is based on false or falsified documentation by the operator, the operator does not conform with the monitoring and reporting obligations, or it has not conformed with the orders of the inspector or a bankruptcy proceedings were opened.

The Law also regulates the administrative supervision which is carried by the Ministry of Environment, the work of the environmental inspectors and prescribes financial penalties for the misdemeanours or economic misdemeanours.

In 2005 the Government also prescribed the programs of measures for adjustment of the existing installations to the positive normative acts. These programs should contain the description and timetable

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

for the proposed measures for adjustment, the expected results of the proposed measures the monitoring and financial framework for these measures.[44]

In 2008 the Government has also established the dynamics for submission of the requests for integrated permits of the abovementioned subjects and activities.[45]

Also, the types of activities that are subject to the permit on integrated conditions were determined by the Government in 2005 and those are listed in several large categories: energy sector, metal industry, mineral industry, chemical industry, waste management and other activities.[46]

In 2005 the criteria on the determination of BAT were adopted by the Government.[47] Among other, here the technical specifications of the plant are listed, geographical position, the environmental conditions on the location, the precautionary principle and special conditions. Special emphasis must be put on application of techniques that produce minimum waste and application of less dangerous substances, re-use of the raw materials and their recycling, the scientific progress and the new, the energy efficiency of the used raw materials, follow up of the Best available technologies, prevention of accidents and the prevention and reduction of the overall impact of the harmful emissions to the environment.[48]

In a event that BAT do not ensure satisfactory results in the compliance with the standards of protection of the environment, additional measures will be enshrined in the permit regarding the: 1) emission limit values 2) ban on certain polluting emissions on certain geographical areas, 3) application of priority measures in certain economic sectors, 4) financial framework for application of these measures and 5) enlisting alternative measures for improvement of the quality of the environment.[49]

The recent reports of the European Commission have not noted significant progress in the field of Industrial pollutions control and risk management in Serbia. The 2009 Progress Report noted the adoption of by-laws and the intention to start issuing integrated permits in 2009 and 2010.[50] The 2010 Progress

[44] Regulation on the contents of the program of measures for adjustment of the existing installations to the prescribed conditions, Official Bulletin of the Republic of Serbia, 84/2005.
[45] Regulation on the establishing the dynamics of submission of the requests for issuing of the integrated permit, Official Bulletin of the Republic of Serbia, 108/2008.
[46] Regulation on the types of activities and facilities subject to integrated permit, Official Bulletin of the Republic of Serbia, 84/2005
[47] Regulation on the criteria for determination of the Best Available Techniques, for application of the quality standards, and determination of the emission limit values in the integrated permit, Official Bulletin of the Republic of Serbia, 84/2005.
[48] Art.2
[49] Art.3
[50] Serbia 2010 Progress Report, SEC(2009) 1339, http://www.europa.s/upload/document s/key_documents/2009/sr_rapport_2009_en.pdf., p.44

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Report noted that the list of installations pending integrated permit is being revised, as well the start of the application of the International Plant Protection Convention.[51]

5. Industrial pollution regulation in Croatia

The Croatia is the only one of the three countries that concluded the accession negotiations in 2011, including the Chapter on Environment. It has the highest degree of approximation of its legislation in this field with the EU legislation. The Chapter on Environment was opened in February 2010, and provisionally closed in December 2010.[52]

Unlike Serbia, Croatia has not adopted a special Law on Industrial Pollution Control. So, the issue of the pollution from industrial installations like in Macedonia is regulated by the general Law on the Protection of the Environment.

The protection of environment from industrial installations is ensured under special heading of the Law "Integrated conditions for environmental protection."[53] All installations on territory of Croatia that will emit harmful emissions into the air, soil or water before their construction or before the start of operation or reconstruction must obtain integrated conditions. These conditions should ensure prevention, reduction and in greatest possible extent elimination of the pollution at the source level. Also, the purpose is to ensure reasonable exploitation of the natural resources and establishing a balance between the economic developments with the regeneration capacities of the nature itself.[54]

These integrated conditions are set by the Ministry of Environment of Republic of Croatia, and are part of the location permit for the installations. These conditions must lie on best available technologies and contain conditions regarding the protection of air, water, soil and the sea. The compliance with these conditions is checked in the process of technical inspection of the plant during the process of issuing the permit to start operation.[55] The process of the participation of the public in the decision-making process on the permits is regulated by secondary legislation.[56]

The operator of the plant is obliged inter alia to undertake all necessary measures prescribed by the relevant legislation, especially the BAT, not to produce waste, or the waste to be incinerated, or if that is

[51] Serbia 2010 Progress Report, SEC(2010) 1330, http://www.europa.rs/upload/documents/key_documents/2010/Rapport%20SR%20TO%20PRESS%20CONF%2008.11.pdf p.43
[52] www.entereurope.hr
[53] The whole procedure was concretely defined in 2008 by the Government. See: Regulation on the procedure for establishing integrated conditions for protection of the environment, Narodne Novine, 114/08.
[54] Art.82
[55] Art.84
[56] Regulation on the informing and participating of the public on the environmental issues, Narodne Novine, 64/2008.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

not possible, than to be disposed in a way not to cause significant harmful effects to the nature, and to ensure efficient use of the energy.[57]

The decision on the integrated conditions must set all conditions that the plant must satisfy, as well prescribing the modalities on inspecting the compliance with these conditions during the test period. In the areas where stricter emission limit values are set by special legislation, the decision should enlist those stricter conditions. The permit for operation of the plant confirms that the plant fulfils the conditions set in the decision on the integrated conditions. In the framework of the procedure for obtaining operation permit, during the test period an expert from the Ministry checks whether the plant fulfils the integrated conditions according to the Decision by the Ministry.[58]

The integrated conditions expiry for a period of five years after the permit for operation was granted. The permit for operation ceases to be valid in that part. The plant may ask for prolongation of these integrated conditions only if according to the positive legislation at the time of submission of the request, the same integrated conditions can be granted.[59]

The plant can start full operation only if during the test period all conditions set by the decision on integrated conditions are complied with.[60] The operator of the plant after the start of the technological process must inform the Agency of Environment of the results on the monitoring of emissions in the air, soil and water, as well as to report to the inspection services any unforeseen event having significant effects on the environment. Also, every intention to change the way of operation or reconstruction must be reported to the Ministry. The Ministry ex officio is obliged to reconsider and update the integrated conditions every 5 years. These updates are necessary especially in case where new limit values of emissions should be set because of the significant pollution of the environment; if there has been significant improvement in the BAT that can significantly improve the protection of the environment, there should be new techniques introduced in order to ensure worker's safety or if that is necessary in order to achieve approximation with the Law (on Environment), or with European or International Law.[61]

The Law provides conditions for early termination of the decision on integrated conditions when the plant exercises significant change in the organization or has made reconstruction without the permission of the Ministry, or where the plant in a prescribed period set by the environmental inspectors does not undertake the relevant measures in order to comply with the decision on integrated conditions or the permit for operation of the plant. This also applies in a case when such measures were ordered in

[57] Art.83
[58] Art.89 (3)
[59] Art.90
[60] Art.91
[61] Art.94

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

accordance with some special law, and the plant does not comply with the decision of the inspection services.[62]

The Law sets obligation for all operators of plants dealing with dangerous substances to undertake all measures in order to prevent, to eliminate or to reduce the risk of potential accidents, and also to reduce their potential effects to people, property and the environment. These measures as well as concrete proof of the taken measures are to be communicated to the Ministry of Environment. The Ministry should be notified by the operator for every construction of a facility, or a reconstruction before the obtainment of the decision on integrated conditions, on the increase of the quantity or the nature of physical form of the dangerous substances as well as the subsequent changes in the procedure for dealing with such substances, that can increase the risk of accidents and in a case of permanent cessation of activities of the plant.[63]

In a case of an accident, the operator must promptly alert the Ministry of Environment and the central body competent for protection and rescues concerning the accidents, the released dangerous substances during and after the accident. Also, the operator shall make an assessment of the consequences for the people's health and environment and the undertaken additional measures, measures for reducing the medium and long-term consequences from the accident and measures eliminating the probabilities that such accident will happen in the future.[64] If contrary to the Safety Brief, the plant introduces changes in the technological process, changes the way of operation, the type and quantities of dangerous substances that can cause major accidents, or if it permanently ceases to operate, then the operator must exercise revision and, if necessary, to update the Safety Brief and inform the Ministry as well as the organ competent for protection and rescue for these steps.[65] The measures for prevention and procedure of acting of operators and competent organs in a case of an accident were in detail regulated in 2008 by secondary legislation.[66]

The Register of all plants operating with dangerous substances is run by the Agency of Environment, as well as all reported accidents on these plants. On the basis of this Register the Ministry of Environment organizes an exchange of information with the central body for protection and rescue, with a purpose of enabling the plants dealing with dangerous substances on the ratio between the undertaken safety measures and the nature and overall risk of occurrence of a major accident.[67]

In the recent years, Croatia has obtained relatively high marks by the European Commission on the issue of industrial pollution prevention and control. The 2009 Progress Report on Croatia noted significant

[62] Art.95
[63] Art.98
[64] Art.105
[65] Art.103
[66] Regulation on prevention of major accidents involving dangerous substances, Narodne Novine 114/08.
[67] Arts.186 and 106.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

improvements in this field, notably the Implementing legislation under IPPC and SEVESO II Directive, as well as the establishment of registers of installations falling under these directives.[68]

In the latest 2010 Progress Report, Commission considered that Croatia has achieved good progress in the area of industrial pollution and risk management. The establishment of European Pollutant Release and Transfer Register (EPRTR) has advanced well, as well as the alignments of the existing installation with the requirements under the IPPC Directive and Large Combustion Plants Directive is stepped up. Still, Commission notes the administrative capacity for the implementation of legislation needs to be further strengthened.[69]

6. Conclusion

The awareness of the problem of the impact of the emissions released by industrial installations in the air, water and soil, in the European Union in the recent period led to the adoption of new streamlined legislation regarding the industrial emissions embodied in the new Directive 2010/75/EU. This Directive inter alia sets new, stricter emission targets for certain polluting substances (especially NOx) and timetable for their compliance by the Member States and industrial operators on their territory. The aim was to offer high level of protection of the environment and human health, while simplifying the legislation and cutting the unnecessary administrative costs. The Directive came into force on 6 January 2011, and the Member States should take necessary steps for transposition by 6 January 2013.

Macedonia, Serbia and Croatia under the Stabilization and Association Agreements have obligations in the field of industrial pollution control and risk management. This important aspect of the Environmental Policy was monitored by the Commission in its annual reports. So far, only Serbia has adopted a special Law on Integrated Prevention and Control of Pollution, while in Macedonia and Croatia the provisions regarding the industrial emissions control are enshrined in the general Law on the Environment, as well as the secondary legislation adopted in that regard. Most advanced of the three countries in this field is Croatia, followed by Macedonia and then Serbia. However, the analysis and the comparison of the legislation regarding industrial pollution control in the three countries reveals certain disparities with the corresponding European legislation. After the adoption of the new Directive on industrial emissions in 2010, Macedonia and Croatia should adopt special Laws on integrated pollution and control having in mind the importance and the complexity of the European legislation in this field. Serbia should also align its existing Law on integrated pollution with the new Directive, since the existing version and the subsequently adopted secondary legislation only scarcely regulates this complex area. Substantial amendments in all three countries should be made on the more adequate, effective and as early as possible participation of

[68] Croatia 2009 Progress Report, {COM(2009) 533, http://ec.europa.eu/enlargement/pdf/key_documents/2009/hr_rapport_2009_en.pdf, p.62.
[69] Croatia 2010 Progress Report, SEC(2010) 1326, http://www.mvpei.hr/custompages/static/hrv/files/101110_Izvijesce_o_napretku_HR_za_2010.pdf, p.59-60.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

the public in the decision-making process concerning the issuing of the integrated permits, appropriate access of the public to judicial overview of the decisions, better cooperation with the non-governmental organizations active in the field of environmental protection, aligning the emission target values in accordance with the new Directive, streamlined provisions on carrying out the inspections and enactment of inspection plans and shorter periods for revision of the issued permits, opt-out provisions for the existing installations, transitional national plans etc. Although the timeline for the Member States of EU to transpose the Directive is until 2013, especially Macedonia and Serbia should take necessary steps for preparation of this alignment of their legislation as well its adoption in that time-limit. Also, further strengthening of the administrative capacity and the expertise of the environmental inspectors in Macedonia and Serbia especially at local level is needed to ensure effective implementation of the legislation and ensure compliance and necessary revisions of the issued permits. This is especially important for these two countries, because it can eliminate the unnecessary prolongation of the future accession negotiations in the Chapter 27 on Environment, having in mind that this is one of the most complex chapters in the negotiations.

7. References

[1] Tiwary, A., Colls, J., *Air Pollution: Measurement, modelling and mitigation, Abingdon*, Routledge, 2010.
[2] Damjanović, D., Mikašinović,N., (urednici), *Izazovi evropskih integracija u oblastima zaštite životne sredine i održivog razvoja lokalnih zajednica, [The Challenges of European Integration in the areas of Environmental Protection and Sustainable Development],* Palgo, Beograd, 2010.
[3] Directive 2010/50/EU, *Official Journal of EU,* L 334/50, 17.12.2010
[4] Law on the Environment, *Official Gazette of the Republic of Macedonia*, 53/05, 05.07.2005.
[5] Law on the amendment of the Law on Environment, *Official Gazette of Republic of Macedonia*, 24/07, 01.03.2007.
[6] Regulation on the determination of the activities of the installations subject to integrated ecological permit or a permit for harmonization with a operational plan and timetable for submitting applications for permits for harmonization with a operational plan, *Official Gazette of Republic of Macedonia*, 89/05, 21.10.2005.
[7] Rulebook on the on emission limit values for substances which are obligatory in the A integrated ecological permit, *Official Gazette*, 72/2010, 27.05.2010.
[8] Law on Integrated Prevention and Control of Pollution, *Official Bulletin of Republic of Serbia*, No.135/2004.
[9] Regulation on the contents of the program of measures for adjustment of the existing installations to the prescribed conditions, *Official Bulletin of the Republic of Serbia*, 84/2005.
[10] Regulation on the establishing the dynamics of submission of the requests for issuing of the integrated permit, *Official Bulletin of the Republic of Serbia*, 108/2008.
[11] Regulation on the types of activites and facilites subject to integrated permit, *Official Bulletin of the Republic of Serbia*, 84/2005.
[12] Regulation on the criteria for determination of the Best Available Techniques, for application of the quality standards, and determination of the emission limit values in the integrated permit, *Official Bulletin of the Republic of Serbia,* 84/2005.
[13] Regulation on the informing and participating of the public on the environmental issues, *Narodne Novine*, 64/2008.
[14] Regulation on the procedure for establishing integrated conditions for protection of the environment, *Narodne Novine*, 114/08

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[15] Regulation on prevention of major accidents involving dangerous substances, *Narodne Novine* 114/08.
[16] European Commission, COM (2005) 446, http://europa.eu/legislation_summaries/environment/air_pollution/l28159_en.htm
[17] European Commission, Serbia 2010 Progress Report, SEC(2010) 133, 9 November 2010, http://www.europa.rs/upload/documents/key_documents/2010/Rapport%20SR%20TO%20PRESS%20CONF%2008.11.pdf.
[18] European Commission, Croatia 2009 Progress Report, SEC(2009)1333/2, http://www.delhrv.ec.europa.eu/files/file/progres%20report/CROATIA%202009%20PROGRESS%20REPORT.pdf
[19] European Commission, Croatia Progress Report 2010, SEC(2010) 1326, http://www.delhrv.ec.europa.eu/files/file/progres %20report/ hr_rapport_2010_en.pdf,
[20] European Commission, Macedonia 2009 Progress Report, SEC(2009) 1335 http://ec.europa.eu/enlargement/pdf/key_documents /2009 /mk_rapport_2009_en. pdf.
[21] European Commissin, Macedonia 2010 Progress Report, SEC(2010)1332, 9 November, 2010, http://www.delmkd.ec.europa.eu/en/bilateral-relations/pdf/mk_rapport_2010_en.pdf.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Influence of Fertilization System on Wheat Yields in Terms of Global Climate Change

Miroslav Jelić [1], Olivera Nikolić [3], D. Knežević [1], Nadica Savić [1], G. Dugalić [2]
[1] University of Priština, [2] University of Kragujevac, [3] EDUCONS University, Serbia

Abstract.
Over the last few decades, wheat production, both in Serbia and worldwide, has been practiced under characteristic agro-meteorological conditions. It has generally been affected by specific strongly marked agro-meteorological and climate extremes, most notably extreme temperature and drought events during critical periods in the growing season, which mostly had a negative impact on the growth, development and yield of wheat in Central Serbia.
This paper presents results and discussion on both the potential effect of climate change on winter wheat yield and the possibility to alleviate it through an appropriately adjusted fertilization system.
The present study on the effect of different rates and ratios of NPK fertilizers on grain yield in seven winter wheat cultivars under different (dry and "normal") conditions during the year was conducted in a long-term field experiment at the Small Grains Research Centre in Kragujevac over a period of seven years (2000/01-2006/07).
Depending on the fertilization treatment, the average yield reduction in dry years showed 50% variation relative to "normal" years. The highest reduction in grain yield and other productive traits of wheat in dry years was observed in the treatment involving nitrogen nutrition, particularly lower application rates. As compared to the non-treated control, the use of complete NPK fertilization having an increased amount of phosphorus resulted in the lowest yield reduction during the dry years that were unfavorable for winter wheat production. The average grain yield reduction in dry years was lowest in wheat cultivar Matica and highest in Kg-100, respectively.

Keywords: Cultivar, fertilization, global climate change, yield, wheat.

JEL Codes: Q54, O13

1. Introduction

Over the last several decades, a frequent occurrence of extreme weather and climate events has been observed, leading to devastating effects on human society and the environment. These extremes have been induced by changes in meteorological elements (air temperature, rainfall amount and spatial distribution, wind speed and direction, cloudiness occurrence, amount of solar radiation etc.) and have a direct effect on the intensity and duration of meteorological events (a higher frequency of occurrence of heat waves, droughts, bad weather etc.).

Wheat production in Central Serbia has been practiced under characteristic agro-meteorological conditions in the past decade. The overall plant production during the period has been affected by specific strongly marked climate and agro-meteorological extremes. High positive deviations of monthly air

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

temperatures have been observed, most particularly during certain months of the winter (January and February) and summer (July and August) seasons. Moreover, long periods of extremely high air temperatures (10-17 days) and soil and air drought are characteristic of the period (Savić et al., 2009; Paunovic et al., 2010).

These weather conditions, particularly extreme temperature and drought events during critical stages of the growing season, have mostly adversely affected the growth, development and yield of not only wheat but also of most other crops (Josipović et a., 2005; Savić et al., 2009; Maklenović et al., 2009; Stanković et al., 2009; Paunović et al., 2010).

The objective of this study was to test variations in winter wheat yield over the years in Central Serbia with a particular focus being placed on the effects of precipitation and temperature regimes.

2. Material and method

The meteorological data (precipitation and mean air temperatures) for Kragujevac were obtained from the National Hydrometeorological Service based in Belgrade. The region selected for the evaluation of the effect of weather on winter wheat yields was Central Serbia – Kragujevac or Sumadija (total area 1600 km2). The study was carried out at the Small Grains Research Centre in Kragujevac in a stationary field trial involving fertilization over a period of seven years from 2001 to 2007.

The research included an untreated control and the following combined fertilization treatments: N1 (80 kg N ha-1); N2 (120 kg N ha-1); P1 (60 kg P2O5 ha-1); P2 (100 kg P2O5 ha-1); K (60 kg K2O ha-1). The trial was set up in a randomized block design with three replications. Experimental plot size was 100 m2 for fertilization with P and K. The plot was divided into two subplots of 50 m2 each for two N application rates. The winter wheat (Triticum aestivum L.) cultivars used in the trial were Takovčanka, Studenica, Kg- 56, Kg-100, Toplica, Matica and Lazarica. Wheat was cultivated in rotation with millet. The rest of the production technology employed was conventional. The crop was harvested at full maturity, and grain yield was measured and adjusted to 14% moisture.

The soils of Šumadija have limited fertility, mainly due to their less favorable physical and chemical properties. Major factors that constrain soil fertility include acid reaction, nutritional imbalances, low levels of available phosphorus (P) and unfavorable physical properties (Milivojević et al., 2008).

3. Results and discussion

Wheat yield is mostly dependent upon meteorological conditions during the growing season, notably precipitation and temperature. Along with soil, climate is a factor determining the choice of an adequate cultivation system, cultivar, cultural operations and fertilization method.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Major climate elements that limit wheat production in Central Serbia are precipitation and temperatures. Therefore, water is an important factor in plant development due to its fundamental role in numerous life processes in the plant. Water deficiency during stem elongation and heading as the two critical stages of wheat development is found to be a constraint to high yields.

The agro-climatic analyses performed as part of this research involved investigation, collection, verification, analysis and interpretation of major climatic parameters which were thereafter used in the evaluation of the productivity and adaptability of wheat genotypes to climatic stress factors. Data on the amount of precipitation during the critical period of the winter wheat growing season (March-June) across months as compared to the long-term mean (1961-1990) are given in Tab. 1. Quite different amounts and distribution of precipitation were observed in the wheat growing seasons. The third, fourth and seventh years of the study were characterized by substantially reduced total precipitation amounts (196.0-265.7 mm) and highly uneven distribution of precipitation during the evaluated part of the growing season as compared to the long-term mean and the other years analyzed (2001, 2002, 2005 and 2006) (Tabs. 1 and 2). Furthermore, apart from the insufficient amounts of precipitation in the critical stages of wheat development during 2003, 2004 and 2007, which were found to be less favorable i.e. unfavorable for plant development, this period was also characterized by increased mean monthly air temperatures as compared to the long-term mean and the other years analyzed (Tab. 1).

The average grain yield of winter wheat ranged from 2.65 to 5.19 t ha-1 depending on the year i.e. weather conditions (precipitation and temperature). During the years that were less favorable for wheat development, a considerably lower grain yield of winter wheat (3.24 t ha-1) was obtained, as compared to the other years analyzed.

Table 1: Winter wheat yields and weather data variations in Kragujevac for the 2001-2007 period

Winter wheat grain yield in the region of Kragujevac and weather characteristics											
Year	Grain yield of wheat	Precipitation (mm) and mean air temperatures (0C)									
		March		April		May		June		July	
		mm	0C	mm	0C	mm	0C	mm	0C	mm	0C
2001	5.19	36.8	11.0	155.3	10.8	44.5	17.4	109.1	18.5	59.4	23.1
2002	4.16	26.0	8.9	63.7	10.8	38.6	18.4	57.2	21.6	99.5	23.3
2003	2.75	2.8	5.8	37.2	10.8	42.3	19.9	47.7	23.3	66.0	22.5
2004	3.28	21.3	7.1	52.3	12.8	50.3	14.5	61.4	19.8	80.4	22.0
2005	4.74	44.5	4.7	69.0	11.6	70.2	16.5	50.8	19.3	86.2	21.7
2006	4.65	116.1	6.0	86.3	12.7	29.1	16.6	84.8	19.8	22.4	23.1
2007	3.68	62.9	9.1	3.6	12.1	119.2	18.3	25.3	22.9	10.1	24.8
X		44.3	7.5	66.8	11.6	56.3	17.4	62.3	20.7	60.6	22.9
Means 1961-1990		40.0	6.7	55.0	11.2	64.0	16.2	68.0	19.9	69.0	21.1

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The decrease in wheat yield during the three years also resulted from unfavorable weather conditions, involving particularly reduced precipitation amounts in the critical stages of winter wheat development. The total sum of precipitation in the period analyzed during the less favorable years was below 300 mm and 48% lower on average as compared to the years having favorable weather conditions (Tabs. 1 and 2).

The lowest average grain yield of winter wheat was obtained in the year 2003 characterized by the lowest sum of precipitation (196 mm) over the period analyzed (Tab. 2). The very low amounts of precipitation in the growing season, particularly in March (2.8 mm), which were quite below the long-term mean, along with the lack of precipitation during April, had an unfavorable effect on further wheat crop development. The deficiency of precipitation and the resulting strong soil desiccation induced very low nitrogen mobilization from soil reserves and led to decreased utilization of this nutrient from the nitrogen fertilizers applied following wheat fertilization (Stanković, 2010).

The 2007 growing season was marked not only by reduced amounts of precipitation but also by increased air temperatures, most notably in the second part of the wheat growing season. The high air temperatures during this part of the growing season caused continuous accumulation of effective temperatures above 50C as well as increased soil temperatures at the root zone, leading to much earlier succession of plant developmental stages than commonly observed under Serbian climate conditions. Generally, such weather conditions, along with strongly marked extreme temperature and drought events in critical periods of the growing season, had an adverse effect on the growth and development and, eventually, grain yield and quality of wheat.

The highest sum of precipitation in the period analyzed (March-July) was in 2001 (405.1 mm), when the average grain yield produced was 5.19 t ha-1. The growing season in this year was quite favorable in terms of soil moisture reserves required for the mineralization of both organic residues and the mineral fertilizers applied. During the growing season, precipitation distribution was observed to be quite uneven. However, the amounts of precipitation in March and April were considerably above the long-term mean and had a favorable effect on tailoring intensity and growth of wheat plants. Therefore, the conditions existing during wheat fertilization were highly favorable for nitrogen mobilization and utilization from the nitrogen fertilizers applied. Weather conditions were favorable for wheat plant development both during the heading and grain filling periods. Similar results were previously obtained by Savić et al. (2009); and Stanković et al. (2010).

A positive effect on grain yield stability in wheat plants was obtained by increased fertilizer rates, particularly during the years when weather conditions were unfavorable for wheat production (Tab. 2). During the years having favorable weather conditions (2001, 2002, 2005, 2006), NPK fertilization led to a yield increase as compared to the control, the increase being 2.7-fold and 2.9-fold higher at lower (N1) and higher (N2) nitrogen rates applied, respectively.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Table 2: Wheat yields and weather characteristics

Precipitation, temperatures and winter wheat grain yield in the region of Kragujevac													
Year	SP		Fertilization treatment										
	P (mm)	T (0C)	O	N		NP1K		NP2K		NP1		NK	
				N1	N2	N1	N2	N1	N2	N1	N2	N1	N2
2001	405.1	16.2	2.69	4.14	4.32	4.89	5.08	6.67	7.04	6.30	6.37	4.81	4.41
2002	285.0	16.6	1.94	3.98	4.04	4.28	4.89	5.02	5.10	4.93	5.29	4.05	3.09
2003	196.0	16.5	1.10	2.88	3.24	2.88	3.04	2.86	3.25	2.75	3.05	2.61	2.98
2004	265.7	15.2	1.23	2.98	3.89	3.29	3.56	3.98	4.05	3.07	3.41	3.38	3.58
2005	320.7	14.8	2.21	4.16	4.42	4.66	4.98	6.28	6.39	5.23	5.82	4.24	3.91
2006	338.7	15.6	2.02	4.08	4.26	4.70	4.88	6.23	6.98	4.15	4.43	4.88	4.82
2007	221.1	17.4	1.62	3.50	3.61	3.66	3.98	4.25	4.51	3.87	4.35	3.61	3.78
X	290.3	16.0	1.84	3.67	3.97	4.05	4.34	5.04	5.33	4.33	4.67	3.94	3.79

SP- sums for the March-July period, P-precipitation, T- mean monthly temperatures, X- average

During the years that were less favorable for wheat production (2003, 2004, 2007), the use of NPK fertilizers, especially those having increased amount of phosphorus (NP2K), as compared to the control, gave a 2.8-fold and 3.0-fold average yield increase at the lower and higher nitrogen rates applied, respectively. The increasing phosphorus fertilization rates applied in the years having unfavorable weather conditions resulted in higher wheat production stability as compared to the treatment employing lower or no rates of phosphorus. The lower decline in wheat yield at higher phosphorus fertilization rates used in the years unfavorable for wheat production was also previously reported (Boeye et al., 1999).

Higher nitrogen rates (120 kg ha-1) had a stronger effect on wheat yield increase except in the NK treatment during all years (Tab. 2). In the treatment using only nitrogen, a higher effect of the increasing N rate was observed in the years that had less favorable weather conditions, as opposed to the other fertilization treatments.

The yield of the winter wheat cultivars tested showed variations depending also on weather conditions during the research period (Tab. 3). The lowest grain yield was obtained by cv. Kg 100 (4). So, the average grain yield of this cultivar, during the years that were less favorable for wheat production, was low (2.85 t ha-1).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Table 3: Effect of precipitation and mean air temperatures on wheat cultivar yields

Precipitation, temperatures and winter wheat grain yield in the region of Kragujevac									
Year	Annual sum		Sorte						
	mm	OC	1.	2.	3.	4.	5.	6.	7.
2001	824.6	12.0	5.19	4.89	4.89	5.05	4.39	5.36	4.82
2002	638.3	12.5	3.88	4.05	3.56	3.43	4.21	3.96	4.36
2003	478.1	12.0	2.38	2.51	2.44	2.15	2.98	3.10	2.96
2004	709.9	11.7	3.12	3.35	3.10	3.05	3.16	3.66	3.52
2005	809.3	11.0	4.23	4.90	5.21	4.75	4.22	4.79	5.02
2006	691.1	11.8	4.20	4.65	4.67	4.15	4.77	5.25	4.82
2007	640.6	12.9	3.54	3.45	3.63	3.35	3.52	4.05	3.86
Average	684.5	12.0	3.79	3.97	3.93	3.70	3.89	4.31	4.19

The highest grain yield in all years excepting 2005 was obtained by cv. Matica (6). In addition, during the years that were less favorable for wheat production, this cultivar had the highest average grain yield, which was 3.60 t ha-1 over the three-year period. At unfavorable weather conditions, grain yield of cv. Matica was for 26% higher in relation to grain yield of cv. Kg 100.

4. Conclusions

In the analyzed period, the meteorological conditions had a significant effect on the grain yield of winter wheat produced in Central Serbia. The marked deficiency of precipitation and high air temperatures during the growing seasons of 2003 through 2005 induced a significant reduction in winter wheat yield.

During less favorable and unfavorable years, the use of a complete NPK fertilizer, most notably increased phosphorus rates, reduced the adverse impact of unfavorable weather events on wheat grain yield.

The negative effect of drought and high air temperatures on winter wheat productivity can be mitigated by an adequate choice of drought-tolerant and early maturing cultivars that pass through a series of phenophases more rapidly, thus avoiding the stress factors of unfavorable weather. The highest tolerance to unfavorable weather conditions during winter wheat production was observed in cv. Matica.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

5. References

[1] Boeye, D., Verhagen, B., Van Haesebroeck, 1. V. and El-Kahloum, M. (1999). Phosphorus fertilization in a phosphorus-limited fen: effect of liming. *Applied vegetation science,* 2(1), 71-78.

[2] Josipović, M., Kovačević, V., Petošić, D. and Šoštarić, J. (2005). Wheat and maize yield variations in the Brod-Posavina area. *Cereal Research Communications,* 33(1), 229-233.

[3] Maklenović, V., Vučković, S., Kovačević, V., Prodanović, S., Živanović, Lj. (2009). Precipitation and temperature regimes impacts on maize yields. In: Proceedings of the XLIV Croatian Symposium on Agriculture with Internacioanal Participation (Loncaric Z. And Maric S. Eds.), 16-20 February, Opatija, Croatia, pp. 569-573.

[4] Milivojević, J., Jelić, M., Đalović, I., Komljenović, I. (2008). Impact of fertilization on iron, manganese and zinc ststus in oats grown on vertisol of Serbia. *Research Communications,* 36(2), 255-258. Novak, A. and Erdelyi, E. (2010). How barley growing conditions and its output change in Hungary. *Agricultural Informatics,* 1(2), 1-7.

[5] Savić, N., Jelić, M., Knežević, J., Knežević, D. (2009). Analiza vremenskih uslova u proizvodnji ozime pšenice na području centralne Šumadije. Zbornik radova, XIV Savetovanje o biotehnologiji sa međunarodnim učešćem. Agronomski fakultet Čačak, 59-65.

[6] Stanković, S. (2010). Uticaj azota na proizvodnju pšenice na različitim tipovima zemljišta. *Doktorska disertacija.* Poljoprivredni fakultet. Zemun, 141.

[7] Paunović, A., Kovačević, V., Madić, M., Jelić, M., Iljkić, D. (2010). Uticaj vremenskih prilika na prinose pšenice u periodu 2000.-2007. godine. Zbornik radova, XV Savetovanje biotehnologiji sa međunarodnim učešćem. Agronomski fakultet Čačak, 29-37.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Assessing the changes in drought conditions during summer in the Republic of Moldova based on RegCM simulations

Vera Potop[1], Constanta Boroneant[2], Mihaela Caian[3]
[1]Czech University of Life Sciences Prague, Czech Republic,
[2]University Rovira I Virgili, Tortosa, Spain,
[3]Rossby Centre, SMHI, Norrköping, Sweden,

Abstract.
We assess the changes in drought conditions during summer in the Republic of Moldova based on the Standardized Precipitation Index (SPI) calculated from monthly precipitation data simulated by the regional climatic model RegCM3. The RegCM simulations were conducted at a horizontal resolution of 10 km in the framework of EU-FP6 project -CECILIA. The domain was centered over Romania at 46°N, 25°E and included the Republic of Moldova.

Keywords: drought, Standardized precipitation index, RegCM, climate change.

JEL Codes: Q 54,

1. Introduction

Drought is a recurring extreme climate event over land characterized by below-normal precipitation over a period of months to years. It is defined as a dry spell relative to its local normal condition. Drought is often classified into three types (Dai, 2011): (1) Meteorological drought which is a period of months to years with below-normal precipitation. It is often accompanied with above-normal temperatures, and precedes and causes other types of droughts. (2) Agricultural drought is a period with dry soils that results from below-average precipitation, intense but less frequent rain events, or above-normal evaporation, all of which lead to reduced crop production and plant growth. (3) Hydrological drought occurs when river stream flow and water storages in aquifers, lakes, or reservoirs fall below long-term mean levels. Hydrological drought develops more slowly because it involves stored water that is depleted but not replenished. Severe drought conditions can profoundly impact agriculture, water resources, tourism, ecosystems, and basic human welfare.

In the last two decades, drought was one of the greatest threats for farmers cultivating field crops in the Southern and Eastern Europe. In extreme cases, the effects of drought can lead to serious damages to agricultural sector. Drier conditions and increasing temperatures already observed in many regions of

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Eastern Europe could lead to lower agricultural production and crop variability may increase. The Republic of Moldova is among the eastern European countries affected by extreme drought.

The changes of temperature/precipitation ratio over the year shows that although Moldova's baseline climate only for the end of summer and the beginning of autumn were characterized as semiarid, it is likely that in the future there would be significantly longer and deeper dry spells. In particular, according to the results of six General Circulation Model experiments based on A2 and B2 SRES scenarios, Moldova will face warmer and wetter winters and hotter and drier summers and autumns. The projected annual decrease of precipitation in association with increase of temperature would likely stimulate strong humidity deficit inducing droughts (Corobov and Overcenco, 2007).

In previous studies (Potop and Soukup, 2009; Potop, 2011) we have extensively analyzed the spatial and temporal evolution of drought events in Republic of Moldova by comparing results from the most advanced drought indices (e.g. the SPI and SPEI), which take into account the role of antecedent conditions in quantifying drought severity. In the present study, the Standardized Precipitation Index (SPI), originally developed by McKee et al. (1993) was adopted to assess and project drought characteristics in the Republic of Moldova based on regional climate model (RegCM) simulations. It is well recognized that Global Circulation Models (GCMs) can reproduce reasonably well climate features on large scales (global and continental), but their accuracy decreases when proceeding from continental to regional and local scales because of the lack of resolution (Meehl et al., 2007). This is especially true for surface fields, such as precipitation and surface air temperature, which are critically affected by topography and land use. However, in many applications, particularly related to the assessment of climate-change impacts, the information on surface climate change at regional to local scale is fundamental.

One alternative to bridge the gap between the climate information provided by GCMs and that needed in impact studies is nesting of a fine scale limited area model (or Regional Climate Model, RCM) within the GCM. Such an approach have been used in the framework of the EU-project CECILIA (Central and Eastern Europe Climate Change Impact and Vulnerability Assessment). The regional climatic model ICTP_RegCM3 centered over Romania and including the Republic of Moldavia was run at a horizontal resolution of 10 km, for the current climate (1961-1990) and under SRES A1B scenario for 2021-2050 and 2071-2100 periods. In this paper we use monthly precipitation data simulated by the ICTP_RegCM3 to asses changes in drought characteristics over the Republic of Moldova based on the Standardized Precipitation Index (SPI) (McKee et al., 1993, 1995) at time scale of 3, 6 and 12 months.

2. Data description

We used monthly temperature means and precipitation totals simulated with the Beta version of the regional climatic model ICTP_RegCM3 at a horizontal resolution of 10 km. The ICTP_RegCM model was originally developed (Giorgi et al, 1993) and then augmented and used in various reference and scenario simulations (Giorgi et al., 1994a, 1994b; Pal et al., 2004).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The RegCM simulations conducted in CECILIA-FP6 Project covered a domain (41.016°N-50.175°N; 14.095°E-36.192°E) centered over Romania (46°N, 25°E) (Boroneant et al,2009; Boroneant et al,2011; Halenka,2010). For this study we selected a model domain centered over Republic of Moldova (45.01°N-49.01°N; 26.52°E-30.48°E) (Fig. 1). The simulations were driven by ERA40 double nested from 25 km RegCM run for the period 1961-1990 and by the ECHAM driven RegCM run at 25 km for the time slices 1961-1990 (control run) and 2021 -2050 and 2071-2100 (A1B scenario runs). The CRU TS2.10 land observation data set (http://www.cru.uea.ac.uk/cru/data/hrg/ cru ts 2.10) has been used to validate the RegCM temperature and precipitation simulations. The horizontal resolution of CRU TS2.10 precipitation data set is 0.5°lat x 0.5°lon. The monthly temperature and precipitation simulations have been also validated against observations recorded at 15 meteorological stations of Moldova's State Hydrometeoro-logical Service (SHS). The validation period was 1961-1990.

To examine spatial drought variability, three agro-climatic regions were delineated. The resulting input dataset consists of four to six stations for each region, with altitudes ranging from 21 to 242 m a.s.l. (Fig. 1a). The agro-climatic regions reflect various physical-geographical conditions (relief, slope and elevation). Prior to model validation with station observation data, the quality control of observational dataset was made by SHS and the Institute of Geography, Academy of Sciences, Moldova.

3. Methods

First, we validate the model ability to simulate monthly temperature and precipitation over the Republic of Moldova domain. In this respect, we compare the annual cycle of temperature and precipitation based on RegCM simulations forced with ERA40 reanalysis data with the corresponding annual cycle calculated from CRU TS2.10 land observation data set and from observations at 15 representative stations from Republic of Moldova.

The annual cycles of temperature and precipitation were calculated in each grid point of data sets downscaled at station coordinates and then spatially averaged. The same rule was applied for the station series. The RegCM simulations (control and scenario runs) forced with the ECHAM GCM have been corrected against the systematic errors induced by the GCM. The bias correction has been calculated as a difference (ratio) between the temperature (precipitation) mean of the control run and the ERA40 run for the reference period 1961-1990 and then applied to each value of grid point time series. We used the distribution version of the SPI program available on ftp://ulysses.atmos.colostate.edu which was adapted for looping over each grid point of the domain.

In the original algorithm used to compute the SPI, McKee et al. (1993) adjusted a Gama distribution function to the precipitation series. Later, other authors tested several distributions based on different timescales and concluded that in the Central Europe, the Gamma distribution is sufficiently flexible function to calculate the SPI on various timescales (Lloyd-Hughes and Saunders, 2002). However, for climatic areas

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

with widely ranging precipitation variability like in the southern and southeastern Europe, the Pearson III distribution is suitable (e.g., Vicente-Serrano, 2006). SPI can be calculated for various timescales to monitor meteorological, agricultural and hydrological droughts with respect to severity, duration and extent. To ascertain variability of different type of droughts in the country, the SPI was calculated for short-term (1 to 2 months), medium-term (3 to 12 months) and long-term timescales (13 to 24 months). The SPI calculated for 1 to 2 months is mainly considered meteorological drought, for 3 to 12 months it can be considered as agricultural drought and for 13 to 24 months it is qualified as hydrological drought. In this study, a summer drought episode (JJA) was defined as a continuous period of SPI values less than -1.0 at least once during the episode. Values of -1.0 to -1.49 correspond to moderate droughts, -1.50 to -1.99 severe droughts and below -2.0 to extreme droughts. Similarly, values from 1.0 to 1.49 correspond to moderate wet, 1.50 to 1.99 corresponds to severe wet and values above 2.0 correspond to extreme wet conditions. Values from -0.99 to 0.99 are qualified as normal conditions.

a) b)

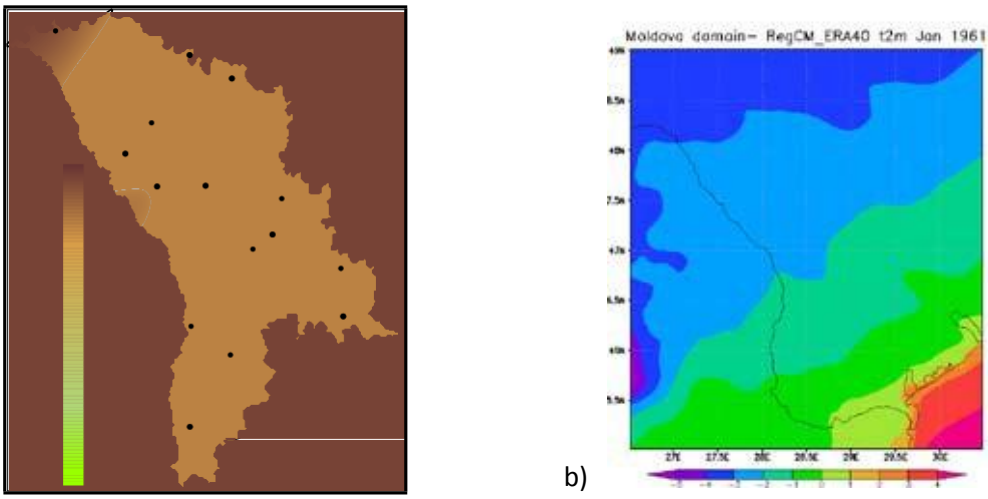


Fig. 1: Location of the 15 meteorological stations and RegCM Moldova domain \(26.5°-30.5° E; 45°- 49°N) (b)

4. Results and discussion

Validation model

The model validation has been achieved at station level for the period 1961- 1990. In this respect, the gridded data of temperature and precipitation totals (RegCM simulations forced by ERA40 data and CRU observation data) have been downscaled to station coordinates. For these series, monthly means were calculated for the validation period. Then, these series of monthly means of RegCM simulations, CRU observations and station observations were spatially averaged and compared. The results are presented

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

in Figure 2. The model does well representing the annual cycle of temperature but slightly overestimates the winter (DJF) temperatures and slightly underestimates autumn (SON) temperatures (Fig. 2a). Precipitation totals are systematically overestimated by the model compared to stations and CRU data (Fig. 2b). The largest magnitude of model precipitation errors are observed in late spring (AM) and summer months (JJA) when the model precipitation means are almost doubled the observed (station and CRU) precipitation means.

5. Changes in annual cycle of temperature and precipitation

The bias correction was applied to each value of the time series in each grid point of Moldova domain for RegCM control run and scenario runs forced with the ECHAM GCM. Then, the annual cycle of temperature and precipitation were calculated for each grid point of the domain and then spatially averaged and compared.

Fig. 3 shows the annual cycle of bias corrected temperature and precipitation totals calculated for 30 years, corresponding to the control run (1961-1990) and scenario runs (2021-2050 and 2071-2100), respectively. The results show that the projected temperatures for A1B scenario runs will increase in all months compared to the control run. The temperatures are projected to a higher increase by the end of the 21st century compared to the mid 21st century and reference period 1961-1990. The highest increase is expected during summer months (JJA). The precipitation totals are projected to slightly decrease in late autumn (ON), winter (DJF) and spring (MA) and increase in summer (JJA) during the period 2021-2050. Significant decrease is projected for summer (JJA) during the period 2071-2100.

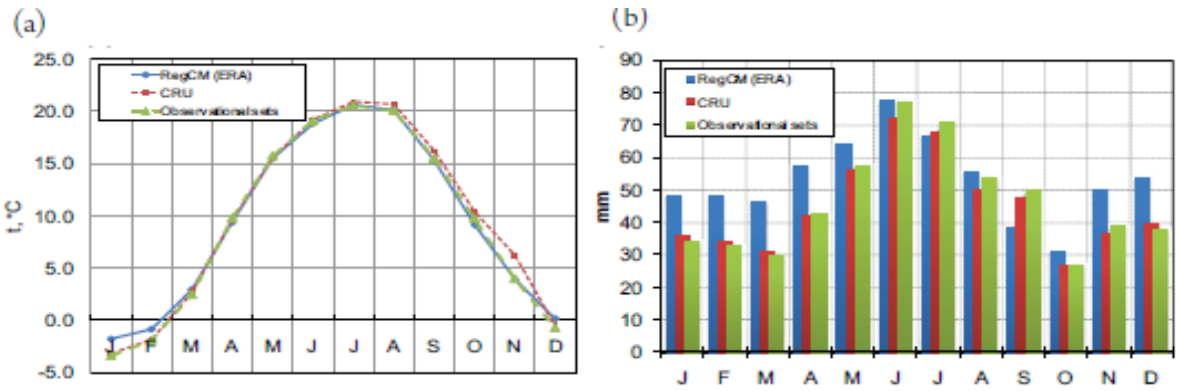


Fig.2: Annual air temperature (a) and precipitation (b) cycle for RegCM (ERA), CRU and observational datasets for reference period 1961-1990.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

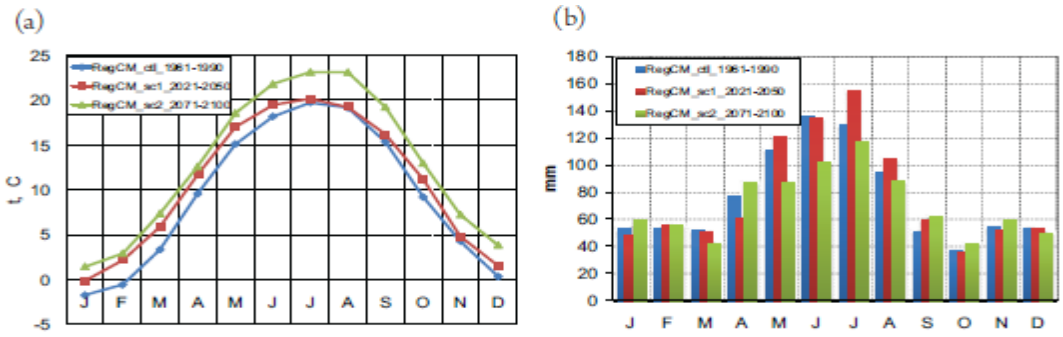


Fig.3*:* Annual air temperature (a) and precipitation (b) cycle after bias correction of the RegCM simulations for the time slices 1961-1990 (control run) and 2021 -2050 and 2071 2100 for Moldova domains.

6. Observed spatio-temporal distribution of SPI values for the period 1960-1997

For climate change projections of future drought characteristics in terms of SPI, an essential requirement is the SPI calculation of a reference climate. Analysis of the spatial and time evolution of drought based on SPI values calculated from observation data at 15 meteorological stations shows that drought conditions have noticeably increased in Republic of Moldova, with drought duration gaining in persistence during the last 20 years (Fig. 4). As a result, prolonged drought periods in the summer months during the early 1960s (1961, 1963, 1967), middle 1970s (1973-1976) to early 1980s (1981, 1986-1987) and 1990s (1990, 1994, 1995, 1996, 1997) is observed. Fig. 4 also shows that wet summers have shortened their persistence and almost vanished after 1985. Additionally, the summer drought episodes have increased in frequency and intensity since the early 1980's. However, the longest extreme summer droughts were recorded during 1973-1976 and 1990-1997. In contrast, the extreme and moderate wet summers have been recorded in 1965, 1970 and 1985.

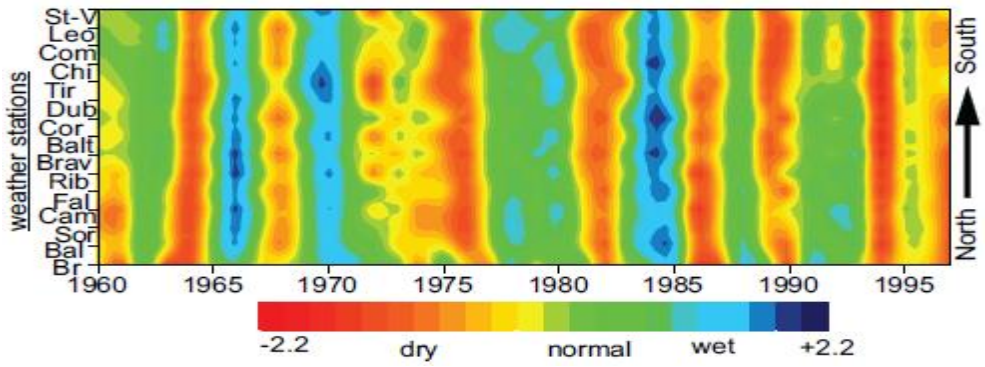


Fig. 4: Spatio-temporal distribution of SPI values at medium-term time scales (3 to 12 months) based on observations at 15 stations (1960-1997).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

In this study, a drought episode was defined as a continuous period of SPI values less than -1.0 at least once during the episode. We computed the consecutive number of months in each drought episode at time scales from 1 month to 24 months. Fig. 5a-b shows a summary of the mean number of summer drought episodes (a) and the average duration of drought (b) for each timescales from 1 month to 24 months per 3 agro-climatic regions for the period 1960 1997. At short timescales a high temporal frequency of drought episodes is showed. With increasing timescales, drought episodes appear with a lower temporal frequency and a longer duration. The mean number of summer drought episodes decreases with the increasing time scales. Thereby, the frequency of summer drought episodes decreases with the increasing length of time scales. As seen in Figure 5(a), the number of short-term summer drought events is significantly higher than those of long-term droughts. We also found that according to the summer medium-term drought (impacting agricultural production), all stations were affected by a severe or extreme drought spell during 1976, 1986, 1990 and 1994 years. Out of these, the drought episode of summer 1961 was recorded in the North agro-climatic region and some stations from Central region, but in the South region was not recorded.

Table 1 shows the mean number of summer drought years and average duration (in months) at short-term, medium-term and long-term drought spells for 3 agro-climatic regions: Nord, Central and South (1960-1997). We should note that the mean number of summer drought years in short-term drought ranged from 14 to 15 for CRU dataset and from 16 to 15 for observational dataset (Table 1) while for the long-term time scale the number of drought episodes was decreasing until 7 years. Relatively similar results indicate both datasets at the short timescales when the average duration of summer drought was ranging between 0.9 and 2.9 months. At the mid-term time scale the average duration of drought were between 2.1 and 2.2 months for CRU data and observational stations, respectively.

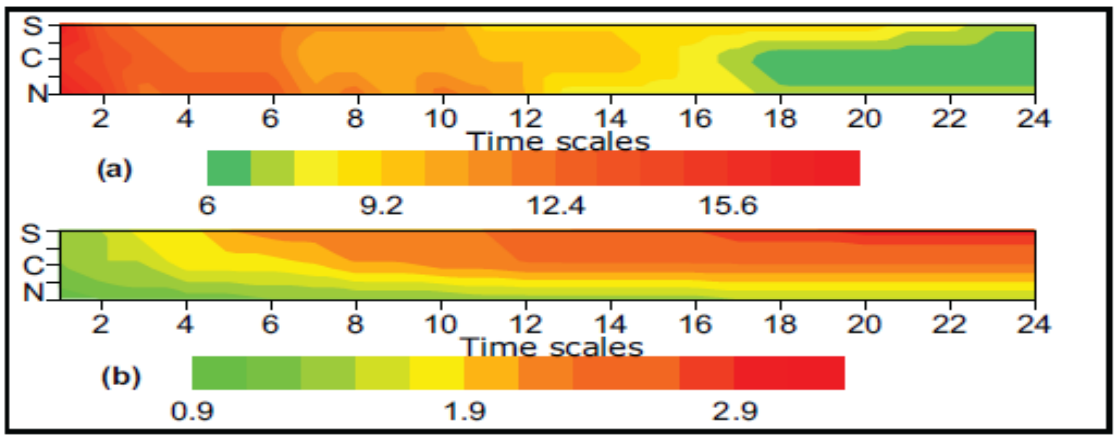


Fig. 5 *a-b*: The mean number of summer drought years (a) and average duration (in months) (b) at timescales from 1 month to 24 months for 3 agroclimatic regions: Nord (N), Central (C) and South (S) (1960-1997).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Fig. 5a-b provides a summary for the average number and duration of summer drought episodes determined based on the SPI at short-, mid-, and long-term time spells.

Table 1: Number of years with summer drought and their average duration (in months) at short-term (1-2 months), medium-term (3 to 12 months) and long-term timescale (13 to 24 months) for 3 agroclimatic regions of Republic of Moldova: Nord, Central and South (1960 1997).

Time scales	CRU dataset			Observational dataset		
	North	Central	South	North	Central	South
short-term	14 (0.9)	13 (1.2)	15 (1.2)	16 (1.1)	15 (1.4)	15 (1.4)
medium-term	13 (1.1)	12 (1.8)	11 (2.0)	11 (1.3)	11 (2.0)	11 (2.2)
long-term	10 (1.3)	11 (2.1)	10 (2.8)	7 (1.5)	7 (2.3)	9 (2.9)

Fig. 6 shows that in general, the southern region is more affected by droughts from moderate to extreme than the northern region. According to these results, extreme and severe summer drought occurred in 6 cases in the North and 10 cases in the Central and South regions based on CRU data and observational dataset at time scales of 3 and 6 months (Fig 6). The middle-term drought observed in the South agro-climatic region might be associated with less of precipitation. This result points out that this region is likely more vulnerable to drought. (Potop, 2011).

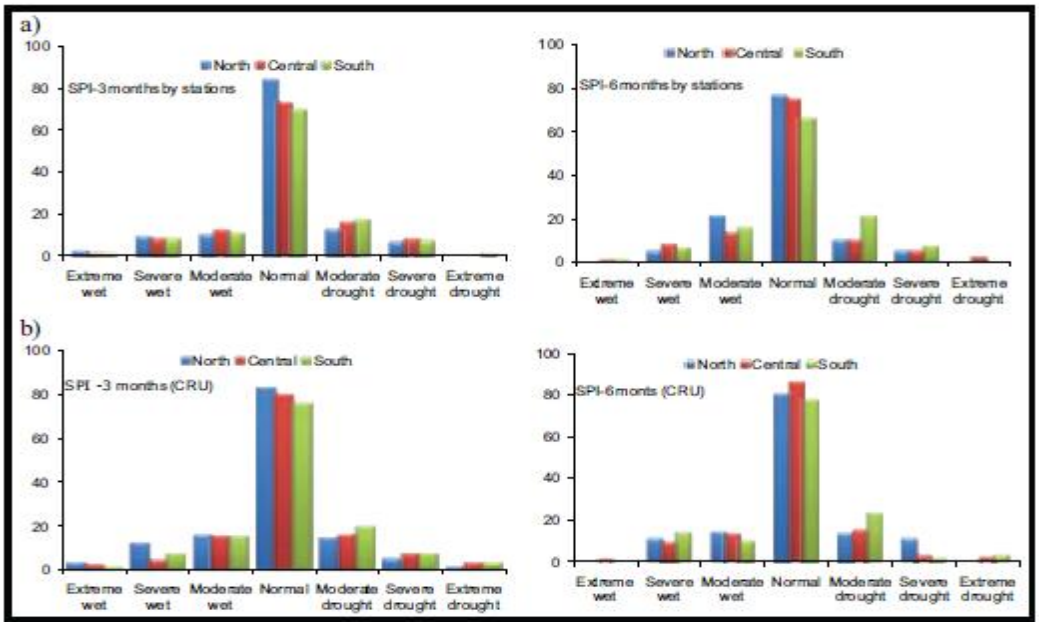


Fig. 6: Frequency distribution of the SPI values in 7 classes of drought category (number of cases) based on station observations a) and CRU data b) averaged per agro-climatic regions for the period 1960-1997

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

7. Projected changes in drought characteristics

SPI - Temporal evolution

Drought appears first in the short time scales and if dry conditions persist, the drought develops at longer time scales. The use of several time scales of SPI take into account the role of antecedent conditions in quantifying drought severity, allowing a better understanding of time scales of water supplies. The SPI was calculated at time scales of 3, 6 and 12 months for each grid point of the RegCM both for the control and scenario runs. The temporal evolution of the averaged SPI calculated for 3, 6 and 12 months over Moldova's domain for the control run for the period 1961-1990 are represented in Fig. 7a). The evolution of the SPI calculated for 3 months shown in upper panel of Fig 7a) shows a high variability of the index between -1 and +1. The persistence of drought conditions can be easily identified from the SPI at time scales of 6 and 12 months. As the time scale for calculation the SPI increases (6 and 12 months) the wet and dry conditions can be clearly identified as well as their persistence. The antecedent conditions in SPI calculated for 6 and 12 months point out on persistence of dry and wet conditions for time lengths of some years (central and bottom panel of Fig. 7a). These characteristics are also true for the temporal evolution of SPI calculated for the scenario runs for the periods 2021-2050 and 2071-2100, respectively (Fig. 7b and 7c) at time scales of 3, 6 and 12 months. In terms of intensity and persistence of dry and wet spells, Fig. 7b) shows that the first part of the period 2021-2050 is characterized by intense and persistent wet spells which are projected to be followed by some years with severe drought. The variability of SPI is projected to increase at the end of this period.

The temporal evolution of SPI for the period 2071-2010 for 3, 6 and 12 months is presented in Fig. 7c. The time series are characterized by a higher variability and longer persistence of both wet and dry periods as compared with the control run and scenario run for the period 2021-2050.

The projected changes in summer drought characteristics based on the SPI calculated from RegCM simulations are presented in Table 2. It should be noted that the projected changes are presented as absolute number of summer drought events and their cumulative values of SPI < 1.0 simulated by the RegCM for the time slices 1961-1990 (control run) and under SRES A1B scenario for 2021-2050 and 2071-2100 periods.

The largest number of drought events was projected at the end of 21th century (2071-2100) at timescale of SPI-3 and SPI-6 months. For instance, for SPI-3 monthly series projected 5 (SPI-3sc1) and 15 (SPI-3sc2) number of drought events for 2021-2050 and 2071-2100 periods, respectively (Table 2). The RegCM simulation produced fewer drought events at timescales of 3 months during the period 2021-2150. Therefore, during the mid-century period (2021 2050) is projected to be less frequently dry events for almost all timescales of SPI series. By the end of the 21st century the projections suggest that long-duration droughts could thus become more important than it is observed during the present climate. Increases in drought severity (expressed by cumulative values of SPI in drought episodes) are also projected for the end of century. The consequences of drought impact on agriculture and environment systems would be severe

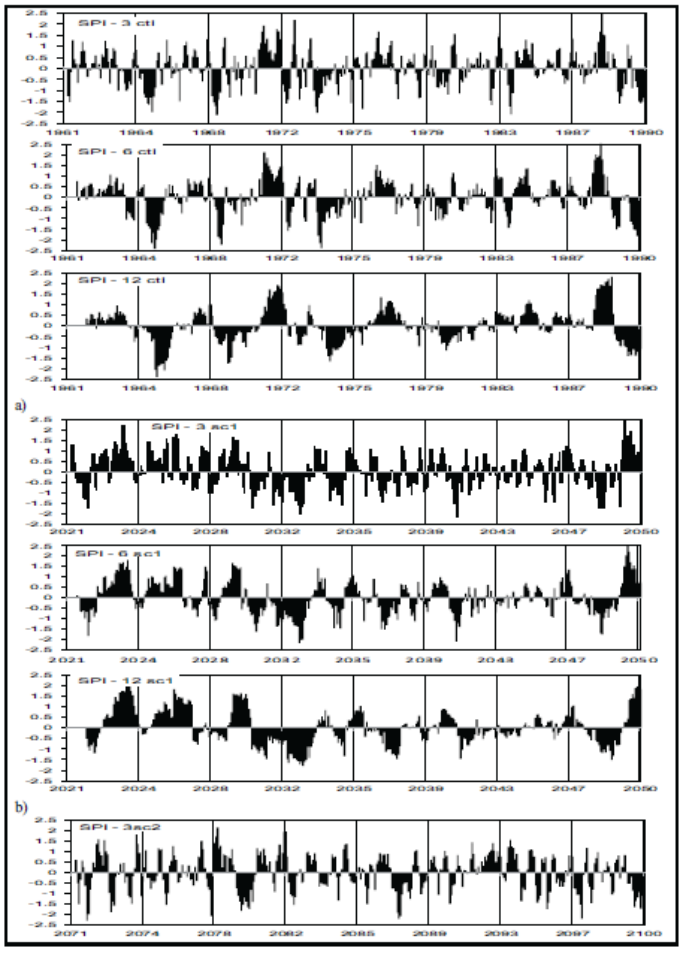
(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

in terms of progressive scarcity of surface water due to high demand of irrigation and of intensification of erosion and desertification processes. Summer drying may also be attributed to a combination of both increased temperature and potential evaporation not balanced by the changes in precipitation. The use of a precipitation-based index does not take into account the changes in evapotranspiration, which are likely given projected changes in temperature (Blenkinsop and Fowler, 2007).

Table 2: Number of summer drought cases and their cumulative values of SPI<-1.0 at timescales 3, 6 and 12 months simulated by the RegCM for the period 1961-1990 (control run) and 2021-2050 and 2071-2100 (A1B scenario runs) averaged for all the grid points of the Moldova domain.

model	time slices	Summer SPI value based on averages summer precipitation totals			JJA SPI monthly value		
		SPI-3	SPI-6	SPI-12	SPI-3	SPI-6	SPI-12
RegCM ctl	1961-1990	5 (-8.0)	5 (-9.1)	5 (-8.1)	10 (-14.3)	13 (-18.2)	9 (-13.7)
RegCM sc1	2021-2050	4 (-5.0)	4 (-6.1)	5 (-8.6)	5 (-7.9)	6 (-7.9)	12 (-16.1)
RegCM sc2	2071-2100	5 (-7.7)	6 (-10.0)	5 (-10.4)	15 (-19.1)	12 (-17.8)	10 (-16.6)



(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

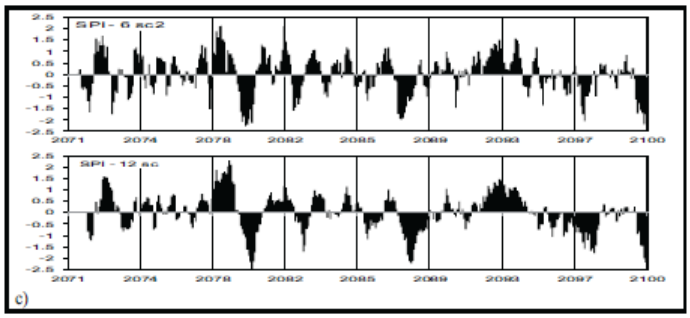
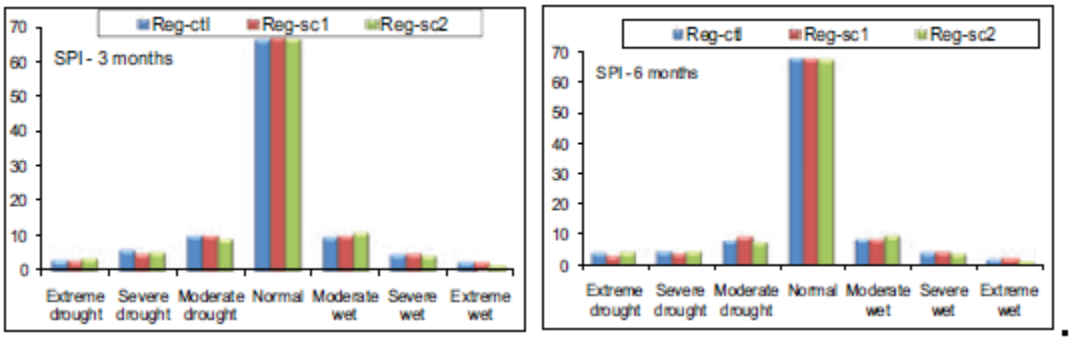


Fig. 7: SPI series at time scales of 3, 6 and 12 months based on monthly precipitation totals simulated by the RegCM control run a) (1961-1990) and A1B scenario runs b) (2021-2050) and c) (2071-2100), averaged for all grid points of the domain. SPI - Frequency distribution

Frequency distribution of monthly SPI values in 7 classes of drought category (%) for the time slices 1961-1990 (control run) and 2021-2050 and 2071-2100 (A1B scenario runs) for 3, 6 and 12 months are represented in Fig. 8 a), b) and c), respectively.

Fig. 8 shows that there are not significant differences between frequency distribution of SPI values calculated for 3, 6 and 12 months in the control run and the two A1B scenario runs. The normal conditions represent 67% out of the total values of SPI in all grid point of the domain. Moderate drought and moderate wet are almost equally distributed around 9% while severe drought and severe wet are equally distribute around 5%. Only slightly increase in extremely dry conditions 5% compared to extremely wet conditions 3% is observed both for the control and scenario runs.



(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

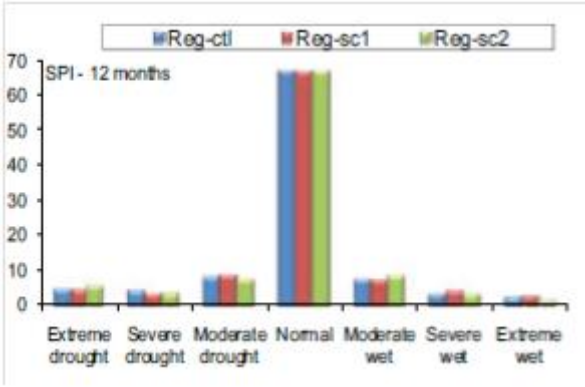


Fig. 8: Frequency distribution of monthly SPI values in 7 classes of drought category (%) at time scales of 3,6, and 12 months calculated from RegCM simulations averaged over all grid points of the domain

8. Conclusions

Various economic sectors, notably agriculture, are sensitive to changes in the characteristics of drought episodes. This article presents the results of the first study on drought characteristics over Moldova based on SPI calculated for RegCM simulated data at high resolution (10 km) for the current (1961-1990) and two future climates (2021- 2050 and 2071-2100). The results can be summarized as follows:

1. RegCM simulations forced by ERA40 data were compared with station observations and CRU data downscaled at station coordinates. The results show that the model does quite well in representing the annual cycle of temperature but precipitation totals are systematically overestimated compared both to stations and CRU data. This feature is transferred to SPI which is based only on precipitation. Consequently, the model underestimates the severity of droughts.
2. The temperatures projected by the A1B scenario runs will increase compared to the control run. The temperatures are projected to increase by the end of the 21st century compared to the mid 21st century and to the reference period 1961-1990. The precipitation totals are projected to slightly decrease in autumn, winter and spring and increase in summer during the period 2021-2050. Significant decrease of precipitation is projected for summer during the period 2071-2100.
3. The evolution of the SPI series calculated for 3 months presents a high variability of the index around normal conditions. As the time scale for calculation the SPI increases (6 and 12 months) the wet and dry conditions can be better identified as well as their persistence.
4. Not significant differences between the frequency distribution of SPI values calculated for 3, 6 and 12 months in the control run and the two A1B scenario runs have been identified. The normal conditions represent 67% out of the total values of SPI in all grid point of the domain.
5. The study represents the first steps in investigating the country vulnerability to drought in the context of climate change. However, more in-depth analysis is required to explore the vulnerability to drought of agro-climatic regions.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

9. Acknowledgements:

The research on drought conditions in the Republic of Moldova was supported by the Czech research project MSM 60460901; The RegCM simulations have been produced in the NMA-Romania in the framework of CECILIA-EU-FP6 Project, Contract 037005 GOCE/2006 (http://www.cecilia-eu.org).

10. References

[1] Blenkinsop S. and Fowler H. J. (2007) Changes in European drought characteristics projected by the PRUDENCE regional climate models. *Int. J. Climatol.*(27), 1595-1610.

[2] Boroneant C., Caian M., Vasile L., Cheval S., Ilie C. and Coll J. R. (2011) *Summer drought analysis across Romania based on RegCM simulations.* WCRP (GEWEX/CLIVAR) Workshop on Drought Predictability and Prediction in a Changing Climate: Assessing Current Capabilities, User Requirements and Research Priorities, 2-4 March, 2011, Barcelona, Spain.

[3] http://drought.wcrpclimate.org/workshop/posters/Boroneant.pdf

[4] Boroneant C., Caian M., Boberg F., Enculescu A. and Matei M. (2009) *Weather Extremes in Romania Simulated With a High Resolution RegCM for Current and Future Climates.* In: MOCA-09 Conference, Montreal, 19-29 July 2009.

[5] http://www.moca-09.org/e/documents/IAMAS2009Program15w.pdf

[6] Corobov R. and Overcenco A. (2007) *Use of climate modeling outputs for regionalization of global climate projections.* In: Problems of ecological monitoring and ecosystem modeling, Vol. XXI, St. Petersburg Gidrometeoizdat, Russian Federation, pp. 123-145

[7] Dai A. (2011) Drought under global warming: a review. Wiley Interdisciplinary Reviews: *Climate Change*, (2), 45-65. doi: 10.1002/wcc.81.

[8] Giorgi F., Marinucci M. R. and Bates G.T. (1993) Development of a second generation regional climate model (RegCM2). Part I: Boundary layer and radiative transfer processes. *Mon. Wea. Rev*.,(121), 2794-2813.

[9] Giorgi F, Bi X and Pal J. S. (2004a) Means, trends and interannual variability in a regional climate change experiment over Europe. Part I: present day climate (1961 -1990). *Clim Dyn* (22), 733-756.

[10] Giorgi F, Bi X and Pal J. S. (2004b) Means, trends and interannual variability in a regional climate change experiment over Europe. Part II: future climate scenarios (2071 -2100). *Clim Dyn* (23), 839-858.

[11] Halenka T. (2010) *Cecilia - EC FP6 Project on the Assessment of Climate Change Impacts in Central and Eastern Europe.* Global Environmental Change: Challenges to Science and Society in Southeastern Europe, SpringerLink, 2010, Part 3, 125-137, DOI: 10.1007/978-90-481-8695-2_11.

[12] Lloyd-Hughes B. and Saunders M. A. (2002) A drought climatology for Europe. *International Journal of Climatology,* (22), 1571- 1592 . McKee T.B., Doesken N.J. and Kleist J. (1993) The relationship of drought frequency and duration to time scales. Preprints Eighth Conf on Applied Climatology Anaheim CA.

[13] Amer Meteor Soc, pp 179-184. McKee T.B., Doesken N.J. and Kleist J. (1995) Drought monitoring with multiple time scales.

[14] Proceedings of the Ninth Conference on Applied Climatology. *Amer Meteor Soc Boston,* pp 233-236.

[15] Meehl G. A., Stocker T. F., Collins W. D., Friedlingstein P., Gaye A. T., Gregory J. M., Kitch A., Knutti R., Murphy J. M., Noda A., Raper S. C. B., Watterson I. G., Weaver A. J. and Zhao Z-C. (2007) Global climate projections. In Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change Program. Cambridge, UK/New York, USA: Cambridge University Press; 2007, 747-846.

[16] Pal J. S., Giorgi F. and Bi X. (2004) Consistency of recent European summer precipitation trends and extremes with future regional climate projections. *Geophysical Research Letters,* (31), L13202, doi: 10.1029/2004GL019836.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[17] Potop V. and Soukup J. (2009) Spatiotemporal characteristics of dryness and drought in the Republic of Moldova. Th*eor Appl Climatol,* (96), 305-318.
[18] Potop V. (2011) Evolution of drought severity and its impact of corn in the Republic of Moldova. TheorAppl Climatol. DOI: 10.1007/s00704-011-0403-2. Vicente-Serrano SM. (2006)
[19] Differences in spatial patterns of drought on different time scales: an analysis of the Iberian Peninsula. *Water Resources Management*, (20), 37-60.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

New Bangalores? The role of Central and Eastern Europe in business and IT services offshoring

Zoltán Gál, Ph.D. senior research fellow,
Centre for Economic & Regional Studies, Hungarian Academy of Sciences
Associate professor, University of Kaposvár, Faculty of Economics
E-mail: galz@rkk.hu

Abstract.

The paper discusses how the second global shift in business services provision and corporate restructuring open up new offshoring opportunities into Central and Eastern Europe (CEE). It explores three issues: First, it builds upon the theoretical framework of the 'new paradigm of globalization, which considers offshoring as one of the most important globalizing forces of recent time. This results in a shift in global trade, namely from 'trade in goods' to 'trade in tasks' determined by the changing trends in the division of labour. Second, the paper gives an overview of services relocation into CEE in comparison with its Asian counterparts. As the EU expanded eastwards, the opportunities for European corporations to offshore their business services to these 'nearshore' locations increased. Building on the region's nearshoring advantages such as geographical-cultural proximity and on their multilingual graduate supply, CEE is likely to utilise more value added quality-driven BPO and KPO services. Third, the paper examines the implications of offshoring for the home markets in CEE assessing its impact on their locations. It reveals the role of offshoring activities in the metropolitan transformation and discusses the factors that make the capital cities an increasingly attractive option for companies to relocate their services. Despite CEE has taken advantage on the trend supported by the global service delivery models reducing dependency on any single location, its further growth may be influenced by the worsening macro-conditions, and future prospect of the region depends largely on government incentives and on the success of exploiting talent pools offered by its provincial cities.

Keywords: second global shift, trade in tasks, offshoring, corporate location strategies, 'nearshoring', Central and Eastern Europe, primary and secondary offshoring locations.

JEL Codes: F21, F23, J 21, L8, R12

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

1. Introduction

The key feature of the second global shift is the offshoring (relocation or global sourcing)[1] of a range of service functions from the USA and Europe to low cost developing countries. Improvements in communication technology helping companies in moving services across country borders has dramatically increased the ability of companies to source production anywhere in the world. The dropping relative prices of services, especially those found in the ICT sectors together with the recent liberalisation of trade is facilitating the spatial fragmentation of value chains alongside the services functions. Offshoring is regarded in the literature as one of the most important globalisation forces. Thomas Friedman in his latest book, The World is Flat (2005), describes offshoring among the major "flatteners" of the technological, economic and social shifts that effectively leveled the economic world, and "accidentally made Beijing, Bangalore and Bethesda next-door neighbours". A global, Internet-enabled platform for various forms of sharing knowledge and tasks in services, irrespective of time, distance, geography and increasingly, language has created the flat World. Nevertheless, the world remains far from flat and proximity, geographical factors still matter a great deal for many service tasks, because their exchange requires face-to-face proximity between partners.

Transportation and communication costs, as well as geographic proximity to customers, workers and suppliers have become less important for many service tasks. The rapid surge of globalisation, opening up of formerly isolated regions such as Eastern Europe, Russia and China to global trade, has substantially boosted task trade and service related cross-border investment. Many Eastern European countries invigorated by the EU enlargement became important locations for services to be offshored. The question is whether these locations might stand as a challenge for the overwhelmingly dominant global position of India and the other East Asian countries or only offer complementary offshoring base for the continental European companies preferring relocating their services nearby. There is a large amount of anecdotal information underpinned by the recent estimates of consultants' reports, which are viewing CEE as an attractive region for offshoring even in global context. Its leading cities are now seen by some analysts as "future Bangalores" in terms of providing offshoring solutions.

This paper attempts to confirm the recent anecdotal evidence by means of using trade and specific location sites data in order to overcome the scarcity of consistent empirical contributions to measure the

[1] Offshoring and outsourcing often used as an interchangeable phenomenon. While outsourcing is delegating an internal business process to an external company, offshoring means the geographical spread and decentralization of production of exchange through the relocation of activities from one site to another. Although, offshoring can occur in combination with outsourcing, but this need not be the case

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

actual significance of CEE in services offshoring. Research on this topic is limited by the lack of appropriate data and the available data can be used to define offshoring only with certain restriction. For instance, FDI data can be indecisive because the cost of services investment (e.g. set up an shared services centre), just like the invested amount is minimal. The employment figure by offshoring projects, if they were available, would allow international comparison. The service export data adopted from the Balance of Payment statistics gives a good approximation to identify those sections in service trade which can be regarded as offshorable.

The paper is divided into five sections. Following the introduction, the second section puts offshoring into the wider context of the economic literature in order to prove that outsourcing and relocation processes not only restructuring the organisational base and geographical accessibility of firms but also it can be interpreted as the key factor constituting the latest phase of globalization. The third section gives an overview of international market of offshoring services. The fourth explores the reasons behind the growing popularity of CEE as an offshoring hub and examines the service trade trends and the comparative advantages of the East European region. The last section examines the home market effects and the impact of offshoring on the local urban network, while the conclusion discusses the sustainability of the region's attractiveness and comparative advantages.

2. Offshoring as a new paradigm of globalization

The fragmentation of production processes across distances, national borders – like globalization – is not an entirely new phenomenon but advances in ICT have accelerated this trend and enabled inroads to the tradable and commoditized services.[2] It goes along with the growing internationalization and large scale spatial dispersion of production and service networks. Service sector outsourcing and offshoring are geographically determined processes of the contemporary global production system as they create dynamic spatial interactions between different - notably the global, the regional, the national and the local – geographical scales (Jones, Kierzkowski, 1990).

However, these production processes have not always been so flexible and 'footloose' in terms of the spatial levels of their operation. Service sector such as manufacturing before was mostly exempt from spatial and organizational fragmentation in the past. Economic activities during the various stages of the two centuries long modernization process produced much differentiated geographies (see Table 1). The

[2] Offshoring reflects the tradability revolution of services. Traditionally, most services were non-tradable and it had even stronger proximity requirement regarding to the geographical position of sellers and buyers. The original precondition of tradability is the use of ICT which allows knowledge to be standardized and digitized, allowing more and more services to fragment their different tasks into smaller components that can be located elsewhere to take the cost, quality and scale economies advantages of the particular location.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

interaction between organizational and geographical dimensions of national/international/transnational production networks created complex structures in which elements of both concentration and dispersal are apparent. The importance of these processes can be not only different in each stages of modernization but requires different kind of embeddings (Grossman and Rossi–Hansberg, 2007).

In the age of Adam Smith, transportation was costly and therefore the fragmentation of production activities in remote locations was difficult and uneconomical. For the subsequent two centuries, the still higher cost of moving goods dictated agglomeration in production, resulting in the geographic clustering of production and people, although it did not necessitate performing production close to the consumption.

The economic geography of that time as Grossman and Rossi–Hansberg (2008) argue was characterized by agglomeration in production rather than fragmentation and specialization required geographic concentration. Countries specialized in making goods from start to finish participate in the world economy with the exchange of different complete goods and fostered the rapid expansion of international trade. This period was characterized by the rapid industrial concentration in the North and southern deindustrialization (Baldwin, 2006).

In the last three decades as the rapidly decreasing communication and coordination costs have fostered the end of the need to perform most manufacturing stages near to each other. The lower cost of transport and information generated a rapid industrialization in the South. The emergence of Southern industrialization forces a relative deindustrialization in the North resulting in a steady shift to services away from industry and parallel geographical separation of various production stages became more attractive. TNCs in the North started to offshore almost all labour intensive stages of production to low cost developing countries creating a transnational network of affiliates. This was the first global shift is associated with relocation of manufacturing employment to low-cost production sites (Baldwin, 2006). As communication technologies have weakened the link between specialization and geographic concentration (specialization needs no geographic concentration), the separation of tasks in time and space became possible. This second shift of globalization 'spatially unpacked' the factories and offices from each other and concentrated into the services sector. The relocation of mostly routine tasks, functions rather than sectors became more common. New "trade in task" paradigm shown in Figure 1 developed by Grossman and Rossi–Hansberg (2008) called this process fragmentation. Advances in this process have made it easier for companies to disaggregate their value chains around the globe, all the while maintaining management control over them, or to disperse service production among numerous supplier firms even in distant locations, contrary to the earlier stages of globalization when specialization required geographic concentration and agglomeration forces were prevailing (Baldwin, 2006; Baldwin and Krugman, 2004).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

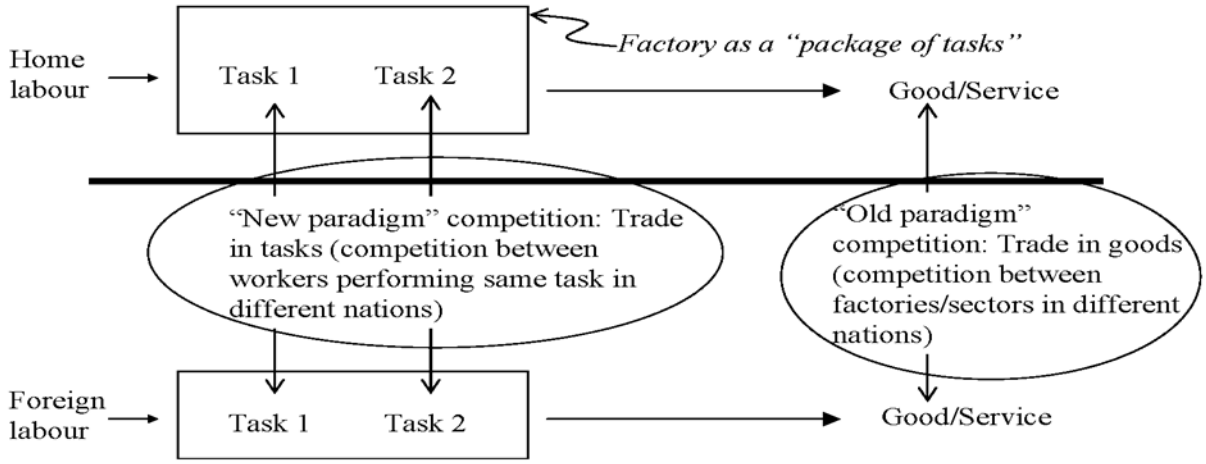


Fig. 1: Task trade: Grossman and Rossi –Hansberg theorem (Source: Baldwin (2006))

Offshoring became a key globalization force and one can argue it is the latest phase of globalization, which has been challenging the traditional territorial division of labour (Blinder, 2006):

The new economic geography (NEG), focusing on the spatial concentration of economic activities has been challenged by the global fragmentation, a geographical spread and decentralization of services activities. Changes in organization and IT reduced the difficulties of coordinating services from distance by enabling firms more easily fragment their production stages (value chains). The fragmentation requires infrastructure and service production capacity in distant places, foreign direct investment can be facilitated the process of decentralization. It means a relocation to host country all or part of service production as the companies can benefit from the various alternative locations endowed with specific local resource based advantages. Some service activities are not fixed in space and can be provided either as a form of foreign trade or by the temporary relocation of a service worker to a client's premises. Other specialist services can be provided only from central locations.

Today neither the comparative advantage nor the traditional NEG approaches are seem to be adequate to explain the territorial dimension of fragmentation. Service value chains became increasingly offshorable not just within but also across regional economies, which opened up a new territorially embedded systems of core service functions challenging obsolete Marshallian districts and clusters by their dispersed global networks. Fragmentation is not simply spatial dispersion in a certain sense but

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

fragmentation means that external linkages interpenetrate the territorially embedded value chains not only in manufacturing but in services, diminishing the home bias even for the core service operation (Grossman and Rossi–Hansberg 2008; Baldwin 2006).Outsourcing and offshoring are both regarded as means to reduce costs and also can be seen as the expression of corporate strategies to distribute risks across a number of service providers and different locations. However, offshoring and outsourcing may be associated with a different landscape wherein the former reinforce local-regional growth and the latter reinforce productive efficacy of the global network at the expense of local economic prosperity. In this sense, offshoring is more consistent with the NEG supporting regional economic growth, while outsourcing relying on extensive inter-regional growth challenges the NEG, and, 'in particular the claimed the necessity that networks of production and exchanges need to be local to create value between network partners' (Clark and Freeman, 2008).

The reason behind the creation of global value chains during the stages of the first and the second global shift also differ from each other (see Table 1). Along with the stages of development associated with the global shifts the nature of FDI has also changed. Traditionally investments seek access to natural resources, production and market building, while recently services increased their share within FDI (Dicken 2003). As argued by Metters and Verma (2008) offshoring is not a new phenomenon as it has been applied to the relocation of isolated stages of labour intensive manufacturing to low-wage developing countries in the form of vertical direct investment during the first global shift. What is new now is its application to knowledge intensive business and financial services. However, recently horizontal investment gains importance as strong flows of FDI across countries are motivated not only by low cost benefits but also by the avoidance of exchange risks, quality labour, and by the quest for proximity advantages with a direct local presence (Bräuninger 2007). Global service providers can locate their units to take advantage of geographical variation of production costs at global scale. In other words, transnational vertical specialisation and integration became feasible, in which different tasks of a service firm's value chain are located in the different parts of the world (Bryson, 2007).

Offshoring has a strong impact on deciding what kind of jobs are being offshored and what are the main differentiating factors from the earlier wave of relocations? While earlier mainly blue-collar jobs were offshorable recently a variety of skill-intensive and cross-sectoral white-collar jobs play key role in this process. The geography of the second global shift is strongly determined by the educational and language abilities of the service workers located in low cost locations (Bryson, 2007).Earlier routine tasks were relocated to low wage developing countries and more recently even the core, more skill-intensive core functions became offshorable even to new locations of the emerging countries. The second global shift in services offers benefits for countries at both ends of this process and participants can reap the benefits of the new global division of labour of this shift. The receiving countries gain jobs, technology, skills and access

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

to global markets, while the investor countries save cost and improve their competitiveness as they can move into the higher value added activities.

The driving forces behind the new wave of offshoring are not simply low wages, but the increased electronic tradability, lower capital intensity and sunk cost of service relocation, which make easier to transfer services to the wider varieties of locations across the globe. Another argument in the literature is that relocation of manufacturing during the first global shift is tended to be more geographically embedded as affiliates built stronger links to the local suppliers and local markets, while service relocation can be regarded as more footloose (Jones and Kierzkowsky, 1990; Arnt and Kierzkowsky, 2001).

Table 1: Offshoring is not a new phenomenon: First and a second global shift

First global shift (relocation of manufacturing jobs)	**Second global shift (relocation of service tasks)**
First wave in the 1980-90s	Since the Millennium: new wave
Blue collar jobs	White-collar jobs
Impacts by industry – manufacturing	Across sectors and across nations –service occupations
Transportation enabled	Internet enabled
Driven by wages	Driven by wages, by new business concept, language, technical training
High capital investment required	Lower capital requirement (proceed faster)
Limited to particular manufacturing sectors	Potentially affects firms in all sectors
Geographically more embedded: stronger links to local suppliers	Geographically more footloose

Source: Edited by the author.

Although separating tasks alongside the entire value chain in time and space, (geographic) proximity as Hillberry and Hummels (2008) argue still matters a great deal for many tasks. While some tasks can be undertaken easily from a large distance, others require more face-to-face contact. It highly depends on the

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

type of tasks (routine or non-routine) and their information content[3]. This resonates to *Grote and Täube's* (2007) argument in which proximity requirement selects between the different organizational and spatial forms of reorganization of value chains and it can be a selection tool between the core and non-core activities. The option of outsourcing certain stages of business tasks and offshoring part of the value chain abroad depends largely on the embeddedness of certain functions in relation to their internal corporate structure and to their corresponding locations abroad. They distinguish different kinds of proximities (spatial, organizational, cultural and professional) necessary for the transfer of information and knowledge in financial services[4].

3. The international offshoring services market

There are a large number of consultancy reports on service offshoring and each provides rather different estimates of the size and its impact on employment. McKinsey's study finds that service providers have so far captured only 10 percent of a $300 billion offshoring opportunity. Their analysis indicates that approximately 35 percent of the work that could potentially be offshored, worth $110-120 billion and divided equally between IT services and business processes, actually will be offshored by 2010 (McKinsey, 2006.). The significance of offshoring is often overestimated and it is because still only smaller portions of services are relocated abroad. In fact, offshoring is by no means as important as one can expect from the rapid surge in FDI data and ongoing political debate on the job losses.[5] Most outsourcing remains predominantly domestic affair and only a small share of service outsourcing is international. According to the IMF calculation based on trade data, the share of imported intermediate goods and services is about 10% of total import in the eight OECD countries selected by the study. Service offshoring is even more underdeveloped. The ratio of imported intermediates to gross outputs of industrial products rose from 6% to 10% between 1980 and 2003, whereas the ratio in services was still only 1% in 2003. However the growth rate for offshoring intensity of services was much higher than in the industry (8.4% to 1.3% since

[3] *Leamer and Storper's* (2001) theorem has a strong implication for offshoring as only those services can be relocated which are based on routine cognitive processes, have high information content, internet-enabled, require no face-to-face contacts and easy to set-up even in remote locations and easy to manage cross-nationally. Nevertheless, most personal services cannot be performed from distance, while impersonal services even the core tasks of financial services are liable to offshoring.

[4] *Grote and Täube's* (2006, 2007) argue that outsourcing becomes an option only when organizational proximity is not necessary. When organizational proximity is needed, relocated units have to be fully owned subsidiaries. Moreover, the content of the processes to be outsourced ought not to be strategic to the outsourcing company. Offshoring of complex tasks is also possible for parts of the value chain that do not require cultural and spatial proximity and where professional proximity ensures sufficient common background for communication (Grote and Täube, 2006, 2007).

[5] The outsourcing market is close to 300billion USD of which only 80 billion USD is subject to offshoring (XMG Report, 2007).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

1990) such as the labour productivity generated by service offshoring (Amiti and Wei, 2005; Bräuninger, 2007).

Offshoring is a key driver of geographically re-engineering corporate value chains as re-location of certain service activities requires the geographical reorganization of firms' value chains by choosing among a number of locations. There is a number of factors at play, and these must be considered when drafting a successful offshoring strategy. Besides the lowest cost, other factors have to be taken into account such as hidden cost and the higher risks of the low cost environment that might drive the firms to select other more quality based locations. The "closer to home or closer to expansion" strategies are applied when TNCs prefer the establishment of sub-centres nearshore or close to the geographical direction of the future market expansion. Nearshoring just like offshoring is not a new phenomenon. Many US-based companies had been using the relatively lower cost employees of Canada and Ireland for many years until India and other very low-cost developing countries became the dominant players at global scale. Earlier each major industrial core had its own offshoring backyard located nearby. Nearshoring means sourcing service activities to a foreign, lower-wage country that is relatively close in distance or time zone and often within the same continent. The customer expects to benefit from one or more of the following constructs of proximity: geographic, temporal, cultural, linguistic, economic, political, or historical linkages[6].

Nowadays, location strategies of companies in global sourcing shift towards the multiple sourcing strategy creating 'global footprints' in a form of hub and spoke model to spread risks among a number of locations, regions and the number of collaborating partners to create global quality labour pool and improve operational performance. Such a strategy creates an optimal mix of locations taking cost, labour pool, language, time zones, cultural factor and regional coverage into account These strategies may appear as alternatives but in most cases firms have developed a global delivery model based on "blended delivery systems" that 'capitalise on the place-based advantages of coupling or blending activities located in a variety of different locations: home–near–far' (Bryson, 2007). . For larger TNCs it is more appropriate to cluster footprint with operations located in different regions in order to reduce their dependency on any single location.. The goal is to have in each geographic region either a regional or a country presence to serve local needs and a global hub to serve as a large-scale transaction engine for all work that is location

[6] There is a considerable heterogeneity referring to the actual meaning of "offshoring". It can be used simply to cover anything from 'outside of country boundaries' or 'not domestic or not a border country' to 'remote lower cost locations' or 'outside of the continent'. In a more widely used interpretation it refers to developing low cost countries that are located outside the First World (Jahns et al., 2006). The geographic dimension of service locations refers to onsite (on the premises of the focal company) and offsite (outside the premises but in the same country) together forming the onshore alternatives, as well as nearshore (relocation of services within a shorter distance, often in the same continent) and, finally, offshore or farshore (developing countries for e.g.US-based companies) options.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

independent, and does not require territorial embeddedness. In this context, different local territories are in competition as much as firms.

4. An emerging offshoring hub: Central and Eastern Europe

The following section explores the reasons behind the growing popularity of CEE as an offshore location, and besides consultancy reports examines the trade data to find evidence of offshoring related service intensity, and finally East European locations compared to other earlier established Asian locations, and discusses the sustainability of the region's attractiveness.

Even as most US and UK companies turn to India to relocate many of their service outsourcing jobs, over the last decade a growing number of outsourcing services seekers from Western Europe have found Bangalores in their own backyard; countries in the CEE region, particularly Czech Republic, Hungary, Poland, Romania, Bulgaria, Russia and Ukraine. With the advent of new generation of service offshoring major companies after targeting India, the Philippines and China as the prime destinations for offshoring technology and call-centre jobs, are now looking towards Eastern Europe to meet their nearshoring requirements.

What are the main driving factors behind the rise of the nearshoring destinations in CEE? First, it can be partly explained by the external factors, namely by the growth demand and new business strategy direction are encouraging more and more European companies to gain benefits of service offshoring. This demand met the increasing supply from the CEE countries wanting to benefit from the new wave of FDI shift to services and they are pitching themselves as ideal nearshore locations. Until the early 2000s offshoring was almost exclusively 'reserved' for the Anglo-Saxon world with limited opportunities for Japanese, French and German companies. As pooling services and offshoring has become part of the mainstream strategy, many of the European companies needed service centers that can operate in European languages. As Indian locations cannot support operation in other languages but English, therefore German, French and Scandinavian countries are looking to gain the benefits through relocation in nearshore East European locations. They require services in their own languages and tend to demand a higher degree of cultural embeddedness, especially in their customer facing activities.

Another driver of nearshore growth is the expansion of offshoring towards new types of services. Not only the list of offshoring functions has grown steadily embracing core competencies, human resource management, analytical work and more complex customer related services but these new higher-value functions require more interactions that only nearshoring operation can provide, namely language skills cultural understanding, same time zones and geographical proximity.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The third driver of the nearshoring boom is the rise of global service delivery model, which creates a pool of global labour located in a large number of service centres around the globe in order to optimise global operation of service providers through their so-called global footprint strategy.

Offshoring can be regarded as a growth market that is gaining breadth and depth. The breath is measured by the number of new players from both the supply and demand sides that take share of this business, while depth is generated by the growing complexity of tasks offshored. Countries in Central and Eastern Europe are gaining importance as offshoring locations. In 2003 CEE with its 1Bn USD share in the global offshoring market is worth to 40 Bn USD lagged far behind the more prominent locations, such as India, Ireland and the Philippines (McKinsey, 2006). The share of CEE is rapidly growing as in 2003 only 5% of service related global FDI projects invested there, while in 2006 more the 22% of FDI project went to the region.[7] A.T.Kearney (2007) consultancy firm created an index of the most attractive countries for offshoring based on costs (financial attractiveness), economic and political environment (business environment) and human resources (skills availability). As expected India came out on top and more countries from CEE were also in the top quarter. As the most advanced CEE countries catch up with their western neighbours, nearly all improved their absolute score, although lose ground while emerging locations move up ranking, the costs and other location advantages are beginning to erode. Once a regional champion, the Czech Republic heading CEE locations at 4th place globally (2004) – but that was 12 places down by 2007. Bulgaria replaced the Czech Republic as the only country from the CEE region in the top 10. Both Bulgaria and Romania experienced a big progress in their business environment improvement because of reforms preceding their EU accession. Slovakia and the Baltic states also jumped into a better position. The Czech Republic and Hungary dropped in this ranking because of rising wages and other costs resulting in newer contenders within CEE are outshining these earlier established locations. Despite the continued environment improvement in the most established nearshore locations, all fell in rankings in relative cost competitiveness.

Business process offshoring in the form of captives of TNCs and third party providers began to take off in Hungary, Czech Republic and Poland from 1998 driven primarily by the improving investment climate, the development of modern office markets and cheap labour supply. New locations, such as Slovakia,

[7] Survey by UNCTAD of over 1,800 export-oriented FDI projects in 2002 and 2003 not surprisingly revealed India with its 12% share to be the largest single recipient of projects such as call centres, shared service centres and IT services, with Asia as a whole being the largest regional hub with its 40% share. Western Europe was not far behind with the UK being the principal location in Europe and second only to India overall. Central and Eastern Europe accounted for only 5% of the global market. These data reveal that most export-oriented service projects are still concentrated into developed countries (51%), although lower-cost locations are rapidly catching up. In the case of shared service centres, developing countries and CEE economies attracted 65% of all export-oriented FDI service projects in 2002-2003 (World Investment Report, 2004).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Romania, and Bulgaria have emerged since the Millennium[8]. Central and Eastern Europe is still an attractive supplier for the European corporations. During the first stage of service FDI investment captives in the form of service shared centres were the main service providers, and recently global and even Indian vendors are opening their new centres in CEE to serve their European clients. In the early 2007, DTZ survey recorded 183 BPO operations across CEE revealing that the three core countries of Poland, Czech Republic and Hungary account for 77% of total BPO in CEE[9].

Considering the shortcomings in different statistical sources, the indecisive evidence of the consultancy reports and the lack of a commonly accepted definition of offshoring this paper uses trade data depicted from the Balance of Payment statistics. This gives a good approximation to identify the trends in those sections of service trade which can be regarded as offshorable and helps to identify the geographical directions of contemporary delocalization processes within the region, and also highlights the shifts in county level performances in attracting offshored services. Following the international methodology (OECD, 2004, WTO, UNCTAD, 2005, Amiti and Wei, 2004, Ghibutiu and Poladian, 2008) two service categories are suitable to approximate the size of trade in offshorable services. Information and computer technology (ICT) and other business services (OBS) or outsourcable business services (BPO) are the most inclusive categories that may be regarded as potentially offshorable services.[10]

The question is whether the data support the widely accepted view that new member states (NMS) increasingly affected by the relocation of offshorable services. The tradability revolution in services is resulted in a rapid surge of relocation service activities. The NMS of the EU have achieved enormous progress in modernizing their service industries and from the Millennium have witnessed a rapid shift towards services in FDI inflows. FDI plays an important role in offshoring, although it is more difficult to quantify it and the tradability of services is already more visible in the patterns of service trade in the case of the six new EU member states (NMS-6) included in this study.[11] Trade in services expanding from a very low base amounting to 63 billion Euro export by 2007, which is almost 3 times higher than that of in 1996. The share of the NMS-6 in the global service export is still modest (2.8%) illustrating the lower exports capabilities of the region although their growth rate is higher than the global or the EU-15 average. In absolute terms Poland, Czech Republic and Hungary are the leader in this field.

[8] In 2006 Romania attracted over 40% of total BPO projects in the regions, which was higher than the correspondent Polish figure.
[9] The shares by countries were the following: Poland (32%), Czech Rep. (25.7%), Hungary (18.5%), Romania (12.5%), Slovakia (5.4%), and Bulgaria (5.4%).
[10] As Ghibutiu and Poladian, 2008 pointed out, it is difficult to distinguish between offshorable and offshored service parts because not all service trade is related to offshoring and nor it is possible distinguish between the affiliated and unaffiliated trade in respectively.
[11] Bulgaria, Czech republic, Hungary, Poland, Romania, Slovakia

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

When looking at the sectoral composition of service export the still comparatively lower share of other services (including relocation related business services) is striking and this means that traditional branches of services reflected the pattern of the economic transition.

It is widely accepted that services offshoring means the global sourcing of business and IT services from abroad therefore to find further evidence of offshoring related service development, export data on the so called "offshorable services", namely on the other business and ICT services can be collected for NMS-6. The share of offshorable services within total service export has been steadily growing from 16% to 24.2% between 1997 and 2007[12]. The total value of offshorable services was equal to 15.3 billion Euro in 2007 and within this aggregate the overwhelming dominance of business services (85%) is striking. In absolute term Poland and Hungary are the largest traders following by the Czech Republic and Romania. The growth rate of offshorable service export increased the most dynamically within the service sector as a whole and Romania, Poland and Hungary experienced the highest growth rate between 2002 and 2007. Due to the rapid growth of offshorable services export over the period of 2002-2007, in combination with the slower expansion of imports the deficits decreased steadily and this resulted in development of net trade gains amounting to 800 million Euro in NMS-6. Hungary increased its net export earlier than others, Poland reduced their deficits more rapidly, and turning it to small surplus, while Romania achieved the highest surplus by 2007 (800 million) within the shortest period.

Service trade statistics are supportive to the preliminary assumption that offshoring generated an expanding exports in particular service categories and a large proportion of business services export in the NMS has been associated with offshoring (Ghibutiu and Poladian, 2008). However, it is obvious that not all this kind of trade provided by offshored services. These data do not show how much of the offshorable services export really provided by offshoring service units and do not distinguish between the different organisational forms of offshore outsourcing and captive offshoring at the same time.

Besides findings based on statistical evidence there are qualitative approaches to define the comparative advantages of CEE arises from the combination of geographical, organizational and cultural proximity to Western Europe. It can be argued that the attractiveness of CEE is based on talent and geography, rather than on low wages and vast labour pool Three groups of apparently important capabilities drive the nearshoring advantages of CEE.

First, these countries have close geographical, political and cultural ties with Western Europe that allows proficiency in clients' languages. The advantages of EU membership not only diminished the external

[12] On country level some offshorable export shares increased even more between 2002 and 2007: Hungary from 20% to32, Romania from 24% to 30% and Poland from 13% to 21%.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

risks but dramatically simplified the administration cost as well. CEE as a nearshoring location score high marks because of its lower cost for communication between the costumer and service provider. Nearshoring locations not only reduce costs and risks of working with distant foreign companies but also ease personal contacts. The sense of humor, the directness of communications and common cultural understandings has always been important cultural elements of successful interactions and a constant point of frustration when crossing cultural barriers. Besides close proximity that may improve the efficiency of day-to-day information exchange to a service provider allows companies to develop intimate working relations. Being in the same time zone is a huge advantage especially if projects require frequent travelling demands and also CEE is particularly interesting for companies who require voice and customer-facing services in their mother languages[13] (Meyer, 2006).

Second, the comparative advantages of CEE still to a large extent lie in the wage differences as cost savings are still one of the most important motives for offshoring. In CEE, labour costs are much lower than in Western Europe, although it varies largely within the region. The salaries in the region are 40 to 60 percent lower than on the Western Europe continent. Hungary, the Czech Republic and Poland have the highest average salaries while; Romania and Slovak Republic have relatively lower average salary levels. While in the EU-8 labour costs for non-public services are around one quarters of those in Germany, the costs are in Romania and Bulgaria about 10% of those in Germany. Comparative advantages in wages between countries and regions can change relatively fast, although CEE will remain relatively cheap for the near future. Ultimately, no low-cost country can remain low-cost forever. Most of the CEE countries are not among the cheapest locations and outpace those of the low-cost Asian countries. As costs in the most advanced CEE countries converge towards EU levels, companies are moving farther East in their search for high-skill and low-cost solutions (Russia, Ukraine, and Turkey).

The third, much has been said about the quality of labour in the region which consists of highly educated, well-trained and motivated workforce, achieving high degree of productivity and flexibility. In total, CEE produces much lower number of university graduates than its large Asian counterparts. However, the CEE graduates turn out to be by far more suitable to work for TNCs. According to the McKinsey Global Institute's survey job candidates from CEE had higher suitability rate (around 50% on average, whereas 80% in developed countries) across all occupations than their Asian or Latin American counterparts (McKinsey 2005). While the technical universities have maintained their quality standard the

[13] In Eastern Europe, the share of German speaking graduates can be as high as the number of English speaking ones. (Nearly 40% of schoolchildren learn German while 70% of them English). Romania is particularly interesting destination for French companies as 85% of schoolchildren learn French there

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

share of science and engineering graduates is lower than Indian or West European averages, which in turn is diminishing the region's capability to specialize in IT or sciences-based service provision.

A few studies have tried to estimate the impact of Eastern European nearshoring locations on the global market breakdown and on the largest global players, such as India. India emerged as the "destination of choice" for offshore delivery of almost all kind of IT and business processes, when compared with other countries. India will remain the leader in global sourcing and CEE provides a much smaller scale pool of different factors facilitating service relocations.

5. Future Bangalores? New geographies of emerging offshoring locations in CEE

Offshoring can have benefits for the host market and generates changes within the service sector as a whole. It also can have the potentially positive effects on consumers of final services, and on producers using intermediate services in terms of better service provision and spillover effects. The following section examines the implications of offshoring for the home markets in CEE, and in particular assesses its impact on their locations and on the urban network.

What is the most likely impact of services offshoring on the home economies? GDP growth of nations largely depends on service innovation. Offshoring is a major driver of shift towards services in FDI. This gains a particular importance in the CEE countries after their EU accession as it helped to mitigate the fear of TNCs' outmigration in manufacturing and it substituted the decreasing share in manufacturing FDI by service investments. The relocation of service tasks results in additional export-oriented capacities in services and increased productivity which may result in spillovers to the local economy, thus accelerating growth and providing additional employment, higher wages and tax. FDI can spur local service providers to become more competitive through demonstration and skills diffusions, thus helping them improve efficiency and create their local brands in knowledge intensive business services. Offshoring enables the host countries to shift to higher value services (Sass, 2008).

Besides the general home market effect the process of selecting and opening new locations is similarly important as offshoring has a strong impact on the cities selected. A key reason to outsource is to save costs, and most discussions on cost revolve around the wages at outsourcing locations. This can be extremely misleading because it precludes several other operating costs — support staff salaries, cost impact of attrition, training, management costs and corporate overheads, real estate, communications and technology costs. These costs vary across cities, and can influence a company's decision to outsource there. There is little doubt that not purely the cost saving is the primary driver of location selection. As more firm recognising offshoring as a part of their longer-term strategies, other factors have to be taken into consideration.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Location strategy making is a multi-faceted process, with different indicators coming into play as the focus is narrowed from macro-regions to countries, cities, district and finally individual property level. However choosing a suitable location is not just a matter of selecting the right country. Nevertheless, companies searching for locations should first focus on defining their priorities in terms of countries (cost, skills, business environment, and proximity) before ranking their specific locations. Country versus city approach is heavily dependent on the selection criteria and equally important to distinguish between some county and city-centric parameters of location sourcing classified. Legal system and business environment are more or less the same for all the cities in a country, the availability of raw manpower, infrastructure and risk are moderately similar within a country, while availability of university graduates, labour and real estate costs and maturity of the ecosystem in a particular offshoring location can be very different within a country. Employment costs differ widely among cities because of limited labour mobility and varying unemployment rates. Companies need to spend time to scrutinise the attractiveness of cities. They must consider various elements of cost, not just salaries and the specific skill sets that each city can provide. Locations that meet requirements for resource availability, quality, operational flexibility and economics stand to become preferred destinations. In choosing a city, companies need to focus less on low wages and more on other ways that candidate cities can fulfil their business needs.

Offshoring has also given a new spur in metropolitan development as the EU expanded eastwards. The subsequent stages of systemic transformation, global transformation characterised by the reintegration of the Central European capital cities into the world-city network. Three capital cities (Budapest, Prague, and Warsaw) entered in the 1990s successfully into the world city system with fully-fledged gateway functions. The metropolitan transformation accompanied by both the rapid deindustrialisation and expansion of services has resulted in the concentration of the high-level business and financial services into the capital cities (Lux, 2010). Simultaneously interactions and symbiotic competition emerged between the capital cities, as they have been competing for attracting investments and have aspiration for business centre function with significant international scope. EU accession, competitive infrastructure costs and strong education system as favourable preconditions supported the first group of capital cities, such as Prague, Budapest and Warsaw in the first wave of the offshoring boom, and they recently followed by Bucharest and Sofia due to the saturation of the former capitals (see Figure 2). These cities were the most successful to reposition themselves during the early stages of transition by exploiting their comparative advantages on global market place. At the beginning costs (labour cost, real estate prices and facilities) were the most important driver in selecting these location mostly for routine offshoring activities. However, these capitals have relatively higher wages comparing to their Asian and Latin American counterparts, which due to the EU accession resulted in further growth in labour costs. Nevertheless, cost differential with Western Europe are still significant, making these cities still attractive for higher value added nearshore service activities.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

The list of the Top 50 outsourcing cities worldwide based on the Tholons consultancy survey (2007) includes 13 cities from CEE, although only Kraków and Brno are not capitals. Bucharest, Sofia, Kiev, Tallin and Moscow have already established locations in the eastern fringe of the region. The first wave of cities in the offshoring boom, including the first tier capital cities such as Warsaw, Prague and Budapest are saturating in terms of skilled labour and offices supply, to the point that raises the opportunity for the second tier cities within and capital cities in other countries. As seen, companies initially located in the first tier capital cities, pushing up costs and attrition rates as direct consequences of market saturation. As a result, companies are constantly searching for new locations. The growing demand for new offshoring locations, as the more mature destinations saturated, gives an opportunity for governments and their investment agencies to attract further services FDI and create high-valued jobs with the introduction of few policy changes. In terms of BPO labour costs, especially Warsaw and lesser extent Budapest and Prague proved to be the most expensive locations.

Eastern European nations boast of numerous mid-size cities with little or no offshoring work is being done currently, but possess large talent pools and low labour costs that can be capitalized.[14] Numerous cities particularly in Poland, Czech Republic and Romania are emerging as new destinations for outsourcing (see Fig. 2). Central and Eastern Europe are emerging as popular destination for Finance & Accounting offshoring for the European market, the frontrunner being Krakow, Poland. There are approximately 30,000 graduates in Krakow, of which about 21,000 are graduates in economics. Capgemini has its largest F&A and R&D offshoring centre in Krakow. Some of the other cities in the CEE that are prime locations for F&A outsourcing are Bratislava, Prague, Budapest and Bucharest. Accenture, Hewitt, IBM, Diageo and others have their European services centres in these CEE cities. Diageo, the world's leading premium drink business, located its business services centre in Budapest in 2001. Now, the centre employs about 500 people and performs financial and administrative tasks for 13 European Diageo business units.

[14] In Central Europe according to the survey conducted by the McKinsey Global Institute, beyond the already established locations there are 40-50 provincial cities with universities appropriate to supply a highly skilled labour. Interviews indicate that, in general, university graduates from Eastern European countries are, on average, well-suited to work for multinational companies.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

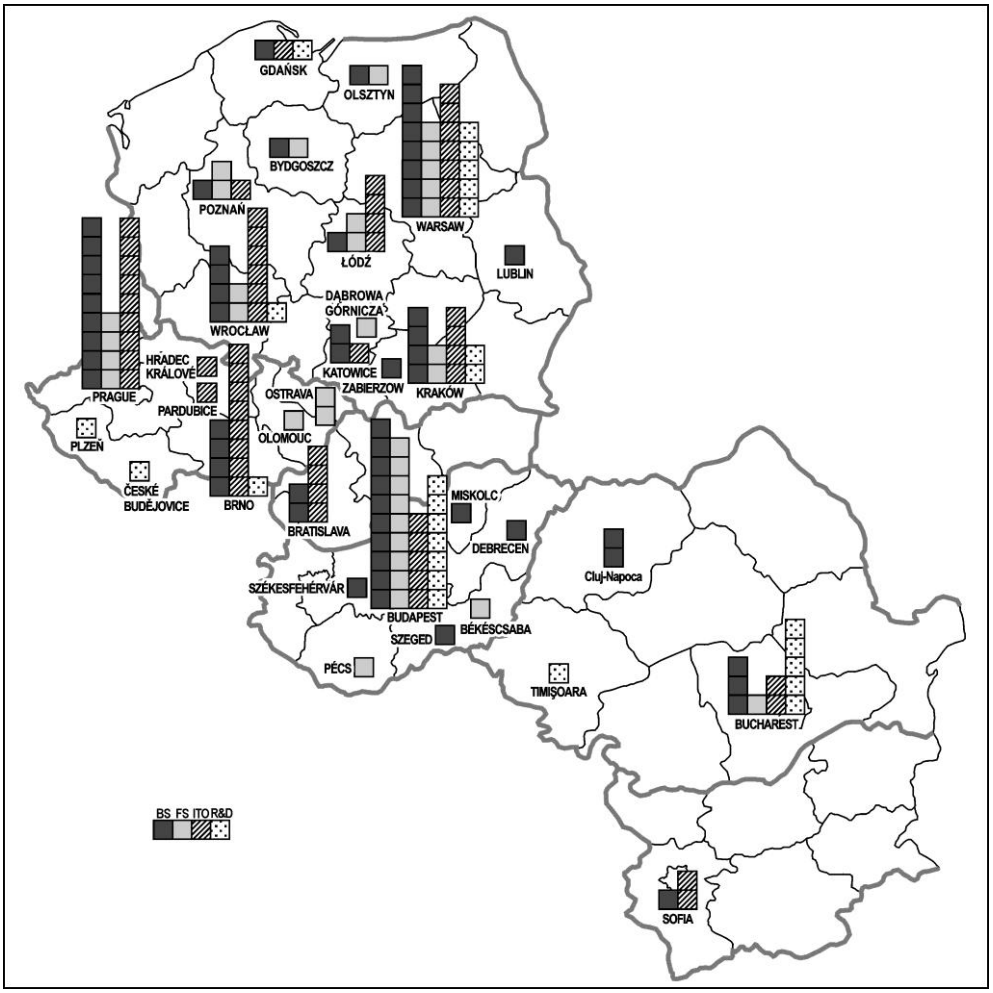


Fig. 2: Geographical and sectoral breakdown of the major services offshoring sites in Central and Eastern Europe, 2007

Legend: BS=business services; FS= financial services; ITO= Information Technology Outsourcing; R&D=Research and development, Knowledge process outsourcing; One box is equal with one offshoring site.

Source: drawn by the author based on data of PAIiIZ, Czehinvest and ITD-Hungary.

Poland, with the largest potential supply of skilled labour and the availability of untapped provincial locations has developed the most extensive network of offshoring locations. Poland has not only larger labour force (with nearly half a million graduates annually) but has more urban centres that can support large-scale operations and longer-term prospect, more so than any other countries in the region[15]. Besides Warsaw, Wroclaw and Kraków the already established hotspots, Lódz, Poznan, Katowice and Gdansk are among the emerging ones. While second tier Polish cities have been attracting BPO investments from the

[15] Labour supply can be tightened in provincial Poland too as cities in regional Poland in particular , have seen large flux of emigration to the Bristish Isles.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

late 1990s, BPO work has only recently found its way to the provincial locations in the Czech Republic. Cheaper regional university centres such as Pardubice, Hradec Kralove and Ostrava with higher unemployment and ready supply of lower cost graduates started to attract cost-conscious call centres migrating out of Prague. Brno succeeded to establish its own location brand even for core services.

However, Hungary once a forerunner in the establishment of shared service centres and BPO opening its first location in 1999 has lost its leading position. Contrary to Poland, most of the projects have concentrated into the capital city of Budapest and governmental agency failed to channel most of new investments towards the midsize cities. While BPO investment has been selected by the Polish and Czech agencies as a priority, the Hungarian agency however received criticism concerning its marketing activity. Not only nations but cities also have an opportunity to promote their location. Lódz, in Poland, among others, has undertaken such an investor promoter initiative, which has been helping to make the city a booming BPO hub. Deloitte's Global location Survey examined Hungary's untapped offshoring locations and selected 5 provincial cities (Debrecen, Kecskemét, Pécs, Székesfehérvár, and Szeged) which should be considered as so-called "under the radar" locations offering an attractive cost/quality ratio that can stand comparison with Budapest. As in other spheres of economic activity in Hungary Budapest dominates the BPO and ITO sectors. Hungary has no suitable office market in its midsize cities. Companies do investigate provincial locations but invariably return to Budapest due to the lack of suitable offices. Alternative options to the costly Budapest tend to be crossborder, such as Bucharest or even Kyiv rather than Miskolc, Pécs or Debrecen. Most of the few provincial BPO locations are located nearby the eastern borders of Hungary taking the operators' intention for their future cross border expansion and easier labour hire into account[16].

In high-demand countries such as the Czech Republic, Poland and in a smaller scale in Hungary many outsourcing vendors are setting up smaller centres with less than 500 employees to avoid the risk associated with the maintenance of a large workforce. Additionally, smaller workforces are more aligned to the smaller labour supply in tier-2 cities, which has the added benefits of lower labour and facilities costs that can more than offset any benefits of scale in capital cities. More Vendors maintain operations in both the capital city and secondary cities in Hungary. Budapest is leveraged for higher-value work, while lower level processing is accomplished in secondary locations that offer much lower costs and extremely lower attrition sites.

Cities with the right combination of location factors will be the winners in the future waves of BPO investment into CEE. Certain locations suffer from structural problems such as low labour supply, higher

[16] The under-development of certain eastern regions of CEE lacking of regional airports, motorways and international schools can deter expatriate manager staff of BPO operations to locate there. In terms of office market the smaller secondary locations can be difficult to beat the advantages of the capital cities or the larger regional centres (Brno, Kraków, Wroclaw).

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

wages, lack of suitable office space or weaker language and technical skills, but BPO is more likely to choose another CEE location rather than leave the entire region. The challenge for individual cities will be to build their attractiveness and competitiveness by investing into their ITC infrastructure, education and business environment.

6. Conclusion

Offshoring is not a new phenomenon as it has historical roots. What is new now is not only its application to knowledge intensive business services shaped by technology allowing far more tasks to be offshored. Offshoring is also a key driver of geographically re-engineering corporate value chains by selecting among a number of operation management techniques and location strategies. As seen, offshoring also became a key globalisation force, and one can argue it is the latest stage of globalisation. Offshoring, partly because of its strong geographical implication has not only been challenging the traditional division of territorial labour, but it has been also a stimulus to develop new macroeconomic models.

As more and more companies recognise the advantages of offshoring, the practice will likely take hold in Western Europe, albeit more slowly than it did in the USA and the UK. Moreover, language sensitive, less experienced and smaller Western European firms tend to choose nearshoring locations in CEE at the first instance. Due to its geographical and cultural proximity, set-up costs are lower, and monitoring can be carried out more intensively than in the case of distant offshoring locations. Despite its popularity among offshoring, destinations Central European countries cannot effectively challenge positions of the earlier established locations, such as India, and particularly cannot compete with it in volumes and IT specialisation. More established locations in CEE also functions as a stepping-stone for eastward expansion and subsequent offshoring locations generating competition within the region.

Central and Eastern Europe offers five primary advantages in which its Asian competitors cannot compete: cultural and geographical proximity to Western Europe, still competitive wages (especially if one can consider India's wage inflation), good educational standards reflected by the higher rate of graduates' suitability, low risk profile and reliable infrastructure. "What is unusual about Eastern and Central Europe is that their most advanced cities offer a potent mix of attributes that even Bangalore cannot rival: a highly educated, multilingual pool of talent in an increasingly affluent consumer market — all barely a stone's throw from its prime clients" (*The New York Times, 30 April 2007).*

Building on these factors CEE is likely to utilize more value added quality-driven services. The shift from non-core (call-centre) to core business process activities (accounting, research & development, transaction processing, customer relations, solution creating services) reinforces the region's comparative advantages. Financial institutions with already existing businesses in CEECs can explore the opportunities of

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

centralising their regional operations in these locations (as an alternative to SSCs in more expensive Western Europe) in order to justify easier the goodwill from the public.

Central and Eastern Europe also takes advantage on the trend supported by the global service delivery models reducing dependency on any single location (India). The expansion towards the second and third tier city locations also gives further potential for offshoring expansion beyond the saturated and more expensive locations of the capital cities.

The question can be raised whether competitiveness can sustain for a longer-term by proximity of CEE to its customers. In fact, offshoring success is somewhat a temporary phenomenon. Comparative advantages currently enjoyed by an offshore destination may not predict for the future. Wages tend to rise as countries climb up the development ladder, which erode the very reason for offshoring. Further growth may be influenced by worsening macro-conditions of the host economies and future prospect of the region depends largely on government incentives and on the success of exploiting talent pools offered by provincial cities.

7. References

[1] Amiti, M. And Wei, S. Fear of Outsourcing. Is It Justified?" *Economic Policy,* 2005. April

[2] Amiti, M. And Wei, S. Services Offshoring, Productivity, And Employment. Evidence From The United States. *IMF Working Paper*. 2005. No. 05/238.

[3] Arndt, S. And Kierzkowski, H. (Eds.). *Fragmentation – New Production Patterns In The World Economy,* Oxford University Press, 2001. Oxford-New York.

[4] Bhagwati, J, Panagariya, A. And Srinivasan, T. N. The Muddles. Over Outsourcing, *The Journal Of Economic Perspectives*. 2004. Vol. 18. No. 4. Pp. 93–114.

[5] Baldwin , R. And Krugman, P. *"Agglomeration, Integration And Tax Harmonization," European Economic Review.* 2004. Vol. 48, 1, Pp 1-23, 2004.

[6] Baldwin , R. 2006. Globalisation. The Great UnbundlingS, Chapter 1, In *Globalisation Challenges For Europe,* Secretariat Of The Economic Council, Finnish Prime Minister's Office, Helsinki, 2006.

[7] Baldwin , R. And Robert-Nicoud, F. Offshoring. General Equilibrium Effects On Wages, Production And Trade, *CEP Discussion Paper*, 2007. No 794. May. 2007

[8] Blinder. A. Offshoring. The Next Industrial Revolution? , *Foreign Affairs* , March/April, 2006. Vol. 85 2, Pp. 113-128

[9] Bräuninger, D. Globalisation And Distribution - Industrial Countries Also Face The Challenge, *Deutsche Bank Research*, 2007. November 21, P.34

[10] Bryson, J. The Second Global Shift. The Offshoring Or Global Sourcing Of Corporate Services And The Rise Of Distanciated Emotional Labour, *Geographiska Annaler, Series B. Human Geography,* 89b, 2007. Suppl 1, 31-43

[11] Cuoto, V., Mani,M. And Lewin, A. *The Globalization Of White-Collar Work. The Facts And Fallout Of Next-Generation Offshoring*, Booz Allen Hamilton And Duke University, 2007, April 13, 2007

[12] Dicken, P. *Global Shift. Reshaping The Global Economic Map In The 21st Century*, The Guilford Press, 2003, New York, London.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[13] Execution Is Everything. The Keys To Offshore Success, *A Report From The A.T. Kearney Global Services. Location Index™,* 2007

[14] Friedman, T. *The World Is Flat. A Brief History Of The Twenty-First Century*, Pinguin Books, 2005, London.

[15] Gál Z._Future Bangalores? *The Increasing Role Of Central And Eastern Europe In The Global Services Offshoring Market. Evidence From Trade Statistics*. 2011. This Item Is In The Repository With The Url Http.//Mpra.Ub.Uni-Muenchen.De/28360/

[16] Http.//Mpra.Ub.Uni-Muenchen.De/Cgi/Users/Home?Eprintid=28360&Screen=Eprint..View..Owner

[17] Gál, Z, Sass, M. Emerging New Locations Of Business Services. Offshoring In Central And Eastern Europe. *Regions Magazine,* 2009, 274.1 18-22.

[18] Ghibutiu, A., Dumitriu, I. The Effects Of Offshoring On Trade In Services. Evidence From Romania, The European Trade Study Group, *ETSG Working Paper*. Available At. Http.//Www.Etsg.Org/Etsg_Web/Etsg_Site/Papers_List.Php. 2008,

[19] Ghibutiu, A., Poladian, S. *Global Sourcing And The New Member States. Seizing The Growth Opportunities And Facing The Challenges* Reser, 2009,

[20] G.M. Grossman & E. Rossi-Hansberg, Trading Tasks: A Simple Theory of Offshoring," *American Economic Review,* 2008.vol. 98(5), pages 1978-97, December.

[21] Grossman, G. And Rossi-Hansberg, E. *The Rise Of Offshoring. It's Not Wine For Cloth Anymore. The New Economic Geography. Effects And Policy Implications,* Federal Reserve Bank Of Kansas City, Jackson Hole Symposium, 2007.

[22] Grote, Michael H. And Täube, Florian A. Offshoring The Financial Services Industry. Implications For The Evolution Of Indian It Clusters, *Environment And Planning A.* 2006. Vol. 38, S. 1287-1305

[23] Grote, Michael H. And Täube, Florian A. When Outsourcing Is Not An Option. International Relocation Of Investment Bank's Research, *Journal Of International Management.* 2007. Vol. 131, S. Pp. 57-77

[24] Hillberry, Russell And Hummels, David, "Trade Responses To Geographic Frictions. A Decomposition Using Micro-Data," *European Economic Review,* 2008. Vol. 523, Pages 527-550, April.

[25] Jahns, C., Hatmann, E. And Bals, L., Offshoring. Dimensions And Diffusion Of A New Business Concept, *Journal Of Purchasing And Supply Chain Management***,** 2006. Vol. 12, Pp. 218-231

[26] Jones, R. W. And Kierzkowski, H. 1990, 2005. The Role Of Services In Production And International Trade. A Theoretical Framework, In Rodney F. And Kreickemeier, U. Eds., *Recent Developments In International Trade Theory*, *Issue,* Pp. 308-348. Edward Elgar, 2005

[27] Jones, R. W. And Kierzkowski, H. A Framework For Fragmentation, *Tinbergen Institute Discussion Paper* 2000. 056/2.

[28] Leamer, E. And Storper, M. The Economic Geography Of The Internet Age, *Journal Of International Business Studies,* 2001. Pp.641-665

[29] Lewin, A., And Peeters, C., Offshoring Work. Business Hype Or The Onset Of Fundamental Transformation? , *Long Range Planning*, 2006. Vol. 39 221-239.

[30] Lux, G. The Service-Based Strategy Of Industrial Restructuring. A Szolgáltatásfejlesztés Mint Ipari Válságkezelési Stratégia, Gulyás, L. – Gál, J. – Baló, T. Eds *Európai Kihívások European Challengeslv. Nemzetközi Tudományos Konferencia.* Szegedi Tudományegyetem University Of Szeged, Mérnöki Kar, Szeged, 511-515. 2007.

[31] Lux G _Location Differences Of Services And Industry. A Central European Dichotomy. *Prace Komisji Geografii Przemyslu Polskiego Towarzystwa Geograficznego,* 2010, 16. Pp. 29-37.

[32] Mankiw, G. And Swagel, P. The Politics And Economics Of Offshore Outsourcing, With Phillip L. Swagel, *Journal Of Monetary Economics*, 2006. 53 5, July, 1027-1056.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 2, Issue 3, 2013

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[33] Metters, R. And Verma, R. History Of Offshoring Knowledge Services, *Journal Of Operations Management,* 2008. Vol. 262, Pp.141-147.

[34] Meyer T. Offshoring To New Shores. Nearshoring To Central And Eastern Europe, *Deutsche Bank Research*, 2006.August 14. P. 12

[35] Meyer T. Offshoring Work, Not Jobs. Deutsche Bank Research, April 12. P. 12 Economics, 2007. No. 61.

[36] Meyer, Thomas Offshoring Deos Not Explain Job Cuts At European Banks, *Deutsche Bank Research*, 2008. August. P.4.

[37] Offshoring. Is It A Win-Win Game? A Report From The Mckinsey Global Institute Mgi, 2003.

[38] Offshoring Of Services. Impact And Implications, International Finalcial Services London Research, March 2005.

[39] Outsourcing In Financial Services, The Joint Forum, Bank For International Settlements, August 2004.

[40] Outsourcing In Poland Challnges, Trends, Case Studies, A Report From The Conference Board And Accenture, 2006.

[41] Poland – Europe's Service Center?, New Foreign Direct Investment Opportunities In Poland, Mckinsey&Company, Warsaw, 2003.

[42] Ricardo, D. On The Principles Of Political Economy And Taxation. London. 1817.

[43] Robert-Nicoud, F. Offshoring Of Routine Tasks And Deindustrialisation. Threat Or Opportunity -And For Whom?. *Journal Of Urban Economics,* 2008. 632, Pp. 517-35 March 2008.

[44] Robinson, M. And Kalakota, R. Pioneering Captive Centers – Excerpt From Offshore. Outsourcing. Business Models, Roi And Best Practices, Mivar Press, 2004.

[45] Sass, M. A Szolgáltatások Relokációja - Európai Folyamatok [Relocation Of Services – European Processes]. *Európai Tükör*, 2008. Xiii. Évf. 7.-8. Szám, 85.-100. O.

[46] Sass, M. , Fifikova, M. Offshoring And Outsourcing Business Services To Central And Eastern Europe. Some Empirical And Conceptual Considerations, *European Planning Studies.* 2011. *Vol. 19. No. 9. ,* Pp. 1593–1609.

[47] The Emerging Global Labor Market.. Part Ii—The Supply Of Offshore Talent In Services. A Report From The Mckinsey Global Institute Mgi, June 2005

[48] The New Face Of Offshoring. Closer To Home?, A Report From The Economist Intelligence Unit. Sponsored By Hewlett-Packard, May 2006.

[49] The Rise Of Nearshoring – Outsourcing In Eastern Europe, Special Report, Economist, December 3rd 2005

[50] The Titans Take Hold, How Offshoring Has Changed The Competitive Dynamic For Global Financial Services Institutions, Deloitte Research Report, 2005.

[51] The Untapped Market For Offshore Services, A Report From The Mckinsey Global Institute 2006. May

[52] UNCTAD, 2004, World Investment Report 2004. Shift towards services, United Nations, Geneva

FRM Publishing House
Bd. Timisoara nr.58, sector 6, code 061317
Bucharest, Romania

Online address: http://jedep.spiruharet.ro
Editors' email : office_jedep@spiruharet.ro