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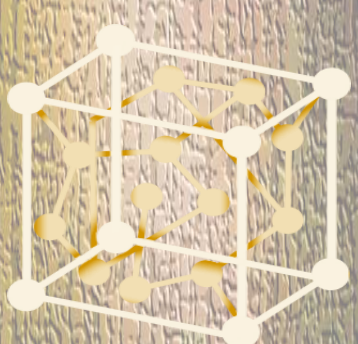

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Developing Social Partnership In Community Working With Children At Risk

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Abstract

When rendering social educational assistance in community (on self-government level), coordination of activities of different institutions working with risk group children is important: in order to attain this goal development of social partnership is one of the ways. The aim of the article is disclose development of social partnership when working with children at risk in community. In order to attain this aim three objectives were formulated. While implementing the first objective, the conception of risk group children, factors of emergence of this socially vulnerable group are discussed; the second – theoretical assumptions for social partnership in community while working with children at risk are disclosed and the third – the viewpoint of the specialists (social pedagogues and social workers), who work with children at risk in community, to development of social partnership is identified. Research methods: analysis of scientific literature, semi-structured interview. Twelve specialists (social pedagogues and social workers), who work with risk group children in community, were interviewed by the qualitative method (semi-structured interview).

Keywords: Children at risk, social partnership**,** community

Introduction

Research relevance

Children are treated as belonging to a social risk group for certain reasons determined by social, economic, demographic, psychological, pedagogical and other factors. Children may be part of a risk group because of nationality, material and social family conditions, etc. Due to the consequences of migration, economic crises and globalization, social pedagogues and social workers encounter a lot of challenges in working with children at risk. The changing environment calls for a new search for socio-educational work with this group of clients. Balachova, Bonner and Levy (2009) note that work with children at risk calls for assistance on three levels: national, municipal and individual.

- On the national level, legislation is developed for children's rights, their protection, and compulsory education, social and economic security as well as welfare.
- On the municipal level, municipal institutions address their tasks in line with the legislation and regulations. They provide children's social and economic security.
- On the individual level, social workers, social pedagogues at schools and social workers at NGOs directly communicate with a child and provide different types of assistance.

In providing assistance on the municipal level, the coherence of different institutions working with children at risk is important. Developing social partnerships is one of the ways towards it.

Scientific problem

The problem of social partnership is analysed in different viewpoints, for example, social partnership in education field is analysed in researches of Bellefeuille & McGrath, (2013) Gross, Haines, Hill, Francis, Blue-Banning, Turnbull (2015), Osipov, Karstanje, Tumalev, Zarubin (2009). Putnam (2001) discusses existence of social partnership as phenomenon of civil society; Bertrand (1998), Seddon, Billett, Clemans (2008) discusses parameters of social partnership – activity of social partners, their roles and expression. It is relevant to explore development of social partnership when working with children at risk in community. In this context two problematic questions emerge: How do specialists working with children at risk in community understand social partnership? How should social partnership be developed in local community while working with risk group children? The aim of the article is to disclose development of social partnership while working with children at risk in community. In order to attain the aim three objectives were formulated: the first one – is to discuss conception of risk group children, factors of origin of this socially vulnerable group, the second objective – is to heighten theoretical assumptions of social partnership while working with children at risk and the third one – is to reveal the viewpoint of specialists (social pedagogues and social workers), who work with children at risk in community, to development of social partnership.

Risk group children

According to Babbie (2010), two criteria should be taken into account when defining the concept of a risk group child: child's behaviour and the specifics of a child's closest environment. The European Union has no approved and acknowledged definition of vulnerable children and children at risk but the European Commission distinguishes the following

categories of the vulnerable children (Favourable Environment for Children and Young People, 2013, p.10):

- children experiencing poverty and social exclusion;
- disabled children;
- children who are the victims of sexual exploitation and human trafficking;
- asylum seeking children and children who came to the European Union unaccompanied;
- children who did not graduate from school, i.e. have only an initial or lower education;
- children of Roma Gypsies;
- children who run away or go missing from home or care institutions;
- children who experienced harassment in electronic environment and school (Favourable Environment for Children and Young People, 2013, p.10).

Prakapas (2001) employed monitoring at school and identified the following groups of children at risk:

- violating the rules of conduct episodically;
- violating the rules of conduct systematically (do not do their homework, communicate boldly with adults, smokers, use physical force, abuse the weaker, reluctant to go to school, etc.)
- delinquents (commit felony and crimes).

The characteristics of families and problematic children groups who face poverty and social exclusion were stated in a survey conducted in Lithuania in 2013 (Service Infrastructure Development Opportunities for the Family Welfare, 2013):

- families which do not look after the children because of the lack of social skills, conflicts or other reasons;
- families who have vulnerable children;
- families who have addictions;
- having experienced violence in closest environment;
- families living in poverty (receiving social benefits, etc.);
- families where parents are unemployed or economically inactive for a long period of time;
- transnational families;
- families who take care of disabled or older relatives;
- young families.

In summarizing, it can be stated that the main and most frequently recurring factors that do not depend on the child but on the child's family and influence child's belonging to social risk group are place of residence,

nationality, home environment, welfare. In this case children at risk are the children growing up at social risk families.

The support providing specialists (social pedagogues, social workers), while improving life quality and educational conditions of these children, are looking for new and qualitative forms of aid and support but responsible work of various specialists does not guarantee the integrated complex assistance that these children are in need of. Providing complex (social educational) assistance at community level is often faced with the laws, the lack of human and material resources, inability to make rational use of available resources.

The analysis of institutions providing services to risk group families in Lithuania was carried out in 2012, and the study was published. This study (Service Infrastructure improvement opportunities to the welfare of the family, 2013) revealed the following trends of social partnership:

- Public institutions associate cooperation not with joint work but with information collection in writing or by phone. In general, cooperation is associated with client forwarding to get the service, sharing information about services provided by other institutions, sharing best practices, collaboration among professionals.
- Non-Governmental sector usually associates cooperation with funding, support, raising money. It is often an obstacle to cooperate. Just a few institutions link cooperation with the joint work for the benefit of the client.
- Often, the communication between various institutions is fragmented, in written form, although the benefit of direct contact and personal relationship is acknowledged. This leads to duplication of services. Often cooperation is complicated by institutions' negative attitude, particularly government institution to certain groups of customers.

The assumption could be made that social partnership is an important factor for helping children at risk.

Social partnership

Most of the institutions working to help families agree that activity based on social partnership, i.e. when all institutions are involved in problem solving, is a very important and sometimes a vital factor for success. According to Petrylaite (2008), social partnership is understood as organisational principle involving social partners' collective relationship being implemented by negotiations and agreements.

Casey (2008) separates several most important social partnership traits. She notes that partnership is implemented through networking with other organisations and has shared achievements, common purpose, mutual

respect and willingness to consult and cooperate, competent participation, information sharing and joint decision-making.

Social partnership brings together people and organizations to draw attention to the issues of interest to all groups of people, such as unemployment, economic or urban development, education development (Casey, 2008). Social problems such as alcoholism, drug addiction, violence, social exclusion of risk group individuals.

Nelson & Zadek (2000) named principles of social partnership: societal aims; innovation, multi-constituency, voluntary, mutual benefit and shared investment, alchemical effect. According to Nelson & Zadek (2000), social partners are concentrated for joint work; they can help the socially vulnerable members of the society, who are excluded from participation in civil life, so societal benefits are created. Social partnership enables partners to find new innovative viewpoints and possibilities to solve social and economic problems. Partners from different level public (European, national or local), private business enterprises or associations, public or local community institutions, non-governmental organizations can take part in social partnership.

Summarizing various scientific studies (Casey, 2008; Petrylaite, 2008; Kaminskiene, 2008; Balciunas, 2010; Nelson & Zadek, 2000 and others), it can be stated that the social partnership is common goal achievement based on cooperation principles. It helps to solve complex social problems, and may be institutional, multi-institutional, national and global levels. Main features of social partnership when working with children at risk are as follows: collaboration in pursuing for quality of activity, coordination of activity fields, search for compromises, sharing responsibility among partners.

Social educational support for children at risk in the local community can be provided by various non-governmental organizations and public sector institutions such as schools, child protection services, police stations, neighbourhoods, educational psychological service. Social partners circle depends on the size of the community in which they operate, traditions and specialists working in the institutions.

Organization of social partnership (in the case of Lithuania), when working with children at risk in local community (self-government level), it takes place due to the initiation of main institutions: school and neighbourhood. The viewpoint of the specialists, who work at these institutions, to development of social partnership is presented in other part of the article.

Research methodology

The qualitative research strategy was chosen for the research. ***The sample***. The X city community was selected for the research. The selection of the sample of the research was based on comfortable, target sample. City X community was selected for the research. Twelve individuals (No=12) were interviewed during the research: social pedagogues (No=6), working at X community schools and social workers (No=6), working at X community municipal units.

Qualitative research methods. Data collection. The data were collected by applying the method of semi-structured interview. *Data analysis*. By integrating ideas of different scientists into the realisation of qualitative content analysis, the method of qualitative content analysis was chosen according to the following steps: *Step 1: to prepare the data* (Mayring, 2000; Berg, 2001): the interview data presented by the research participants were transcribed, i.e. the analysis of audio records was performed on the basis of transcription when a whole transcription of the interview is recorded. (Bird, 2005). *Step 2: to define a unit of the analysis* (De Wever, Schellens, Valcke, & Van Keer, 2006). One sentence was chosen as the analysis unit. *Step 3: construction of categories and formation of coding scheme* (Hsieh, & Shannon, 2005). *Category* was chosen as the largest level of coding; subcategory, which is obtained by heuristic method – by reading the sentence of a research participant and abstracting the information expressed in it as well as creating a subcategory for it, is chosen at the lowest level of coding. The category can consist of two or more subcategories; subcategories are integrated into one category when they are united by one idea expressed by the formulation in the category; several categories integrated into a topic. *Step 4: full-text coding* (Neuendorf, 2002). The texts of seven topics were unanimously analysed according to coding scheme – subcategory, category and topic – in seven electronic files. *Step 5: evaluation of coding integrity* (Patton, 2002; Schilling, 2006). The coded texts were many times read by two researchers, titles of subcategories and categories were discussed and specified as well as combination of subcategories into categories were considered, the combination of categories into topics were corrected and specified. *Step 6: presentation of generalisations from the coded material* (Schamber, 2000). Contents of the coded texts are presented in constructed tables.

*Research instrument***.** The semi-structured interview consisted of 10 questions. The questions were of two types: demographic and information questions. The block of interview demographic questions consisted of three questions. Their purpose was to find out total work experience of the informants, their education and the work experience at the institution they work at present. The research participants were given seven questions while

searching for the answer to the research questions: how the specialists working with children at risk in community understand social partnership and how social partnership should be developed in local community while working with risk group children. Their purpose was to find out how the participants understand social partnership, what goals of collaboration among institutions they raise, who has to initiate social partnership, with what social partners one is collaborating while working with children at risk, what principles of social partnership partners must follow, what benefit, advantages and disadvantages of social partnership they envisage while working with children at risk.

The following *principles of ethics* were considered (Orb, Eisenhauer & Wynaden, 2001): autonomy, benevolence, justice, confidentiality.

Discussion of the research results

Research results: only women participated in the research and all of them had acquired university education. First six informants work as social pedagogues and other six work as social workers at neighbourhoods. The specialists have the medium experience of 4.25 years in their field of work. The education and work experience at institutions of the informants suggest that the specialists have experience and good knowledge working with children at risk and providing them an educational social assistance.

Having performed the analysis the interview participants' data, in the topic „Social partnership", category „Social partnership" was distinguished that consisted of five subcategories: "*Collaboration with partners"; "Method of help", "Problem solving", "Social dialogue", "Communication among different social groups"*. The results showed that the informant described social partnership as collaboration, which included dealing with the social partners, other agencies and organizations, their employees and even private individuals. One of the interviewees described the social partnership as a social dialogue. These two concepts are quite often used as synonyms in scientific literature. Separate sub-category – "*Method of help"* shows that research participants linked social partnership with the goal to help the customer, the common goal and its definition. Subcategory – "*Problem solving"* has shown that it could be the way for problem solving. Subcategory *"Communication of different social groups"* confirms the statement by Petrylaite (2008) that social partnership helps to lower the tension among different social classes.

The topic *„Social partnership organizers*" contains two categories: "*School"* and "*Neighbourhood"*. According to majority of the respondents, social partnership organization at schools should be initiated by a class teacher because it is the person who first notices the child's problems (*„...class teachers <...> Class teacher is the first who can recognise the*

problem...", „...If the child attends school, this meant that the organising of help should start from class teacher..."). Also, all informants mentioned social pedagogue as organizer (*I think that it's school and this has to be done by social pedagogue…" „...at school it is a social pedagogue...",).* This is a specialist who receives all information about children's bad behaviour or school problems. The social pedagogue is a person who evaluates child's needs, chooses effective methods of support, plans the process of assistance to the child, and consults with colleagues and other professionals. Therefore, we can conclude that the class teacher can be the initiator of the problem solving process, i.e. to report to a social pedagogue, but all the problem solving process and the organization of social partnership is a social pedagogue's, rather than the class teacher's responsibility. The topic "Social partners" includes one category with the same name and seventeen subcategories: *"Children rights protection service", "Police", "Neighbourhoods", "Children's day-care centre", "Children's day-care centre", "Schools", "Social support centre", "Youth Centre", "Caritas", "Businesses", "Child care homes", "Pedagogical Psychological Service", "Municipality", "Crisis centre", "Volunteer Training Centre", "Church", "NGO", "Private individuals"*. The research participants mentioned that the circle of the social partners depended on the situation and the particular problem of the child. Having performed the data analysis, it has become evident that it is mostly collaborated with institutions of public sector. The topic "The objectives of collaboration between institutions" includes the category **"***The objectives of cooperation"* and eight subcategories: "*Obtained information", "Exchange of information", "Asking for help from partners", "Consultations about problem solving", "Concentration of effort", "Direction to correct institutions", "Assistance given", and "Learning from partners' experience"*. In the partnership process one consults social partners about providing assistance for children, distributes fields of responsibility, and consults specialists of other fields. The topic "The benefits of social partnership in the process" includes two categories: "*Benefits of social partnership for children"* and "*Benefits of social partnership to support givers"*: The topic "Principles, which are followed in social partnership" distinguishes the category "Principles of social partnership" and eight subcategories: "*Mutual respect", "Benevolence", "Fulfilment of obligations", "Responsibility", "Trust", "Volunteering", "Equal rights", "Persistence"*. According to the research participants, it is necessary to follow these principles not only in social partnership but also in working with children. Referring to the research results it is possible to state that social partnership is based on volunteering principle; this makes conditions for every partner to actively participate in decision-making. Such partnership allows increasing the resources necessary for the work with children and

share risks as well as input (social, financial, human resources and so on) among all participating partners. The obtained data complement the principles of social partnership named by Nelson & Zadek, (2000). Trust in the social partners is very important for the research participants. They understand insistence as the search for new ways of assistance while working with children at risk. The social partners have to pursue more than for the simple sum of their performed works, one has to pursue for synergy effect. The topic „Advantages and disadvantages of social partnership" distinguished the category "Social Partnership Benefits" and sub-categories: "Required information received" (*"... it is necessary to information ...", "...it is possible to receive more detailed information about the children ...")*, "Provided assistance" (*„...there is a need to provide assistance..." „...received assistance")*, "Security feeling" *("... certainty and a sense of security when you know that you are not alone and that the assistance will be provided at a request")*, "The client receives comprehensive assistance" *(„...a comprehensive assistance which is affective is received.")*, "Possibility to learn" *(„...informal opportunities to learn")*, "Promotion of volunteering" ("...volunteering is promoted"). Category "Social partnership shortages" and sub-categories "Indifference of partners" (*„...indifference"; „...indifference, and sometimes miscommunication") and* "Bureaucracy" (*„...bureaucracy is not fully withdrawn").*

Conclusion

The research results showed that social partnership is built on the basis of participation and relies on open communication between all members, supporting each other in common, pre-planned activities and making decisions collaboratively, that collaborating parties need to respect each other and the principles of perseverance, kindness, engagement, responsibility, commitment, trust, voluntariness and equality have to be engaged when developing a social partnership.

After data analysis it can be assumed that the employees of the organizations that operate in the X community and provide social and educational assistance to children at risk, understand the essential of social partnership development and operating principles. Socio-educational personnel clearly identified the importance of social partner's involvement in a comprehensive assistance process affirming that it allows improving the quality and providing the necessary assistance to children at risk in order to improve their quality of life. From the socio-educational personnel's (social workers, social pedagogues) point of view the benefits of social partnership when working with children at risk are:

- successful solution of problems faced by children in the community;

- social partners share the information when solving the problems, consult with each other, give/receive financial support for joint activities (organizing children's occupation).

The main difficulties of social partnership development are indifference of partners and bureaucracy.

References:

Babbie, Earl R. (2013). *The practice of social research*. Belmont [Calif.]: Wadsworth.

Balachova, T., Bonner, B. L., Levy, Sh. **(**2009). Street children in Russia: steps to prevention. *International Journal of Social Welfare,* 1(18), 27-44. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2397.2008.00573.x/pdf

Balciunas S., Blinstrubas, A., Grigencaite, K., Valukonyte, I. (2010). Research on possibilities of social partnership network while doing suicide prevention. *Ekonomika ir vadyba: aktualijos ir perspektyvos,* 2(18), 18-27. DS.002.0.01.ARTIC

Bandziene, V. (2008). Socialinio darbuotojo veiklos ypatumai teikiant pagalbą vaikui iš skurstančios šeimos [The peculiarities of the social worker activity in providing help to children from families in poverty]. *Socialinis darbas. Patirtis ir metodai*, 1(1), 105-115.

Bellefeuille, G., McGrath, J. (2013). A Relational-Centred International Education Partnership: A Phenomenological Inquiry Into The Lived Experiences Of Child And Youth Care/Social Care Students And Faculty. *Contemporary Issues In Education Research – Third Quarter,* 6 (3), 279-288. doi.org/10.19030/cier.v6i3.7897

Berg, B.L. (2001). *Qualitative Research Methods for the Social Sciences*. Boston: Allyn and Bacon.

Bertrand, O. (1998). *Trends and issues in vocational education and training: A perspective from Europe.* [Paper presented at the Seminario sobre Formación Profesional y Empleo, Mexico]. Retrieved from http://www.oei.org.co/iberfop/mexico4.htm

Bird, C. M. (2005). How I Stopped Dreading and Learned to Love Transcription. *Qualitative Inquiry,* 11(2), 226-248. doi: 10.1177/1077800404273413

Casey, M. (2008). Partnership – success factors of inter-organizational relationships**.** *Journal of Nursing Management,* 16, 72–83. doi/10.1111/j.1365-2934.2007.00771

De Wever, B., Schellens,T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computer & Education,* 46(1), 6-28. doi:10.1016/j.compedu.2005.04.005

Doyle, C**.** (2007). *Working with abused children from theory to practice*. Basingstoke: Palgrave Macmillan.

Favourable environment for children and young people [Palanki aplinka vaikams ir jaunimui: issukiai ir galimybes]: Tyrimo ataskaita. (2013). Vilnius, VSI "Europos socialiniai, teisiniai ir ekonominiai projektai" (ESTEP) Retrieved from http://www.socmin.lt/lt/tyrimai.html

Gross J. M. S., Haines S. J., Hill C., Francis G. L., Blue-Banning M., Turnbull A. P. (2015). Strong School–Community Partnerships in Inclusive Schools Are "Part of the Fabric of the School...We Count on Them". *School Community Journal*, 25(2), 9-35. Retrieved from http://www.adi.org/journal/CurrentIssue/CurrentIssue.pdf

Hsieh, H.-F., & Shannon, S.E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15 (9), 1277-1288. doi: 10.1177/1049732305276687

Kaminskiene, L. (2008). *Socialine partneryste mokyklineje profesinio rengimo sistemoje [Social partnership in school vocational training system]*. Doctoral dissertation. Social sciences, educational science (07 S). Kaunas: Vytautas Magnus University.

Mayring, Ph. (2000). Qualitative Content Analysis [28 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research [On-line Journal]*,1(2), 1-10. Retrieved from http://qualitative-research.net/fqs/fqs-e/2-00inhalt-e.htm

Nelson, J., & Zadek, S. (2000). *Partnership Alchemy. New Social Partnerships in Europe*. Copenhagen: The Copenhagen Centre. Retrieved from http://www.zadek.net/wp-content/uploads/2011/04/Copenhagen-Centre_Partnership_Alchemy_New-Social-Partnerships-in-Europe_2000.pdf

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage Publications.

Orb, A., Eisenhauer, L. & Wynaden, D. (2001). Ethics in Qualitative Research. *Journal of Nursign Scholarship*, First Quarter, 93-96. Retrieved from http://www.columbia.edu/~mvp19/RMC/M5/QualEthics.pdf

Osipov A. M., Karstanje P., Tumalev V. V., Zarubin V. G. (2009). On Social Partnership in the Sphere of Education. *Russian Education and Society*, 51(12), 81–95. doi:10.2753/RES1060-9393511206 Retrieved from http://www.tandfonline.com/doi/pdf/10.1080/10609393.2004.11056847

Patton, M.Q. (2002). *Qualitative Research and Evaluation Methods*. Thousand Oaks, CA: Sage.

Petrylaite, D. (2008). *Profesiniu sajungu veikla ir socialines partnerystes pletra Lietuvoje [The development of trade union activities and social partnership in Lithuania]*. Jonava: AB „Achema" darbuotoju profesine sajunga.

Prakapas, R. (2002). *Rizikos grupes vaiku elgesio koregavimas taikant mokyklini monitoring [Children at risk behavior adjustment applying of school monitoring]*. Doctoral dissertation. Social sciences, educational science (07 S). Vilnius: Technika.

Putnam, R. D. (2001). *Kad demokratija veiktu [Making Democracy Work]*. Vilnius: Margi rastai.

Seddon T., Billett S., Clemans A. (2008). *Sustaining effective social partnership.* Adelaide: Australian National Training Authority.

Service infrastructure development opportunities for the family welfare [Paslaugu infrastrukturos tobulinimo galimybes siekiant seimos geroves]: Tyrimo ataskaita. (2013). Vilnius: VSI „Europos socialiniai, teisiniai ir ekonominiai projektai“ (ESTEP) Retrieved from http://www.socmin.lt/lt/tyrimai.html

Schamber, L. (2000). Time-line interviews and inductive content analysis: Their ffectivenss for exploring cognitive behaviors. *Journal of the American Society for Information Science*, 51 (8), 734-744. doi: 10.1002/(SICI)1097-4571(2000)51:8<734::AID-ASI60>3.0.CO;2-3

Schilling, J. (2006). On the pragmatics of qualitative assessment: Designing the process for content analysis. *European Journal of Psychological Assessment*, 22 (1), 28-37. doi:10.1027/1015-5759.22.1.28 Retrieved from http://www.wompt.com.au/lecturing/materials/schilling2006.pdf

Global Warming, Early Flowering, Increase In Allergy Cases And Ahpco To Improve The Indoor Air Quality

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Abstract

Global warming exerts substantial effect on flora and fauna. Increasing greenhouse gases causing accelerated pollinosis and fungal spore production, two major aeroallergens causing asthma and allergies. Recent reports show that the Texas Panhandle residents suffering from allergy and asthma has increased since 2007 and is twice that of the state rate. Climate change has effect on aeroallergens and allergies (Anglin, 2014). Early onset of spring and flowering season have been evidenced all over the world.The increasing trends of total pollen amounts, changing pollen seasons, and increasing carbon dioxide indicate there should be an increase in allergies and severity. The increasing trend of aeroallergen production will result in more cases of allergies throughout the coming years. We have been analyzing the daily aeroallergen by using Melinex tape from the Burkard Volumetric Spore Trap. Exposed, stained Melinex tape was observed under a BX-40 Olympus microscope. 16-years' aeroallergen data of Texas Panhandle revealed a gradual shift in aeroallergen index with the warmer climate and a shift in flowering seasons. A collaborative research between the West Texas A&M University and Air Oasis developed Advanced Hydrated Photo Catalytic Oxidation (AHPCO) Nanotechnology and Plasma Nanotechnology. We evaluated the AHPCO Nanotechnology as a safe and efficient way in reducing indoor aeroallergens, such as pollen, bacteria, fungal spores and hyphae, dust particles, fibers, animal dander and VOCs in the indoor air. There is an ongoing research to apply the AHPCO and Plasma Nanotechnology to develop commodities like air purification system, food preservation system, ice makers and cell phone sterilizers.

Keywords: Early flowering, allergy cases, AHPCO

Introduction

Aeroallergens cause serious allergic and asthmatic reactions. Allergy and Asthma cases have doubled in the Texas Panhandle area since 2007 (Ranaivo, 2011). Analysis of aeroallergen can help in diagnosis and treatment of allergic rhinitis. Global warming exerts substantial effect on flora and fauna. Increasing greenhouse gases causing accelerated pollinosis and fungal spore production, two major aeroallergens causing asthma and allergies. The level of atmospheric carbon dioxide (CO_2) is predicted to increase throughout this century, largely due to the burning of coal, oil, and natural gases. In addition to contributing to the global warming, higher concentrations of this greenhouse gas may also be increasing the incidence of allergies and asthma by raising pollen counts. Plants produce more pollen when grown under high levels of CO_2 which is the main fuel for photosynthesis. Plant pollens are ubiquitous and irritating allergens and allergies to pollen exacerbates asthma (Potera, 2002). Analyzing the aeroallergens with a Burkard Spore Trap provided information regarding the onset, duration, and severity of the pollen season that clinicians use to guide allergen selection for skin testing and treatment. We have been investigating the daily aeroallergen concentration in terms of the meteorological conditions such as daily temperature, wind speed and precipitation. For more than a decade we have been using a Burkard Volumetric Spore Trap to capture the significant aeroallergen in the texas Panhandle area and analyzing them with a microscope and software to determine the daily aeroallergen index. We used various techniques to collect aeroallergen samples and characterizing them with digital and fluorescence microscopy for 16 years. The indoor air surrounding us plays an extremely important role in our well-being and efficiency. Breathing pure and clean air allows us to think more clearly, sleep soundly, and stay healthier. Studies show that we receive 56% of our energy from the air we breathe, more than from water and food combined. We have assessed the Air Oasis air purifiers that utilize a new generation AHPCO (Advanced Hydrated Photo Catalytic Oxidation) nanotechnology and do not rely on filters or air passing through the air purifier. This new technology simply produces a blanket of redundant oxidizers that not only clean the surrounding air, but sanitize surfaces as well by targeting the particulate matters in the air as well as on the surface and sanitize the air eventually. Collaboration between the corporate worlds with academia has been proved to be beneficial in scientific inventions. New world trade and economy are based on the application of innovative technology developing novel products that are in great demands. Global economies are so tightly interconnected that companies, governments and

industries will soon be forced to cooperate in ways we could not have imagined just a few years ago. Innovations in technology continue to have massive effects on business and society. A collaborative research between the West Texas A&M University and Air Oasis developed Advanced Hydrated Photo Catalytic Oxidation (AHPCO) Nanotechnology (2005-2014) and Plasma Nanotechnology (2014-2015). AHPCO nanotechnology has been successfully applied to develop the air purification system, in food processing facility to reduce contamination and to developed cell phone doc and sanifier that makes the cell phone germ free while charging. A major group of microbes, including bacteria and fungi can cause food contamination during processing. This technology, if used will prove to be an efficient way of reducing the food contaminants, especially during meat processing that toll thousands of lives in the world. The AHPCO nanotechnology brought a new era in air purification, advanced contaminant free food processing and a mobile phone sanifier system that are being marketed in the United States, United Kingdom, China, Hong Kong, Singapore, Bangladesh, Dubai and Turkey. Aeroallergens are often the cause of serious allergic and asthmatic reactions, affecting millions of people each year (Nester, 2001). Aeroallergen sampling provides information regarding the onset, duration, and severity of the pollen season that clinicians use to guide allergen selection for skin testing and treatment (Dvorin *et al*., 2001). Aeroallergens include pollens, fungal spores, dusts, plant fibers, burnt residues and plant products like gums and resins. All these microscopic objects are captured from an urban locality using a Burkard Spore Trap. The types of pollen that most commonly cause allergic reactions are produced by the plain-looking plants (trees, grasses, and weeds) that do not have showy flowers. These plants manufacture small, light, dry pollen granules that are custom-made for wind transport; for example, samples of ragweed pollen have been collected 400 miles out at sea and 2 miles high in the air. Since airborne pollen is carried for long distances, it does little good to rid an area of an offending plant - the pollen can drift in from many miles away.

Fungal spores as allergens

For decades, airborne fungal spores have been implicated as the causative factors in respiratory allergy. Exposure to high atmospheric spore counts and sensitization to specific fungal allergens have been associated with severe asthma, mainly in young adults (Helbling, 2003). Sensitivity to fungi is a significant cause of allergic diseases, and prolonged exposure to fungi is a growing health concern (Santilli, 2003). Bogacka *et. al* (2003) considers the allergy to mold allergens as a risk factor for bronchial asthma in patients suffering from allergic rhinitis. Most fungi commonly considered allergenic, such as *Alternaria* spp., *Cladosporium* spp., *Epicoccum nigrum*,

Fusarium spp., or *Ganoderma* spp. display a seasonal spore release pattern, but this is less well defined than it is for pollens (Beaumont, 1985; Solomon *et. al* 1988). Warm dry weather conditions promote passive dispersal of dry air spora, including *Alternaria, Cladosporium, Curvularia, Pithomyces* and many smut teliospores. Diurnal levels of these spores usually have peaks during the afternoon hours under conditions of low humidity and maximum wind speeds (Webster, 1970). Moist weather conditions promote the active dispersal of moist air spora, such as the explosive release of ascospores from Pezizales, and the expulsion of basidiospores from the gills of the Basidiomycetes. Often, the two most encountered mold spores in atmospheric sampling are ascospores from different species of Pezizales and spores from *Alternaria* sp. (Ogden, 1974). Airborne fungal spores are important allergens. These airborne spores come into contact with the eye or enter the body as the air is breathed. Allergic reactions to fungal spores fall into two distinct groups, based on whether the hypersensitive response is immediate or delayed (Gumowski *et. al* 1991). Individuals are exposed to fungal spores every day. About 20-30% of the population can develop an allergic response shortly after exposure to dust that contains allergens such as fungal spores (Moore-Landecker, 1996). Many studies have been reported on the role of fungi in allergic disease, but none that systematically documented such a role for the fungal species that are responsible for allergic rhinitis in the Texas Panhandle. Many case studies were found, but none of these unequivocally document a cause/effect relationship between the increase in the fungal allergens and the incidence of allergic rhinitis in this area. Our previous studies revealed the data on the pollen and spore composition in the air in the Texas Panhandle (Ghosh *et. al* 2003a, b 2011a,b). This investigation covered the survey on the aeroallergen present in the Texas Panhandle. The objective of this study was to collect, identify, enlist and characterize the pollen and spores of the local areas. Our study included the recording of the aeroallergen concentration in the air on a diurnal basis. We also tried to find out the relationship between these concentrations with both the weather on a particular day and the incidence of allergic reactions. The aeroallergen data were used to assess and enumerate the impact of airborne pollen and mold spores on the breathing and causes of allergic rhinitis in the susceptible individuals. This study was aimed to help to aid the diagnosis of allergic rhinitis by documenting the relation of pollen and fungal spore composition and concentration with the incidence of allergic rhinitis recorded in the Allergy A.R.T.S. Clinics at the Amarillo Center for Clinical Research (Web site for Allergy ARTS). Wet mounting for viewing the fluorescence in pollen was done following the technique developed in our laboratory (Ghosh et. al 2006) by using 2-3 drops of deionized water on the slides. On a few slides, we added 1-2 drops of 2%

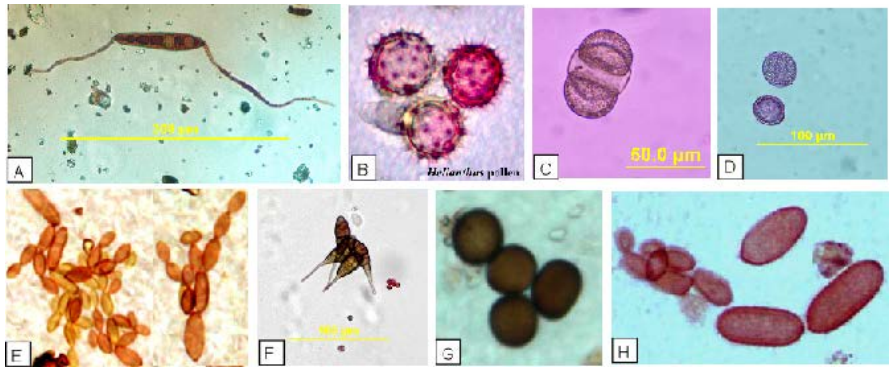
safranin for staining the pollen that improved the visibility of the pollen architecture. Pollen grains were extracted from the anthers of the flowers and half of them were mounted with deionized water and half of them were mounted with 2% safranin. The pollen grains were teased with a clean needle and the debris from the anthers was removed using a forceps. The slides were mounted and observed under the microscope.

Digital Microscopy on aeroallergens

Tapes were analyzed with five latitudinal traverses that correspond to specific hours, and the daily mean concentration was assessed. Daily mean concentration was determined mathematically by taking a sum total of all traverses and multiplying this sum by a correction factor. Correction factor is microscope-objective specific and is determined prior to the counting. It can be expressed as the total area sampled divided by the graticule width (Lacey, 1995). Samples were examined, counted, and photographed using a BX-40 Olympus microscope attached to a DP-70 Digital Camera. We also used an *Image Pro Plus* software to analyze the capture images. This assessment involved the optical counting of pollen grains and fungal spores through a microscope and the use of a micrometer scale and graticule (100 square microns). The graticule is an ocular grid consisting of a square area of 100 square microns. The graticule was calibrated using a stage micrometer. The pollens and fungal spores were identified using standard keys from literature and the websites (Ogden, 1974; Moore *et al.*. 1991, Horner *et al*. 2002, websites of AAAAI, Palynology, University of Arizona). The diurnal variation in aeroallergen count was determined by counting them from the corresponding traverse of the tape with the specific time period. The time of entrapment of a specific aeroallergen could be determined by placing a scale beside the slide.

Observation on pollen and fungal spores

The most significant aeroallergens recorded were the pollens like grass pollen (Poaceae), Short Ragweed (*Ambrosia artemisiifolia*) (Fig. 1D), Pine (*Pinus strobus*) (Fig.1C), Common Sunflower *(Helianthus annuus)*, Hairy Sunflower *(Helianthus hirsutus*) (1B), Buffalo Bur *(Solanum rostratum),* Purple Nightshade (*Solanum elaeagnifolium*) and Lamb's Quarters (*Chenopodium album*) and the fungal spores like *Alternaria* (Fig. 1F), ascospores from Pezizales, *Dreschlera* (1A), *Stachybotrys* (1H), *Cladosporium* (Fig. 3E), *Curvularia,* Teliospores of *Ustilago* sp. (1G).



Figs. 1A-H showing the most frequent aeroallergens of the Texas Panhandle. A. *Drechslera* spore, B. Pollen from *Helianthus hirsutus* (Hairy sunflower). C. *Pinus strobus*, D. Ragweed (top) Grass (bottom) pollen, Spores from E. *Cladosporium*, F. *Alternaria alternata*, G. *Ustilago and* H. *Stachybotris.*

Effect of meteorological factors on distribution of spore and pollen

Temperature was found to have an inverse relationship with mold spore concentration. Rainfall was found to affect the mold count directly, with increases in precipitation bringing subsequent higher mold spore concentrations.

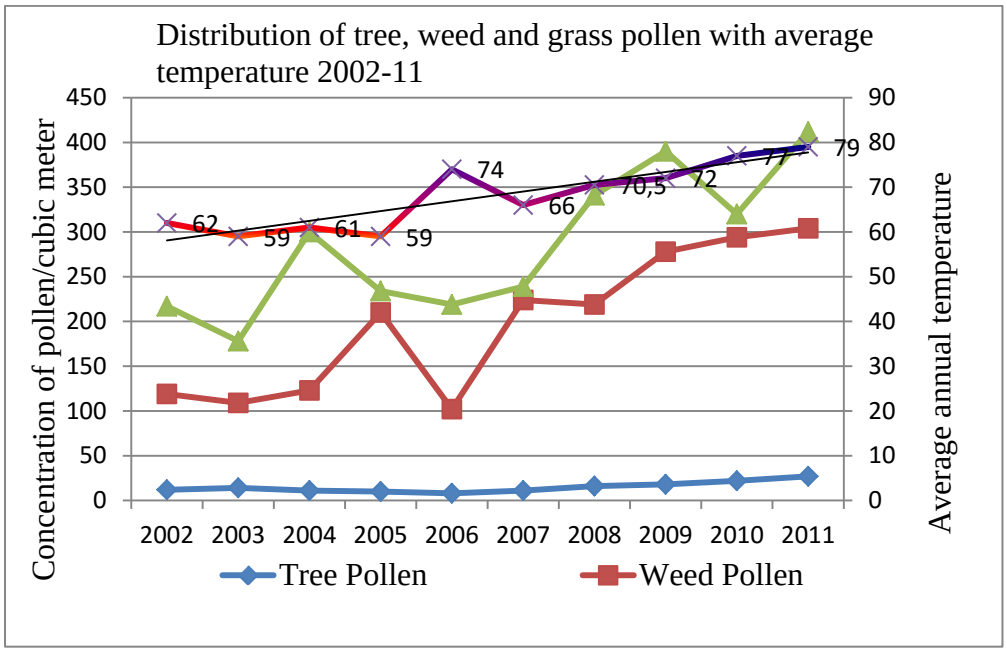


Fig.2.

Graph showing the distribution of tree, weeds and grass pollen with variation of temperature. Significant increases in fungal spores were observed in late summer following several inches of rain. Fungal spore

concentrations did show more susceptibility to meteorological conditions on a daily basis than did pollen concentrations. Of all the airborne pollens observed, most significant was that of annual or short ragweed (*Ambrosia artemisiifolia* L.) pollen. It is characterized by a spherical morphology with a multi-porate surface and 16–27 micrometers in diameter (Fig.1D). Pores are geometrically arranged about the surface and can be seen easily using phase-contrast microscopy. *A. artemisiifolia* begins its pollination cycle in mid-August and continues until mid-October in the Texas Panhandle. Ragweed pollen is arguably the largest single seasonal allergen in North America (Knox, 1979). Grass (*Poaceae*) pollen was constant component of the pollen count throughout the study, having peaks in mid-July and then again in late August. We observed different types of grass pollens that are allergenic to many patients as they exhibit sensitization on challege tests at the Allergy ARTS clinic. Most grass pollens were similar in morphology. Grass pollen has an ovate morphology with a single pore (Fig. 1D). Sizes range from 7 micrometers to over 75 micrometers, as in the case of corn (*Zea maize*) pollen. Significant smooth cell walls were observed on grass pollen, with little ornamentation being present on the surface. Specifically, the mean concentration of tree pollen over the study period was 2 grains/cubic meter of air. The mean concentration of grass pollen was 6.0 grains /cubic meter of air, and of weeds the mean concentration was 33.2 grains/cubic meter of air. For molds, the mean was 713.7 spores/cubic meter of air over the study period. Mold spore concentration varied the most, followed by weed pollen. Tree pollen varied in concentrations and were present in great amount during Mid August till September. Weed pollen increased drastically in mid-August. Grass pollen concentrations remained steady throughout the season. The comparative collected pollen and spore data and the weather information revealed that specific weather variants could influence dispersal and concentration of a specific aeroallergen. We have recorded the phenomenon of early flowering all over Texas covering Amarillo-Canyon metroplex, Denton, Dallas metroplex, Houston and Galvaston. Many studies have already shown that flowering times have come earlier as a result of recent global warming, but what's unknown is how long the plants will be able to "keep up" by budding earlier and earlier (National Geographic, 2016). The mean maximum temperature for this survey was 31.4°C, and the mean minimum temperature was 18.2°C. Temperature was found to have an inverse relationship with mold spores. As the temperature rose, mold spore concentrations would decrease to a great extent. We observed a significant reduction in the ascospore concentration with the increase in temperature. The count of ascospores during the wet weather could surpass the total concentration of dry conidia measured on a typical summer day. There was a great variation in the occurrence of spore species in different times of the

day. Ascospores, although observed throughout the day, were in greater concentration in the early morning hours. *Alternaria* conidia were present in greater quantities during the warmer, dryer afternoon and evening hours. The effect of temperature on pollen concentration is not as clear, though there does appear to be a long-term relationship. Temperature variations as they relate to seasonal changes have been shown to affect primarily the types of pollens observed, not necessarily the concentrations. It was observed that precipitation increased the number of mold spores, but there was no direct correlation between number of spores and amount of rainfall. As noted earlier, certain genera of fungi, such as the Ascomycetes, require raindrops to initiate their active dispersal mechanism. Corresponding to this knowledge, it was found that Ascomycetes concentrations significantly increased in the hours just following a rain shower. Precipitation in general affected mold spore concentrations directly by increasing the daily concentrations, due to an increased relative humidity and to the availability of moisture. It was noted that in the hours just following precipitation, pollen concentrations were observed to drop drastically, as the particles were washed from the atmosphere. In the Texas Panhandle wind speed is an important factor that controls the aeroallergen concentration. Peak wind speed showed some direct correlation with mold spore or pollen concentrations. The mean peak wind speed over the study period was 5.4 m/s. It was observed that sustained windy or windless periods did have an effect on pollen and spore concentrations. Wind speeds over 8.0 m/s increased pollen and spore concentrations on average. Due to smaller size and less mass, mold spores were more directly influenced by wind speeds. Possibly a more representative comparison would be to compare average daily wind speed to the concentration of aeroallergens. Overall, the most prevalent aeroallergens present during the summer months were *Alternaria*, short ragweed (*Ambrosia artemisiifolia*) and grass (*Poaceae*) pollen. During the summer months the most dominant pollen was the grass (*Poaceae*) pollen, which peaked in July and then dropped off in August. Grass pollen count has been increased in the city of Hisai in Mie Prefecture in a period of 15 years and that caused the increase in sensitization to the allergi rhinitis (Ito Y, Kimura T, Miyamura T. 2002). In mid-August, the dominant pollen changed to ragweed (*Ambrosia artemisiifolia*.), corresponding to the beginning of the flowering season for short ragweed (Muilenberg *et al*., 1996). As evidenced earlier, the presence of pollen in ambient air is significantly influenced by physiological functions of the plant's flower that interact with various meteorological parameters (Bush, 1989). As noted earlier, certain genera of fungi, such as the Ascomycetes, require raindrops to initiate their active dispersal mechanism. Corresponding to this knowledge, it was found that Ascomycetes concentrations significantly increased in the hours just

following a rain shower. Precipitation in general affected mold spore concentrations directly by increasing the daily concentrations, due to an increased relative humidity and to the availability of moisture. It was noted that in the hours just following precipitation, pollen concentrations dropped drastically, as the particles were washed from the atmosphere. From the analysis of the ten years aeroallergen data from Texas Panhandle region it can be concluded that there was a gradual shift in the aeroallergen index and that caused the increased cases of allergic rhinitis (Fig. 2, 3).

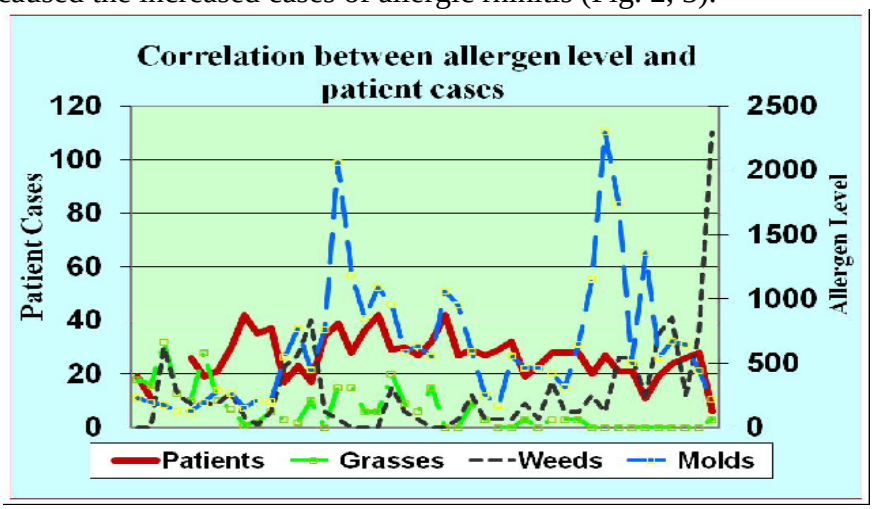


Fig. 3

Correlation between allergen level and cases of allergy and asthma (data analyzed from Allergy A.R.T.S Clinic, 2001-2014). A gradual shift was noticed in the aeroallergen concentrations with the increase in temperature (Fig. 2). Even this slight change reflects the impact of global warming amongst the aeroallergens. From the analysis of aeroallergen data it is very clear that the concentration of pollen from the trees, grass and weeds have a significant correlation with the number of patients suffering from allergy and asthma. The peaks in pollen and mold concentration match with the peak of the number of patients visited the allergy clinics. Fig. 3 shows the graphical representation of the aeroallergen and patients' data analyzed from Allergy A.R.T.S Clinic, for the period of 2001-2014.

AHPCO Nanotechnology to improve indoor air quality (IAQ)

The implications of nanotechnology can improve the quality of life and add new features to the original functions of the product. Improving the quality of life of individuals is imperative in business because it will improve the well-being of the society as a sum. Health professional in all the countries expressed their concerns on the increasing trend of allergy and asthma cases. Allergies are caused by a hypersensitive reaction of the human

body's immune system to the allergen. Global warming exerts substantial effect on flora and fauna. Increasing greenhouse gases cause accelerated pollinosis and fungal spore production, two major aeroallergens for asthma and allergies. Research collaboration for a decade between the West Texas A&M University and the Research and Development division of Air Oasis on aerobiology and biotechnology developed an air purification system that uses Advanced Hydrated Photo Catalytic Oxidation (AHPCO) Nanotechnology to reduce the airborne aeroallergen and VOCs. Air Oasis1 air purifiers utilize a new generation AHPCO technology that does not rely on filters or air passing through the air purifier. This new technology simply produces a blanket of redundant oxidizers that not only clean the surrounding air, but sanitize surfaces as well. We have assessed these unique air purifiers that target the particulate matters in the air as well as on the surface and sanitize the air eventually. We assessed the capacity of AO 1000 G3 model of air purifier, Inducts, Wall Mounts and Air Oasis Mobile Sanifier in reducing the aeroallergen: pollen, bacteria, fungal spores and hyphae, dust particles, fibers, animal dander and VOCs in the indoor air. We have been working in developing an efficient device to reduce the indoor aeroallergen to alleviate the symptoms of allergy and asthma. AHPCO has been used in reducing indoor aeroallergens, MRSA in the hospitals, and microflora that cause contamination during food processing. These air purification systems were evaluated in the Microbiology and Mycology laboratories of the BSA Hospital laboratory in Amarillo, Texas in terms of the net reduction of bacteria in a negative pressure laboratory and the specific effect on isolates identified to be methicillin resistant *Staphylococcus aureus*, MRSA. Bacteria isolated from the room air exposure were gram positive bacilli such as *Bacillus* sp. and *Coryneform* (diptheroids) sp., coagulase negative *Staphylococcu*s sp., *Micrococcus* sp., and encapsulated gram negative bacilli. We recorded an average of 68.5% reduction of bacterial population on the TSA plates when running the Air Oasis air purifiers. The AHPCO nanotechnology has been used to develop an efficient air purification system, devices to ensure the safety in food processing chambers and charging docks for the mobile phones. AHPCO nanotechnology has been proved to reduce allergy and asthma symptoms by reducing the indoor VOCs and aeroallergens, such as air-borne pollen, bacteria, fungal spores and hyphae, dust particles, fibers and animal dander. Evaluations on safety measures of the AHPCO nanotechnology showed no side effect on the human cell cultures. The Air Oasis units were exhibited at the world trade show of China Clean Expo 2013 and are being marketed in China, Hong Kong, Singapore, Bangladesh, Dubai, USA and UK. Air Oasis, USA is developing strategies to promote small businesses in Southeast Asia and all over the world.

Conclusion

Allergy and Asthma cases have been doubled in the Texas Panhandle area since 2007. The aeroallergen data that we collected using a Burkard Spore Trap for 15 years showed a steady increase in aeroallergen concentration in the Texas Panhandle area. A fluctuation and gradual shift in aeroallergen index with the warmer climate and a shift in flowering seasons were noticed that contributed to the increased allergy cases. Analysis of aeroallergen can help in diagnosis and treatment of allergic rhinitis. Analyzing the aeroallergens with a Burkard Spore Trap provided information regarding the onset, duration, and severity of the pollen season that clinicians use to guide allergen selection for skin testing and treatment. We have been investigating the daily aeroallergen concentration in terms of the meteorological conditions such as daily temperature, wind speed and precipitation. We used a Burkard Volumetric Spore Trap to determine the daily aeroallergen index by collecting aeroallergen samples and characterizing them with digital, fluorescence microscopy for 15 years. The most significant aeroallergens recorded were the pollens from Asteraceae, Chenopodiaceae, Poaceae and spores from *Alternaria, Stachybotrys, Aspergillus* and *Curvularia*. The characterization and analysis of microscopic aeroallergens was accomplished using Fluorescent Microscopy. Aeroallergens were viewed, recorded, and analyzed with fluorescent microscopy exhibited storage protein, oil granules, and the layer of sporopollenin, along with additional ultra-structural details like concordant pattern, exines, pores, colpi, sulci, and other ornamentations. The digital micrographs provided micro-measurements and additional views of the detailed ultra-structural morphology. Analyzing the aeroallergens collected and sampled with the Burkard Spore Trap provided information regarding the onset, duration, and severity of the pollen season that was compared to the number of patient cases seen over a 15 year period. The data accumulated from these studies can be utilized for the forecasting the types and duration of the pollen season. Temperature was found to have an inverse relationship with mold spore concentration. Rainfall had a direct correlation with the mold count directly, increase in precipitation resulted in subsequent higher mold spore concentrations. Early flowering has been recorded from different parts of the United states that produced more pollen and hence resulted increased allergic rhinitis and asthma cases. From the analysis of aeroallergen data it is very clear that the concentration of pollen from the trees, grass and weeds have a significant correlation with the number of patients suffering from allergy and asthma. The implications of nanotechnology can improve the quality of life and add new features to the original functions of the product. AHPCO Nanotechnology has been used in

reducing indoor aeroallergens, MRSA in the hospitals, and microflora that cause contamination during food processing.

References:

Anglin, R. Ghosh, N. "Experts: High pollen count increases medical dangers." Amarillo Globe-News. 10 Dec. 2014. Web link: http://amarillo.com/news/local-news/2013-10-12/experts-high-pollen-count-increases-medical-dangers

Beaumont, F., H. F. Kauffman, H. J. Sluiter, and K. De Vries. 1985. Sequential sampling of fungal air spores inside and outside the homes of mold-sensitive, asthmatic patients: a search for a relationship to obstructive reactions. *Ann. Allergy* 55:740–746.

Bogacka E, Nittner-Marszalska M, Fal AM, Kuzniar J, Nikiel E, Malolepszy J. 2003. Allergy to mould allergens as a risk factor for bronchial asthma in patients suffering from allergic rhinitis. *Pol Merkuriusz Lek.* 2003 May; 14(83):388-92.

Bush, R. 1989. Aerobiology of pollen and fungal allergens. Journal of Allergy and Clinical Immunology. 64;1120-1124

Dvorin DJ, Lee JJ, Belecanech GA, Goldstein MF, Dunsky EH. 2001. A comparative, volumetric survey of airborne pollen in Philadelphia, Pennsylvania (1991-1997) and Cherry Hill, New Jersey (1995-1997). : *Ann Allergy Asthma Immunol*. 2001 Nov; 87(5): 394-404

Ghosh, N., R. Camacho, E. Schniederjan, C. Saadeh, M. Gaylor. 2003a. Correlation between the meteorological conditions with the aeroallergen concentration in the Texas Panhandle. *Texas Journal of Microscopy.* 34:1:12-13

Ghosh N., B. Patten, Lewellen, G. T., C. Saadeh, M. Gaylor. 2003b. Aeroallergen survey of the Texas Panhandle using a Burkard Volumetric Spore Trap. *The Journal of Allergy and Clinical Immunology.* Vol. 111, No. 2: S91

Ghosh, N., Saadeh, C. and Gaylor, M. 2006. Quantification and characterizing the Aeroallergen by scanning and analyzing the tapes from the Burkard Spore-trap, *Journal of Scanning Microscopies*, Vol. 28, No. 2:127-128 (2006).

Ghosh, N. and Whiteside, M. 2006. Fluorescent Microscopy in Characterizing Some Biological Specimens. *Journal of Scanning Microscopies*, Vol. 28, No. 2:129-130 (2006).

Ghosh, N., Silva, J, Vazquez, A, Das, A B, Smith, D W. 2011a. Use of fluorescence and scanning electron microscopy as tools in teaching biology. *Scanning Microscopies 2011: Advanced Microscopy Technologies for Defense, Homeland Security, Forensic, Life, Environmental, and Industrial Sciences*, edited by Michael T. Postek, Dale E. Newbury, S. Frank Platek,

David C. Joy, Tim K. Maugel, Proceedings of SPIE Vol. 8036 (SPIE, Bellingham, WA 2011) 803613:1-11

Ghosh. N., A. Aranda, J. Bennert. 2011b. Photo-Catalytic Oxidation Nanotechnology Used in Luna Improved the Air Quality by Reducing Volatile Organic Compounds and Airborne Pathogens (2011) *International Journal of the Computer, the Internet and Management,* Vol. 19 No. SP1, 2011: 2.1-2.5

Ghosh, N., D. Wylie, E. Caraway, J. Bennert, J. Bennert and C. Saadeh. 2013. Bringing Biotechnology into Business: Application of AHPCO Nanotechnology to Market a Novel Filter-Less Air Purifier. *International Journal of the Computer, the Internet and Management,* Vol.21 No.2 (May-August, 2013) pp. 51-55

Gumowski, P. I., J.-P. Latge, and S. Paris.1991. Fungal Allergy. In: Arora D. K., L. Ajello, and K. G. Mukerji, Eds. *Handbook of Applied Mycology. Vol. 2*, Humans, animals and insects. Mercel Dekker Inc. NY: 163-204.

Helbling A, Reimers.2003. Immunotherapy in fungal allergy. *Current Allergy Asthma Rep.* 2003 Sep; 3(5):447-53

Horner, E, Levetin, E, Shane JD, Solomon W. 2002. *Advanced Aeroallergen*: 58th AAAAI Annual Meeting, March 2, 2002:1-68

Ito Y, Kimura T, Miyamura T. 2002. Gramineae pollen dispersal and pollinosis in the city of Hisai in Mie Prefecture. A 14-year study of Gramineae pollen dispersal and cases of sensitization to Gamineae experienced at an allergy clinic over a 15-year period. *Arerugi* 2002 Jan; 51(1):9-14

Knox, BR.1979. *Pollen and Allergy*. University Park Press: Baltimore: 3-57

Lacey, J. 1995. *Airborne Pollens and Spores. A Guide to Trapping and Counting*. The British Aerobiology Federation, U.K. 1995:1-59

Moore-Landecker, E. 1996. *Fundamentals of the Fungi*, 4th edition, Prentice Hall,

NJ 07458:342-343, 400-401,464

National Geographic. 2016. Earliest Blooms Recorded in U.S. Due to Global Warming. Web site: http://news.nationalgeographic.com/news/2013/01/130116-spring-earlier-global-warming-plants-trees-blooming-science/ visited on March 11, 2016.

Nester, EW. 2001. *Microbiology: A human perspective*, Third Ed. McGraw-Hill, NY:1-15

Ogden, Eugene C.1974. *Manual for Sampling Airborne Pollen*, Hafner Press, NY:146-157

Potera, C. 2002. Global Warming Prolongs Sneezin' Season. (Allergies). *Environmental Health Perspectives,* Vo. 110, No. 10, October 1, 2002

Ranaivo, Y. An Increasing Trend. Study: More Amarilloans Battle Asthma's Effects. Amarillo Globe-News. August 28, 2011. Web link: http://amarillo.com/news/local-news/2011-08-28/increasing-trend

Santilli J, Rockwell W. 2003. Fungal contamination of elementary schools: a new environmental hazard. *Ann Allergy Asthma Immunology*. 2003 Feb; 90(2): 175.

Solomon, W. R., and K. P. Matthews. 1988. Aerobiology and inhalant allergens, p. 312–372. *In* E. Middleton, C. E. Reed, E. F. Ellis, N. F. Adkinson, and J. W. Yunginger (ed.), Allergy: principles and practice, 3rd ed. The C.V. Mosby Co., St. Louis.

Website for Allergy ARTS: http://www.allergyarts.com/

Website for American Academy of Allergy Asthma and Immunology: http://www.aaaai.org/

Website: University of Arizona: http://www.geo.arizona.edu/palynology/polonweb.html

Webster, John. 1970. Introduction to Fungi University Press: Cambridge: 68.

Using Geographic Information Systems And Large Historical Data Bases To Protect Public Health And The Environment

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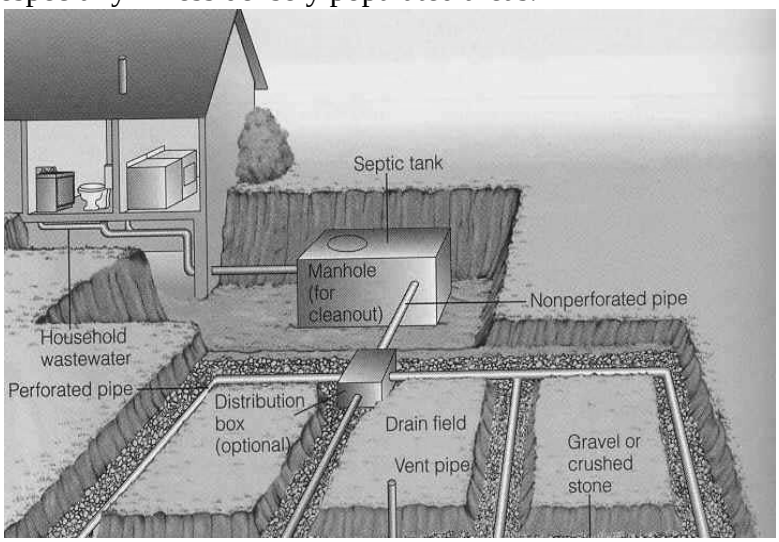
Abstract

The Lowcountry of South Carolina, USA experienced rapid growth and development as tourism and recreation replaced rural agriculture and silviculture land uses in the 1960's. At that time no water and wastewater infrastructure existed. Septic systems and shallow drinking water wells were installed to service private homes. The pace of development increased dramatically in the 1970's with the conversion of Hilton Head Island (Island) into a world class beach, tennis and golf resort destination. This new high-density development included water and wastewater infrastructure; however, a few older, more rural sections of the Island still retain septic systems. Hilton Head Public Service District (PSD), the local water/wastewater utility, is planning to provide service to these remaining properties over the next few years by extending both water and sewer to affected residents. This study utilized Geographic Information Systems (GIS) and large digitized databases such as soil survey and wetland inventory data to map the distribution of soils and wetlands on Hilton Head Island that were identified as unsuitable for effective operation of septic systems. A hazard ranking scheme was developed and a hazard assessment conducted to determine which properties on the Island faced the greatest risk of septic system failure. The PSD would use the results of this study to prioritize which properties would be targeted for sewer and water line extension and connection to the affected residents. This way potential health risks and impacts to surface water quality by failing septic systems could be avoided in a cost-effective and expeditious manner.

Keywords: Public Health, Environment, Septic System, GIS

Introduction

After World War II there was a significant shift in the demographics of the population of the United States. The "GI Bill", that provided returning veterans free college tuition and low-interest loans to purchase property and re-enter civilian life, fueled rapid economic growth as many more individuals were able to afford their own homes. Most of this growth in the real estate market occurred in the single-family home sector, largely in the suburban areas around major cities. This suburban land was previously low-density farmland, field and forest land (Dunham-Jones & Williamson, 2008). At that time there were very few areas outside of cities that were served by public sewer systems so most of the new homes in these suburban and rural areas had to rely on on-site sanitary disposal systems such as septic systems to treat and dispose of sanitary wastewater. Previously in rural areas cesspools and pit privies (outhouses) were the common on-site disposal technologies predominantly in use. While these systems functioned moderately well in low-density rural areas, high-density suburban development required a more effective on-site treatment. Septic systems presented a simple, cost effective and expedient technical solution. When properly sited, installed, operated and maintained these decentralized wastewater treatment systems can protect public health and preserve water quality, especially in less densely populated areas.



From Texas A&M University

Figure 1. Generalized diagram of a typical residential septic system.

Traditional septic systems (Figure 1) consist of a septic tank (~1,000 gal.) and a subsurface leach, or drain field (sometimes called a tile field) to treat gravity fed wastewater generated from toilets, sinks, bathing and

laundering. The septic tank separates the solid components of the wastewater stream from the liquids. The solids and potential pathogenic microorganisms and chemical contaminants are partial broken down by a combination of aerobic (in the presence of oxygen) and anaerobic (without oxygen) processes utilized by microorganisms that are naturally present in the wastewater stream. The solids (sludge) collects in the bottom of the tank, while the scum floats on the surface of the liquid. (USEPA, EPA/625/R-00/008, February 2002) Baffles in the tank are intended to prevent sludge and floatables from reaching the lateral drain pipes and clogging the drain field. Clogging of the drain field is one to the primary ways septic systems fail. Unfortunately, when septic systems fail to properly function, biological contaminants such as viruses, pathogenic bacteria, fungi and protozoans can reach the groundwater. These contaminants can have negative impacts on public health, potentially far from the site of the failure. Additionally, local surface water quality can be significantly degraded from the release of nutrient-rich and bacteria-laden wastewater.

Septic System Failure

Septic tanks and drain fields have been the sources of groundwater and surface water pollution (Craun, 1979, 1984; Fetter, 1994; Katz et al., 2009). Many infectious disease outbreaks and water-borne diseases have been traced back to one or more failed septic systems (Bicki, 1989; DeBorde et al., 1998; Fong et al., 2007). Improper siting and poor design are two of the primary causes of septic system failure. When siting and designing a septic system the location and depth of the drain field (relative to the groundwater table) are the most critical steps in assuring reduction of contaminants and dispersal of septic wastewater. Key components of proper design and siting of drain fields are the permeability of the local soils and the frequency and duration of inundation of subsurface soils by groundwater ("drainage class"). Low permeability of certain soil types slows the vertical and horizontal movement of liquid wastewater. Low soil permeability will cause septic drain fields to function poorly or fail, often resulting in wastewater backing up and being present at or near the ground surface presenting a public health issue (as photo documented in Figure 2).

Figure 2. Failing septic system on north end of Hilton Head Island with Intracoastal Waterway in background.

The maintenance of an appropriate vertical distance between the bottom of the drain pipe and the surface of the groundwater table (unsaturated zone) is critical to effective and efficient decontamination of wastewater in the area of the drain field. This unsaturated zone is where wastewater is decontaminated and treated through physical, chemical, and biological processes. In this zone, aerobic microorganisms in the soil break down contaminants and effectively remove pathogenic microorganism from the wastewater as it moves vertically through the zone. Once the wastewater reaches the groundwater table (saturated zone) anaerobic conditions exist and decontamination processes become very slow because of the absence of sufficient concentrations of oxygen. After potential contaminants reach the saturated zone they can migrate horizontally relatively quickly along natural groundwater migration routes (typically down topographic gradients). This horizontal movement of groundwater can result in contaminants migrating away from the site/property from which they were released, potentially contaminating neighboring properties or surface water down-gradient.

The frequency and duration of inundation of subsurface soils by groundwater varies by location, topographic elevation (above sea level), soil type, and season. (Schoeneberger, 2002) Often soils that have low permeability also have poor drainage which makes them poor candidates for septic system siting. Additionally, low lying areas should also be avoided because they have very short vertical distances between the ground surface and the top of the groundwater table. Seasonal difference in the groundwater table elevation, due to lack of evapotranspiration by trees during winter months, results in groundwater being at or near the ground surface for a

significant portion of the year. These areas with seasonally high water tables should be avoided when installing septic systems.

Improper maintenance of septic systems is one of the primary causes of septic system failure. It is critical to prevent solids and floatables from reaching the drain field. When solids, fats, oils and biological waxes reach the drain field the pore spaces between the soil particles could become clogged, reducing the natural filtration and contaminant degradation that occurs within the drain field. Clogging this interstitial space between soil particles reduces permeability and, in extreme circumstances, artificially raises the water table limiting the thickness of the unsaturated zone (Figure 3). The result is lack of decontamination and more rapid horizontal migration of contaminants off site. Under-sink garbage disposals, paper products, cooking oils and feminine hygiene products should not be discharged into septic systems as these materials often cause blockage and failure of the system.

Local Conditions That Affect Septic System Performance

Hilton Head Island is located in the Sea Island Coastal Region of the Atlantic Coastal Plain and includes geological deposits which formed and were reworked by fluctuations in sea levels during the Pleistocene epoch. Fine sands, muds, silts and clays make up the majority of the soil types found on Hilton Head Island. The Island is characterized by a "corrugated" dune ridge and slough landscape where narrow, old sand dune ridges are separated by low-lying sloughs, some with forested wetlands.

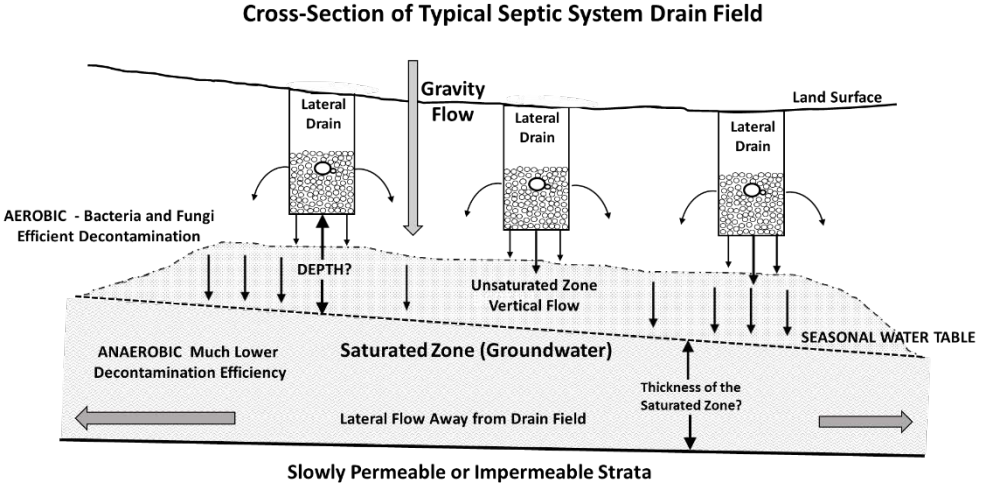


Figure 3. Addition of sanitary wastewater to the drain field artificially raises the groundwater table further restricting the depth of the unsaturated decontamination zone

One of the practical consequences of this geologic landscape is that upland (dune ridge) habitat – which might be suitable for traditional septic system designs – is quite limited and typically bordered by broad, low-lying sloughs and wetlands. Soil types found in these sloughs include Hydric (wetland) soils (Table 1) that present significant challenges in the proper operation of a septic system (Stuck, 1980). Hydric Soils are defined as a soil that formed under conditions of saturation, flooding or ponding long enough during the local growing season to develop anaerobic conditions near the ground surface (59 Fed. Reg. 35680, 7/13/94). If the zone of decontamination underlying septic system drain fields is not greater than 12 inches there is a strong likelihood that the septic system will fail to function effectively. If the water table is at or near the ground surface, septic system wastewater will directly impact the public and potentially run off into adjacent surface waters (Vogel and Rupp, 1999; Ward and Trumble, 2003). Clearly septic systems installed over hydric soils cannot function as intended. Complicating this problem is the fact that sanitary wastewater distributed throughout the drain field can artificially raise the local groundwater table, further reducing the amount of time wastewater is retained within the unsaturated zone (Figure 3). Additionally, locally heavy precipitation can raise the local groundwater table very quickly leading to rapid failure of the drain field as well as enhancing runoff into surface water. High rainfall has been shown to reduce this filtration process by saturating the soil allowing contamination of groundwater and surface water (Hagedorn, 1984).

Hydric Soils of Beaufort County, SC

Soil Type	*Depth of water table from surface*
Argent	0.0′ – 1.0′
Baratari	0.0′ – 1.0′
Bladen	0.0′ – 1.0′
Bohicket	+3.0′ – 0.0
Cape Fear	+0.5′ – 1.5′
Capers	+1.0′ – 1.0′
Deloss	0.0′ – 1.0′
Fripp	0.0′ – 1.0′
Handsboro	+3.0′ – 0.5
Hobonny	+1.0′ – 0.0
Levy	+2.0′ – +1.0′
Okeetee	0.5′ – 1.0′
Osier	0.0′ – 1.0′
Pinckney	0.0′ – 1.0′
Polawana	0.0′ – 0.5′
Rosedhu	0.0′ – 1.0′
Santee	0.0′ – 1.0′
Sewee	1.0′ – 2.0′
Tomotley	0.0′ – 1.0′
Wahee	0.0′ – 1.0'
Williman	0.0′ – 1.0′
Yemassee	0.0’ – 1.5’
Yonges	0.0 ‘– 1.0′

Table 1. Depth to water table from ground surface (in feet) for Hydric Soils found in Beaufort County. Positive values indicate water table is above the ground surface

Some sandy soils (Wando) found on high, old dune ridges (i.e. Brahms Point on Hilton Head Island) have high permeability but relatively deep water tables. These areas are excessively drained and septic wastewater moves so rapidly in the vertical direction that it is not retained in the decontamination zone long enough to effectively decontaminate and de-nutrify the wastewater. Inorganic nutrients like nitrogen, phosphorous and chloride can move quickly through the unsaturated zone without being attenuated. Locally, groundwater migrating through these soils typically discharges to tidal surface water; therefore, the potential does exist for septic systems in excessively drained soils such as Wando soils to impact water quality.

Conditions on Hilton Head Island are not ideal for the use of on-site disposal systems such as septic systems. Historically a succession of high and low sea level stands during the Pleistocene epoch have reworked the local soils in such a way that very fine sands, silts and clays dominate the soil types found on the Island (Zeigler, 1959). Many of these soil types exhibit low permeability and therefore drain very slowly. A high percentage of soils on Hilton Head Island are Hydric Soils. As identified in the Soil Survey of Beaufort and Jasper Counties, SC (Stuck, 1980), the surficial water table is at, or near the ground surface for a significant portion of the time (Table 1). Clearly, septic systems located in the areas where these soils are present are much more likely to fail even under normal operating conditions.

Documented Local Impacts of Septic System Failure

The PSD is a special purpose district created by the South Carolina General Assembly in 1969 to provide water and sewer services to Hilton Head Island. Residents of the Island relied on private wells and on-site wastewater disposal systems (mostly septic tanks) for their drinking water and wastewater disposal needs until 1957. At that time, a local development firm called the Hilton Head Water Company introduced a community waterworks system, installing water lines and drilling wells throughout the Island. As the community expanded and development progressed, however, Hilton Head Island citizens became increasingly aware of the need for enhanced services, a need especially apparent in fire protection.

In 1995 the Hilton Head Public Service District (PSD) was formed from the consolidation of several smaller utilities. Today, the PSD serves more than 18,000 customers in the north- and mid-island areas of Hilton Head Island.

The PSD presently operates the sanitary sewer system in a section of the Island where sewer access has yet to be provided to all properties. Residents in the areas report many examples of not being able to take showers or wash clothes after periods of rainfall due to malfunctioning septic systems. Even worse situations include homeowners who have suffered property damage to floors, walls, and furniture as a result of failing septic systems sending household wastewater back into the home.

Recently (24 April, 2015) the local newspaper, *The Island Packet* reported that (http://www.islandpacket.com/2015/04/24/3715642/unpaved-roads-aside-residents.html) many residents on the Island experience foul odors and pools of household wastewater on the ground in their neighborhood as a result of malfunctioning septic systems. Residents fashion makeshift barricades around the failed systems using PVC pipe and tarps, or place pieces of plywood over them. “But when it rains, the makeshift

solutions don't work, and the sludge comes pouring out. A few months ago, a little boy tripped and fell into a sewage pile," the newspaper story reports.

Unfortunately, many properties on the Island that lack access to the sanitary sewer system are owned by low-income residents who cannot afford the cost of sewer connection. A partnership among the PSD, the Town of Hilton Head Island, and Project SAFE (Sewer Access for Everyone) – a charitable fund of the Hilton Head-based Community Foundation of the Lowcountry – is working to provide sewer access and connection assistance for low-income homeowners.

Veronica Miller, a Hilton Head Island schoolteacher and president of a Native Islander neighborhood association, had to use blankets and quilts to clean up the interior of her home after her septic system backed up in spring of 2015. This had been a regular occurrence for Miller. In the summer of 2015, her home was connected to the PSD's sanitary sewer system thanks to a grant from Project SAFE.

The solution to this problem is obvious: extend sanitary sewer connections to all residents and businesses on Hilton Head Island. The PSD has developed a Master Sewer Plan that details the sewer projects necessary to provide access throughout its service area. The utility is planning to fund $1 million for regional sewer pump stations needed under the plan. The Town of Hilton Head Island is planning to fund $3.5 million for the sewer lines called for by the plan, and Project SAFE is embarking upon a $3 million capital campaign to fund low-income homeowners' connection costs.

One of the critical considerations in this planning process is assuring that residents in areas that are most prone to septic system failure are offered sewer connection access as soon as practical. To this end, a hazard analysis was conducted to identify which areas of the PSD service area were at the greatest risk of exposure to the harmful impacts on public health and the environment caused by septic system failure.

Hazard Analysis

We were able to conduct a hazard analysis of soil types located within the PSD service area on Hilton Head Island using pre-existing data sets (Table 2) available from the Town of Hilton Head Island, the Federal Emergency Management Agency (FEMA), U.S. Fish and Wildlife Service (USFWS) and the Natural Resources Conservation Service (NRCS).

LIDAR Base Elevation Data – Beaufort County GIS
USDA-NRCS Soil Survey Maps
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627
FEMA Flood Zone Maps: Searchable
http://www.hiltonheadislandsc.gov/publicsafety/flood/floodzonesearch.cfm
USFWS National Wetland Inventory (NWI) Maps
http://www.fws.gov/wetlands/Data/Metadata.html

Table 2. Digital mapping data bases used in the development of the hazard analysis of soil types

The first step in the hazard analysis was to make a list of project-appropriate assumptions that would guide the implementation of the analysis. These assumptions were based upon general data regarding the factors that would most affect septic system performance. These included soil permeability and expected drainage patterns in relation to land position/elevation differences. The first and most logical assumption is that we would consider only areas on Hilton Head Island within the PSD service area. Secondly, areas that were tidally inundated or wetlands that were permanently or seasonally inundated were excluded from the analysis because no septic systems were found there.

The next assumption in the hazard analysis considers the effect of soil permeability on septic system performance. Based upon the NRCS Soil Survey for Beaufort and Jasper Counties (Stuck, 1980), soils that have slow permeability are not suitable for the effective operation of septic systems. Also, soils that have rapid permeability are poorly suited for septic system operation. The permeability scoring system developed for this hazard analysis (Table 3) considered soils with permeability scores of 2 or lower to be poorly suited for effective septic system operation.

Soil Permeability	Soil Permeability Score
Very Slow Permeability	1
Slow Permeability	2
Moderately Slow Permeability	3
Moderate Permeability	4
Moderately Rapid Permeability	3
Rapid Permeability	2

Table 3. Permeability scoring system developed for the hazard analysis

In addition to soil permeability the hazard analysis considered the effect of drainage class on septic system performance. Based upon the NRCS Soil Survey, soils that have poor drainage or are excessively drained are not suitable for the effective operation of septic systems. The Drainage Class scoring system developed for this hazard analysis (Table 4) considered soils with Drainage Class scores of 2 or lower to be poorly suited for effective septic system operation.

Soil Drainage Class	Soil Drainage Score
Very Poorly Drained	1
Poorly Drained	2
Somewhat Poorly Drained	3
Moderate Well Drained	4
Well Drained	3
Excessively Drained	2

Table 4. Drainage Class scoring system developed for the hazard analysis

The goal of the hazard analysis was to develop a risk-based hazard ranking system that could then be used to consider how much risk to public health and the environment could be mitigated as a result of the sewer line extension planning process. Therefore, the final step in the hazard analysis process is the computation of a final soil type "Risk Score" and assignment of a "Hazard Class" to each type of soil found within the PSD service area. The primary assumption that was made in the calculation of the Risk Score was that the combined effect of soil permeability and soil drainage characteristics would more accurately inform the users of this hazard analysis as to the risk of septic system failure in these soil classes. Consequently, the Risk Score was calculated by simply adding the soil permeability score and the soil drainage class score together (Table 5).

In assigning the Hazard Class, three different Hazard Classes were established:

- **HH** = **High Hazard** (Risk Score of 3 and lower, or 5 and lower if either the soil permeability score or drainage class score was 1)
- **MHH** = **Moderately High Hazard** (Risk Score 4 or 5 except when either the soil permeability score or drainage class score was 1)
- **LMH** = **Low - Moderate Hazard** (Risk Score 6 or higher)

The High Hazard Class designation should indicate to the users of this Hazard Analysis that properties found within these soil class zones have an extremely high probability of septic system failure and are not suited for effective septic system operation. The Moderately High Hazard Class designation should indicate that properties found within these soil class zones have a moderate to high probability of septic system failure, especially in winter months or during significant precipitation events. These soil types are poorly suited for effective septic system operation. The Low - Moderate Hazard Class designation should indicate that properties found within these soil class zones have a low to moderate probability of septic system failure. They are more prone to failure during winter months or during exceptional precipitation events. These soil types are moderately well suited for effective septic system operation especially when water tables are greater than three feet below the surface.

Hazard Class	Soil Map Units in PSD Service Area
High Hazard	Bohicket, Capers, Cape Fear, Hobcaw, Handsboro, Hobonny, Levy, Pinckney, Lynn Haven, Santee
Moderately High Hazard	Argent, Leon, Osier, Ogeechee, Bladen. Yonges
Low - Moderate Hazard	Leon. Pinckney, Williman

Table 5. Hazard Class designation for each soil type found within the PSD service area on Hilton Head Island.

GIS Mapping and Sewer Line Extension Planning

Once the hazard ranking of each soil type found within the PSD service area was completed the mapping of each hazard class could proceed. Utilizing the substantial Geographic Information Systems (GIS) capabilities of the PSD, soil types of the same Hazard Class were grouped and mapped as four "Hazard Class Units" (High, Moderately High, Moderate, and Low) on a base map that included tax parcel data layer and NWI wetland data. This new Soil Hazard Class Map was combined with the PSD Master Sewer Plan map (Figure 4) resulting in project-site, parcel-specific information about the current risk to public health and the environment at each of the PSD's Sewer Master Plan project sites.

This combination of environmental and public health risk data and project planning tools like GIS will provide the end users with critical risk-based information that was previously unavailable. Certainly environmental and public health protection aren't the only factors to be considered on large capital projects like the PSD Master Sewer Plan, but they should be given equal weight in the planning and decision making process. This effort demonstrated that locating, analyzing and mapping environmental and public health data is relatively inexpensive and not very labor intensive when compared with engineering and contractor support required on capital projects. It provided useful information that can aid in future planning and project scheduling.

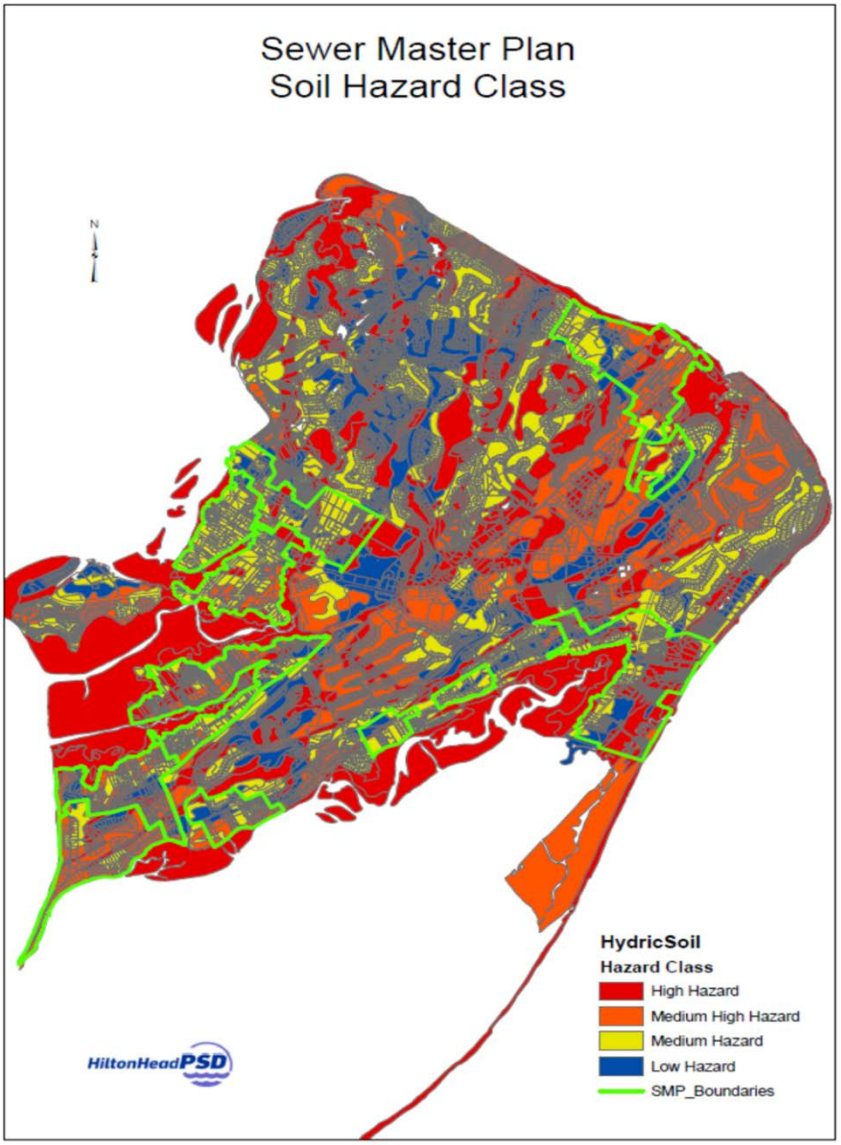


Figure 4. Soil Hazard Class Map combined with the PSD Master Sewer Plan map

References:

Bicki, T. (1989). Septic systems operation and maintenance of on-site sewage disposal systems. University of Illinois at Urbana-Champaign, College of Agriculture, Cooperative Extension Service lw-15.il

Craun, G.F. (1979). Waterborne disease. A status report emphasizing outbreaks in groundwater systems. Ground Water. 17 (2):183-191.

Craun, G. F., (1984). Microbiological aspects of groundwater pollution due to septic tanks. In G. Bitton, and C.P. Gerba (Eds.), *Groundwater Pollution Microbiology* (pp 135-180). New York: John Wiley & Sons.

DeBorde, D.C., Woessner, W.W., Lauerman, B., and Ball, P.N. (1998). Virus occurrence and transport in a school septic system and unconfined aquifer, Ground Water. 36 (5): 825-834.

Dunham-Jones, E., & Williamson. J. (2008). *Retrofitting suburbia: urban design solutions for redesigning suburbs*. John Wiley & Sons, 2008.

Fetter, C.W. (1994). *Applied Hydrogeology*. Englewood Cliffs, NJ: Prentice Hall. 691 p.

Fong, T. T., Mansfield, L. S., Wilson, D. L., Schwab, D. J., Molloy, S. L., and Rose, J. B. (2007). Massive microbiological groundwater contamination associated with a waterborne outbreak in Lake Erie, South Bass Island, Ohio. Environmental Health Perspectives. 115: 856-864.

Hagedorn, C. (1984). Microbiological aspects of groundwater pollution due to septic tanks. In G. Bitton, and C.P. Gerba (Eds.), *Groundwater Pollution Microbiology* (pp 181-196). New York: John Wiley & Sons.

Katz, B. G., Sepulveda, A. A., and Verdi, R. J., (2009). Estimating nitrogen loading to ground water and assessing vulnerability to nitrate contamination in a large karstic springs basin, Florida. Journal of the American Water Resources Association. 45: 607-627.

Schoeneberger, P. J. (2002). *Field book for describing and sampling soils*. Government Printing Office.

Stuck, W. M. (1980). Soil survey of Beaufort and Jasper Counties, South Carolina.

U.S. Environmental Protection Agency (2002). Onsite Wastewater Treatment Systems Manual, Office of Water, Office of Research and Development.

Vogel, M. and Rupp, G. (1999). Septic tank and drainfield operation and maintenance. MontGuide MT 9401. Montana University Extension Service. Montana State University. www.montana.edu/wwwpb/pubs/mt9401.html 10/15/03

Ward, A.D., and Trumble, S. W., (2003). *Environmental Hydrology*, 2nd Ed. Lewis Publishers, Boca Raton,
475 p.

Zeigler, J. M. (1959). Origin of the sea islands of the southeastern United States. Geographical Review. 49 (2): 222-237.

Findings From A Us State Department Of Health Workforce Assessment Survey

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Abstract

To determine the level of public health competency and training in the existing Tennessee Department of Health (TDH) workforce, an anonymous survey was implemented electronically. Questions were based on the Council on Linkages Core Public Health Competencies, a consensus set of skills identified by the Council on Linkages Between Academia and Public Health Practice as being desirable for the delivery of the Essential Public Health Services. All 5,178 active TDH employees were eligible to participate in the survey. In each of the core competency areas Leadership Level respondents scored consistently higher than Management Level or Entry Level, and Management Level respondents scored higher than Entry Level respondents. However, overall findings indicate that the eight core competency areas are not fully integrated into the TDH, and that there are clear training needs with high priority. Needs scores were calculated by dichotomizing responses into 'Unaware/Aware' and 'Knowledgeable/Proficient', with the 'Unaware/Aware' category indicating a training need in that area. When considering responses from all three Tiers, needs scores greater than 50% were found for six of the eight core competency areas. These results identify opportunities for improvements through a coordinated training strategy. Findings also highlight the need for deliberate planning activities related to diversity and hiring, as a significant percentage of employees are predicted to retire in the near future. Given resource constraints within TDH, training activities should be directed to increase competencies that are likely to have the greatest impact on the mission of the Department of Health.

Keywords: Workforce assessment, public health, competencies

Introduction

The health of residents of the United States depends on a strong public health infrastructure that is capable of efficiently and effectively delivering the essential services of public health. The US Department of Health and Human Services recognized this significance when it included specific objectives that address continuing education and training needs for the public health workforce in *Healthy People 2020* (US Department of Health and Human Services, 2010). Training activities are vital for the development of the current workforce and for future capacity.

Literature Review

In a landmark report, the Institute of Medicine noted that an estimated 80% of the public health workforce had little or no formal professional training in public health or in their specific field within public health (Gebbie, Hernandez, & Rosenstock, 2003). A 2007 National Association of County and City Health Officials (NACCHO) publication concluded that "Though information on the educational attainment of Local Health Department (LHD) workers is not available, data on occupations suggests that the percentage of LHD workers who received public health training in their formal educations is relatively low." (Leep, 2007.).

On-the-job training options may be lacking. For example, in the state of Tennessee, with the exception of the Tennessee Workforce Development Consortium, there have been virtually no formal educational opportunities for Tennessee Department of Health (TDH) staff since the late 1980's. The need for workforce development was highlighted in the state's revised Tennessee Department of Health training agenda focused on employee-identified issues and leader priorities (State of Tennessee, Department of Health, 2012).

The Association of State and Territorial Health Officials (ASTHO) reported that, in the nation overall, the percentage of public health employees eligible for retirement was expected to grow steadily from 18% in fiscal year 2010 to 27% in fiscal year 2014 (Association of State and Territorial Health Officials, 2011). They also noted that Tennessee would see 30-40% of its health department employees eligible for retirement in fiscal year 2014. In 2007, an ASTHO national survey noted that the average age of a Tennessee public health employee was over 48.7 years, above the national average of 47 years (Lewis & Reichardt, 2008). The Association of Schools of Public Health (ASPH) reported that, nationally, 250,000 new public health workers would be needed by 2020, and suggested that 23% of existing public health workers would be eligible to retire by 2012 (Association of Schools of Public Health, 2008).

Two NACCHO reports highlighted the prevalence of formal training deficiencies. The first, published in 2009, noted that only 8.4% of top executives in LHDs had formal graduate-level training in public health – MPH, Dr.PH, or Ph.D. (National Association of County & City Health Officials, 2009). While several Tennessee LHD directors have completed the MPH program through the TN Workforce Development Consortium, the majority still lack formal training in public health. The second, published in 2010, reported that 52% of Tennessee's LHDs lost staff due to layoffs and attritions in 2009, versus 46% nationwide (National Association of County & City Health Officials, 2010).

As part of its efforts to determine the level of competency in its existing workforce, as well as to assist with credentialing activities, the Tennessee Department of Health signed a Memorandum of Agreement (MOA) with LIFEPATH, the Public Health Training Center housed at East Tennessee State University's College of Public Health. LIFEPATH's mission is to provide both academic and non-academic competency-based training to public health employees in the state of Tennessee. The MOA outlined a process for surveying all Department of Health employees across the state of Tennessee.

Methods

The survey instrument was developed by the North Carolina Center for Public Health Preparedness, The North Carolina Institute for Public Health, at The University of North Carolina at Chapel Hill and was used with permission. The North Carolina Center for Public Health Preparedness instrument has been validated and used for workforce assessments in North Carolina and West Virginia.

Questions for the survey are based on The Council on Linkages Core Public Health Competencies (adopted in May 2010), a consensus set of skills identified by the Council on Linkages Between Academia and Public Health Practice (Council on Linkages) as being desirable for the delivery of the Essential Public Health Services (The Council on Linkages Between Academia and Public Health Practice, 2010). The US Department of Health and Human Services included these competencies in their Healthy People 2020 objectives. The survey uses the 8 core competency areas identified by the Council on Linkages and assigns questions pertinent to these areas to respondents based on one of three Tiers – Tier 1: Entry Level, Tier 2: Management Level, and Tier 3: Leadership Level (The Council on Linkages Between Academia and Public Health Practice, 2010). The following table indicates the number of survey questions for each core competency area by Tier.

Table 1: Competency Areas and Questions by Tier

Competency Area	Tier 1 Questions	Tier 2 Questions	Tier 3 Questions
Analytical Assessment	12	12	13
Policy Development/Program Planning	10	11	13
Communication	6	6	7
Cultural Competency	6	6	7
Community Dimensions of Practice	10	10	11
Public Health Science	9	9	10
Financial Planning and Management	13	14	17
Leadership and Systems Thinking	8	8	9

In previous applications of the survey, respondents self-selected their Tier using descriptions provided in the survey. As a validity check to this method of self-selection, the instrument was modified to use job classification as the driver to identify Tier. A test of agreement was conducted using Cohen's Kappa statistic that resulted in moderate agreement between self-selected tier and job classification (kappa = 0.5089). Job classifications were placed into appropriate Tier by a panel of practice professionals from the Tennessee Department of Health across local, regional, and state levels. These professionals were familiar with the classifications and respective job responsibilities carried out by that classification. Potential responses for each question were:

1. **Unaware** – I am unaware, or have very little knowledge of the item
2. **Aware** – I have heard of it; limited knowledge and/or ability to apply the skill
3. **Knowledgeable** – I am comfortable with knowledge or ability to apply the skill
4. **Proficient** – I am very comfortable, an expert; could teach this to others

Prior to the administration of the survey, TDH provided LIFEPATH with a list of job classifications, a list of all TDH employee email addresses, and a TDH email account. An email describing the anonymous survey and containing a link to the survey site was sent to all TDH employees on June 4, 2012. The survey was administered via SurveyMonkey™ (SurveyMonkey.com, LLC) from June 4, 2012 through June 29, 2012. All TDH employees received a weekly email reminder to complete the survey. Data were collected and maintained by LIFEPATH, and a cleaned (de-identifiable) data file was provided to TDH at the end of July.

After the survey period opened, LIFEPATH and TDH personnel began to receive communication from TDH employees noting missing job classifications. After investigation it became apparent that the job classification list, mutually agreed upon by both parties, excluded certain job categories. This meant that some employees were unable to enter the survey questions. The solution implemented was to direct employees with this issue to use 'comparable' job classifications (determined by a pool of experts and using an algorithm based on Tier) from the initial list. While this solution allowed employees whose job classifications were missing to participate in the survey, the incomplete job classification list caused the number of respondents who began (but did not complete) the survey to be overstated.

Results

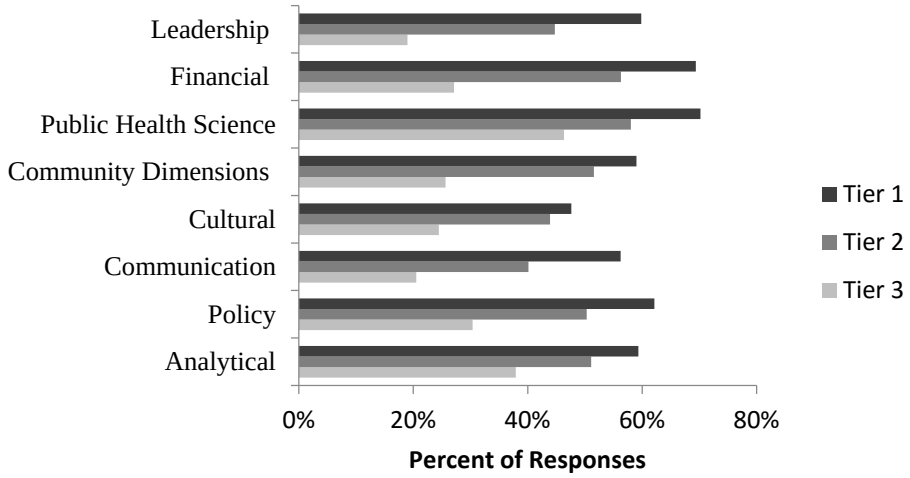
The list of TDH employee email addresses netted 5,178 usable addresses. There is variance in the rate of completion (number of questions answered), including both competency-based and demographic questions. Due to the job classification issue noted above, the final response rate was calculated as the number of respondents who completed at least 1 competency question divided by the total number of usable email addresses – 3,086/5,178 = 59.60%.

Competencies

Responses to questions for each of the 8 core competencies were dichotomized into 'Knowledgeable/Proficient' and 'Unaware/Aware' and reported by Tier. Tier 3 (Leadership Level) respondents scored consistently higher than Tier 2 (Management Level) or Tier 1 (Entry Level) in each of the core competency areas, and Tier 2 respondents scored higher than Tier 1in each of the core competency areas. Nearly 20% of Tier 3 employees and 40%+ of Tier 2 employees scored within Unaware/Aware in each of the core competency areas.

The level of 'need' for each of the 8 core competency areas was also calculated. Need Score was calculated by first dichotomizing the responses as described above then assessing the percentage of responses in the 'Unaware/Aware' category. The following is a summary of needs scores for all Tiers by all competencies.

Figure 1 - Percent of Responses With Needs Score By Tier



When considering responses from all 3 Tiers, the needs score is greater than 50% for 6 out of 8 core competency areas. Tier 1 respondents have an average need of 60.46% in each of the 8 core competency areas, Tier 2 respondents have an average need of 49.50% across the 8 core competency areas, and Tier 3 respondents have an average need of 28.91% across the 8 core competency areas.

Demographics

Demographic findings were calculated based on those respondents who answered at least 1 of the competency questions. This approach is justified by frequency analysis showing less than 1% of respondents who did not complete at least half of the competency questions filled out the demographics portion of the survey.

Statewide

Most (84.10%) of the respondents are female. More than one-half (51.03%) of respondents are age 18-49, and 48.97% are age 50 and above. Interestingly, 3.2% of respondents are age 66 and above, with 0.8% of respondents being 71 years or older. Most respondents (81.92%) are white or Caucasian and 13.84% of respondents are Black or African American.

Approximately 33% of respondents have a BS or BA degree, 20.85% have a high school degree or GED, 16.46% have an Associate's degree, and 14.01% have a graduate or professional degree. Slightly less than 4% of respondents have "known" formal public health training (MPH, MSEH, DrPH), while 8.86% of respondents "may have" some formal public health

within their training (i.e., these include MSN, MD/DDS/Other clinical doctoral degrees, PhD), and 32.67% of respondents have BS/BA degrees where the level of formal public health training is unknown.

While respondents were asked their employment status (in terms esoteric to the state, each employment contract holds status of "Contract", "Metro", "State", or "County"), the number of 'State' responses is overstated, leading us to believe that respondents misunderstood the question, their actual contracting mechanism status, or both. The data indicate that most employees work for the state (68.4%), followed by 22.31% for the County, 7.75% for Metro, and 1.54% under contract.

As mentioned previously, the incomplete job classification list caused the number of respondents who began (but did not complete) the survey to be overstated. A total of 353 respondents self-identified Tier level using the descriptions listed in question 1 of the survey, then exited the survey – presumably because their job classification was not listed in the dropdown list in question 2 of the survey (selecting a job classification in question 2 was required for direction into the Tier-based competency questions). Ninety-one individuals and two large groups/departments of employees (State Laboratory and the Office of Policy, Planning, and Assessment) were directed to 'comparable' job classifications. It is not possible to assess the effect of the missing job classifications on response rate, or to assure an accurate job classification frequency.

Central Office, Metropolitan, and Rural Regions

Rural regions reported the greatest female to male employee ratio, followed by Metropolitan areas. Rural regions have a younger workforce relative to Metropolitan regions, which report a younger workforce than Central Office. While most respondents for each region are white or Caucasian, Metropolitan regions have a higher percentage of Black or African American employees.

Metropolitan and Rural respondents reported higher numbers of High School/GED, Associate degrees, BS/BA degrees, and MSN than Central Office. Central Office respondents reported higher MPH, MBA, MD/DDS/Other, PhD, and Other degree categories than Metropolitan and Rural regions.

Limitations

The effect of the incomplete job classifications list is unknown. As described above, the same panel that selected Tiers for job classifications also developed the equivalency cipher that allowed individuals with classifications not listed to respond to the survey. As these equivalencies were based on Tier, this solution should not have affected statistical tests of

agreement. As a further assessment of validity, however, the same agreement tests will be conducted on data gathered from future surveys containing complete job listings.

The process of substituting equivalencies limited any analysis of competency scores or demographics by job classification. The distribution of employees among the available job classifications was inflated due to the substitution process; therefore, researchers were unable to draw any correlations between specific jobs and competency or needs scores. Measures of competency within job classifications or groups of classifications are useful for training initiatives and will be gathered through the administration of future surveys.

A further limitation that was not anticipated was email firewall security in place at some health departments that blocked the receipt of our survey by their employees. It was assumed that using a @tn.gov, rather than @etsu.edu email address, would allow all email traffic would be received by all TDH employees. However, this was not the case for two large Metropolitan regions (827 total employees. In both cases the Department Directors agreed to forward all emails related to the survey directly to their employees; however, the survey period was approximately one-half complete when this solution was implemented. The effect of this issue on potential response is unknown.

Conclusion

The findings from this survey indicate that the 8 core competency areas are not fully integrated into the Tennessee Department of Health, and that there are clear training needs with high priority. Assuming these competencies are required to deliver the Essential Public Health Services, the survey results identify opportunities for TDH to make improvements through a coordinated training strategy. Such improvements may serve to increase both the efficiency and effectiveness with which TDH provides public health services to protect, promote, and improve the health and prosperity of people in Tennessee.

One possible strategy would be to evaluate the needs scores for each Tier, determine the importance of the core competency area to that Tier, and develop training opportunities to increase the level of competency within that Tier.

On August 24, 2012, LIFEPATH personnel presented preliminary findings of the TDH Workforce Assessment survey to the TDH Executive Leadership Team (ELT). After this presentation, Deputy Commissioner Behringer conducted a session where groups of ELT members discussed the 8 core competency areas and reported the ‘Importance’ of each competency and the ‘Interest’ in each competency for the 13 TDH Units represented.

The 'Importance' ranked higher than the 'Interest' for all but 1 of the core competency areas – Cultural Competency. These findings may be used to identify training opportunities that are of interest to Units, of importance to Units, or both.

The strategy of using needs scores for each Tier as an identifier of training opportunities could be married with this 'Importance' data as a guide to target training to specific Units. Once training needs are identified, TDH could use formal educational offerings (e.g., Certificate and degree programs), in-house training options, and/or opportunities available through LIFEPATH to move the workforce toward proficiency in the core competency areas. LIFEPATH's Learning Management System (LMS) houses an expanding number of non-academic courses that could be useful in this regard. Additionally, TDH could contract with LIFEPATH for more interactive training.

In addition to identifying training needs based on competency scores, this survey also highlights two important demographic characteristics of the TDH workforce: lack of diversity and an aging labor pool. As the workforce ages and significant number of employees become eligible for retirement, and as the demand for public health workers increases to meet the needs of the people of Tennessee, hiring strategies could be implemented to address both of these issues. It should be noted that while retirements result in vacancies in positions they also result in lost knowledge. Strategies such as mentoring programs may be warranted to assure continuity of services.

While the need for trained public health professionals will remain, there are also significant resource constraints. ASTHO's research brief "Budget Cuts Continue to Affect the Health of Americans: March 2012 Update" reports that 87% of state and territorial health agencies have had budget cuts since 2008 (Association of State and Territorial Health Officials, 2012). And NACCHO recently released a report from its Job Losses and Program Cuts survey that showed 57% of all LDHs reduced or eliminated services in at least one program area in 2011 (National Association of City & County Health Officials, 2012). Therefore, training activities should be directed to increase competencies that are likely to have the greatest impact on the mission of TDH.

Future Need

There are several opportunities to improve future TDH workforce training needs assessments. The survey core competency questions could be modified to include an 'N/A' (not applicable) response, which would provide an indication of the significance of any competency area(s) to respondents in specific job classifications. A response column could also be added that would allow respondents to indicate an 'Importance' score for each of the

core competency area questions – while the 'Ability' score indicates competency, an 'Importance' score could be used as an indicator of importance of the competency question to the job. This calculation would reduce the inclusion of non-applicable low competency scores from respondents in jobs that do not require skill in a particular competency category. However, it would also lengthen an already lengthy survey. Finally, the demographic section could be extended to include a question asking respondents about formal public health education.

Significance of this Study

It is clear from this study that the 8 core competency areas are not fully integrated into the practice of public health in the Department of Health; and the mission to protect, promote, and improve the health of the people may not be served efficiently and/or effectively. Findings from this study could be used to inform a training strategy for Health Department workers based on Tier. Given the period of limited resources, a more targeted training approach could prove beneficial.

Finally, the results highlight a need to plan for future changes in the public health workforce. With a significant percentage of the workforce expected to retire in the near future, the Department of Health is faced with both a dilemma and an opportunity. The dilemma includes the loss of key personnel with a resulting knowledge/expertise loss for the organization. Mentoring strategies and succession plans are encouraged to limit this effect. The opportunity includes the ability to diversify the workforce and hire employees who are knowledgeable about the core public health competencies.

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References:

Association of Schools of Public Health. (2008). *ASPH Policy Brief: Confronting the public health workforce crisis*. Retrieved from http://www.healthpolicyfellows.org/pdfs/ConfrontingthePublicHealthWorkforceCrisisbyASPH.pdf. Accessed December 5, 2015.

Association of State and Territorial Health Officials. (2012). *Budget cuts continue to affect the health of Americans: Update March 2012*. Retrieved from http://www.aahd.us/wp-content/uploads/2012/04/ASTHO-Budget-Cuts-Impact-Research-0312.pdf. Accessed December 5, 2015.

Association of State and Territorial Health Officials, (2011). *ASTHO Profile of State Public Health, Volume Two*. Retrieved from http://www.astho.org/uploadedFiles/_Publications/Files/Survey_Research/ASTHO_State_Profiles_Single%5B1%5D%20lo%20res.pdf. Accessed December 5, 2015.

The Council on Linkages Between Academia and Public Health Practice. (2010). *Core competencies for public health professionals*. Retrieved from http://www.phf.org/resourcestools/Documents/Core_Public_Health_Competencies_III.pdf. Accessed December 5, 2015.

Gebbie, K.M., Hernandez, L.M., & Rosenstock, L. (Eds). (2003). *Who will keep the public health? Educating public health professionals for the 21st century*? Washington, DC: National Academies Press.

Leep C. (2007). *The Local Health Department workforce: Findings from the 2005 national profile of Local Health Departments study*. National Association of County & City Health Officials. Retrieved from http://www.naccho.org/topics/infrastructure/profile/upload/LHD_Workforce-Final.pdf. Accessed December 5, 2015.

Lewis, M. & Reichardt, A. (2008). *2007 State public health workforce survey results*. Arlington, VA: Association of State and Territorial Health Officials. Retrieved from http://biotech.law.lsu.edu/cdc/astho/WorkforceReport.pdf. Accessed December 5, 2015.

National Association of County & City Health Officials. (2009). *2008 National profile of Local Health Departments*. Retrieved from http://www.naccho.org/topics/infrastructure/profile/resources/2008report/upload/NACCHO_2008_ProfileReport_post-to-website-2.pdf. Accessed December 5, 2015.

National Association of County & City Health Officials. (2010). *Local Health Department job losses and program cuts: Findings from January/February 2010 survey*. Retrieved from http://www.naccho.org/topics/infrastructure/lhdbudget/upload/Job-Losses-and-Program-Cuts-5-10.pdf. Accessed December 5, 2015.

National Association of County & City Health Officials. (2012). *Local Health Department job losses and program cuts: Findings from the January 2012 Survey*. Retrieved from http://www.naccho.org/topics/infrastructure/lhdbudget/upload/Research-Brief-Final.pdf. Accessed December 5, 2015.

State of Tennessee, Department of Health. (2012) *TN forward: Top to bottom review 2012, Chapter 11: Health*. Retrieved from http://www.arts.tn.gov/governor/toptobottom/files/chapters/health.pdf. Accessed December 5, 2015.

SurveyMonkey.com, LLC. Palo Alto, CA. Available from: www.surveymonkey.com.

U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. (2010). *Healthy People 2020*. Washington, DC: Office of Disease Prevention and Health Promotion. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/preparedness. Accessed December 5, 2015.

The Defence Spending - Growth Nexus In Turkey

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Abstract

Due to globalization the power balances change in the form of a new world. In order to continue their freedom against inner and outer threats, countries have spent some of their national income to the military defence although their nation's loss of wealth. Recently, it has been wondered how the portion military defence spending has affected the financial growth. In this research, it will be studied on whether defence spending has a triggering effect on economical development. After dealing with the relationship of defence spending with economic growth on the frame of theory, it is concluded that there has been a two dimensional causality relation between defence spending and growth by analyzing 2006 – 2015 years data in long and short terms.

Keywords: Defence spending, economic growth, Granger causality, unit root, cointegration

Introduction

It is a reality that one of the reason of states is to protect the safety of their countries people and their properties. There are some duties of the state such as inner and outer safety, fairness and the fulfillment of social needs. Therefore, there have been some spending areas of the state like education, health, infrastructural investment and defence.

In the 21st century a great part of state budget has been put aside for defence spending. So higher defence spending in the countries lead to less resources to the other areas except defence spending (Akal et al., 2011).

Whether there is a relationship between defence spending and economic growth has accelerated by Benoit's works in 1973 and it has been the leading one for the other studies. Following this research, the causality relation of these has been searched and many empirical analyses using the data of emerging and developed countries has been done (Turk, 2007).

In this study the relationship between defence spending and growth will be analyzed by using the quarterly data from 2006 to 2015. Here, there are three parts. In the first part, following the literature review, theoretical frame is given. Secondly, the relationship between the defence spending and growth will be taken into the consideration in an econometric approach in the light of data. In the last part all the research will be argued and the necessary suggestions will be proposed.

Theoretical Approach

It is mentioned that there are two different approaches dealing with the effect of defence spending on the growth. One of them is Keynesyen and the other one is neo-classical approach. According to Keynesyen approach defence spending' positive effect on growth relates to positive externalities. The increase in defence spending will rise the capacity and output by the help of multiplier mechanism. In accordance with neo-classical approach, the effect of defence spending on growth is explained by crowding out effect. Increasing the defence spending results in economic shrinkage of the sources using on the process of production. So private investments will be excluded (Aksogan and Elveren, 2012).

Defence spending may affect growth positively both from supply and demand side. From the demand side, possible increase in defence spending will increase the growth. Because the rise in defence spending will decrease unemployment. So, this affects the growth positively by increasing the total demand (Gokbunar and Yanikkaya, 2004).

At the same time, the increasing defence spending will play an important role by providing inner and outer safety. Thus, investors will find the most suitable area. Therefore, the country will be thought as a safe port by the investors. So national and international investment and capitals will be attracted. Following this, the investment and of course capital inflow will increase. The capital inflow to the country will affect the growth positively by conveying the capital directly to the investment. However, if the country is open to external shocks or there exists lack of safety inside and outside, this situation will be risky to the capital owners and investors. As a result, there will be less investment, rise in unemployment, less total demand and drop in production. Finally, this affect the economical growth negatively (Ozbaran, 2004).

From the supply side, it is claimed that there is a positive relationship between the defence spending and economic growth because spending happened on defence industry generally creates various public infrastructural investments. These are mainly airways, communication webs, dams, ways and other transportation webs. Today widely used communication tools like smartphones and aviation tools are the output of science sector and so the

defence industry. Social and economical events will be provided easily by this technology, and they also will accelerate the production of goods and services and so will create a positive effect on growth (Sumer, 2005). At the same time, infrastructural investment will result in developments on education, health and human capital. Therefore, the productivity of final output will increase and so it affects economic growth positively. (Kirbitcioglu, 1998) Together with the increase in defence spending, the countries' R&D activities will rise (Gulmez and Yardimcioglu, 2012). So innovative ideas have appeared in the economy and these innovative ones change into profitable high value added products. By producing these products Reel GDP (Gross Domestic Product) i.e growth increases. The increase in import spending of defence industry bring the importing also the production technique. This gained technology is applied to defence industry and private sectors in production are affected positively and this gives rise in economic growth. (Tuyluoglu and Sarac, 2012)

Classical economists have thought that defence spending are nonproductive and unnecessary. Finally, they claim that it will not affect economic growth positively. They claim that due to increasing defence spending, sources in the area of private consuming, public infrastructure, education and health are wasted. Therefore, growth will be affected negatively (Sumer, 2005).

The literature review about defence spending is given in Table 1. According to some researches there is a causality relation from defence spending towards growth. According to other researches there is a causality relation from economic growth towards defence spending. However in some other researches there hasn't been any causality relation. So nobody has had an agreement between defence spending and economic growth.

Table 1. Literature Review

Author	Methodology and Period	Result
Gokbunar, Yanikkaya (2004)	Panel Data (1980-1997)	It was determined that defence spending have increased investments so affecting growth positively in developing countries. On the other hand, no relationship was found in the developed ones.
Chi-Hung L. and Chiehwen (2008)	Granger Causality (1947-2002)	It was concluded that defence spending is not an evident factor on growth.
Gorkem, Işik (2008)	VAR, Granger Causality (1968-2006)	In Turkey, it is concluded that there is not a relation of causality between defence spending and growth.
Yilanci, Özcan (2010)	Zivot-Andrews Unit Root Test, Gregory-Hansen	There isn't cointegration relation between the

	Cointegration, Toda-Yamamoto Causality (1950-2006)	defence spending and the growth but it is found that there is uni-directional relation of causality from GDP towards defence spending.
Demir (2011)	Spatial Econometrics (2004-2007)	In Turkey it is found that there is statistically significant but negative relationship between military and civil defence spending and growth.
Yurttançikmaz et al. (2012)	ARDL (1965-2008)	In long term it is determined that military spending affects growth positively. In short term it is determined that military spending has statistically significant and positive effect on growth.
Alptekin (2012)	Unit Root Test, Panel Cointegration (1991-2008)	There is a negative effect of defence spending on growth.
Basar, Kunu (2012)	Panel Data (1997-2004)	More defence spending causes less growth. This relation is statistically significant.

The Progress of Defence Spending In Turkey

A country's power is measured by the country's technology but not its wealth. In Turkey, it is found that defence spending-GDP ratio is increasing. Resolution process effect is the main reason of this situation. Personal and ammunition expenditure decreased, however one of the other component, defence industry spending increased. Clearly, Turkey realizes its projects on the field of defence like self weapons, unmanned / manned aerial vehicles, helicopters, ships and tanks after the resolution process which was started in 2004 (Erel, 2010). Together with the rise in defence expenditure, the production in defence industry also increases. The output of the defence industry reduces Turkey's external dependency. So external deficit also decreases. As a result, the balance of payment surplus arises, therefore it affects the economic growth positively (http://evds.tcmb.gov.tr/, 02.01.2016).

Econometric Approach

Model and Data Set

This study investigates the relationship between the defence spending and economic growth. The variables take place in the model are defence spending (DS) and growth (GDP). In the analysis, quarterly data between 2006Q1 – 2015Q3 is used. The data is taken from the Central Bank of the

Republic of Turkey (CBRT) electronic data delivery system. Johansen's cointegration approach is applied in order to determine whether there is a long term relationship between the variables. If there is a cointegration relation, vector error correction model is used to get the short term model.

Table 2. Unit Root Results

	Level (intercept and trend)		First Difference (intercept and trend)	
Variables	ADF Values	Probability	ADF Values	Probability
GDP	-3,317466	0,0805	-2,103126	0,0358
DS	-2,769465	0,2173	-37,42679	0,0000

The used variables GDP and DS are stationary in their first difference, i.e. I (1) as it seen in Table 2.

In Table 3, lag length is found via vector auto regressive (VAR) model. It was seen, according to the Akaike Information and Schwarz Criteria, lag lenght is found as four.

Table 3. Lag Structure

Lags	LogL	LR	FPE	AIC	SC	HQ
0	-1125.262	NA	3.24e+25	64.41495	64.50382	64.44563
1	-1074.282	93.21942	2.21e+24	61.73041	61.99704	61.82245
2	-1069.727	7.808156	2.15e+24	61.69871	62.14310	61.85211
3	-1031.804	60.67765	3.11e+23	59.76022	60.38236	59.97499
4	-1018.572	19.65865*	1.86e+23*	59.23269*****	60.03259*	59.50882*

The lag length found from VAR analysis is used in Johansen Cointegration test given in Table 4.

Table 4. Johansen Cointegration Results

Trace Test	%5 Critical Value	Probability	No. of CE(s)
11.39453	12.32090	0.0711	None
4.475226	4.129906	0.0408	At most 1*
Max-Eigen Statistic	%5 Critical Value	Probability	No. of CE(s)
6.919307	11.22480	0.2566	None
4.475226	4.129906	0.0408	At most 1*

In Table 4, it is obvious that there is at least one cointegration. GDP and DS are not stationary in level so they are going to be stationary by taking first differences. Existing errors can be avoided by Error Correction Model.

Table 5. Error Correction Model (ECM)

Hata düzeltme	D (GSYİH)	D (SH)
cointEq1	-0.156474	0.278958
Standart hata	(0.05063)	(0.04706)
T Hesaplanan Değeri	[-3.09071]	[5.92716]

As seen in Table 5 Error Correction Model results take place there. With the help of data, it is calculated to get the time period that the short term deviations can be avoided to get the long term equilibrium by 1/ECM formula. To find the period and use formula, cointEq1 has to be between 0 – 1 and t value must be it must statistically significant (Tarı,2012). CointEq1 is found as -0.156 and t value is significant (-3.090). It is concluded that short term fluctuations can regain their long term equilibrium approximately in 2(1/0.0156 quarterly period) years. In other words, %16 of short term deviations are avoided in every quarter of the year.

Table 6. Short Term Analysis

Cointegrating Eq:	Coefficient
GDP(-1)	1.000000
DS(-1)	**-10.91107**
	(0.22461)
	[-48.5776]

Short term analysis is seen in Table 6.Due to this, 1 unit TL increasing in the short term defence spending, will increase GDP 10.911TL.

Table 7. Granger Causality Test

Ho	Probability	Decision
DS≠> GDP	0.0006	Reject Ho
GDP ≠> DS	0.0434	Reject Ho

In Table 7 Granger Causality test which applied to Error Correction Model takes place. As seen, it is concluded that there is a bilateral causality relation between defence spending and GDP which is the main topic of this research.

Conclusion

In Turkey, it is believed that after 2006 in defence spending there is a decrease. However, it is not like that. How does this happen like that? The main reason is the defence spending components relocate among each other. After the process of resolution in 2006, expenditure of defence industry and TUBITAK's (The Scientific and Technological Research Council of Turkey) research and development spending are obviously increasing defence spending totally. At the same time in military spending, ammunitions and staff costs decline causes decrease in defence spending. Entirely, with the increase in high value added products Turkey in the field of defence

decreases its external dependency. So balance of payment deficit decreases and this gives rise in growth.

As a result of analysis, it is expressed that Turkey should follow some policies. The illegal terrorist movements which are active in Turkey's economy should be removed. By getting rid of all kinds of phenomenon causing instability, innovative ideas should turn into marketable products by supporting R&D. High budget defence industry spending should be increased. Therefore, hopefully economic growth will be realized by avoiding the dependency to the import.

References:

Akal, Mustafa, Adnan Dogruyol and Kursat Bilisli. Sanghay İsbirliği Orgutu Ve Turkiye-Iran Savunma Harcamalari Nedenselligi Testi. Kirgizistan Celalabat: Uluslararasi Hakemli Sosyal Bilimler Enstitusu E-Dergisi, 2011.

Aksogan, Gul and Adem Yavuz Elveren. Turkiye'de Savunma, Saglık Ve Egitim Harcamalari Ve Gelir Esitsizligi (1970-2008): Ekonometrik Bir Inceleme. Turkiye: Sosyoekonomi 17.17, 2012.

Alptekin, Volkan. Benoit Hipotezi: Secilmis Oecd Ulkeleri Olceginde Panel Veriler Yardimiyla Analizi. Turkiye Celal Bayar Universitesi Sosyal Bilimler Dergisi10/2, 2012.

Basar, Selim and Serkan Serdar Kunu. Savunma Harcamalarinin Iktisadi Buyumeye Etkisi. Turkiye: Sosyal Bilimler Enstitusu Dergisi, 2012.

Can, Erel. Turk Silikon Vadisi Hayata Geciriliyor. Turkiye: http://www.canerel.com.tr/v2/images/publication/Makale1987WEByayin.pdf

Demir, Ayse. Turkiye'de Il Bazında Sivil ve Askeri Savunma Harcamalarinin Ekonomik Buyume Uzerindeki Etkisi: Mekansal Ekonometri Yaklasimi. Turkiye: Afyon Kocatepe Universitesi Sosyal Bilimler Enstitusu Dergisi 2011.

Gokbunar, Ramazan and Halit Yanıkkaya. Savunma Harcamalarini Belirleyen Faktorler Ve Ekonomik Buyumeye Etkileri. Turkiye: Ankara Universitesi SBF Dergisi 59(01), 2004.

Gorkem, Hilal and Serkan Isik. Turkiye'de Savunma Harcamalari Ve Ekonomik Buyüue Arasindaki Iliski. Turkiye: Marmara Universitesi I.I.B.F Dergisi, 2008.

Gulmez, Ahmet, and Fatih Yardimcioglu. OECD Ulkelerinde Ar-Ge Harcamalari ve Ekonomik Büyüme Iliskisi: Panel Esbutunlesme ve Panel Nedensellik Analizi (1990-2010). Turkiye: Maliye Dergisi 163, 2012.

Kirbitcioglu, Aykut. Iktisadi Buyumenin Belirleyicileri ve Yeni Buyume Modellerinde Beseri Sermayenin Yeri. Turkiye: Ankara Universitesi SBF Dergisi 53.(01), 1998.

Ozbaran, M. Hakan. Turkiye'de Kamu Harcamalarinin Son Bes Yilinin Harcama Turlerine Gore Incelenmesi. Turkiye: Sayistay Dergisi 53, 2004.

Selen, Ufuk and Kadir Eryigit. Yapisal kirilmalarin varliginda, Wagner kanunu Turkiye icin gecerli mi. Turkiye: Maliye Dergisi 156, 2009.
Sumer, Kutluk Kagan. Savunma Harcamalarinin Ekonomik Buyume Uzerine Etkisinin İncelenmesi. Turkiye: Guvenlik Stratejileri Dergisi 01, 2005.
Tari, Recep, Ekonometri, Umuttepe Yayinlari, Kocaeli, 2012.
Turk, H. Karahan. Turk Savunma Sanayinin Ekonomik Etkileri ve Savunma Harcamalari-Büyüme Iliskisinin Ekonometrik Modellenmesi. Yuksek Lisans Tezi, 2007.
Tuyluoglu, Sevket And Senay Sarac. Gelismis ve Gelismekte Olan Ulkelerde Inovasyonun Belirleyicileri: Ampirik Bir Analiz. Turkiye: Eskisehir Osmangazi Universitesi İktisadi Ve İdari Bilimler Dergisi 7.(1), 2012.
Yilanci, Veli, and Burcu Özcan. Yapisal Kirilmalar Altinda Turkiye icin Savunma Harcamalari ile GSMH Arasindaki İliskinin Analizi. Turkiye: CU İktisadi ve İdari Bilimler Dergisi 11.(1), 2010.
Yurttancikmaz, Ziya Caglar, Amin Aali, And Omer Selcuk Emsen. Askeri Harcamalar ve Ambargonun Ekonomik Buyumeye Etkileri: Iran Uzerine Bir Uygulama. Ataturk University Journal Of Economics and Administrative Sciences 26.(2), 2012.
http://evds.tcmb.gov.tr/, 02/01/2016

The Relationship Between Export And Economic Growth In Turkey

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Abstract

Turkish economy has joined globalization after the year 1980 by abandoning the imported substitution growth strategy and adopting an economic growth strategy towards exportation. In this paper, the relationship between export and growth will be handled through a theoretic and Turkish economy framework. Then the existence of a relationship between export and growth in the Turkish economy will be shown through a cointegration analysis and Granger causality test using quarterly data between years 2006-2015. It is found that, in the relationship between export and growth, there is a unidirectional causality from total export towards growth and no causality relation is found between total import and economic growth.

Keywords: Export, Economic Growth, Turkish Economy, Cointegration, Granger Causality

Introduction

Economic growth is one of the indispensable elements for economic study and is influenced by many channels. Economic growth takes place when a country's real GDP increases in time and it is seen as an important indicator of welfare. It puts forward the economic structure of a country, GDP per capita and that country's development level (Takım, 2010).

Looking at the types of economic growth, it can be seperated into five groups; unemployed growth, relentless growth, quiet growth, rootless growth and futureless growth. Due to a move towards adopting structural reforms especially after 2001, unemployed growth came about in the Turkish economy. This is often referred to as "jobless growth" in literature. Jobless growth is referred to a situation where unemployment increases in spite of a sufficient growth in the economy. Failure to fairly distribute economic growth between the stakeholders is defined as relentless growth. Quiet growth can said to be the economic growth in the situation of failures in the

democratization process and when there is lack of individual rights and freedom. Degeneration of society's customs and traditions during the growth process is referred to as rootless growth in literature. The growth that occurs often at the expense of consuming the non-renewable natural sources in order for the economic growth to take place is called futureless growth. (Berber, 2011)

Increasing unemployment rate alongside the increasing economic growth in Turkey in the past fifteen years supports the jobless growth. While this economic growth was taking place in the past fifteen years a national bourgeoisie and an elite class was formed in Turkey. This may suggest a movement towards a relentless growth. It is not possible to talk of a futureless growth in Turkey because it does not have the sufficient technology to process most of its natural resources. Consequently, resources stays as raw materials and waits for its use.

From past until present aspects such as; population, wages, human and physical capital, savings and interest level, exports and imports as well as natural sources and technology have been considered as determinants of economic growth. (Ozel, 2012:63-73)

While mercantilists defend that economic growth will be achieved by increasing export through foreing trade mechanisms, keeping import limited to just raw materials and intermediate goods, and accumulating gold and bullions in the economy, the physiocrats expressed that agriculture is the only productive industry and they argued that export of agricultural products will bring about the growth. In the classical school; Adam Smiths theory of absolute advantage and David Ricardo's theory of comparative advantage both argue that with foreign trade being free, countries all around the World would maximise their own interests and an economic growth will take place as the welfare of all the countries throughout the world would increase. (Bilgili, 2015: 10 - 105)

There has been great changes in the understanding of growth and economy management with the 1929 World economic crisis, government's effect in the economy has increased. As this understanding started to lose its popularity in 1960 with the approach of supply sided economists, the government interventions started to decrease. In this period an import substitution industrialization strategy was adopted and an import based growth was aimed. In other words; achieving an economic growth was aimed by purchasing intermediate and investment goods from other countries and selling them to foreign markets after processing them. (Yardımcı, 2006)

Looking at the World in general; After World War II, four countries known as the Asian Tigers (Singapore, Taiwan, Hong Kong and Korea) showed the advantages of adopting an externally open trade policy while around the same period Latin American countries demonstrated the

disadvantages of adopting externally closed economic structures. Institutions which provide short and long term debts such as IMF and the World Bank provides these long or short term funds as long as the requirements are fulfilled. This provides basis for countries'economic growth and welfare. (Özcan and Özçelebi, 2013)

Turkey who had adopted an import- substitution strategy until 1980 is currently adopting an industrialization strategy towards exportation. Capital movements were released to avoid currency bottlenecks in the country, but export was given extreme importance believing that the most healthy foreign exchange inflows would be from export earnings. (Seyidoglu, 2014) Considering Turkey's economic structure for the period, currency acquired through capital inflows iis open to speculations and sudden shocks and therefore is perceived as unhealthy foreign exchange inflow.

In the 90's to increase exports, direct loans and incentives for exports were eliminated and instead inward and outward processing mechanisms according to the European Union customs code were introduced and state aid programs, prepared according to internatonal standards, for export were activated. (Boratav, 2013)

Devaluation was made in the 2001 economic crisis to increase net exports, thereby currency inflow to the country was aimed by limiting domestic demand and directing firms towards exportation. The increase in export had shown itself in 2002 as well. The country's economy has entered into a rapid recovery. Export strategic plan was put into force on 1 January 2004 in order to bring the important increase in export to a sustainable structure. Industrial products which are the main dynamo of exports reached levels of 84.8% and the total exports for the period became 73.5 billion dollars. With the implementation of this plan, in 2007 a 25% increase came about and it brought it up to 107 billion dollars. Exports were managed to increase to 132 billion dollars in 2008. (Takım, 2010)

In the first quarter of 2009, Turkey had started feeling the effects of the global economic crisis and had difficulty finding credit. Although Central Bank of the Republic of Turkey increased interest rates as of that period, no increase in the capital inflows were observed. (http://evds.tcmb.gov.tr/ , 03.01.2016) This was because EU countries and USA were in economic crisis themselves and their financing needs were greater. Consequently there were no capital inflows to Turkey. As a result, exchange rates increased. However, the increase in the foreign exchange rate not only did not increase export but also made imports more expensive. Narrowing foreign trade volume of all the countries trading with the USA can be given as the main reason for the non increasing exportation. The demand for imported goods have also decreased for Turkey from all those countries importing. Therefore

Turkey's export volume narrowed. Lack of export had caused the outputs to be directed towards domestic markets but due to insufficient demand in the domestic market led the general level of the prices to decrease. Thus, production and employment has decreased and economic growth is affected negatively. (Ertugrul, Ipek ve Colak, 2010)

Literature

From Table 1 it can be seen that; in some research there is a causality relationship from export towards economic growth; (Sandalcılar, 2012; Takım, 2010; Özcan and Özçelebi), in others a causality relationship from economic growth towards exportation; (Demirhan, 2005; Aktaş, 2009) and some showed a double way causality relationship (Yapraklı: 2007).

Table 1. Literature Review

Author	Method and Period	Results
Demirhan (2005)	Johansen (1988) Cointegration, Granger Causality (1990Q1 – 2004Q1)	One way causality relationship was found from export towards growth.
Sandalcılar (2012)	Pedroni Panel Cointegration Test, Causality	It was concluded that the short and long term causality relationship was from export towards growth.
Takım (2010)	Granger Causality (1975 - 2008)	It was found that export increases economic growth.
Aktaş (2009)	Johansen Cointegration, ADF, Causality (1996 -2006)	It was concluded that a causality bond exist from growth towards exportation..
Özcan ve Özçelebi (2013)	Johansen Cointegration (2005(1)- 2011(11)	Export-led growth hypothesis is supported.
Yapraklı (2007)	Cointegration, Granger Causality (1970-2005)	It was conclluded that there is a double way causality relationship and that agriculture and mining export positively affects economic growth.
Gemi, Emsen ve Değer (2008)	Granger Causality Test (1980-2006)	It was concluded that the impact of exports on growth depends on the imports.
Çamurdan (2013)	Cointegration, Granger Causality Test (1999Q2-2013Q1	It points out that growth depends on exports and exports depends on imports.

Empirical Analysis

Unit root results for the variables are seen from the Table 2.

Table 2. Unit Root Results

Level (constant and trends)			First Differencial (constant and trends)	
Variables	ADF Values	Probability Values	ADF Values	Probability Values
GDP (Y1)	-3.3143	0.0729	-2.4909	0.0134
Total imports (X1)	-1.053	0.9285	-3.8425	0.0002
Total Exports (X2)	-0.5076	0.9809	-4.3235	0.0000
Intermediate Good Imports (X3)	-1.7963	0.6959	-6.5772	0.0000
Intermediate Good Exports (X4)	-1.0480	0.9299	-4.1599	0.0001
Capital Goods Exports (X5)	-1.9328	0.6263	-4.8205	0.0000
Concumer Goods Exports (X6)	-1.4932	0.8222	-2.4046	0.0167
Consumer Goods Imports (X7)	-1.3919	0.8543	-4.6734	0.0000

The concept of stability is of great importance in time series analysis. If the time series average and varience does not change over time and the calculated covarience between the two periods is not related to the current period but to the distance between the two periods, then it is stable. Augmented Dickey Fuller Test is used to conduct the unit root test in the study. Variables were integrated on the first difference level. In other words, in 5% significance variables are I (1). As it can be seen from Table 2, in levels, Y1, X1, X2, X3, X4, X5, X6 and X7 variables include a unit root. After the ADF unit root test, lag length of the analysis can be determined.

Table 3. Lag Length Measurement Through Var Analysis

Lag	LogL	LR	FPE	AIC	SC	HQ
0	644.08	NA	7.84e-19	-18.98739	-18.72414	-18.88322
1	937.82	508.56	8.35e-22	-25.84519	-23.47597 *	-24.90769
2	1063.15	187.07	1.45e-22	-27.67626	-23.20106	-25.90542
3	1184.09	151.63	3.27e-23	-29.37585	-22.79467	-26.77166
4	**1291.68**	**109.195***	**1.39e-23***	**-30.67701***	**-21.98986**	**-27.23948***

The most appropriate lag length chosen was seen as four. As it can be seen from the results of the Var analysis lag length measurement, values of variables Y1, X1, X2, X3, X4, X5, X6 and X7 were found to have a relationship with their values from four periods lag. The chosen lag length will be used in the Johansen Cointegration test.

Table 4. Johansen Cointegration Results

Trace Test	%5 Critical Value	Probability Value	Cointegration Number
328.7403	159.5297	0.0000	None*
224.3646	125.6154	0.0000	At Most 1*
157.1775	95.75366	0.0000	At Most 2*
94.71570	69.81889	0.0002	At Most 3*
59.45682	47.85613	0.0028	At Most 4*
28.86110	29.79707	0.0638	At Most 5
14.26540	15.49471	0.0759	At Most 6
0.257442	3.841466	0.6119	At Most 7

Max-Eigen Statistic	%5 Critical Value	Probability Value	Cointegration Number
104.3757	52.36261	0.000	None*
67.18707	46.23142	0.001	At Most 1*
62.46179	40.07757	0.000	At Most 2*
35.25887	33.87687	0.0340	At Most 3*
30.59572	27.58434	0.0199	At Most 4*
14.59570	21.13162	0.3182	At Most 5
14.00796	14.26460	0.0548	At Most 6
0.257442	3.841466	0.6119	At Most 7

There are cointegration between the variables according to Table 4. There happens errors in the short term. These errors were avoided with the Error Correction Model (ECM).

Table 5. Error Correction Model (ECM)

Error Correction	D(Y1)	D(X1)	D(X2)	D(X3)	D(X4)	D(X5)	D(X6)	D(X7)
cointEq1	-0.418*	-0.893	-0.857	-1.001	-0.929	-0.353	-0.745	-0.281
S- errors	0.089	0.302	0.210	0.303	0.272	0.402	0.222	0.384
t values	-4.689*	-2.953	-4.077	-3.299	-3.417	-0.878	-3.346	-0.733

Error Correction Model results can be seen in Table 5. With these data, within how many periods the deviations from the long term within the short term is shown to come to equilibrium again can be found using the formula $\frac{1}{ECM}$. Error correction coefficient value should be in the range 0 to -1 in order to be significant(Tarı, 2012: 435). When looking at data from Table 5, error correction coeffcent is seen to be -0.418074 whih falls between the 0 and -1 range. The t statistic is also significant. Relative result of the expression $\frac{\mathbf{1}}{\left|\mathbf{-0.418074}\right.}$ equals to 2 quarter periods. Therefore, through this model it could be concluded that the short term fluctuations can be restored into their long term balance within a time frame of 8 months. In other words, in the short term fluctuations from the long term balance can be restored closer to its long term balance by 42% per quarter period.

Table 6. Short Term Analysis

Cointegrating Eq:	CointEq1
Y1	1.000000
X1	-0.024477
X2	13.49277
X3	-0.243362
X4	-6.358784
X5	-0.959403
X6	-6.222110
X7	-0.091174

In the short term, every TL increase respectively in X1, X2, X3, X4, X5, X6 and X7 will increase GDP to 0.024477 TL, 13.49277 TL, 0.243362 TL, 6.358784 TL, 0.959403 TL, 6.222110 TL, 0.091174 TL respectively.

In Table 7, Granger causality test results which are applied to the error correction model can be found. As it can be seen, related to the relationship beween total export and GDP which is the main topic of the study; a unidirectional causality relationship was found from total export towards growth and no causality relationship was detected between total import and GDP. The result of including both the total exports and total imports item components (capital goods export, intermediate goods import, intermediate goods export, consumer goods export, consumer goods import) of the Turkish economy to the analysis is; consumer goods positively effect

economic growth and there is a unidirectional causality from consumer goods export towards economic growth.

Table 7. Granger Causality Test

Ho	Probability	Decision
X6 ≠> Y1	0.0008	Reject Ho*
X5 ≠> Y1	0.0113	Reject Ho*
X3 ≠ >Y1	0.0001	Reject Ho*
Y1 ≠> X3	0.0133	Reject Ho*
X2 ≠> Y1	0.0129	Reject Ho*
X7 ≠> X6	0.0008	Reject Ho*
X5 ≠>X7	0.0255	Reject Ho*
X7 ≠>X5	0.0101	Reject Ho*
X7≠> X4	0.0232	Reject Ho*
X5 ≠> X6	0.0004	Reject Ho*
X4 ≠>X6	0.0109	Reject Ho*
X6 ≠>X4	0.0028	Reject Ho*
X3 ≠> X6	0.0003	Reject Ho*
X6 ≠> X3	0.0102	Reject Ho*
X2 ≠> X6	0.0065	Reject Ho*
X6 ≠> X1	0.0008	Reject Ho*
X5 ≠> X4	0.0054	Reject Ho*
X5 ≠> X3	0.0015	Reject Ho*
X5 ≠> X2	0.0473	Reject Ho*
X5 ≠>X1	0.0002	Reject Ho*
X3 ≠> X4	0.0442	Reject Ho*
X2 ≠> X4	0.0018	Reject Ho*
X3 ≠> X1	0.0129	Reject Ho*

It was seen that there was no causality relationship between consumer goods import and economic growth. A two way causality relationship was found between intermediate goods import and economic growth. However, no relationship was discovered between intermediate goods export and economic growth. Lastly, a one way causality relationship was seen from capital goods export towards economic growth.

Conclusion

Turkey was observed to be in an interaction with foreign markets as other economies where foreign trade is inevitable due to globalization. By using 2006-2015 quarterly data, it was concluded that export – led economic growth strategy was also valid for the Turkish economy. A unidirectional causality relationship from total export towards economic growth was found as a result of the causality test conducted. Also through the results it was found that there were no causality relationship between import and economic growth. In other words, it could be concluded that, the increase in export between the years 2006-2015 in the Turkish economy increased the

economic growth but the increase in the economic growth did not increase the exportation.

In the light of these findings the following could be said about the Turkish economy. It is a developing country where there are; not enough human capital and technology, abundant reserves of natural sources which are subject to export without being processed, and more exported consumer goods and imported intermediate goods. It was concluded that the exported goods were generally consumer goods and this had an important role in the country's economic growth. As Turkey imports intermediate goods, it increases its economic growth and this increase in economic growth leads to more intermediate goods import. It was found that Turkey exports limited number of consumer goods which also has a considerable amount of effect on the economic growth. Taking the current economic structure of the Turkish economy in consideration, it is believed that if Turkey imports the intermediate goods, convert them into final consumer goods and then exports them, it can bring about an economic growth.

References:

Aktas, Cengiz. Turkiye'nin ihracat, ithalat ve ekonomik buyume arasindaki nedensellik analizi. Turkiye: Kocaeli Universitesi Sosyal Bilimler Enstitusu Dergisi (18) 2009.

Berber, Metin. (2011). Iktisadi Buyume Ve Kalkinma. Trabzon: Derya Kitabevi.

Bilgili, Yuksel. (2015). Karsilastirmali Iktisat Okullari. Ankara: Ikinci Sayfa Yayinlari.

Boratav, Korkut. (2013). Turkiye Iktisat Tarihi 1908-2009. Ankara: Imge Kitapevi.

Camurdan, Burak. Turkiyede 1999-2013 Donemi Icin Ihracat, Ithalat ve Ekonomik Buyume Arasindaki Nedensellik Iliskisi. Nwsa: Social Sciences 8.(4) 2013.

Demirhan, Erdal. Buyume ve ihracat arasindaki nedensellik iliskisi: Turkiye ornegi. Ankara Universitesi SBF Dergisi 60.(4) 2005.

Erim, Nese. (2011). Iktisadi Dusunce Tarihi. Kocaeli: Umuttepe Yayinlari.

Ertugrul, Cemil, Evren Ipek, And Olcay Colak. Kuresel Mali Krizin Turkiye Ekonomisine Etkileri. Akademik Fener Dergisi 2010.

Ozcan, Burcu, And Oguzhan Ozcelebi. Ihracata Dayali Buyume Hipotezi Turkiye Icin Gecerli Mi? Yonetim Ve Ekonomi: Celal Bayar Universitesi Iktisadi Ve Idari Bilimler Fakultesi Dergisi 20.(1) 2013).

Ozel, Hasan Alp. Theoretical grounds of economic growth/Ekonomik buyumenin teorik temelleri. Cankiri Karatekin Universitesi Iktisadi ve Idari Bilimler Fakultesi Dergisi 2.(1) (2012)

Gerni, Cevat, O. Selcuk Emsen, and M. K. Deger. Ithalata Dayali Ihracat ve Ekonomik Buyume: 1980-2006 Turkiye Deneyimi. Dokuz Eylul Universitesi 2. 2008.
Sandalcilar, Ali Riza. Bric Ulkelerinde Ekonomik Buyume ve Ihracat Arasindaki Iliski: Panel Esbutunlesme ve Panel Nedensellik. Suleyman Demirel Universitesi Iktisadi ve Idari Bilimler Fakultesi Dergisi 17.(1) 2012.
Senol, Coskun. Turkiye'nin Ihracati Uzerine Bir Degerlendirme. Gumruk Dunyasi Dergisi 54. 2007.
Seyidoglu, Halil. (2014). Uluslararasi Iktisat Teori Politika ve Uygulama, Istanbul: Guzem Yayinlari.
Takim, Abdullah. Turkiye'de GSYIH ile Ihracat Arasindaki Iliski: Granger Nedensellik Testi/The Relationship Between GDP and Exports in Turkey: Granger Causality Test. Ataturk Universitesi Sosyal Bilimler Enstitusu Dergisi 14.(2) 2010.
Tari, Recep. (2012) Ekonometri, Umuttepe Yayinlari, Kocaeli.
Yaprakli, Sevda. Ihracat ile ekonomik buyume arasindaki nedensellik: Turkiye uzerine ekonometrik bir analiz. ODTU Gelisme Dergisi 34. 2007.
Yardimci, Pinar. Icsel Buyume Modelleri Ve Turkiye Ekonomisinde Icsel Buyumenin Dinamikleri. Selcuk Universitesi Karaman Iktisadi Ve Idari Bilimler Fakultesi Dergisi, 2006.
(http://evds.tcmb.gov.tr/ 03.01.2016)

Efficiency Analysis Of Non-Life Insurance Companies In Terms Of Underwriting Process With Data Envelopment Analysis

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Abstract

Efficiency analysis with DEA, attract quite few attention in finance sector. In literature all over performance of companies examined in general. However analysis of the activities performances carried out by the company can be researched with data envelopment analysis. In this paper, in order to analyze the effectiveness of underwriting processes for insurance companies primarily inputs and outputs are determined. These input and output variables were obtained from annual reports of the 12 insurance companies operating in Turkey. Efficiency analysis were made by using models of CCR and BCC with utilizing EMS program. Thus, according to both models efficient and inefficient companies were determined. In addition, scale efficiencies of insurance companies which were evaluated were also examined. Finally, by using specific input and output variables analysis of insurance companies which has been developed to see performance of companies relative to single activity.

Keywords: Data Envelopment Analysis, Insurance, Efficiency, Underwriting

Introduction

Insurance can be defined from the viewpoint of several disciplines. For instance the Commission on Insurance Terminology of the American Risk and Insurance Association has defined insurance as follows. Insurance is the pooling fortuitous losses by transfer of such risks to insurers, who agree to indemnify insureds for such losses, to provide other pecuniary benefits on their occurrence, or to render services connected with risks (Rejda, 2008: 19). Here the concept of pooling means putting people who

have the same risk sharing the losses by the entire group. Fortuitous refers to an unforeseen and unexpected way revealed in the concept of loss. Another important concept in definition is the transfer of risk. Pure risk is transferred from the insured to the insurer, which is in a stronger financial position. Insurance is a complicated mechanism so it is consequently difficult to define. However in simple terms it has two fundamental characteristics. First of all this mechanism transfers or shifts risk from one individual to a group, secondly it shares losses on some equitable basis, by all members of group (Vaughan & Vaughan, 2013: 34).

According to the definition of insurance, risks are undertaken with premiums collected by individuals that are exposed to the same risk. In the case of losses in order to compensate the loss insurance companies have to put aside technical reserves and commentate underwriting process carefully. Therefore underwriting process is crucial for insurance companies.

Underwriting is the function of evaluating the subject of insurance which will be person, property, profession, business, or other entity determining whether to insure it. The underwriter must apply company standards to each applicant and based on these standards, ascertain whether the application represents an acceptable risk ("Insurance Underwriting", 2001: 4). However in practice companies do accept risks that have different risk profile but the acceptance of those risks is done under different conditions, like charging an extra premium, applying exclusions (Macedo, 2009: 1). Consequently, while assessment of risks some factors are considered. For instance, in life insurance policies age, sex, health history, financial condition, personal habits may include as a factor in the underwriting process whereas type, value of property, construction materials, potential hazards, security measures in non-life insurance policies.

Brockett, Cooper, Golden, Rousseau & Wang (2004) examined the efficiency of insurance companies by using solvency, claims payment ability and return on investment as outputs via data envelopment analysis. As a result the effect of solvency on efficiency was shown. Hwang & Kao (2006) applied the model that measuring managerial efficiencies in two sub-processes independently by Seiford & Zhu (1999) to 24 non-life insurance companies. In first stage performance was measured by marketability whereas in second stage performance was measured by profitability. Wu, Yang, Vela & Liang (2007) put Hwang & Kao (2006) paper to next stage by developing simultaneously assessing both production and investment performance of insurers. Lin, Yang & Liou (2007) evaluate non-life insurance companies in Taiwan in terms of service innovation via data envelopment analysis. Writers tried to see how efficiencies change with the innovation of e-commerce in insurance industry. Eventually when e-commerce applied there wasn't significant change in efficiency scores.

Similarly with the Hwang & Kao (2006), again Kao & Hwang (2008) proposed a modified conventional model which consider whole process as two relational stage. But this model is more reliable in measuring efficiency and is capable of identifying the cause of inefficiency more accurately. Chen, Cook, Li & Zhu (2009) said that the model which is proposed by Hwang & Kao (2006) has a major drawback because of applicability to only constant returns to scale (CRS) situations. Therefore Chen et al. developed an additive decomposition approach that involves overall efficiency based on weighted sum of stages. Wu & Zeng (2011) calculated technical, pure technical, scale and super efficiency by using LİNDO software and SAS software on behalf of supplying a tool for comparing in the field of economic management. They evaluate life insurance companies in China. Consequently the importance of underwriting quality, service awareness and business structure was stated. Huang & Eling (2013) analyzed non-life insurance companies in Brazil, Russia, India and China in order to captures cross-cultural differences such as political and economic environment. As a result they found out that environment affects the efficiency of non-life insurers. Zimková (2015) extends the radial DEA models to non-radial model (SBM) and super efficiency model. These models was applied in 13 Slovak insurance companies. The recent study of Biener, Eling & Wirfs (2016) analyzed Swiss insurance companies in the life, property/ casualty and reinsurance sector in terms of productivity and efficiency by means DEA. In this paper unbalanced panel dataset was used which covers the period of 1997-2013. The results of this study validated and help to better understand the determinants of productivity in insurance sector.

Insurance Sector in Turkey

Foreign subsidiaries are dominated in insurance sector in Turkey. The first insurance company which has only domestic capital was established in republic period. Afterwards, on favor of economic developments the number of insurance companies has increased (Turgutlu, Kök & Kasman, 2007: 89). In the sector as of 2014, 63 insurance, pension and reinsurance companies have been operating, of which 38 are non-life insurance, 5 are life insurance and 19 are pension and one is reinsurance companies. Table 1 shows the market shares of insurance sector in terms premium production in Turkey. It is obvious that non-life insurance companies is the major part of insurance sector. In addition over the years the percentage of market share in non-life insurance gained strength.

Table 1: Market Shares of Life and Non-Life Insurance Sector (%)

Market Share	2010	2011	2012	2013	2014	2015
Non-Life	84.56	84.35	86.33	85.99	87.4	87.9
Life	15.44	15.65	13.67	14.01	12.6	12.1
Total	100.00	100.00	100.00	100.00	100.00	100.00

Data Envelopment Analysis (DEA)

The DEA technique has been developed to analyze questions of general substitutability between outputs and inputs. This method is a distribution free (non-parametric) in which efficiency frontier is determined by the data (Bates, Baines & Whynes, 1996: 1443). DEA was described as a non-parametric frontier method that uses linear programming techniques to discover the frontier firms and construct a convex piece-wise linear surface or frontier over these firms by Diacon, Starkey & O'Brien (2002).

DEA was suggested by Charnes, Cooper & Rhodes in 1978, then Banker, Charnes & Cooper proposed a modified DEA model in 1984. With the help of these suggested models performance can be evaluated. Evaluated units which has common inputs and outputs is called Decision Making Units (DMU). By means of DEA relative efficiency of each DMU's can be calculated in order to make a comparison. As a result, this method provides also reference units for inefficient ones. A reference unit is traditionally found in DEA by projecting the inefficient DMU radially to the efficient surface (Korhonen, 1997: 1).

There are three main phases carrying out an efficiency study by means of DEA are the following (Golany & Roll, 1989: 238):

- Definition and selection of DMU to enter the analysis.
- Determination of input and output variables which are relevant and suitable for assessing the relative efficiency of DMU's.
- Application of the DEA models and analysis outcomes.

The advantage of DEA is that this method is applicable for all types of data as inputs and outputs. Therefore data based on various scales can be used on behalf of calculating efficiencies. However the number of DMU's should be at least three times the total number of inputs and outputs (Paradi, Yang & Zhu, 2011: 325).

$$n \geq \max \{m*s, 3*(m+s)\} \quad (1)$$

n = The number of DMU's
m = The number of input
s = The number of output

DEA Models

The two main DEA models are CCR proposed by Charnes et al. and BCC developed by Banker et al.. These models provide a variety of ways of assessing the efficiency of DMU's in order to improve the planning and control of these activities (Charnes et al., 1978: 443). CCR and BCC can be generated as input oriented or output oriented. Input oriented model specifies the most appropriate values of inputs in order to product the most efficient value of outputs, whereas in output oriented model vice versa. In other words, input orientation means that DMU is not efficient if it is possible to decrease any input without augmenting any other input and without decreasing any output (Charnes, Cooper & Rhodes, 1981: 669). In this study input oriented model will be considered.

The model that Charnes et al. (1978) was proposed consider constant return to scale (CRS) while evaluating the efficiencies. Input oriented CRS model can be seen as below (Charnes et al., 1978: 430):

$$\text{Max } h_0 = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \tag{2}$$

$$\frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_r x_{ij}} \leq 1; \quad j = 1, 2,..., n$$

$$u_r, v_i \geq 0; \qquad r = 1, 2,..., s; \quad i = 1, 2,..., m$$

Here the y_{rj}, x_{ij} are the known outputs and inputs of the j^{th} DMU. u_r, v_i are the weights of respectively output and input variables. The objective function measure efficiency of each DMU by obtaining the maximum ratio of weighted outputs to weighted inputs. So as to make the input oriented model more simple and soluble non-linear type replace with primal linear model (Ray, 2004: 30).

$$\text{Max } h_0 = \sum_{r=1}^{s} u_r y_{r0} \tag{3}$$

$$\sum_{i=1}^{m} v_i x_{i0} = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_r x_{ij} \leq 0 \quad j = 1, 2,..., n$$

$$u_r, v_i \geq 0; \qquad r = 1, 2,..., s; \quad i = 1, 2,..., m$$

Obtained efficient DMU will be references to inefficient units. In order to determine efficient reference sets dual CRS model can also be utilized

(Cooper, Seiford & Zhu, 2011: 9). The dual model of CRS can be seen as below:

$$\theta^* = \text{Min } \theta_0$$

$$\sum_{j=1}^{n} x_{ij}\lambda_{ij} \le \theta x_{i0} \quad \text{i = 1, 2,..., m} \qquad (4)$$

$$\sum_{j=1}^{n} y_{rj}\lambda_j \ge y_{r0} \quad \text{r = 1, 2,..., s}$$

$$\lambda_j \ge 0 \qquad \text{j = 1, 2,..., n}$$

Primal model in Eq. (3) refers to as the envelopment form, whereas the dual model in Eq. (4) is the multiplier form (Charnes, Cooper, Lewin & Seiford, 1994: 26). In equity (4) λ_j is the weight of j^{th} DMU. Because of this model is a constant returns to scale $\lambda_j \ge 0$. θ_0 refers to the total efficiency score which should be 1 if DMU is efficient.

The model that explained above considers total efficiency which is composed by technical and scale efficiency. Therefore in order to see why DMU is inefficient technical and also scale efficiency score should be calculated. At this point another model which is called BCC or Variable Returns to Scale (VRS) point out (Banker et al, 1984: 1085).

$$\text{Max } h_0 = \sum_{r=1}^{s} u_r y_{r0} - u_0 \qquad (5)$$

$$\sum_{i=1}^{m} v_i x_{i0} = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} - u_0 - \sum_{i=1}^{m} v_r x_{ij} \le 0$$

$$\text{j = 1, 2,..., n} \qquad u_r, v_i \ge 0; \qquad \text{r = 1, 2,..., s;} \quad \text{i = 1, 2,..., m}$$

In this primal BCC model u_0 specifies whether returns to scale is increasing or decreasing. The dual BCC model is expressed as (Cooper, Seiford & Tone, 2007: 91):

$$\theta^* = \text{Min } \theta_B$$

$$\sum_{j=1}^{n} x_{ij}\lambda_{ij} \le \theta x_{i0} \quad \text{i = 1, 2,..., m} \qquad (6)$$

$$\sum_{j=1}^{n} y_{rj}\lambda_j \ge y_{r0} \quad \text{r = 1, 2,..., s}$$

$$e\lambda_j = 1 \qquad \text{j = 1, 2,..., n}$$

$$\lambda_j \ge 0$$

As it can be seen above the only difference of BCC model from CCR model is the constraint of being convex. In DEA literature dual models of these two is utilized as primal models (Cooper et al., 2007: 91).

If any DMU is efficient according to BCC model, it isn't possible to say DMU is also efficient as to CCR model exactly. However in addition to BCC model, if scale efficiency is exist, it can be said that DMU is efficient precisely in terms of CCR model (Coelli, 1996: 18). The calculation of scale efficiency is shown as:

$$\text{Scale Efficiency} = \frac{Q_{CCR}}{Q_{BCC}} \tag{7}$$

Determining Inputs and Output Variables

In DEA literature generally production and intermediary approach are used so as to compare units. But these approaches evaluate the general performance of each DMU. Because of taking main sources as inputs, performances can be evaluated in terms of production. The production approach treats insurers as institutions that provide various products and services to their customers. Therefore they collect premiums from clients and redistribute most of the funds to those policyholders who sustain losses (Yang, 2006: 913). In the literature the most common output variables used for risk pooling/bearing services are either premiums or the present value of losses incurred (Huang & Eling, 2013: 581). In addition labor expenses, equity capital and debt capital are generally considered as inputs (Cummins, Misas & Zi, 2004: 3131).

This study differentiates in determining input and output from the other studies that generally use the same input and output variables. While determining input and output variables decision makers should focus on the activity that are going to inspect. Since underwriting process will be evaluated, net written premiums, the number of policies, claim paid and insurance technical provisions are used as inputs and outputs. In simple way insurers take premiums from their clients in order to pay incurred losses. In addition insurance companies have to consider all insured people whether they will face losses or not. Therefore so as to recompense all unforeseen losses undertaken insurers put aside insurance technical provisions. Consequently while incurred losses consist of policies that insurers undertaken, insurance technical provisions show the power of written premiums. As a result, the number of policies and written premiums are input variables, whereas insurance technical provisions and losses paid are output variables.

The Performance Analysis of Non-life insurance Companies in terms of Underwriting

In this study 12 non-life insurance companies operated in Turkey was taken as DMU in order to evaluate their performance in terms of underwriting process. 12 companies that are determined constitute 68.73 % market share of non-life insurance sector in terms of premium production in Turkey. On account of comparison between years (2010-2014) period was used. Input and output variables were taken from financial reports of insurance companies. Although there are lots of DEA models, CCR, BCC and scale efficiencies were calculated in order to determine the cause of inefficiencies. Table 2 shows the result of efficiency scores based on constant returns to scale.

Table 2: CCR Efficiency Scores (%) (2010-2014)

DMU	2010	2011	2012	2013	2014	Average	Ranking
DMU1	76.08	76.14	96.52	100.00	100.00	89.75	4
DMU2	78.46	67.52	85.00	74.64	72.18	75.56	8
DMU3	78.70	78.84	97.74	100.00	100.00	91.06	3
DMU4	72.85	68.15	61.11	28.06	53.46	56.73	11
DMU5	82.51	63.75	63.76	60.00	71.50	68.30	10
DMU6	74.68	74.91	77.80	76.84	78.34	76.51	7
DMU7	74.47	77.25	73.19	75.38	87.62	77.58	6
DMU8	53.80	40.43	42.19	35.82	41.56	42.76	12
DMU9	85.22	81.63	92.17	75.14	65.91	80.01	5
DMU10	79.17	82.90	66.26	65.60	67.53	72.29	9
DMU11	86.30	100.00	100.00	100.00	100.00	97.26	2
DMU12	100.00	100.00	100.00	100.00	97.67	99.53	1

As it can be seen from Table 2, the average of all DMU's CCR efficiency scores (total efficiency scores) cannot reach 100%. The least efficient insurance company is DMU8 while the most efficient one is DMU12 as of average efficiency scores. In 2010 only one insurance company was efficient. In year 2011 and 2012 DMU11 was also efficient. Although two more insurance company were efficient in 2013, the most of them remained same in terms of underwriting process. In last term three insurance companies (DMU1, DMU3, DMU11) were efficient. As a result with the help of efficiency scores managers or decision makers can easily notice the situation of company among the others in sector.

Table 3: BCC Efficiency Scores (%) (2010-2014)

DMU	2010	2011	2012	2013	2014	Average	Ranking
DMU1	100.00	100.00	100.00	100.00	100.00	100.00	1
DMU2	81.23	73.92	86.09	74.97	72.29	77.7	6
DMU3	100.00	100.00	100.00	100.00	100.00	100.00	1
DMU4	82.49	80.74	66.01	32.90	100.00	72.43	8
DMU5	86.68	69.97	66.20	62.19	87.16	74.44	7
DMU6	78.83	78.19	79.27	79.48	95.61	82.28	4
DMU7	78.83	86.64	74.71	76.01	87.73	80.78	5

BCC Efficiency Scores (%) (2010-2014) (Continued)

DMU8	59.73	45.23	45.88	38.40	51.27	48.10	9
DMU9	100.00	100.00	100.00	100.00	100.00	100.00	1
DMU10	85.20	90.75	70.72	70.11	100.00	83.36	3
DMU11	90.27	100.00	100.00	100.00	100.00	98.05	2
DMU12	100.00	100.00	100.00	100.00	100.00	100.00	1

In Table 3, BCC efficiency score are shown. In literature BCC efficiency scores are called as technical or pure technical scores. This score is consisted of CCR efficiency scores, therefore the number of technical efficient companies is higher than the number of total efficient companies. DMU1, DMU3, DMU9, DMU12 are the most efficient insurers, whereas DMU8 is an inefficient insurance company among the others. In addition DMU1, DMU3 and DMU9, DMU12 have shown a stable performance in terms of underwriting between the years 2010-2014. The number of efficient insurance companies increased within 5 years. In the beginning of period 4 insurers are efficient, whereas in the year 2014 7 insurance companies reached 100% efficiency.

Table 4: Scale Efficiency Scores (%) (2010-2014)

DMU	2010	2011	2012	2013	2014	Average	Ranking
DMU1	76.08	76.14	96.52	100.00	100.00	89.75	8
DMU2	96.59	91.34	98.73	99.56	99.85	97.21	3
DMU3	78.70	78.84	97.74	100.00	100.00	91.06	7
DMU4	88.31	84.41	92.58	85.29	53.46	80.81	11
DMU5	95.19	91.11	96.31	96.48	82.03	92.23	6
DMU6	94.74	95.81	98.15	96.68	81.94	93.46	5
DMU7	94.47	89.16	97.97	99.17	99.87	96.13	4
DMU8	90.07	89.39	91.96	93.28	81.06	89.15	9
DMU9	85.22	81.63	92.17	75.14	65.91	80.01	12
DMU10	92.92	91.35	93.69	93.57	67.53	87.81	10
DMU11	95.60	100.00	100.00	100.00	100.00	99.12	2
DMU12	100.00	100.00	100.00	100.00	97.67	99.53	1

Table 4 demonstrates the scale efficiencies of insurance companies. Scale efficiency scores help to decision makers in order to comprehend the

reason of inefficiency in CCR model. If a decision making unit is inefficient according to CCR model, while BBC efficiency score is 100%, it can be said that inefficiency derive from scale inefficiency. Based on this although DMU1, DMU3 and DMU9 are efficient in terms of BCC model, scale inefficiencies as mentioned Table 4. As a result the least efficient insurers are DMU9 and DMU4 in the sense of scale efficiency.

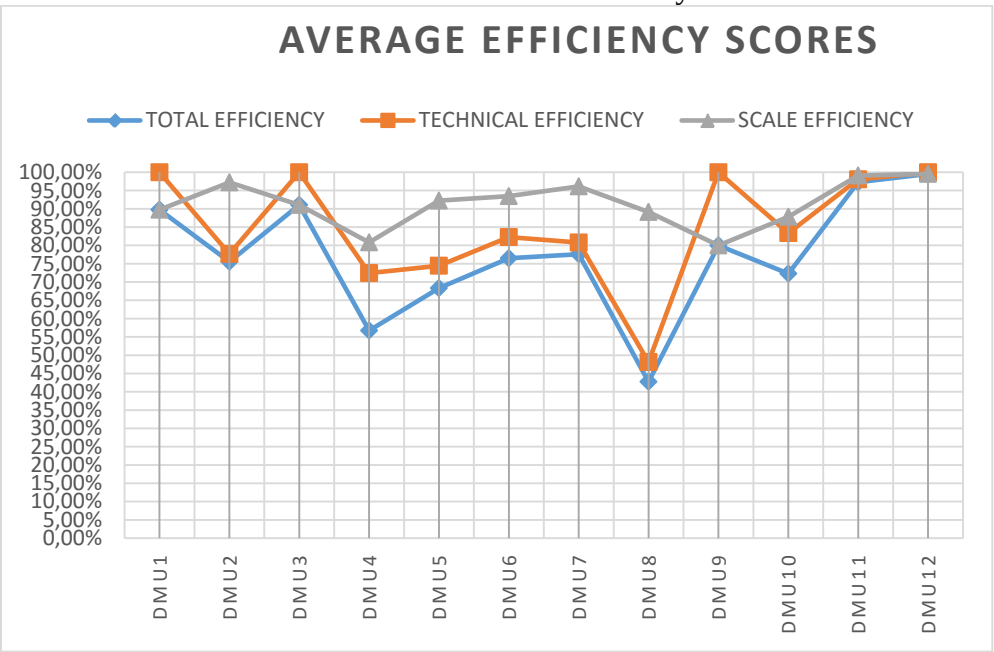

Figure 1: Average Efficiency Scores (2010-2014)

Average efficiency score are viewed more comprehensible in Figure 1. It is evident that DMU8 is the most inefficient insurer. As a summary in order to be efficient in terms of underwriting process, each insurance company have to predict the amount of losses that they undertook correctly. Otherwise insurers will have trouble about compensate these losses. Thereby it can be said that DMU8 couldn't foresee forthcoming losses. As a result of it, they put too much money as insurance technical provisions rather than invest in financial instruments. In other words, being efficient from the point of underwriting is not only about paying less compensation than the amount of taking premiums or not about minimum incurred losses. Being efficient means distribute risks to the great number of insureds and allocate sufficient amount of money based on the amount of losses incurred.

Conclusion

The literature of performance analysis there are lots of methods that evaluate efficiency of decision making units. However the most preferred one is Data Envelopment Analysis. By means of DEA, decision

makers can compare units in terms of relative efficiencies. However banks and insurance companies are taken as DMU in generally, evaluation criteria doesn't change. Analysis which were done before considered the same financial indicators as inputs and outputs. But these financial indicators can evaluate the general financial performance of DMU's. Although efficiency of activity performance play a key role in comparison, very few studies focused on activity of companies was made in literature.

In this study underwriting performance of 12 non-life insurance company were analyzed via EMS program. Input and output variables were identified distinctly from the other studies. Written premiums and the number of policies were taken as inputs, whereas losses paid and insurance technical provisions were taken as outputs. Data was collected from financial reports of companies. In addition 5 years (2010-2014) were examined in terms of total, technical and scale efficiencies by means of DEA. Variables used in this study can guide decision makers in order to decide whether the related company is relatively efficient or not. For suggestion to further study various activities of financial institutions can be evaluated by determining relevant variables with related activities.

References:

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management science*, *30*(9), 1078-1092.

Bates, J. M., Baines, D., & Whynes, D. K. (1996). Measuring the efficiency of prescribing by general practitioners. *Journal of the Operational Research Society*, 47(12), 1443-1451.

Biener, C., Eling, M., & Wirfs, J. H. (2016). The determinants of efficiency and productivity in the Swiss insurance industry. *European Journal of Operational Research*, *248*(2), 703-714.

Brockett, P. L., Cooper, W. W., Golden, L. L., Rousseau, J. J., & Wang, Y. (2004). Evaluating solvency versus efficiency performance and different forms of organization and marketing in US property—liability insurance companies. *European Journal of Operational Research*, *154*(2), 492-514.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European journal of operational research*, *2*(6), 429-444.

Charnes, A., Cooper, W. W., & Rhodes, E. (1981). Evaluating program and managerial efficiency: an application of data envelopment analysis to program follow through. Management science, 27(6), 668-697.

Charnes, A., Cooper, W. W., Lewin, A. Y., & Seiford, L. M. (1994). Data Envelopment Analysis: Theory, Methodology and Applications, Kluwer Academics Publishing, Norwell.

Chen, Y., Cook, W. D., Li, N., & Zhu, J. (2009). Additive efficiency decomposition in two-stage DEA. European Journal of Operational Research, 196(3), 1170-1176.
Coelli, T. (1996). A guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Program, *CEPA Working Paper 96/08*, University Of New England.
Cooper, W. W., Seiford, L. M., & Tone, K. (2007). Data envelopment analysis a comprehensive text with models, applications, references and DEA-solver software, Springer, USA.
Cooper, W. W., Seiford, L. M., & Zhu, J. (Eds.). (2011). Handbook on data envelopment analysis (Vol. 164). Springer Science & Business Media.
Cummins, J. D., Rubio-Misas, M., & Zi, H. (2004). The effect of organizational structure on efficiency: Evidence from the Spanish insurance industry. Journal of Banking & Finance, 28(12), 3113-3150.
Diacon, S. R., Starkey, K., & O'Brien, C. (2002). Size and efficiency in European long-term insurance companies: an international comparison. *The Geneva Papers on Risk and Insurance. Issues and Practice*, 27(3), 444-466.
Golany, B., & Roll, Y. (1989). An application procedure for DEA. *Omega*, *17*(3), 237-250.
Huang, W., & Eling, M. (2013). An efficiency comparison of the non-life insurance industry in the BRIC countries. *European Journal of Operational Research*, *226*(3), 577-591.
Hwang, S. N., & Kao, T. L. (2006). Measuring managerial efficiency in non-life insurance companies: an application of two-stage data envelopment analysis. *International Journal of Management*, *23*(3), 699.
Insurance Underwriting. (2001). Cape Education, *Inc. Revised.* Retrieved from https://www.ceclass.com/164.pdf
Kao, C., & Hwang, S. N. (2008). Efficiency decomposition in two-stage data envelopment analysis: An application to non-life insurance companies in Taiwan. *European Journal of Operational Research*, 185(1), 418-429.
Korhonen, P. (1997). Searching the efficient frontier in data envelopment analysis. Interim Reports, *Aiding Decisions with Multiple Criteria* (pp. 543-558). Springer US.
Lin, C. H., Yang, H. L., & Liou, D. Y. (2007). Service innovation efficiency evaluation on non-life insurance industry in Taiwan. *Industrial Engineering and Engineering Management, 2007 IEEE International Conference on* (pp. 1955-1959). IEEE.
Macedo, L. (2009). The Role Of Underwriter In Insurance, *Primer Series On Insurance*, *Issue 8*, The World Bank.
Paradi, J. C., Yang, P. Z., & Zhu, H. (2011). Assessing bank and bank branch performance: modelling considerations and approaches, *Handbook on*

Data Envelopment Analysis, International Series In Operations Research & Management Science, 164, 315-361.
Ray, S. C. (2004). *Data envelopment analysis: theory and techniques for economics and operations research*. Cambridge university press.
Rejda, G. E. (2008). *Principles of Risk Management and Insurance*, Pearson, Boston.
Seiford, L. M., & Zhu, J. (1999). Profitability and marketability of the top 55 US commercial banks. *Management science*, *45*(9), 1270-1288.
Turgutlu, E., Kök, R., & Kasman, A. (2007). Türk sigortacılık şirketlerinde etkinlik: Deterministik ve şans kısıtlı veri zarflama analizi. *İktisat İşletme ve Finans*, *22*(251), 85-102.
Vaughan, E. J., & Vaughan, T. M. (2013). *Fundamentals of Risk and Insurance*, John Wiley & Sons, USA.
Wu, D., Yang, Z., Vela, S., & Liang, L. (2007). Simultaneous analysis of production and investment performance of Canadian life and health insurance companies using data envelopment analysis. *Computers & Operations Research*, *34*(1), 180-198.
Wu, H., & Zeng, X. (2011). Application of computer technology in efficiency analysis of China Life Insurance Company. *Journal of Computers*, *6*(9), 1832-1841.
Yang, Z. (2006). A two-stage DEA model to evaluate the overall performance of Canadian life and health insurance companies. *Mathematical and Computer Modelling*, *43*(7), 910-919.
Zimková, E. (2015). Technical Efficiency and Super-efficiency of the Insurance Sector in Slovakia. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *63*(6), 2205-2211.

Paradigms Of Evaluation Of The Real Estate In Georgia, Such As Land And Forest

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Abstract

In the years following the land reform in Georgia and origination of private land property rights in the country, the formation of the land value started to be gradually regulated according to the market value prompted by the 'demand-and-supply' principle. In the authors' opinion, the due management of the agricultural development of Georgia needs significant preparatory works. In the attempt to solve the existing problems, the article gives the situation analysis and certain recommendations. One of the reasons for the degradation of the eco-systems in Georgia and of forests in particular, is the failure to assess the eco-system service of forests, as the forest value is fixed by considering the opportunity to gain the timber and other secondary forest products only, without considering the environmental protection function of the forests. In some cases, the qualitative and quantitative parameters of the forest functions are assessed by using complex mathematical calculations, what in terms of scarce information, yield wrong assumptions. In addition, the methods of economic evaluation of the natural resources are sometimes contradictory. Therefore, the authors think that the concept of the gross economic value is best to use as the methodological approach in the economic evaluation. Value of natural capital or eco-system services in Georgia is not taken into account during the decision-making process either at a state, or a private level, or during the pricing of the forest profitability inter alia. In the article, the authors give their proposals regarding the optimal ways to solve these problems.

Keywords: Ecosystem, natural resources, land, forest resources, economic evaluation

Introduction

Creating the favorable conditions for thorough, rational and efficient use of the land resources and improving land management is one of the urgent problems for any country in the world, and is particularly important for Georgia, as for the land-poor country with rapidly progressing erosive processes. In addition, as the land is necessary for human life, is the durable means of production and is indispensable, by considering the swift population growth and need to boost the production volume of the material values, the use of the land resources in the country must be more thorough, rational and efficient.

Due to the diversified functions of the land in different branches of the national economy, in practice there are a great number of the indicators of the land use efficiency. These indicators much differ from one another. The main thing to consider when solving the question of the thorough use of the land resources is the interests of all branches to ensure the efficient use of land in agriculture, as of the durable means of production and rational organization of the non-agricultural land use.

Following the above-mentioned, thorough, rational and efficient use of land resources, in conjunction with other useful actions, must create all necessary conditions for the successful development and improvement of the social-economic, material-technical, scientific-intellectual and spiritual and moral aspects of the human life.

I.

Georgia is a traditional agricultural country. Nearly half of the population lives in rural areas, where a low-input, subsistence and semi-subsistence farming is a major source of livelihood. An increasing share of agricultural land is left unused.

This land privatization process resulted in subsistence agriculture, with land owners, in excess of half a million, categorized as self-employed farmers. Agriculture became side-lined as a sector. The expected dynamic of the land privatization process was that there would be a gradual consolidation of holdings through a lease process and a functioning land market. This dynamic has not come into effect; rather there is a continuing predominance of small plot cultivation practice.

Of the total agricultural land area, 75% is still State owned, but available for sale. The Government of Georgia accomplishes the sales procedures through the public e-auctions (www. privatization.ge, www.eauction.ge). As for arable land, 55% of them are already privatized.

According to the agriculture census in 2005, there are more than 700,000 agriculture holdings in Georgia, from which more than 99% are classified as family farms. The farm sector is dominated by small private

farms, 93% with less than 2 ha of land, with an average of 2.3 ha per plot. About 82% of agriculture holdings are subsistence and 18% for semi-subsistence or commercial.[1]

The reform of agricultural land in Georgia was launched in 1992 through the mass denationalization of the agricultural land. The land reform then mostly pursued social aims. In order to avoid social unrest due to the mass impoverishment of the population and economic hardships, the government of that time was forced to distribute some land, mainly very small parcels, to almost entire population of the country.

The reform was not built upon any conceptual basis; nor did it have any long-term vision of what it could bring to the country in economic and social terms. Moreover, a low degree of legitimacy of the then-time government, a clear lack of competence, a shortage of time as well as adequate monetary and organizational resources adversely affected the consistency and quality of the reform soon after its commencement. Right from the outset, the government failed to establish precise mechanisms guaranteeing ownership rights. This, in fact, still needs improvement as of today.

At this point, it should be noted that the reform, to some extent, met requirements of all groups of population. Land was given both, to rural and urban population regardless of whether or not they had been engaged in agriculture earlier. In this sense and by considering that it was probably impossible for the land reform to be implemented consistently in the setting of objective, extremely grave problems in the 1990s, we should assume that regardless of a number of serious shortcomings, some weak prerequisites for the establishment of a class of owners were still created.

At the initial stage of the reform the state maintained its control on perennial meadows and pastures. Meanwhile, the process of leasing out land resources that remained under the state ownership was launched. Large plots of land were leased out to probably relatively affluent rural and urban residents who thus became actual holders of those lands.

Eventually, the state initially transferred some 760, 000 ha of land to the population within the framework of the reform and leased out a large part of that 460,000 ha land which remained at its ownership. Up to 1.25 ha of land was allocated to people engaged in agriculture and permanently living in rural areas, whilst up to 5 ha was given to people of the same category, but living in the high-mountainous areas. Those who were not engaged in agriculture, but lived in rural areas permanently were allocated 0.75 ha of

[1] Assessment of the Agriculture and Rural Development Sectors in the Eastern Partnership Countries. Georgia. The European Union's Neighbourhood Programme. Accomplished by the Food and Agriculture Organization (FAO) with the financing of the European Commission, 2012

land, whilst the people of the same category, but living in the high-mountainous areas were given up to 5 ha of land each. Urban residents who had or wanted to buy parcels in villages could receive up to 0.15 ha in zones adjacent to urban areas, up to 0.25 ha in the lowlands and up to 1 ha in the mountainous regions. Residents of regional centers and towns engaged in agriculture were given 0.75 ha of land each, whilst the same category of residents employed in the non-agricultural sector received up to 0.5 ha of land. [1]

In a wide sense, "land" means all natural resources and riches, being the "naturally granted riches" and used by the man. This wide category includes such resources, as arable land, forests, ore deposits and water objects. The land itself is an important natural resource.

In addition to land, the property relations relate to the soil cover, vegetation cover, non-migrated wild fauna, melioration facilities erected off land and field protective forest zones. They have no value without the land. The land, with its natural value, is charged with the fixed land tax. In view of the diversified natural properties and economic uses of land, the land farming relations can also be diversified. While some kind of relation is formed in agriculture, another is formed in industry, and still other kinds of relationship are formed in forestry, in building of settled areas, etc.

Therefore, we must consider the land assessment in two directions: on the one hand, land is a natural resource with its characteristic area, relief, fertility, waters, forests and bushes and flora and fauna. The land is assessed following its multi-purpose function constantly associated with the gaining of profit. On the other hand, land is thought in terms of the major constituent of the real property. It is assessed from the position of usability and profitability. The land is assessed on the example of a concrete land plot.

It is worth mentioning that the absence of land market, which is a direct result of the problems of the property rights protection, also of the fact that for the market to operate, transparent information is needed, has a negative impact on the prices of the land sold by the state.

Table 1: Average size of land sold by the Ministry of Economics of Georgia and average price paid per hectare of land (GEL)

Size in hectare	Sales price
Less than 1 ha	Less than 360 GEL
From 1 to 2 ha	360-720 GEL
From 2 to 3 ha	720-1080 GEL
From 3 to 4 ha	1080-1334 GEL
From 4 to 5 ha	1334-1440 GEL
More than 5 ha	More than 1440 GEL

Source: privatization.ge

The table above shows that the sales price of land plots disposed by the Ministry of Economics is not very high. An average sales price is only three times higher than the price the private owners will have to pay for the proper registration of their ownership rights. In such a case, lands are purchased by more or less informed investors having relevant financial resources. It is easy to assume that in case of small-size private owners, the cost of proper registration may even exceed the nominal (market) price of land.

The empirical studies of results of the programmed registration projects launched in the 1980s show that the registration produced significant positive results in the absolute majority of Asian, Latin American and other transitional countries. As a result of proper completion of the land registration, there will be established mechanisms for consolidating the land based on the market principles; for example, groups of specialized "consolidators" will emerge, which will work to increase the land market price by means of buying out parcels from individuals and improving them. [2]

Evaluation of the land as that of the real estate is based on the consideration that every land plot is unique with its location and content, and its supply is limited.

In the years following the land reform in Georgia and origination of private land property rights in the country, the formation of the land value started to be gradually regulated according to the market value prompted by the 'demand-and-supply' principle.

An agricultural land is assessed by considering the following parameters:

- Soil;
- Water rights;
- Climate;
- Harvesting opportunities;
- Environment control;
- Rights to use mineral resourses;
- Other important details.

A non-agricultural land is assessed by considering the following parameters:

- Prestige;
- Location;
- Size and shape;
- Opportunity to unite the plot;
- Topography;
- Rate of harvest;
- Accessibility;

- Environment;
- Utility services.

One of the major conclusions of the United National Conference "RIO+20" held in Brazil (on June 20-22, 2012) was that the modern climatic, biodiversity, fuel crises as well as recent crises, such as food and water deficit, and financial system and economy as a whole are the result of the failure to assess the natural resources and environment [3].

The ecological-economic evaluation of natural resources and forest ecosystem in particular is recognized as one of the tools to solve the social-economic and natural systems management problems and modern ecological problems.

The economic evaluation of the eco-service is of a decisive importance for improving the environmental protection and is the basis to make the right managerial decisions. It is the economic evaluations allowing fixing the damage caused by irrational use of eco-services, prove the economic efficiency of the investments in the environmental protection complex, compare the loss and profit of the rendered eco-service and calculate the values of compensation fees.

The importance of the ecological-economic evaluation of the natural resources and of forest ecosystems in particular, is evidenced by the materials of the FAO Committee on Forestry. The 20th Committee session noted that the ecological value of forests, plantations and forestry is given more importance... and it is necessary to activate the process of development of such innovative economic mechanisms and methods, such as rendering the ecological service, giving its quantitative representation and evaluating the full spectrum of commodity and services what will promote a deeper understanding of the role of forests in solving the important social-economic problems and achieving the goals and target values.

The need for the economic evaluation of natural resources was discussed in the document, such as "Biodiversity Strategy and Action Plan of Georgia". This document underlines that no economic evaluation of biodiversity has been ever accomplished in Georgia and it is necessary to develop modern monetary methods of evaluation, ensure the protection of the ecological, economic, social and cultural values of forest eco-systems and use them based on the principles of sustainability. The data of Report TEEB – 10 No. 1 underline the need for the development and improvement of the methodological approaches to the ecological-economic evaluation of the eco-systems and forest eco-systems first of all, as the reduction of the forest areas and deterioration of their quantitative indicators were considered as one of the major ecological problems of modern times. [4,5,6]

In our view, one of the reasons for the degradation of the eco-systems in Georgia and of forests in particular, is the failure to assess the eco-system

service of forests, when the forest value is fixed by considering the opportunity to gain the timber and other secondary forest products only, without considering the environmental protection function of the forests.

The following must be considered as the natural parameters of the direct forest benefit and environmental formation functions:

- Timber supply per tree (as the source of timber) to gain direct benefit;
- CO2 absorption;
- CO2 depositing ability of the forests;
- CO2 emission;
- Function of purifying atmospheric air;
- Dust-retaining ability of the forests;
- Soil-protecting function;
- Soil-retaining function over the mountain slopes;
- Water-protecting and water-regulating functions;
- Maintaining the underground river flow and mineral water output;
- Forests as fauna habitats;
- Maintaining the species and numbers of wild animals;
- Recreational function;
- Forest attractiveness for holiday-making and tourism.

The ecological-economic assessment of the natural resources and forests in particular, is one of the most complex problems of the directions of the economic science, the ecological economics. This direction, as an independent science and study discipline, was established in the 1970s under name “Nature use and environmental protection”.

As the analysis of the literary sources evidence, forest eco-systems have a number of functions, and there are a number of methodological approaches to the economic evaluation of the given natural resources. It should be noted that in some cases, the qualitative and quantitative parameters of the forest functions are assessed by using complex mathematical calculations, what in terms of scarce information, yield wrong assumptions. In addition, the methods of economic evaluation of the natural resources are sometimes contradictory.

In our opinion, the concept of the gross economic value is best to use as the methodological approach in economic evaluation. Gross economic value of the forest resources can be identified by summing up to aggregated indicators: use value and non-use value. So, the Gross Economic Value = Use Value + Non-use Value (1). Use value on its turn, is the sum of several summands: direct use value, indirect use value and delayed alternative value, i.e. Use Value = Direct Use Value + Indirect Use Value + Delayed Alternative Value (2). The economic value of these parameters is associated with a number of peculiarities.

The parameter most convenient to evaluate economically is the direct use value. The direct use value is measured based on the established prices. The existing market prices of goods and services (eco-tourist trips, hunting tours) must be considered as one of the types of value parameters.

So, the direct use value given by the forests is made up of:

- Sustainable (inexhaustible) timber production;
- Medicinal herbs;
- Non-essential products (mushroom, berries, nuts, etc.);
- Tourism;
- Sustainable hunting and fishing.

Indirect use value is more difficult to determine. This indicator is often used in a global scale or in a wide regional aspect, i.e. it tries to identify the benefit by covering as large area as possible. This includes the ecology regulation functions, including waste assimilation and pollution, global effects, etc. At present, there are studies of economic evaluation of the given functions. For example, indirect use value is made up of the following parameters:

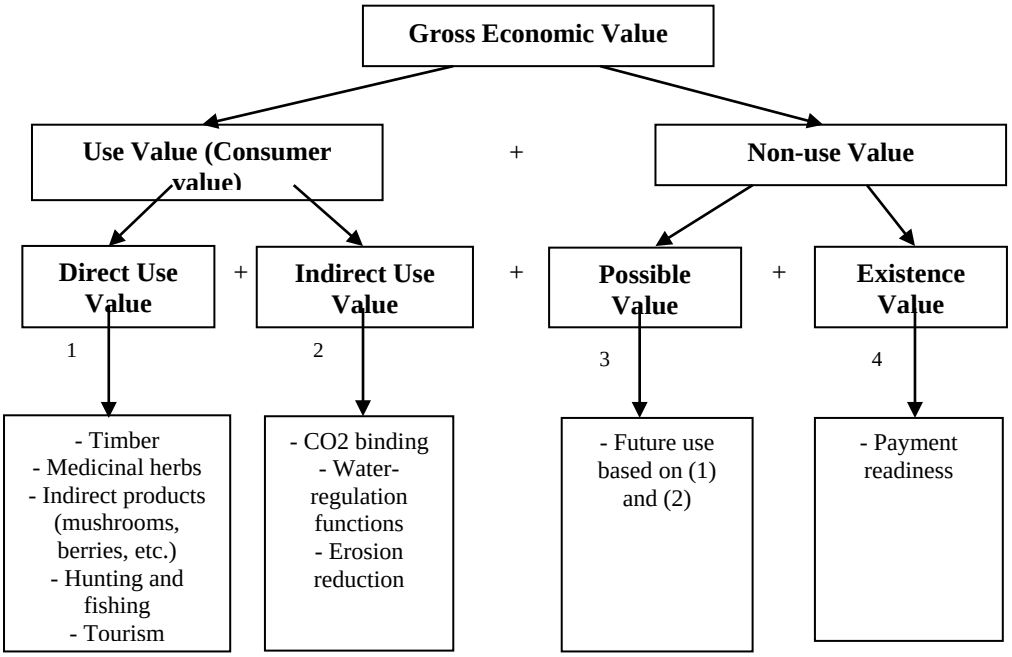
- Carbon gas binding (mitigation of the greenhouse effect);
- Water-regulation functions (anti-flood measures);
- Erosion reduction (improvement of soil productivity, reduction of water resource pollution).

It is also difficult to calculate the delayed alternative value (potential value). The delayed alternative value is associated with the conservation of biological resources and its possible future use, i.e. the medications of the future, genes in plant-growing, biotechnology, substitutes of exhaustible resources, etc. are considered. In such cases, the potential value may be the corrected sum of the direct and indirect use values. As for the unused value, it is based on so called existence value, which is the trial to economically assess quite delicate ethic and esthetic aspects: nature self-value for a human. Esthetic value of nature, the obligation to maintain the nature for the future generations, heritage value, etc., are the benefit of an individual or the society gained only through knowing that such goods and services exist.

Existence value may be an important reason for protecting the wild nature. This kind of value is assessed by means of simplified economic approaches, first of all, the associated theory of “payment readiness”.

So, the gross economic value of the forests may be defined with the following formula: Gross Economic Value = Direct Use Value + Indirect Use Value + Delayed Alternative Value + Existence Value (3). The structure of the aggregated indicators of the economic values of forests is given in Fig. 2. a program must be developed with the time schedule and budget and the

principal rights and obligations of the main actors engaged in the program realization are to be identified, (4) relevant funds and technologies allowing



the cheapest realization of the program are to be obtained, (5) the land ownership legislation is to be improved to maximally facilitate the registration procedures. The state must consider and reduce the costs of the procedures as much as possible to avoid constraints during the program implementation.

The degree of the state interference may be from minimal through proactive. For instance, where the state wishes to realize the development projects and there are high expectations of investments, the options of the land parcel buyout and consolidation may be considered for the further realization or accomplishment of different infrastructural or investment projects.

The value of natural capital or eco-system services in Georgia is not taken into account during the decision-making process either at a state, or a private level, or during the pricing of the forest profitability *inter alia*. The tax to use the timber of the major forest-forming tree species is minimal, not exceeding 5% of their market value. The tax for different uses of the forest fund lands is also very low. Similarly, the auction prices of leasing are much lower than the prices gained through evaluation of the functions of forest eco-systems. Our proposal is to at least double the tax and auction prices for using the timber and to use the gained extra funds to form the special fund to develop the forest complex.

Unfortunately, a large portion of the agricultural lands in Georgia remain unused. The present statistics, reports and field visits clearly show that a great part of the arable lands (130.000 ha) is not sown/used. Besides, it is clear that many land owners no longer live in these areas and thus, do not use the land and not allow others to use it, either. To solve this problem, we think it is necessary to target larger farmers with better opportunities to improve the productivity and harvest export, and to better substitute the harvest import.

Conclusion

Today, the tax and regulatory system provides no incentives to change the current pattern of land use and small-scale production. Property tax is payable only on land holdings (Property tax: by region, land type and quality: pasture land from 2 to 5 GEL; agriculture land from 8 to 57 GEL) greater than five hectares, whether the land is used or not. In addition, the individual land owners, classified as self-employed in agriculture, pay no income tax, nor need to account for turnovers not exceeding 100,000 GEL (around € 42,000) and value added tax on turnovers not exceeding 200,000 GEL (around € 84,000). If an individual's or group's income exceeds these limits, they need fiscal identity and are required to report to the fiscal authorities, pay taxes and undergo official control and surveillance. This situation much constrains the formation of producers' groups of one sort or another. [6]

In our opinion, in order to boost the efficiency of the state support of agriculture, it is necessary to shift from the short-term investments to the long-term ones in such fields, as irrigation and drainage systems and service infrastructure. It is also necessary to identify all land resources to help increase the areas of the economically active agricultural land. There are a number of opportunities in this respect: taking into account not fully used pastures and areas included in the forest fund; actively continuing the land privatization process owned by the state and rehabilitating the degraded land areas.

So, the qualitative transformation of agriculture in Georgia will play a decisive role in securing the economic success of the country. Objectively, the optimal solution of the land privatization and land relation issues will be a strong impulse to maintain the positive trend of the economic reforms and to secure the economic development and independence of the country.

References:

Terra Institute. LTD for USAID: Georgia Land Market Development Project Final Report, October, 2005

The present situation, analysis and recommendations of the land market. 2013, Retrieved from http://www.eprc.ge/
United Nations conference on sustainable development (rio+20), national preparatory process; 2012
Georgia 2000 – Regions, vol. VI, “Forestry and Environmental Protection”, Tbilisi, 1987
Gulisashvili V.Z. Vertical zonation of forest vegetation of the Eastern Pre-Caucasus and the Caucasus. Tbilisi Botanical Garden Bulletin, №61. Tbilisi, Publishing House Georgia, 1958
Ordinance of the Government of Georgia „On approving the Biodiversity Strategy and Action Plan of Georgia for 2014-2020“; Retrieved from https://matsne.gov.ge/ka/document/view/2342057
www.privatization.ge
www.eauction.ge

Impact Of The Terms-Of-Trade On Business Cycles In Slovak And Czech Economies

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Abstract

Using Slovak and Czech data and the empirical structural vector autoregressive model, the observed impact of the terms-of-trade on business cycles is very small. Furthermore we observe Obstfeld-Svensson-Razin effect of terms-of-trade in both countries. The trade balance negatively reacts on the changes in terms-of-trade. However the theoretical model with import-able, export-able and non-tradable goods calibrated with the empirical observations in Slovakia and Czech Republic does not suit to the empirical model. The reactions of consumption, output and real exchange rate on the terms-of-trade shocks are overestimated and the trade balance reacts positively on the terms-of-trade shocks in the theoretical models for both countries. Moreover, the theoretical model calibrated using Slovak and Czech data predicts Harberger-Laursen-Metzler effect. The trade balance positively reacts on the changes in terms-of-trade. The theoretical and empirical mismatch in literature dealing with the terms of trade influence is confirmed. The paper is divided into two parts. Firstly, structural vector autoregressive model is introduced and estimated. Secondly, the theoretical model with import-able, export-able and non-tradable goods is presented and calibrated. Data of Slovak and Czech economy are used.

Keywords: Terms of Trade, Business Cycle, Trade Balance

Introduction

Terms-of-trade is theoretically significant source of business cycles and it causes shifts in trade balance. However different theoretical and empirical studies lead to different results of the short-run terms-of-trade impact on output and on trade balance. There are two theoretical effects of terms-of-trade impact on trade balance. Harberger (1950) and Laursen and Metzler (1950) used traditional Keynesian model to show that trade balance grows with terms-of-trade. On the contrary, dynamic optimizing models of

Obstfeld (1982) and Svensson and Razin (1983) leads to a conclusion that positive effect of terms-of-trade on the trade balance is weaker the more persistent a terms-of-trade shock is. Uribe and Schmitt-Grohe (2016) showed that in small open economy real business cycle model (or dynamic stochastic general equilibrium model) with capital costs sufficiently permanent terms-of-trade shocks have negative impact on the trade balance. Empirical studies of Aguirre (2011), Broda (2004) and Uribe and Schmitt-Grohe (2016) surprisingly do not support statistically significant impact of term-of-trade on output in poor and emerging countries. In general authors can confirm an intuition that the more open the economy is the higher effect of terms-on-trade on trade balance is. This result may not be achieved in theoretical general equilibrium models even if non-tradable goods are considered. Uribe and Schmitt-Grohe (2016) developed MXN model with tradable and non-tradable goods to show that an existence of non-tradable goods "reduce the importance of terms-of-trade shocks." However authors state that the theoretical model still overestimates the signification of the terms-of-trade impact on the business cycles.

In this paper we confirm this theoretical and empirical mismatch. In the first part of the paper we present and estimate the empirical SVAR model of the terms-of-trade impact on the Slovak and Czech business cycles to state that the influence of the terms-of-trade is very small. In the second part we present and calibrate MXN model of Uribe and Schmitt-Grohe (2016) using Slovak and Czech observations to state that the theoretical model predicts relatively high impact of the terms-of-trade on business cycles.

Empirical Model

First, we used vector autoregressive (VAR) models for our analysis. Every endogenous variable is a function of all lagged endogenous variables in the system in VAR models. See Lutkepohl (2005) for more details about them. The mathematical representation of the VAR model of order *p* is:

$$\mathbf{y}_t = \mathbf{A}_1\mathbf{y}_{t-1} + \mathbf{A}_2\mathbf{y}_{t-2} + ... + \mathbf{A}_p\mathbf{y}_{t-p} + \mathbf{e}_t \quad (1)$$

where $\mathbf{y}_t$ is a *k* vector of endogenous variables; $\mathbf{A}_1$, $\mathbf{A}_2$, …, $\mathbf{A}_p$ are matrices of coefficients to be estimated; and $\mathbf{e}_t$ is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values. Due to problem of over-parametrisation we can use the Bayesian approach to estimation.

The VAR model (1) can be interpreted as a reduced form model. A structural vector auto-regressive (SVAR) model is structural form of VAR model and is defined as:

$$\mathbf{A}\mathbf{y}_t = \mathbf{B}_1\mathbf{y}_{t-1} + \mathbf{B}_2\mathbf{y}_{t-2} + ... + \mathbf{B}_p\mathbf{y}_{t-p} + \mathbf{B}\mathbf{u}_t \quad (2)$$

A SVAR model can be used to identify shocks and trace these out by employing impulse response analysis and forecast error variance decomposition through imposing restrictions on used matrices.

Uribe and Schmitt-Grohe (2016) proposed a specification of the SVAR, through which we can determine responses on terms-of-trade impulse:

$$\mathbf{A}\begin{pmatrix} f_t \\ tb_t \\ y_t \\ c_t \\ i_t \\ rer_t \end{pmatrix} = \sum_{i=1}^{p} \mathbf{B}_i \begin{pmatrix} f_{t-i} \\ tb_{t-i} \\ y_{t-i} \\ c_{t-i} \\ i_{t-i} \\ rer_{t-i} \end{pmatrix} + \mathbf{B}\begin{pmatrix} u_t^f \\ u_t^{tb} \\ u_t^y \\ u_t^c \\ u_t^i \\ u_t^{rer} \end{pmatrix} \tag{3}$$

where f is relative cyclical component of the terms of trade, tb is relative cyclical component of the trade balance to output ratio, y is relative cyclical component of output, c is relative cyclical component of consumption, i is relative cyclical component of investment and rer is relative cyclical component of real exchange rate.

The u_t^f, u_t^{ttb}, u_t^y, u_t^c, u_t^i and u_t^{rer} are structural shocks of given variables. We estimated the parameters of the SVAR specification (3) using Amisano and Giannini (1997) approach. The class of models may be written as:

$$\mathbf{Ae_t} = \mathbf{Bu_t} \tag{4}$$

The structural innovations $\mathbf{u_t}$ are assumed to be orthonormal, i.e. its covariance matrix is an identity matrix. The assumption of orthonormal innovations imposes the following identifying restrictions on **A** and **B**:

$$\mathbf{A\Sigma_e A^T} = \mathbf{BB^T} \tag{5}$$

Noting that the expressions on both sides of (5) are symmetric, this imposes $k(k+1)/2 = 21$ restrictions on the $2k^2 = 72$ unknown elements in **A** and **B**. Therefore, in order to identify **A** and **B**, we need to impose $(3k^2-k)/2 = 51$ additional restrictions. The matrix **A** of unrestricted specification is a lower triangular matrix with unit diagonal (15 zero and 6 unity restrictions) and matrix **B** is a diagonal matrix (30 zero restrictions) in this just-identified specification. Other tested restrictions are imposed on elements of matrix **A** (matrix of contemporary effects between endogenous variables), which means that our specification becomes over-identified and also testable.

The selected lag of model (3) is validated by sequential modified likelihood ratio test statistic and information criteria and by the LM test for autocorrelations. Significant values of serial correlation for lower lags could be a reason to increase the lag order of an unrestricted VAR, but this is not

our case. We verified the stability of a VAR model (i.e. whether all roots have modulus less than one and lie inside the unit circle). We estimated the parameters of restricted and unrestricted specifications. Using the logarithm of the maximum likelihood functions of both specifications we calculated the likelihood ratio statistics and verified the significance of restrictions. All tests are explained in Lutkepohl (2005) for example.

Using matrix polynomial in lag operator $\mathbf{A}(L) = \mathbf{B_1}L + \mathbf{B_2}L^2 + \ldots + \mathbf{B_p}L^p$ we can rewrite (2) as structural moving averages (SMA) representation:

$$\mathbf{y_t} = \left[\mathbf{A} - \mathbf{A}(L)\right]^{-1}\mathbf{B}\mathbf{u_t} = \mathbf{C}(L)\mathbf{u_t} = \mathbf{C}(0)\mathbf{u_t} + \mathbf{C}(1)\mathbf{u_{t-1}} + \ldots + \mathbf{C}(h)\mathbf{u_{t-h}} + \ldots \quad (6)$$

Hence, $\mathbf{C}(0)$ is the coefficient matrix on impact, $\mathbf{C}(1)$ at a one period lag, and so on. Generally, $\mathbf{C}_{i,j}(h)$ element is the impulse response of variable *i* to shock *j* at horizon *h*. The forecast error of **y** at horizon *s* is:

$$\mathbf{y_{t+h}} - \hat{\mathbf{y}}_{\mathbf{t+h}} = \mathbf{C}(0)\mathbf{u_{t+h}} + \mathbf{C}(1)\mathbf{u_{t+h-1}} + \mathbf{C}(2)\mathbf{u_{t+h-2}} + \ldots + \mathbf{C}(h)\mathbf{u_t} \quad (7)$$

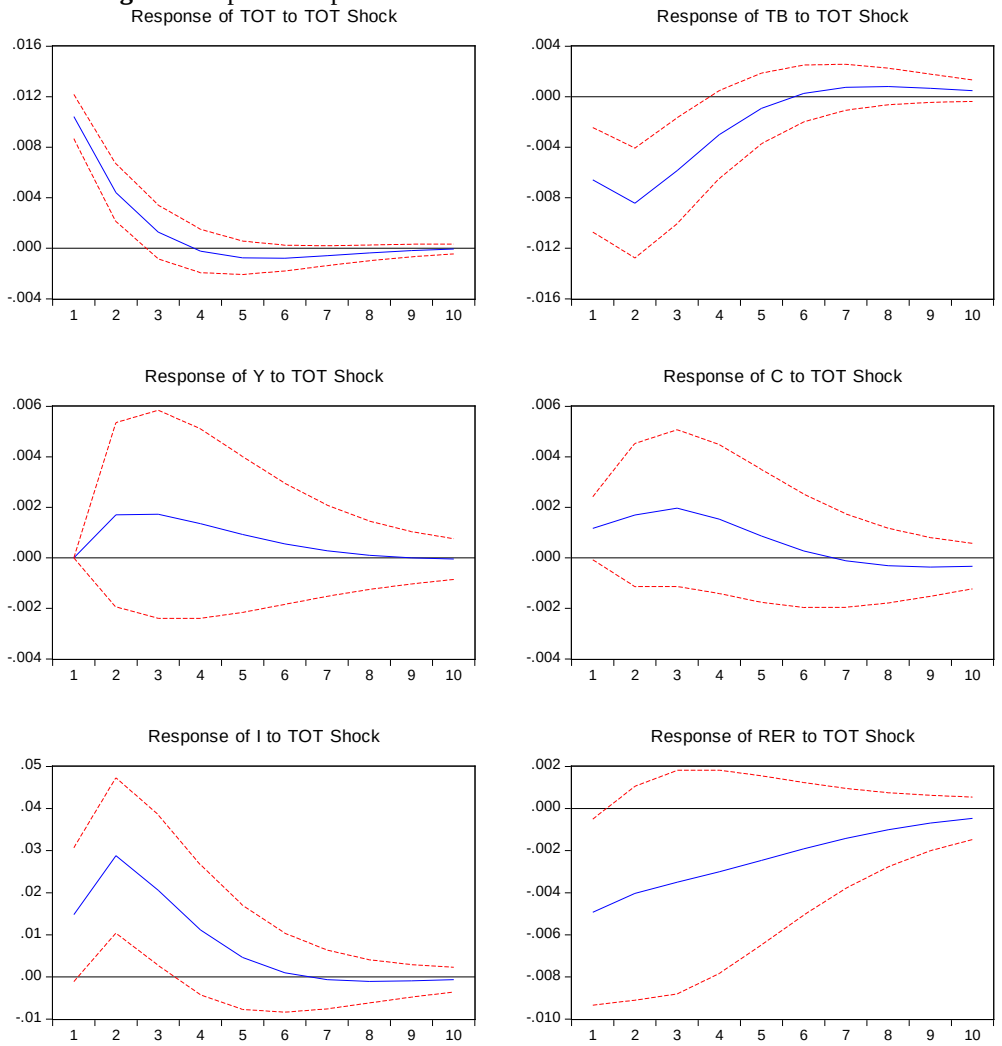
Variance of the forecast error (assuming orthogonality) is expressed as sum of the individual variances of shocks:

$$\mathrm{var}\left(\mathbf{y_{t+h}} - \hat{\mathbf{y}}_{\mathbf{t+h}}\right) = \mathbf{C}(0)\mathbf{I}\mathbf{C}(0)^{\mathbf{T}} + \mathbf{C}(1)\mathbf{I}\mathbf{C}(1)^{\mathbf{T}} + \ldots + \mathbf{C}(h)\mathbf{I}\mathbf{C}(h)^{\mathbf{T}} \quad (8)$$

The fraction of the forecast error variance of variable *i* due to shock *j* at horizon *h*, is then the (*i*,*j*) element of expression (8) divided by the total forecast error variance and is expressed as a percentage. We calculated the impulse response functions. Generally, the impulse response function traces the effect of a one-time shock in one of the innovations on current and future values of the endogenous variables.

Data for Czech and Slovak economies are gathered from the Eurostat portal. The responses to the terms-of-trade shock in Slovakia are in the Figure 1. As output shock elasticity coefficient is not statistically significant, the improvement in terms-of-trade has no impact on the aggregate activity and the one-quarter delayed output expansion is statistically insignificant. The same result applies to the consumption. Investment displays a somewhat larger expansion, albeit with a one-quarter delay. Real exchange rate falls immediately. On the other hand, the impact of the terms-of-trade shock on trade balance is clearly statistically significant. The 10 % increase in the terms of trade causes a decrease of 6.7 % in trade balance. Furthermore a huger contraction is delayed by one quarter.

Figure 1 Impulse Response Functions to Terms-of-Trade Shock in Slovakia



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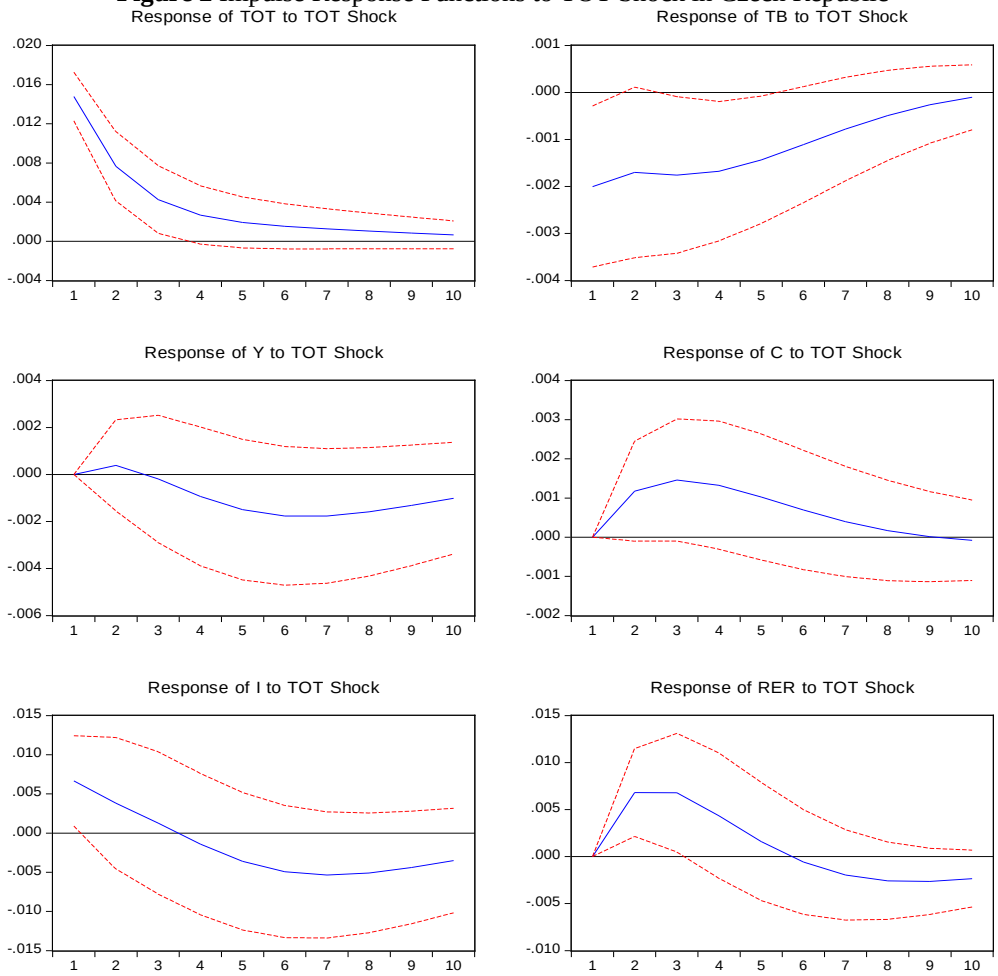
The responses to the terms-of-trade shock in Czech Republic are in the Figure 2. As output shock elasticity coefficient is not statistically significant, the improvement in terms-of-trade has no impact on the aggregate activity and the one-quarter delayed output expansion is statistically insignificant. The same result applies to the consumption and real exchange rate. Investment displays a small expansion. On the other hand, the impact of the terms-of-trade shock on trade balance is statistically significant. The 10 % increase in the terms of trade causes a decrease about 2 % in trade balance. Again, the result suggests confirmation of Obstfeld-Svensson-Razin effect rather than Harberger-Laursen-Metzler effect of the terms-of-trade in both Slovakia and Czech Republic

Figure 2 Impulse Response Functions to TOT Shock in Czech Republic



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Theoretical model:

Uribe and Schmitt-Grohe (2016) presented the model with import-able (*m*), export-able (*x*) and non-tradable (*n*) sectors. The presence of non-tradable goods should reduce the importance of terms-of-trade shock.

We consider a large number of identical households with preferences described by the utility function

$$U = E_0 \sum_{t=0}^{\infty} \beta^t \frac{\left[c_t - \frac{\left(h_t^m\right)^{\omega_m}}{\omega_m} - \frac{\left(h_t^x\right)^{\omega_x}}{\omega_x} - \frac{\left(h_t^n\right)^{\omega_n}}{\omega_n} \right]^{1-\sigma} - 1}{1-\sigma} \tag{9}$$

where c_t denotes consumption, for sector $j \in \{m,x,n\}$, h_t^j denotes hours worked in the sector j. Sectoral labour supplies are wealth inelastic and

parameters ω_j denote wage elasticity in the sector j. The symbol E_0 denotes the expectations operator conditional on information available in initial period 0. The parameter σ measures the degree of relative risk aversion.

Households maximize the lifetime utility function (9) subject to the budget constraint

$$c_t + i_t^m + i_t^x + i_t^n + \phi_m\left(k_{t+1}^m - k_t^m\right)^2 + \phi_x\left(k_{t+1}^x - k_t^x\right)^2 + \phi_n\left(k_{t+1}^n - k_t^n\right)^2 + p_t^\tau d_t = \\ = \frac{p_{t+1}^\tau d_{t+1}}{1+r_t} + w_t^m h_t^m + w_t^x h_t^x + w_t^n h_t^n + u_t^m k_t^m + u_t^x k_t^x + u_t^n k_t^n \quad (10)$$

where for sector $j \in \{m,x,n\}$, i_t^j denotes gross investment, k_t^j denotes capital, w_t^j denotes real wage rate and u_t^j is the rental rate of capital in the sector j. Quadratic terms of the budget constraint (10) are capital adjustment costs, where ϕ_j denotes capital adjustment cost parameter in the sector j. The variable p_t^τ denotes the relative price of the tradable composite good in terms of final goods, d_t denotes the stock of debt in period t denominated in units of the tradable composite good and r_t denotes the interest rate on debt held from period t to $t + 1$. Consumption, investment, wages, rental rates, debt, and capital adjustment costs are all in units of final goods.

The capital stocks accumulation is given by

$$k_{t+1}^j = (1-\delta)k_t^j + i_t^j;\ \forall j \in \{x,m,n\} \quad (11)$$

where δ denotes constant depreciation rate.

There are 5 types of large number of identical firms in the economy which differ according to their output: firms producing final goods, tradable composite goods, import-able goods, export-able goods and non-tradable goods.

Final goods are produced using non-tradable goods and a composite of tradable goods via the CES technology

$$B\left(a_t^\tau, a_t^n\right) = \left[\chi_\tau\left(a_t^\tau\right)^{1-\frac{1}{\mu_{\tau n}}} + (1-\chi_\tau)\left(a_t^n\right)^{1-\frac{1}{\mu_{\tau n}}}\right]^{\frac{1}{1-\frac{1}{\mu_{\tau n}}}} \quad (12)$$

where a_t^τ denotes the tradable composite good and a_t^n the non-tradable good, $0 < \chi_\tau < 1$ denotes distribution parameter and $\mu_{\tau n} > 0$ is the elasticity of substitution between tradable composite good and non-tradable good.

The tradable composite goods is produced using importable and exportable goods as intermediate inputs via the CES technology

$$a_t^\tau = A\left(a_t^m, a_t^x\right) = \left[\chi_m\left(a_t^m\right)^{1-\frac{1}{\mu_{mx}}} + (1-\chi_m)\left(a_t^x\right)^{1-\frac{1}{\mu_{mx}}}\right]^{\frac{1}{1-\frac{1}{\mu_{mx}}}} \quad (13)$$

where a_t^m denotes import-able good and a_t^x the export-able good, $0 < \chi_m < 1$ denotes distribution parameter and $\mu_{mx} > 0$ denotes the elasticity of substitution between import-able and export-able goods. Import-able, export-able and non-tradable goods are produced with capital and labour via the Cobb-Douglas technologies

$$y_t^j = A^j \left(k_t^j\right)^{\alpha_j} \left(h_t^j\right)^{1-\alpha_j}; \ \forall j \in \{x,m,n\} \tag{14}$$

where sector $j \in \{m,x,n\}$, y_t^j denotes output and A_t^j denotes total factor productivity in the in sector j.

To ensure a stationary equilibrium process for external debt, we assume that the country interest-rate premium is debt elastic

$$r_t = r^* + \psi\left(e^{d_{t+1}-\bar{d}} - 1\right) \tag{15}$$

where r^* denotes the sum of world interest rate and the constant component of the interest-rate premium, the last term of (15) is the debt-elastic component of the country interest-rate premium and we assume the parameter debt-elastic $\psi > 0$.

Model implied terms-of-trade f_t is assumed to follow AR(1) process

$$\log \frac{f_t}{\bar{f}} = \rho \log \frac{f_{t-1}}{\bar{f}} + \pi\varepsilon_t \tag{16}$$

where ε_t is a white noise with mean zero and unit variance, and $\bar{f} > 0$. The serial correlation parameter is $0 < \rho < 1$ and terms-of-trade standard error is $\pi > 0$.

For details of households' and firms' problem first-order conditions, market clearing and competitive equilibrium derivation and definitions see Uribe and Schmitt-Grohe (2016).

Calibrating the model we follow Uribe and Schmitt-Grohe (2016) process. The calibrated values of the model parameters are in the Table 1 for Slovak economy and in the Table 2 for Czech economy. We assume the values of σ, δ, r^*, ω_m, ω_x and ω_m from the small open economy real business cycle model calibrated for Slovak data by Jurkovicova (2015). We assume that wage elasticity is same in all three sectors. Toroj (2012) calibrated Slovak elasticity of substitution between tradable composite good and non-tradable good, $\mu_{\tau n}$, to be 0.76. Uribe and Schmitt-Grohe (2016) provide a rich discussion with literature references on calibrating the elasticity of substitution between import-able and export-able goods. Further we adopt Uribe and Schmitt-Grohe (2016) ideas to calibrate α_m, α_x, α_n in the Slovakia. We assume that Czech and Slovak characteristics are similar to calibrate same values of σ, δ, r^*, in both Slovak and Czech economies. The values of ω_m, ω_x, ω_m, $\mu_{\tau n}$, α_m, α_x, α_n, are gathered from Ambrisko (2015). Considering high-frequently (i.e. quarterly) data it is assumed that $\mu_{mx} = 0.8$ in both

economies. Calibrating $\overline{f}$, A^m and A^n in both countries we adopt values Uribe and Schmitt-Grohe (2016). The values of terms-of-trade serial correlation, ρ, and standard error, π, correspond to the data characteristics used in empirical models. To calibrate χ_m, χ_τ and A^x we follow a process of Uribe and Schmitt-Grohe (2016) and implied moment restrictions of average share of value-added exports in *GDP*, s_x, average trade balance-to-*GDP* ratio, s_{tb}, and average share of non-tradable goods in *GDP*, s_n. Likewise Uribe and Schmitt-Grohe (2016) we use OECD Trade in Value-Added (TiVA) and UNCTAD statistical databases to find values of these moment restriction. The values of the rest implied structural parameters, $\overline{d}$ and β come from the values of calibrated ones. We fail to reach a negative reaction of the trade balance to a terms-of-trade shock in the theoretical MXN model to follow empirical facts observed in the Figures 1 and 2. After substituting big values for the parameter ψ, the response of the trade balance is close to 0 – positive using Slovak values and negative using Czech values. Therefore we calibrate ϕ_j, $j \in \{m,x,n\}$ and ψ to capture moments observed in the empirical model. From the Figure 1 it follows that there is no statistically significant reaction of investment to the terms-of-trade shock in Slovakia. On the other hand the Czech SVAR model implies that that investment-terms-of-trade volatility ratio conditional on terms-of-trade shocks equals approximately to 0.45. As Uribe and Schmitt-Grohe (2016) pointed out, the standard deviation conditional on terms-of-trade shock of investment in the trade sector is 1.5 times as large as its counterpart in the non-traded sector.

Table 1 Calibration of the MXN Model: Slovakia

Calibrated Structural Parameters			Moment restrictions		
σ	2	Jurkovicova (2015)	s_n	0.27	UNCTAD
δ	0.1		s_x	0.37	OECD
r^*	0.04		s_{tb}	-0.015	
ω_m	2.7		$p^m y^m/(p^x y^x)$	1	Uribe and Schmitt-Grohe (2016)
ω_x	2.7		$\sigma_{im+ix}/\sigma_{in}$	1.5	
ω_n	2.7		no reaction of investment		
$\mu_{\tau n}$	0.76	Toroj (2012)	Implied Structural Parameter Values		
μ_{mx}	0.8	Uribe and Schmitt-Grohe (2016)	χ_m	0.875	
α_m	0.35		χ_τ	0.78	
α_x	0.35		$\overline{d}$	–0.509	
α_n	0.25		A^x	1.374	
$\overline{f}$	1		β	0.962	
A^m	1		ϕ_m	0	
A^n	1		ϕ_x	0.159	
π	0.013	Empirical model	ϕ_n	0	
ρ	0.464		ψ	1.5017×10^{-5}	

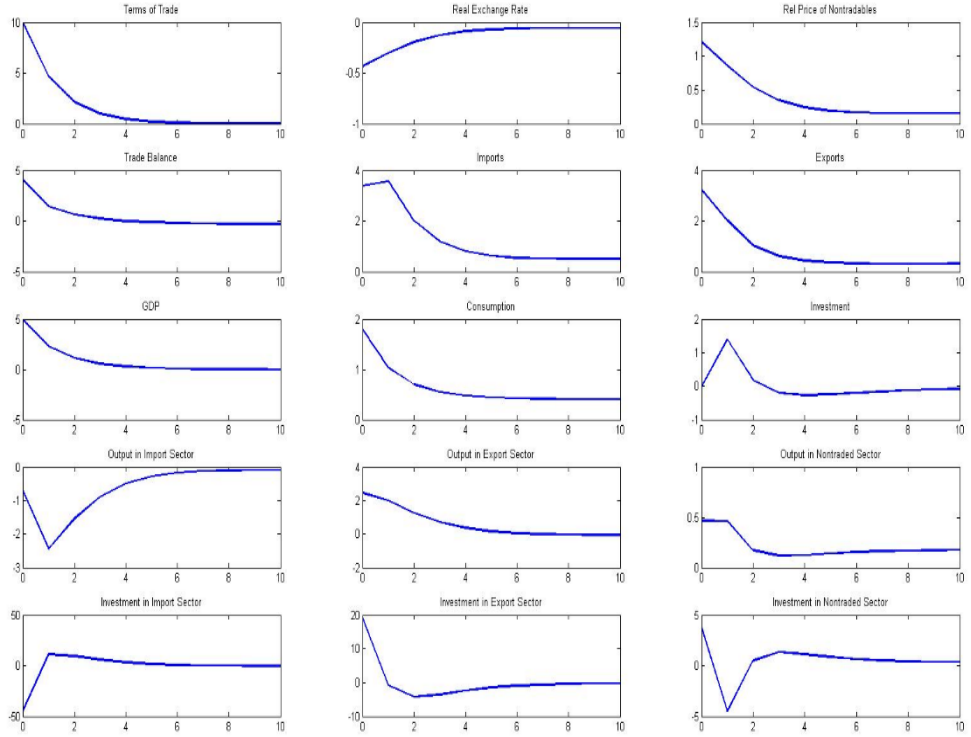
Source: Literature referenced in the table and own processing

Table 2 Calibration of the MXN Model: Czech Republic

Calibrated Structural Parameters			Moment restrictions		
σ	2	Jurkovicova (2015)	s_n	0.27	UNCTAD
δ	0.1		s_x	0.34	OECD
r^*	0.04		s_{tb}	0.08	
ω_m	2.7	Ambrisko (2015)	$p^m y^m/(p^x y^x)$	1	Uribe and Schmitt-Grohe (2016)
ω_x	2.7		$\sigma_{im+ix}/\sigma_{in}$	1.5	
ω_n	2.7		σ_i/σ_{tot}	0.45	Empiric. model
$\mu_{\tau n}$	0.76		Implied Structural Parameter Values		
α_m	0.35		χ_m	0.672	
α_x	0.35		χ_τ	0.979	
α_n	0.25		$\overline{d}$	1.800	
μ_{mx}	0.8	Uribe and Schmitt-Grohe (2016)	A^x	1.436	
$\overline{f}$	1		β	0.962	
A^m	1		ϕ_m	0.0125	
A^n	1		ϕ_x	0.021	
π	0.013	Empirical model	ϕ_n	0	
ρ	0.464		ψ	0.0176	

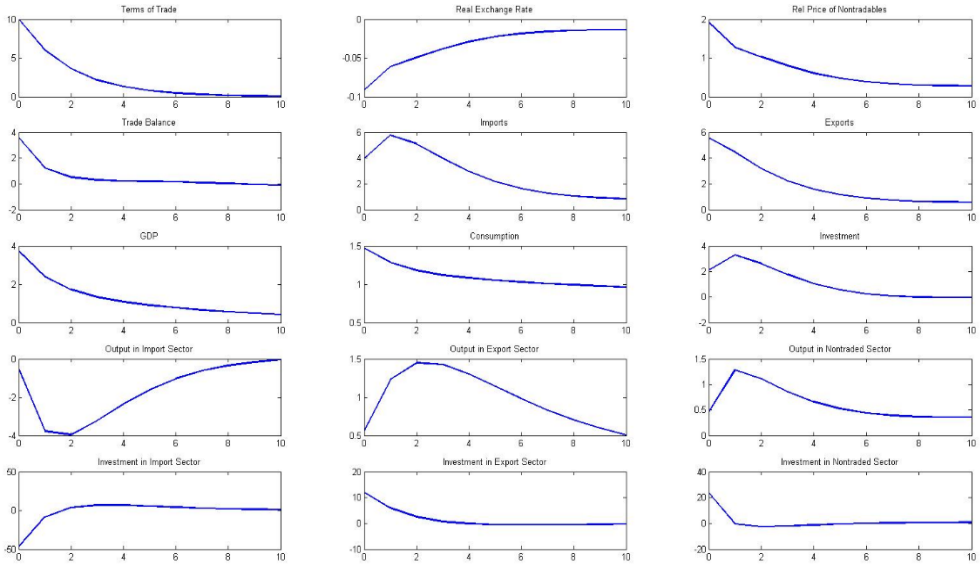
Source: Literature referenced in the table and own processing

Figure 3 Impulse Response Functions to Terms-of-Trade Shock in Slovakia



Source: Own processing

Figure 4 Impulse Response Functions to TOT Shock in Czech Republic



Source: Own processing

In order of finding model equilibrium the first order linear approximation to the nonlinear solution are applied using algorithms of Uribe and Schmitt- Grohe (2016). Responses to the terms-of-trade impulses and covariance-variance matrix conditional on the terms-of-trade shock is computed using algorithm of Uribe and Schmitt- Grohe (2016).

Conclusion

In empirical models we observe small impact of terms-of-trade on business cycles in Slovakia and Czech Republic. In Slovakia real exchange rate and in Czech Republic investment reacts immediately, while other aggregates do not change (or they change later mostly as reaction of other variables) on terms-of-trade shock. In both countries terms-of-trade has negative effect on the trade balance.

However, theoretical model calibrated to suit empirical observations overestimates the influence of terms-of-trade shocks in both countries. Both output and investment rise after terms-of-trade shock realization in both countries. The theoretical falls in real interest rates are overestimated as well. As we already pointed out, we cannot achieve a negative reaction of the trade balance in the theoretical model as it is in the empirical model.

Acknowledgements

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References:

Aguirre, Ezequiel. *Business Cycles in Emerging Markets and Implications for the Real Exchange Rate*. Ph.D. Dissertation, New York: Columbia University, 2011.

Ambrisko, Robert. *A Small Open Economy with the Balassa-Samuelson Effect*. Working paper series (ISSN 1211-3298), Prague: Charles University CERGE EI, 2015.

Amisano, Gianni, and Carlo Giannini. *Topics in Structural VAR Econometrics*. *2nd ed*. Berlin: Springer-Verlag, 1997.

Broda, Christian. Terms of Trade and Exchange Rate Regimes in Developing Countries. *Journal of International Economics*, 63(1), 2004, 31-58.

EUROSTAT portal. Retrieved from http://ec.europa.eu/eurostat/data/database [Accessed 4th April 2016]

Harberger, Arnold C. Currency Depreciation, Income, and the Balance of Trade. *Journal of Political Economy*, 58(1), 1950, 47-60.

Jurkovicova, Maria. *Model realneho hospodarskeho cyklu v slovenskej ekonomike*. Thesis, Bratislava: University of Economics, 2015.

Laursen, Svend, and Lloyd A. Metzler. Flexible Exchange Rates and the Theory of Employment. *Review of Economics and Statistics* 32(4), 1950, 281-299.

Lutkepohl, Helmut. *New Introduction to Multiple Time Series Analysis*. Berlin: Springer, 2005.

Obsfeld, Maurice. Aggregate Spending and the Terms of Trade: Is There a Laursen-Metzler Effect? *Quarterly Journal of Economics*, 97(2), 1982, 251-270.

Svensson, Lars E. O., and Assaf Razin. The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect. *Journal of Political Economy* 91(1), 1983, 97-125.

Toroj, Andrzej. *Poland and Slovakia during the crisis: would the euro (non-)adoption matter?* Working paper of Ministry of Finance in the Poland Republic no. 13-2012, Warsaw. 2012.

Trade in Value Added database (OECD.STAT). Retrieved from: http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm [Accessed 4th March 2016]

UNCTAD database. Retrieved from http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?IF_ActivePath=P,15912 [Accessed 4th March 2016]

Uribe, Martin, and Stephanie Schmitt-Grohe. *Open Economy Macroeconomics*. New York: Columbia University. 2016. Retrieved from http://www.columbia.edu/~mu2166/book/ [Accessed 4th March 2016]

Soil Contamination And Its Effects On Beans (*Phaseolus Vulgaris* L.) Growth Affected By Organic Matter, And Associated With *Glomus Intrarradices*

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Abstract

Contamination is a growing problem affecting irrigation water. The objective of this research was to evaluate the effect of two sources of irrigation water, clean one, sewage water, and organic matter on the association with *Glomus intrarradices* on beans (*Phaseolus vulgaris* L.). The interpolation of the chemical analysis did not find differences between clean and sewage waters regarding the increase of contaminants in the soil. The contamination of the soil by sewage water did not affect plant growth or yield. It only affected nitrogen fixation. There were highly significant increases ($p \leq 0.05$) in all the variables recorded due to the application of organic matter, and to the inoculation with *Glomus intrarradices*. The irrigation source of the soils used in this experiment only had a significant effect ($p \leq 0.05$) on pod number and nitrogen fixation. The best growth and grain yield occurred with inoculated plants and supplementary organic matter.

Keywords: Soil contamination, vermicompost, sewage water, arbuscular endomycorrhiza, edible legumes

Introduction

Common bean is the most important legume in Mexico. Around 1.7 million hectares were planted in 2015 in this country (SIAP, 2016). It is cultivated mainly in areas where water is scarce. Sewage water has been used for its irrigation. Studies on its effect on plant growth and yield are needed.

Farmers usually apply chemical fertilizers. Its cost has been increasing dramatically (Huang, 2009). Organic matter sometimes is also used. However, their consequences on beneficial microorganisms as endomycorrhiza need to be understood. *Glomus intrarradices* has been used to improve plant growth under different conditions included contaminated soils. Several researchers consider that kind of fungi as the most important organisms on earth interacting in agro environments. More than 80% of all terrestrial plants, among them most of the horticultural and crop plants have a symbiotic relationship with these fungi. The stimulation of plant growth can be attributed mainly to the improvement of phosphorus nutrition (Alarcon, 2008; Gardezi *et al*., 2005, 2008, and 2015; George *et al.,* 1994; Plenchette *at al.*, 2005).

Glomus intrarradices has increased bean yield 36% (Irizar *et al.*, 2003). Novella *et al*. (2003) had reported augmented corn and bean yield when they were cultivated together and were inoculated with a combination of *Rhizobium* and mycorrhiza.

The objective of this study was to map soil contamination due to the use of sewage water and investigate its effect on the growth and yield of beans associated with *Glomus intrarradices*.

Materials and methods

The study was done in agricultural fields, and under greenhouse conditions at the Postgraduate College, Montecillo Campus, State of Mexico, in the spring and summer of 2014.

Two soils, from Tocuila, Texcoco, Mexico, were used. One came from a one-hectare parcel irrigated with sewage water, and the other one was from another one-hectare field irrigated with clean water from a well. Geographical Information Systems were used. Sixteen wells were located using GPS in a digital orthophoto from the Mexican Institute of Geography and Informatics from 1996 with a 2 m pixel, scale 1:20,000.

From the soil samples obtained, a 17 variables chemical analysis, and a 13 variables agronomical analysis were performed. An Excel spreadsheet with the chemical, and the agronomical variables was constructed. It was transformed to Dbase later. The coordinates were transferred to a point map in GIS ArcView v. 3.2 associated to the spreadsheet using the Trigulat

Irregular Network (TIN) method. This allowed analyzing the movement of chemical elements such as potentially toxic heavy metals from the samples.

The treatments were: planting in soil irrigated with sewage water and the other one with clean water. Both soils were collected at three depths 0-5, 5-10, and 10-40 cm from plots of one hectare each (Castellanos *et al*., 2000).

The inoculation was done during the planting, mixing 5 g of sand with sorghum roots with 78 % colonization of *Glomus intrarradices* and 1050 spores per 100 g of inert material. Two levels of *Glomus* were applied, with and without *Glomus*.

Table 1. Soil analysis for the two plots, one irrigated with sewage water and the other with clean one.

Soil sample	pH	EC	OM	TN	NO_3	P	CEC
	1:2	dm sec^{-1}	%	%	mg kg^{-1}	mg kg^{-1}	C mol (+) kg^{-1}
Residual water							
Soil depth 0-5 cm	7.44	349	2.5	0.098	18	15	19
Residual water							
Soil depth 5-10 cm	7.37	454	2.48	0.096	17	14	18
Residual water							
Soil depth 10-40 cm	7.44	475	2.45	0.094	15	11	15
Clean water							
Soil depth 0-5 cm	7.52	314	2.49	0.097	17	14	18
Clean water							
Soil depth 5-10 cm	7.75	332	2.47	0.095	16	13	17
Clean water							
Soil depth 10-40 cm	7.85	384	2.43	0.092	13	10	13
Soil sample	**Ca**	**Mg**	**K**	**Na**	**Fe**	**Zn**	**Cu**
	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}
Residual water							
Soil depth 0-5 cm	1250	59	1180	400	5	3	0.5
Residual water							
Soil depth 5-10 cm	1210	56	1220	640	5	3	0.5
Residual water							
Soil depth 10-40 cm	1245	59	1400	800	4	3	0.4
Clean water							
Soil depth 0-5 cm	1240	58	1120	360	5	3	0.5
Clean water							
Soil depth 5-10 cm	1243	60	1110	640	3	3	0.4
Clean water							
Soil depth 10-40 cm	1200	53	1140	720	4	2	0.4

Key: pH= Hydrogen potential, EC=Electrical conductivity, OM= Organic matter, TN= Total nitrogen, NO3= Nitric nitrogen, CEC= Cation Exchange Capacity.

Organic matter was applied as a vermicompost. Four doses were applied. In every bag of three kg, 0, 28.86 g, 57.7 g, and 86.46 g of vermicompost were mixed. They were equivalent to 0, 25, 50, and 75 t ha^{-1} of organic matter.

The variables evaluated were: plant height (PH, cm), leaf area (LA, cm^2), pod number (PN), grain dry weight (GDW, g), root length (RL, cm), root volume (RV cm^3), root dry weight (RDW, g), pod dry weight (PDW, g), grain number (GN) biomass dry weight (BDW, g), white nodule number (WNN), red nodule number (RNN), and total nodule number (TNN).

A factorial arrangement with 16 treatments (4x2x2) was used with a completely randomized block design with three replications. An analysis of variance for all variables registered was done, and a Tukey mean comparison test for the significant variables.

Results and Discussion

Table 1 shows the average values for the chemical analysis of the sixteen wells sampled. No geographical pattern was found for pollutants (Figures 1 and 2). Sewage water only increased the quantity of Cu and Zn, but its levels were below the threshold for considering them as contaminants (Castellanos *et al.*, 2000). No Cr or Ni traces were found. The soil texture was sandy loam. Its higher infiltration rate could reduce the contaminant buildup.

The soil pH was alkaline. It was higher in those irrigated with clean water. The difference was greater in the 10-40 cm depth. The soil watered with clean water had a pH of 7.85, and the one with sewage water, only 7.44 (Table 1). The electrical conductivity (EC), organic matter (OM), total nitrogen (TN), nitric nitrogen (NO3), phosphorous (P), Cation Exchange Capacity (CEC), calcium (Ca), potassium (K), sodium (Na), iron (Fe), zinc (Zn), and copper (Cu) quantities were higher in the soils that were irrigated with sewage water.

There were highly significant differences ($p \leq 0.01$) in all the variables recorded due to the application of organic matter, and to the inoculation with *Glomus intrarradices*.

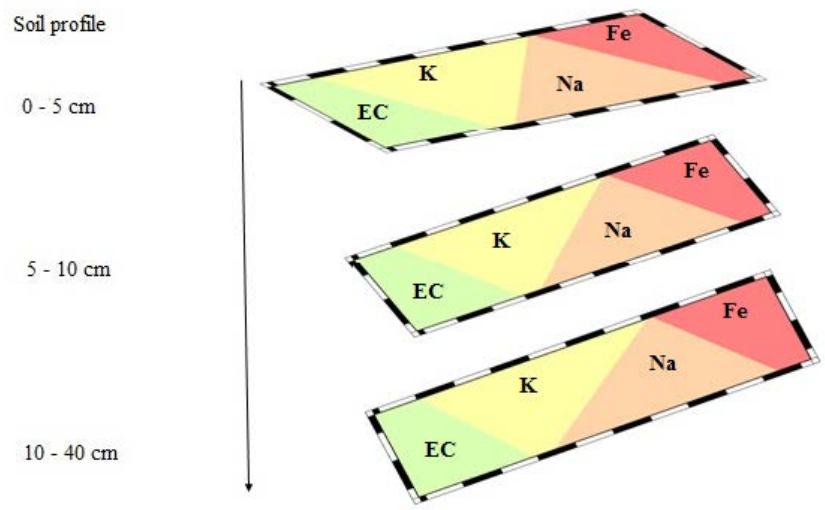

Figure 1. Soil analysis of three profiles irrigated with clean water.
Key: EC: Electrical Conductivity; K: Potassium; Na: Sodium; Fe: Iron.

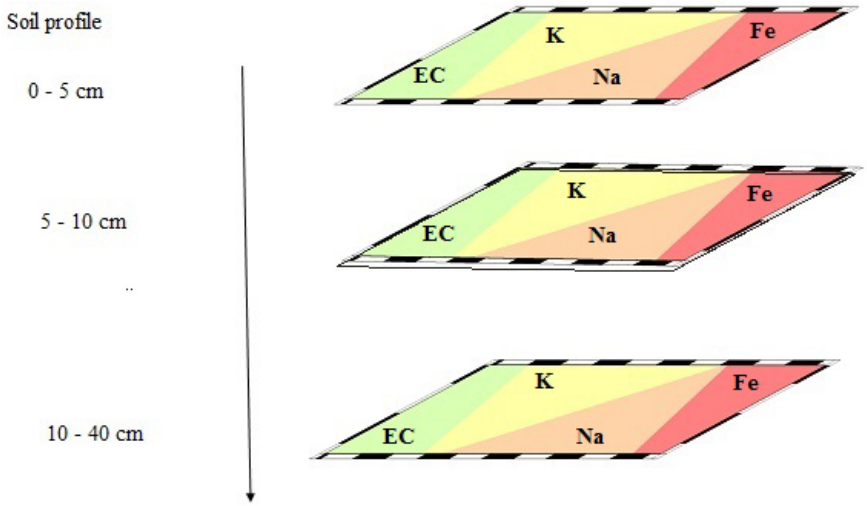

Figure 2. Soil analysis of three profiles irrigated with sewage water.
Key: EC: Electrical Conductivity; K: Potassium; Na: Sodium; Fe: Iron.

As it is shown in Figures 1 and 2, sixteen samples were obtained in order to analyze the movement of chemical elements, such as potentially toxic heavy metals, in different soil depths. The soils irrigated with clean water (Figure 1) did not have any significant difference in electrical conductivity, or K, Na, and Fe content in the three depths (0-5, 5-10, 10-40 cm; Figure 1). A similar situation was found in the soils irrigated with sewage water (Figure 2). There were no elements potentially toxic in those soils. It is advisable to continue monitoring heavy metals in regular intervals to ensure they remain in safe levels.

In both soils, total nitrogen (TN), and the nitric nitrogen (NO3) quantities were low. The distribution was higher in the 5-10 cm layer. No ammoniacal nitrogen (NH4) was found in the two soils. It explains why total nitrogen is only slightly higher on the soils that were irrigated with sewage water that had a greater organic matter (Lavelle and Spain, 2005).

There were highly significant differences ($p \leq 0.01$) in all the variables recorded due to the application of organic matter, and to the inoculation with *Glomus intrarradices*.

The pod number, and the white, red, and total nodule number were significantly affected ($p \leq 0.05$) for the contamination from the soil with sewage water. Their higher content of nitric and total nitrogen could reduce the nodule number. It is well known the antagonistic effect between nitrogen content is soils and nitrogen fixation (Dong *et al*., 2011). The lack of effect on growth and yield could be explained by the low N fixation (Gardezi *et al.* 2005 and 2015; Lindemann and Glove, 2003).

A positive effect of inoculation with *Glomus intrarradices* was found. The highly significant differences ($p \leq 0.01$) among treatments for all the variables recorded generated a beneficial effect on plant growth due to an improvement in the absorption of mineral nutrients required by the plants (Aryal *et al*., 2003 and 2006). This behavior was similar to that found by Gardezi *et al.* (2005, 2008b, 2009, 2010, and 2015).

Table 2. Effect of the inoculation with *Glomus intrarradices* on common bean (*Phaseolus vulgaris* L.).

Glomus intrarradices	Plant height (cm)	Dry weigth aerial part (g)	Leaf area (cm2)	Grain number (ln)	Grain dry weight (g)	Pod dry weight (g)	Pod number (ln)
Inoculated	124.542a	24.292a	448.79a	2.9806a	10.958a	3.0000a	2.1849a
No inoculated	100.667b	16.375b	357.92b	2.3845b	5.083b	2.1667b	1.8475b

Glomus intrarradices	Root lenght (cm)	Root volume (cm3)	Dry weigth root (g)	White nodule number (ln)	Red nodule number (ln)	Total nodule number (ln)
Inoculated	28.708a	9.7917a	3.0833a	1.9818a	2.6397a	3.0620a
No inoculated	19.500b	6.2500b	2.0833b	1.2320b	1.9258b	2.2557b

ln=transformed to natural log. Means with the same letter in each column are not significantly different (Tukey $\alpha = 0.05$).

Yield, root and shoot growth from plants with mycorrhiza were superior to those without inoculation (Table 2). The treatments with

mycorrhiza were 54% taller, had 25% more leaf area, 48% heavier shoot dry weight, 47% longer roots, 56% greater root volume, and 48% more root dry weight. This is an indication of a positive effect of mycorrhiza on plant growth originated by better mineral nutrient absorption required by the plant (Alarcon, 2008; Aryal *et al*., 2003 and 2006; Gardezi *et al.*, 2015). Gardezi *et al*. (2007, 2008a, 2009, and 2015) also found this beneficial effect in *Leucaena lecocephala* associated with endomycorrhiza and with Rhizobium. Positive responses to the inoculation with mycorrhiza were also found in a number of species (Gardezi *et al.*, 1990 and 2015; Irizar *et al*., 2003; Tawaraya, 2003), including beans (Aryal *et al*., 2003 and 2006; Bermudez *et al*., 1995).

The inoculation with *Glomus intrarradices* improved root and shoot growth. It also had a beneficial effect on the biological nitrogen fixation, and a superior absorption of nutrients (Gardezi *et al.*, 2015). Thus, it contributed to higher yield in beans, coinciding with other studies (Aryal *et al*., 2003 and 2006). Inoculated plants had 38% heavier pods and yielded 116% more grain (Table 2).

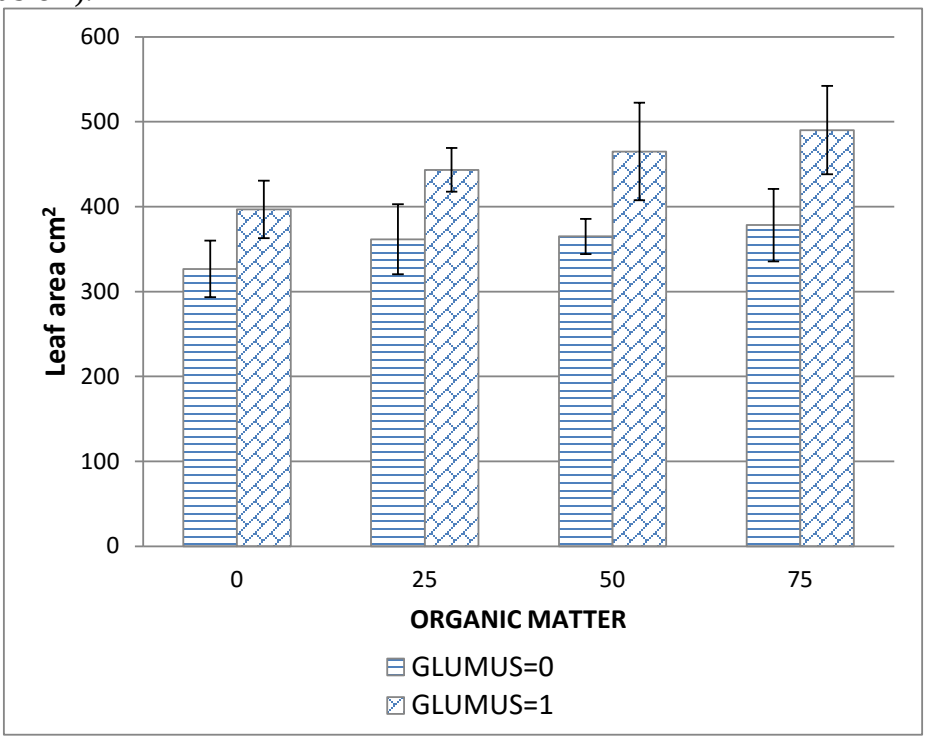

Figure 3. Effect of inoculation with *Glomus intrarradices* and organic matter on soils with two types of irrigation on leaf area of three cultivars common bean (Phaseolus vulgaris). Key: Glumus=0: Noninoculated, Glumus=1: Inoculated with Glomus intrarradices. The vertical lines indicate standard error.

Plant growth was affected by the organic matter application (Table 3). It provided significantly higher ($p \leq 0.01$) plant height in all the treatments compared with the control. Aryal *et al*. (2003 and 2006) found similar results. Only the higher quantities gave heavier dry weight of the aerial part. A similar situation was found in the leaf area (Figure 3).

Root length and root volume were also significantly greater ($p \leq 0.05$) only with the two higher applications of vermicompost. However, all the doses of organic matter gave heavier roots.

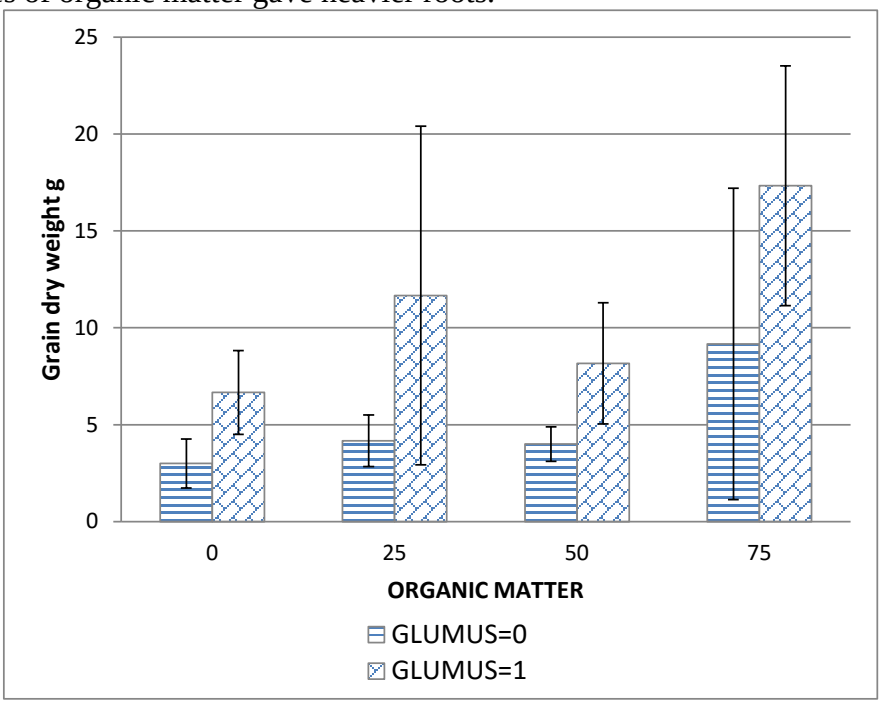

Figure 4. Effect of inoculation with *Glomus intrarradices* and organic matter on soils with two types of irrigation on grain yield of common bean (Phaseolus vulgaris).
Key: Glumus=0: Noninoculated, Glumus=1: Inoculated with Glomus intrarradices. The vertical lines indicate standard error.

Organic matter also promoted nitrogen fixation. All the vermicompost applications had a significantly higher total nodule number. However, only the elevated dose was related with a greater white and red nodule number.

In an analogous way with mycorrhizal inoculation, the organic matter promoted better root and shoot growth. Therefore, as a result, photosynthetic production increased. Pod number was higher with organic matter. Grain yield was 174% enhanced with the highest dose of organic matter compared to the control (Table 3, Figure 4).

Thus, the poorest growth and grain yield occurred with uninoculated that lacked supplementary organic matter (Table 3, Figure 4).

Table 3. Effect of organic matter (vermicompost) on common bean (*Phaseolus vulgaris* L.).

Organic matter t*ha^{-1}	Plant height (cm)	Dry weigth aerial part (g)	Leaf area (cm2)	Grain number (ln)	Grain dry weight (g)	Pod dry weight (g)	Pod number (ln)
0	90.167b	15.333b	361.67b	2.289b	4.833b	2.083b	1.824b
25	115.000a	19.833ab	402.50ab	2.511ab	7.917ab	2.667a	1.949ab
50	123.417a	22.917a	415.00a	2.963a	6.083b	2.750a	2.131a
75	121.833a	23.250a	434.25a	2.968a	13.250a	2.833a	2.161a

Organic matter t*ha^{-1}	Root lenght (cm)	Root volume (cm3)	Dry weigth root (g)	White nodule number (ln)	Red nodule number (ln)	Total nodule number (ln)
0	19.583b	5.917b	2.000b	1.125b	1.744b	2.070b
25	24.833ab	7.667ab	2.750a	1.637ab	2.564a	2.919a
50	25.917a	9.083a	3.000a	1.682ab	2.337ab	2.692a
75	26.083a	9.417a	2.583a	1.983a	2.487a	2.954a

ln=transformed to natural log. Means with the same letter in each column are not significantly different (Tukey α= 0.05).

The irrigation source of the soils used in this experiment only had a significant effect ($p \leq 0.05$) on pod number and nitrogen fixation. The higher content of organic matter and nitrogen found in the soils watered with sewage water generated a greater pod number. However, this effect was not present in grain yield.

The nitrogen fixation, measured as the nodule number (white, red, and total) was higher in the soils irrigated with clean water. A possible explanation for this finding is the antagonistic effect between nitrogen content is soils and nitrogen fixation (Dong *et al*., 2011). The soils watered with sewage water had higher total and nitric nitrogen (Table 1). Gardezi *et al*. (2012, 2013, and 2015) found similar results in previous experiments.

Conclusion

The soil chemical analysis of each plot allowed to have the distribution of nutrients and contaminants. The interpolation of the chemical analysis did not find differences between clean and sewage waters regarding the increase of contaminants in the soil. The contamination of the soil by sewage water did not affect plant growth or yield. It only affected nitrogen fixation. Mycorrhizal inoculation and nitrogen fixation provided higher bean

root and shoot growth and therefore, better yields. The application of organic matter, as vermicompost, improved plant growth, and grain yield.

In a future study, a larger area will be sampled to search for higher variability among clean and sewage water.

References:

Alarcón, A. Los hongos micorrízicos arbusculares como biotecnología en la propagación y manejo de plantas en viveros. Agroproductividad 1(1): 19-23. 2008.

Aryal, U. K., H. L. Xu, and M. Fujita. Rhizobia and AM fungal inoculation improve growth and nutrient uptake of bean plants under organic fertilization. J Sustainable Agric. 21(3): 27-39. 2003.

Aryal, U. K., S. K. Shah, H. L. Xu, M. Fujita. Growth, nodulation and mycorrhizal colonization in bean plants improved by rhizobial inoculation with organic and chemical fertilization. J Sustainable Agric. 29(2): 71-83. 2006.

Bermúdez, M., L. Castro, y R. Araya V. Efecto de la aplicación de micorrizas y roca fosfórica sobre el crecimiento y la adquisición de nutrimentos de plantas de frijol en un ultisol de Costa Rica. Mejoramiento y manejo agronómico del frijol común (*Phaseolus vulgaris* L.) para adaptación en suelos de bajo fósforo. En Beck, D.; comp. y ed. Memoria del Taller Internacional sobre Bajo Fósforo en el Cultivo de Frijol. San José (Costa Rica). 13-15 Nov 1995. p. 95-103. 1995.

Castellanos, J. Z., J. X. Uvalle B. y A. Aguilar S. Manual de interpretación de suelos y aguas. México: Colección INCAPA. 226 p. 2000.

Castillo, C. G.; Rubio, R.; Rouanet, J. L.; Borie, F. Early effects of tillage and crop rotation on arbuscular mycorrhizal fungal propagules in an Ultisol. Biology and Fertility of Soils 43(1): 83-92. 2006.

Dong ShouKun, Liu LiJun, Sun CongShu, Zhang Bing, Ma XiuFeng, Jiao GuangChun, Ma ChunMei, Gong ZhenPing. A study of the effects of nitrogen levels on nodule growth of soybean using ^{15}N tracing. Plant Nutrition and Fertilizer Science 17 (4): 985-988. 2011.

Gardezi, A.K., R. Ferrera-Cerrato, J. Kohashi, E.M. Engleman y M. Larqué-Saavedra. Potencial de diferentes variedades de *Phaseolus vulgaris* de alta eficiencia en la fijación de nitrógeno en asociación con *Rhizobium leguminosarum* Biovar *Phaseoli*. Agrociencia 1(4): 25-39. 1990.

Gardezi, A. K., I. D. Barceló-Quintal, V.M. Cetina-Alcalá, A. L. Bussy, M. U. Larqué-Saavedra, E. M. Saenz, A. Exebio-García, J. Pérez-Nieto, and M. A. Borja-Salin. Phytoremediation by *Leucaena leucocephala* in association with arbuscular endomycorrhiza and *Rhizobium* in soil polluted by Cr. *In* Callaos et al. The 9th World Multiconference on Systemics, Cybernetics and Informatics. Orlando, Florida. U.S.A. VII: 289-298. 2005.

Gardezi, A. K., E. Ojeda-Trejo, E. Mejia-Saenz, A. Exebio-García, U. Larque-Saavedra, S. Márquez-Berber, y V.M. Cetina–Alcalá. Effect of arbuscular endomycorrhizas associated with cow manure in *Leucaena leucocephala*. *In* Callaos et al. The 11th World Multiconference on Systemics, Cybernetics and Informatics. Orlando, Florida. U.S.A. IV: 113-118. 2007.

Gardezi, A. K., A. Exebio-García, E. Ojeda-Trejo, E. Mejia-Saenz, L. Tijerina-Chavez, M. Delgadillo-Piñon, U. Larqué-Saavedra, C. Villanueva-Verduzco, and H. Gardezi. Growth response of *Leucaena leucocephala* associated with arbuscular endomycorrhizae to applications of organic matter in an irrigated soil with sewage water. *In* Callaos et al. The 12th World Multiconference on Systemics, Cybernetics and Informatics. Orlando, Florida. U.S.A. IV: 153-158. 2008a.

Gardezi, A. K., H. S. Gardezi, E. Ojeda-Trejo, and S. R. Márquez-Berber. Respuesta a la inoculación de *Glomus intraradix*, materia orgánica y dosis de fertilización fosfatada en el crecimiento de mezquite (*Prosopis* sp.). Agroproductividad 1(1): 24-28. 2008b.

Gardezi, A. K., I. D. Barceló, A. Exebio-García, E. Mejía-Saenz, U. Larqué-Saavedra, S. R. Márquez-Berber, C. Villanueva-Verduzco, H. Gardezi, and D. Talavera-Magaña. Cu^{2+} bioaccumulation by *Leucaena leucocephala* in symbiosis with *Glomus* spp. and Rhizobium in copper-containing soil. *In* Callaos et al. The 13th World Multiconference on Systemics, Cybernetics and Informatics. Orlando, Florida. U.S.A. II: 17-22. 2009.

Gardezi, A. K., B. Figueroa-Sandoval, A Exebio-García, S. R. Márquez-Berber, M. U. Larqué-Saavedra, E. Mejía-Saenz, D. Talavera-Magaña, M. E. Delgadillo-Piñon, C. Villanueva-Verduzco, and H. Gardezi. Effect of *Glomus intrarradices* associated with different genotypes of *Phaseolus vulgaris* (common bean) in two soil types. *In* Callaos *et al*. Proceedings. The 14th World Multiconference on Systemics, Cybernetics and Informatics. Orlando, Florida. U.S.A. II:5-10. 2010.

Gardezi, A. K., S. R. Marquez-Berber, B. Figueroa-Sandoval, U. Larqué-Saavedra, M. Escalona-Maurice. Endomycorrhizal inoculation effect on beans (*Phaseolus vulgaris* L.), oat (*Avena sativa* L.), and wheat (*Triticum aestivum* L.) growth cultivated in two soil types under greenhouse conditions. Journal of Systemics, Cybernetics and Informatics 10(5): 68-72. 2012.

Gardezi, A. K., Márquez-Berber S. R., Figueroa-Sandoval, B., Talavera-Magaña, D., Larqué-Saavedra U., Escalona-Maurice M. J. Fungicide effect on Glomus intrarradices in different genotypes of beans (*Phaseolus vulgaris* L.), oat (*Avena sativa* L.), and wheat (*Triticum aestivum* L.) growth cultivated in two soil types under greenhouse conditions. Journal of Systemics, Cybernetics and Informatics 11(8): 46-51. 2013.

Gardezi, A. K., Márquez-Berber S. R., and Ayala-Garay, A.V. Los usos y beneficios de las micorrizas en la agricultura. *En* Santiago-Tepantlán, C., Ayala-Garay, A.V., and Almaguer-Vargas, G (eds.). Desarrollo y tecnología. Aportaciones a los problemas de la sociedad. México: Plaza y Valdés Editores. pp. 243-265. 2015.

George, E.; V. Romheld y H. Marschner. Contribution of mycorrhizal fungi to micronutrient uptake by plants. In J.A. Manthey, D.E. Crowley y D.G. Lewis (eds.). Biochemistry of metal micronutrients in the rhizosphere. London. pp. 93-109. 1994.

Huang, W. Factors Contributing to the Recent Increase in U.S. Fertilizer Prices, 2002-08. Outlook AR-33. A Report from the Economic Research Service. USDA. http://www.ers.usda.gov/Publications/AR33/AR33.pdf 2009.

Irizar Garza, M. B.; Vargas Vázquez, P.; Garza García, D.; Tut y Couoh, C.; Rojas Martínez, I.; Trujillo Campos, A.; García Silva, R.; Aguirre Montoya, D.; Martínez González, J. C.; Alvarado Mendoza, S.; Grageda Cabrera, O.; Valero Garza, J.; Aguirre Medina, J. F. Respuesta de cultivos agrícolas a los biofertilizantes en la Región Central de México. Agricultura Técnica en México 29(2): 213-225. 2003.

Lavelle P, and A. Spain. Soil Ecology. Dordrecht, The Netherlands: Springer Publisher, 2005.

Novella L., R., A. M. Machado A., M. C. Ladrón de Guevara, y A. Vega B. Participación de los biofertilizantes en la producción del policultivo. Alimentaria 349: 133-135. 2003.

Lindemann, W. C., and C. R. Glover. Nitrogen Fixation by Legumes. Guide A-129. Cooperative Extension Service. College of Agriculture and Home Economics. New Mexico State University. 2003.

Plenchette, C., C. Clermont-Dauphin, J. M. Meynard, and J. A. Fortin. Managing arbuscular mycorrhizal fungi in cropping systems. Can J Plant Sci. 85:31-40. 2005.

SIAP-SIACON. Information System for Agrifood Website. Ministry of Agriculture. Mexico. www.siap.gob.mx 2015.

Tawaraya, K. Arbuscular mycorrhizal dependency of different plant species and cultivars. Soil Science and Plant Nutrition 49 (5): 655-668. 2003.

Tu, C.; Booker, F. L.; Watson, D. M.; Chen, X.; Rufty, T. W.; Shi, W.; Hu, S. J. Mycorrhizal mediation of plant N acquisition and residue decomposition: impact of mineral N inputs. Global Change Biology. 12(5): 793-803. 2006.

Yücel, C.; Özkan, H.; Ortas, I.; Yagbasanlar, T. Screening of wild emmer wheat accessions (*Triticum turgidum* subsp. *dicoccoides*) for mycorrhizal dependency. Turkish Journal of Agriculture and Forestry 33 (5): 513-523. 2009.

Extraction And Curcuminoids Activity From The Roots Of *Curcuma Longa* By Rslde Using The Naviglio Extractor

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Abstract

In the present study the extraction of curcuminoids was performed from *Curcuma longa* roots, focusing the interest on curcumin, the major phenolic component of the root that has been shown to have a high antioxidant activity. A cold extraction technique was employed as an alternative to other conventional solid-liquid extraction techniques such as maceration, infusion, percolation and extraction with Sohxlet which expose curcuminoids to light, heat and oxygen causing the degradation and thus limiting the effectiveness of the processes themselves. The Naviglio Extractor (NE) or rapid solid-fluid dynamic extraction (RSLDE) is an innovative technology of solid-liquid extraction that can extract in a short time, compared to other existing techniques, bioactive substances present in the solid matrix using water as solvent, at room temperature. Curcumin is a plant pigment of very bright yellow orange color and is referred to as the E100 in the list of accepted color additives in the food and pharmaceutical

sector being devoid of toxicity. In the Indian and Asian cuisine it is used to prepare the curry and various typical local sauces while in the Ayurvedic medicine for many centuries to treat a variety of ailments. Recent studies have shown that curcumin exerts anti-tumor effects for its ability to induce apoptosis in cancer cells without cytotoxic effects on healthy cells; in fact, it can interfere with the activity of the transcription factor □ and □-TNF (Tumor Necrosis Factor) which has been linked to a number of inflammatory diseases and cancer diseases.

Keywords: *Curcuma longa* roots, aroma, curcuminoids, anti-tumor effects, Naviglio extractor

Introduction

Curcuma longa is an herbaceous plant, perennial, rhizomatous of the *Zingiberaceae* family, originally from South-East Asia, known for centuries, as well as its use in food as a spice or natural dye, also for its healing properties, especially in traditional Indian medicine. India is today the largest producer and exporter country with about 80% of world production, which amounts to about 1,100.000 t/year (Prabhakaran Nair, 2013).

From the root and rhizome, the underground stem of the plant (Figure 1), a spice of a characteristic golden color is obtained due to the presence of a group of phenolic compounds, classified as curcuminoids in which multiple biological activities have been attributed including antioxidant, antibacterial, antiviral and anti-tumor (Shanmugam et al, 2014).

Fig. 1. Rhizome of *Curcuma longa*.

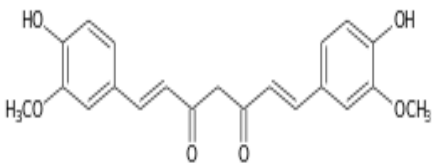


Fig. 2.Curcumin $C_{21}H_{20}O_6$

The crude extract of the dried and ground rhizome is used as a colorant in the kitchen and is cataloged as *Turmeric* and contains a mixture of curcuminoids, between 2-6%, responsible of the biological activity of the plant whose concentration varies depending on the species of Curcuma. The *Curcumin*, instead, is characterized by a mixture of three compounds, of which the main is curcumin (Figure 2), while the dimethoxycurcumin and the bis-dimethoxycurcumin which are respectively the mono and di-ester of methoxy curcumin (Sharma et al, 2013), representing 15-30% of the mixture.

In recent years, researchers have focused primarily on curcumin also known as diferuloylmethane, molecular formula ($C_{21}H_{20}O_6$), which is the

main biologically active component of turmeric, a phenolic compound lipophilic, poorly soluble in water and quite resistant to pH of stomach acid.

Our experimentation has been focused on the extraction of curcumin, from the roots of *Curcuma longa* by Naviglio extractor (Naviglio, 2003), which is a solid-liquid extraction system based on a negative pressure gradient which is provided in the two chambers of extraction and which allows to obtain in a short time an aqueous extract containing the curcuminoids. Subsequently, we proceeded to the quantification of the substances extracted by HPLC and curcumin obtained was compared with a commercial standard.

Materials and Methods

Reagents and Solvents:

All reagents and HPLC grade solvents were purchased from Merck (Darmstadt, Germany): anhydrous ethyl alcohol min. 99% (v/v); The water was produced with a Milli-Q Plus system (Millipore Corporation, Bedford, MA, USA). The standard of comparison (mixture of curcumin, and demethoxycurcumin bis-methoxycurcumin) was purchased from Sigma-Aldrich (Milan, Italy).

There are three Naviglio extractor models: the Lab model (capacity of 0.5, 1 and 2 liters); the Medium model (capacity 5, 10, 20 and 38 liters) and the model Industrial (capacity 50, 100 and 200 liters). In this work a Naviglio extractor (NE), Lab series of capacity of 0.5 liters (Atlas Filters Srl, Padua, Italy) was used for the extraction process. HPLC apparatus with 200 series pump (Perkin Elmer, Shellton, CT, USA), a UV/VIS Series 200 detector (Perkin Elmer, Shellton, CT, USA) set at 520 nm and a C18 column (250 x 4.6 mm particle size 5 □m) (Phenomenex, CA, USA).

Experimental part:

The ethanol/water extracts (50:50 v/v) were obtained in the following conditions:

20.0 g of *Curcuma longa* roots were extracted with 600 mL of an ethanol/water mixture (50:50 v/v) in the Naviglio extractor according to the method previously reported in the literature (Ferrara et al, 2002). Short static phase: 2 min; dynamic phase: 5 cycles with 12 sec. of the piston stop (2 min.); total cycles: 30 for a total of 2 hours.

After evaporation of the solvent, 375 mg of dry residue was obtained, which was dissolved in methanol and analyzed by HPLC for the analysis of bioactive compounds by means of a gradient eluent system. The eluents were: phase A: water and phase B: acetonitrile. The gradient applied was as follows: Time 0 min, 5% B; Time 3 min. 5% B; time 20 min. 100% B time 25 min 100% B. The flow was set to 1 ml/min, while the loop was 20 □L.

Results and Discussion:

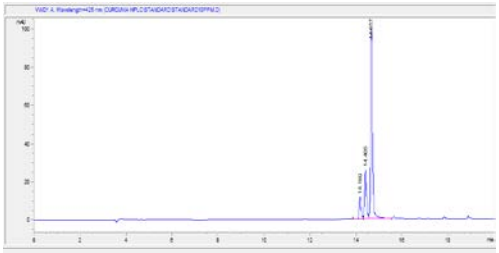
Figure 3 shows the HPLC analysis of the standard Curcumin with the three peaks related to curcumin, dimethoxycurcumin and bis-methoxycurcumin and Table 1 the relative retention times. Using scalar amounts of each standard calibration lines were constructed, in order to quantify the curcuminoids obtained from the extract of turmeric root by means of the Naviglio extractor.

Figure 4 shows the HPLC analysis of curcuminoids and Table 2 the relative retention times obtained by the Naviglio extractor using a solution ethanol/water (50:50 v/v). The use of ethanol was necessary to better solubilize the comminuted root of turmeric. The chromatographic profile revealed three separate peaks identified by comparison with standards. In particular, the peak 3 eluted at 14,237 minutes corresponds to bis-methoxycurcumin, the peak 4 eluted at 14,474 minutes corresponds to dimethoxycurcumin and the peak 5 eluted at 14,725 minutes corresponds to curcumin, which is the most abundant peak.

All determinations and the experiments were performed in triplicate and the results were reported as average value of 3 determinations. The standard deviation was calculated using Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA), and turns out to be less than 1%.

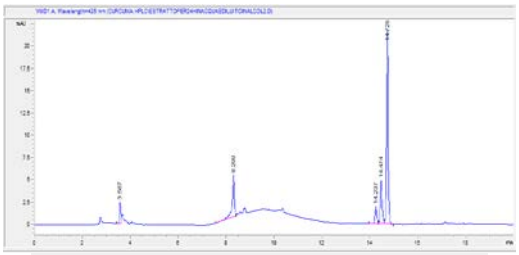
From the comparison of the chromatograms it is evident that in the hydroalcoholic extract in addition to curcumin the other unidentified curcuminoids were present, that are part of the *Turmeric* and are considered effective bioprotectors being able, unlike many other antioxidants, both to prevent the formation of free radicals, and to neutralize the existing free radicals (Krup et al,2013). In some studies, in fact, the powder obtained by grating the root of Curcuma was proven to be capable of inhibiting the growth of certain tumor cells *in vitro* and in a preclinical model of glioblastoma, for the synergistic effects of the mixture of all the bioactive compounds present (Zanotto et al, 2012).

Subsequently, by performing multiple chromatographic runs, it was possible to obtain the purified curcumin which was quantified using a calibration curve.



#	Time	Area	Height	Width	Symmetry
1	14.16	64.7	11.7	0.0821	0.666
2	14.405	136.6	26	0.0803	0.766
3	14.657	564.2	99.8	0.0849	0.705

Fig. 3. Chromatogram of standard Curcumin
Tab. 1 Retention times of standard



#	Time	Area	Height	Width	Symmetry
1	3.567	8	2.4	0.0498	0.827
2	8.299	29.9	4.7	0.09	1.858
3	14.237	10.9	1.9	0.0829	0.807
4	14.474	25.2	4.9	0.078	0.781
5	14.725	108.4	21.8	0.0769	0.841

Fig.4. Chromatogram of hydro alcoholic extract
Tab.2 Retention times of hydro alcohol extract
Naviglio Extractor
Naviglio Extractor

Pharmacological activities of curcumin:

In recent years, many studies and clinical trials carried out on the pharmacological activity of curcumin revealed its healing properties and its potential use as a nutraceutical for a large number of diseases (Kocaadam et al, 2015). Many of its activities, including the anticoagulant, antithrombotic, antihypertensive, anti-inflammatory, anti-diabetic, cholesterol lowering agents, antioxidant, hepatoprotective and antiviral were clinically proven.

Antioxidant property is higher than that of vitamin E, resulting in much more effective in the protection of DNA damage induced by lipid peroxidation (Ramadas et al, 2015). It also possesses hepatoprotective action in respect of certain toxic substances such as carbon tetrachloride, preventing the consequent increase in bilirubin, transaminases and alkaline phosphatase, indices of liver damage. During the last decades, several studies have explored the beneficial effects of curcumin as an anti-inflammatory agent, already known in Ayurvedic medicine, which can decrease inflammation and also play a role in cancer treatment (Shanmugam et al, 2015; Takeyama et al, 2015). It is known that peroxisome proliferator-activated receptors (PPARs) are transcription factors that play an important role in the regulation of genes involved in lipid utilization and storage, lipoprotein metabolism, adipocyte differentiation, and insulin action (Riaz et al, 2000). A review by Jacob et al. (2007) highlights the importance of curcumin as an anti-inflammatory agent and suggests that the beneficial effect of curcumin is mediated by the upregulation of peroxisome proliferator-activated receptor-γ (PPAR-γ) activation. Moreover, there is an increasing interest in curcumin as a cardiovascular disease (CVD) protective agent via decreased blood total cholesterol and low-density lipoprotein-cholesterol (LDL-cholesterol) level. A study by Kim and Kim (2010) has investigated the potential mechanism in the hypocholesterolemic effect of curcumin by measuring cholesterol 7a-hydroxylase (CYP7A1), a rate limiting enzyme in the biosynthesis of bile acid from cholesterol, at the mRNA level. The study results suggest that curcumin reduces concentration of blood cholesterol via induction of the CYP7A1 gene expression. Furthermore curcumin is capable of inhibiting *in vitro* COX1 and COX2 enzymes involved in inflammatory reactions and in osteoarthritis pathologies. Inflammation plays an important role in the development of most diseases: cardiovascular disease, cancer, lung disease, neurological, autoimmune, various forms of arthritis, diabetes. According to the Indian professor Bharat Aggarwal NF-k□ (nuclear transcription kappa beta factor) plays an important role in most of the disease and its inhibition may suppress inflammation (Hoesel et al, 2012); according to a hypothesis, the majority of tumors, the active NF-k□ factor, which in turn promotes the proliferation and metastasis of tumors. The incidence of four very common cancers, breast colon, prostate and lung, the lung is up to ten times lower in India, where significant quantities of turmeric are consumed daily, as compared for example to the United States (Anthwal et al, 2014).

In the literature, many mechanisms of action for the antitumor activity of curcumin have been described; in particular, this activity goes through several mechanisms, such as inhibition of tumor cell proliferation, induction of apoptosis, inhibition of cell transformation from normal to tumor, inhibition of the formation of blood vessels that feed the tumor (anti-

angiogenic effect), inhibition of invasiveness and metastasis suppression and inflammation (Perrone et al, 2015).

Curcumin has antibacterial activity and is used not only to prevent deterioration of foods, but also for the treatment of small wounds to prevent infection and facilitate tissue reconstruction and especially for the skin protection against damage caused by anticancer radiotherapy.

Depression, dementia, neurodegenerative diseases such as Alzheimer's disease, are on the rise because of the aging population in developed countries represents a serious problem for health care purposes.

A study on rats who had behavioral problems, such as poor mobility, showed that co-administration of curcumin and piperine has achieved significant effects both physically and increasing the mobility of the animals with decreased activity of monoamine oxidase and increase of serotonin and dopamine in the brain. The presence of piperine increased bioavailability of curcumin enhancing the effects, and this experience has provided the conditions for the use of curcumin and piperine in the treatment of depressive disorders (Dhutani et al, 2009).

Recent studies on curcumin have shown the anti-amyloidogenic activity, anti-inflammatory, antioxidant and metal chelator that may have neuro-protective effects. In particular, the hydrophobicity of the molecule might allow the passage through the blood brain barrier and subsequent accumulation in the brain, but the brain concentration of curcumin was insufficient due to low bioavailability, mainly due to its shallow water solubility, poor stability in solution, and rapid intestinal deletion even though many efforts have been made to improve its bioavailability. Increasing doses of administration, practical applied in many *in vivo* studies and clinical trials, do not seem an optimal solution, although curcumin possesses low toxicity, because research have always been conducted for limited and not long-term periods (Chin et al, 2013). The only certainty is determined by the fact that curcumin is not toxic to humans of up to 8 g/day dose and prevents the formation of amyloid plaques responsible for the disease (Hsu et al, 2007). The American Food and Drug Administration classifies the curcumin as a GRAS substance (Generally Recognized As Safe), because not teratogenic and free of side effects, at least within the allowable dosages. Only in special cases, such as pregnant women, people with bleeding disorders and patients with gallstones the restriction is necessary.

Conclusion:

Currently there are no toxicological studies on the long-term curcumin administration. However, some research has demonstrated the absence of toxicity in humans with dosing this active principle for short periods of time. Therefore, for its beneficial and healing properties, curcumin

obtained by the described extraction method, may be used as a natural dietary supplement. From the results obtained, it can be stated that the quality of the extracted compounds is quite similar to that of commercial standards and the method is economically advantageous. The extraction process by means of Naviglio extractor is carried out at room temperature, using a pressure increase in the extracting liquid on the solid matrix to be extracted, with a lower risk of degradation of the extracts, as it is in other conventional systems.

References:

Anthwal A., Thakur B. K., Rawat M. S. M., Rawat D. S., Tyagi A. K., & Aggarwal B. B. (2014). Synthesis, characterization and in vitro anticancer activity of C-5 curcumin analogues with potential to inhibit TNF-α-induced NF-κB activation. *Bio Med Research International* ID 524161, pp 10.

Chin D., Huebbe P., Pallauf K., Rimbach G. (2013) Neuroprotective properties of curcumin in Alzheimer's disease-merits and limitations *Curr. Med. Chem*. 30(32), 3055-3085.

Dhutani MK., Bishnoi M., Kulkami SH (2009). Anti-depressant like effect of curcumin and its combination with piperine in unpredictable chronic stress-induced behavioral, biochemical and neurochemical changes. *Pharmacol Bioche. Behav* 92(1), 39-43.

Ferrara L., Montesano D., Naviglio D. (2002). Metodo rapido di estrazione per i coloranti naturali *Piante Medicinali* 1(3),142-144.

Hoesel B., & Schmid J. A. (2013). The complexity of NF-κB signaling in inflammation and cancer. *Molecular Cancer* 12(86), 1-15.

Hsu C-H, & Cheng A-L. (2007*).* Clinical studies with curcumin. The molecular targets and therapeutic uses of curcumin in health and disease *Advances In Experimental Medicine And Biology.* 595, 471-480.

Jacob, A., Wu, R., Zhou, M., & Wang, P. (2008). Mechanism of the anti-inflammatory effect of curcumin: PPAR-γ activation. *PPAR research*, 2007, Article ID 89369, 5 pages. doi:10.1155/2007/89369.

Kim M., & Kim Y. (2010). Hypocholesterolemic effects of curcumin via up-regulation of cholesterol 7a-hydroxylase in rats fed a high fat diet. *Nutrition Research and Practice* 4(3), 191-195.

Kocaadam B., & Sanlier N. (2015).Curcumin, an active component of turmeric (*Curcuma longa*), and its effects on health. *Critical Reviews in Food Science and Nutrition*. DOI: 10.1080/10408398.2015.1077195.

Krup V., Prakash L.H., & Harini A. (2013). Pharmacological activities of turmeric (*Curcuma longa linn*): A review. *J HomeopAyurv Med* 2:133. DOI: 10.4172/2167-1206.1000133.

Naviglio D. (2003). Naviglio's Principle and presentation of an innovative solid-liquid extraction technology: Extractor Naviglio. *Anal. Lett.* 36(8), 1647-1659.
Perrone D., Ardito F., Giannatempo G., Dioguardi M., Troiano G., Lo Russo L., De Lillo A., Luigi Laino L., & Lo Muzio L. (2015). Biological and therapeutic activities, and anticancer properties of curcumin (review*). Experimental and Therapeutic Medicine* 10, 1615-1623.
Prabhakaran Nair, K.P. (2013). *The agronomy and economy of turmeric and ginger: the invaluable medicinal spice crops.* Elsevier Insights. Newnes. p.544.
Ramadas, D., & Srinivas, L (2015). Lipid peroxide induced DNA damage protection by BGS-Haridrin: a glycoprotein from Turmeric (Curcuma Longa). *International Journal of Ethnobiology & Ethnomedicine* 1(1), 1-4.
Riaz A.M., Laurence H.T., Katsunori N., Beigneux A., Moser A.H., Grunfeld C., Kenneth R.F. (2000) Up-Regulation of Peroxisome Proliferator-Activated Receptors (PPAR-a) and PPAR-g Messenger Ribonucleic Acid Expression in the Liver in Murine Obesity: Troglitazone Induces Expression of PPAR-g-Responsive Adipose Tissue-Specific Genes in the Liver of Obese Diabetic Mice *Endocrinology*. 141(11), 4021-4031.
Shanmugam S., & Bhavani P. (2014). Studies on the comparison of phytochemical constituents and antimicrobial activity of *Curcuma longa* varieties. *Int. J. Curr. Microbiol. App. Sci* 3(9), 573-581.
Shanmugam, M. K., Rane, G., Kanchi, M. M., Arfuso, F., Chinnathambi, A., Zayed, M. E., ... & Sethi, G. (2015). The multifaceted role of curcumin in cancer prevention and treatment. *Molecules*, *20*(2), 2728-2769.
Sharma, D. K., Maheshwari A., & Gupta P. M. (2013). Nutritional analysis of *Curcuma longa* L. in different cities of west uttar Pradesh (INDIA). *International Journal of Chemical and Pharmaceutical Sciences* 4(4),7-14.
Takeyama, H., Hayashi, H., Kaida, T., Arima, K., Taki, K., Higashi, T., ... & Beppu, T. (2015). Curcumin may have anticancer effect by normalizing cancer metabolic pathway. *Cancer Research*, *75*(15 Supplement), 1175-1175.
Zanotto-Filho A., Braganhol E., Edelweiss M. I., Behr G. A., Zanin R., Schröder R., Simões-Pires A., et al,. (2012). The curry spice curcumin selectively inhibits cancer cells growth *in vitro* and in preclinical model of glioblastoma. *The Journal of Nutritional Biochemistry* 23(6), 591-601.

Grey Relational Analysis Approach In Academic Performance Comparison Of University: A Case Study Of Turkish Universities

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Abstract

Universities, serve humanity with either the people that educate or their scientific activities. Therefore, students for a quality education and better career and scientists for the advancement of humanity by contributing to the science world need to prestigious universities. To be considered as a reputable university it must be one of the best performing universities in the area. Each year, the data about the ranking of universities are published and shared by various organizations, as worldwide or regional. Grey System theory, has been used successfully in cases where uncertainty or partial information exists. Grey Relational Analysis (GRA) is a part of Grey System theory. In this method, the correlation between reference sequence and comparability sequences is obtained and then ranking is made according to this correlation. In the study 10 Turkish University were analyzed with Grey Relational Analysis and the results of this method were interpreted.

Keywords: Performance Measurement, Education, Grey Relational Analysis, Multi Criteria Decision Making

Introduction:

If any living or any organization wants to survive in an environment where resources are scarce, it must be better than its competitors. It is also possible perform better. However, few people can agree on what that means for performance. The term of performance can have a different meaning from the efficiency, to robustness, resistance or the return on investment (Lebas, 1995: 23). Whereas a system's performance is analyzed, quantitative performance measurement are preferred to the qualitative assessments because of the uncertainty and difficulties (Beamon, 1999: 275).

Performance measurement is a term which contains program input, output, intermediate outcomes and end outcomes (Newcomer, 1997: 7). In this study performance of universities is compared so that, it will be useful that looking from organization's aspect. When asked why an organization needs to measure performance, the answer may be as identifying success, whether customer needs are met or not, understanding its processes, the ability to determine where the problem or the bottleneck etc. (Parker, 2000: 63). Due to these characteristics, performance measurement is very important for organizations and the executives of the organizations monitor their performance constantly. In literature, the performance of universities is measured with data envelopment analysis (Kuah & Wong, 2011; Warning, 2004), Malmquist indices (Worthington & Lee, 2008), DEMATEL, ANP and VIKOR methods (Wu, Lin & Chang, 2011), financial performance ratios (Pursglove & Simpson, 2007), AHP and VIKOR (Wu, Chen, Chen & Zhuo, 2012) etc. methods. In this study performance comparison was made with Grey Relational Analysis.

Grey Relational Analysis

Grey System theory was introduced to science world in 1982 (Ju-Long, 1982). The systems which lack information, such as structure message, operation mechanism and behavior document are referred to as Grey Systems. The goal of Grey System theory and its applications is bridge to the gap existing between social science and natural science. So that it can be said that Grey System theory is interdisciplinary (Julong, 1989: 1). The "grey" word in the name of the theory can be explained as characteristic between black and white. Hereby, "black" means needed information is not exactly available, conversely "white" means needed information is exactly available. "Grey" system proposition establishes a connection between black with white. With the established connection, correct properties of systems are discovered under poorly-informed situations. Therefore, Grey System theory seeks only the intrinsic structure of the system given such limited data (Huang, Chiu & Chen, 2008: 899). Grey System theory has five major components. These are Grey Prediction, Grey Relational Analysis, Grey Decision, Grey Programming and Grey Control (Wei, 2011: 672).

Grey Relational Analysis which used for analyzing relations between the discrete data sets is one of the popular methods. Grey Relational Analysis is also used for decision making in multi attribute cases. The major advantages of Grey Relational Analysis are based on original data, easy calculations and being straightforward and one of the best methods to decide in business environment (Wei, 2011: 672). Grey Relational Analysis compares the factors quantitatively in a dynamic way using information from the Grey System. This approach contacts establish relations among the

factors based on level of similarity and variability (Chang, Tsai & Chen, 2003: 54).

Grey Relational Analysis is used such as areas: behavior effect on energy consumption (Yu, Fung, Haghighat, Yoshino & Morofsky, 2011), decision making with intuitionistic fuzzy methods (Hou, 2010), supplier selection (Yang & Chen, 2006), stock market forecasting and portfolio selection (Huang & Jane, 2009), performance analysis of software project (Song & Shepperd, 2011), e-commerce system safety assessment (Liu, 2011), evaluation of business performance of wealth management banks (Wu, Lin & Tsai, 2010), analyzing of medical data (Xuerui & Yuguang, 2004) etc.

The method proposes theoretically a dependence to measure the correlation degree of factors. Accordingly, this means the more similarity the more factor correlation. Grey Relational Analysis uses Grey Relational grade to measure relation degree of factors (Kung & Wen, 2007: 843). In this respect Grey Relational theory provides efficiently management of uncertainty (Kao & Hocheng, 2003: 256).

Firstly, all alternatives are transformed to a comparability sequence in Grey Relational Analysis. This transformation is called Grey Relational generating. In this step data are normalized and transformed to values in 0-1 interval. Considering this sequence a reference (ideal target) sequence is defined. Then, Grey Relational coefficient is calculated between reference sequence and all comparability sequences. Finally, Grey Relational grade between reference sequence and comparability sequences is calculated according to grey relational coefficient. The highest Grey Relational grade among the alternatives will be the best choice (Kuo, Yang & Huang, 2008: 81; Wei, 2010: 244; Lin, Lin & Ko, 2002: 272). The steps of method are as follows.

Data Preprocessing

In this step, in order to compare correctly the data which have different measurement unit, a transformation operation is made and after this process the data values are obtained in 0-1 interval. $x_0^{(O)}(k)$ and $x_i^{(O)}(k)$ ($i = 1,2,\dots,m; k = 1,2,\dots,n$) ($m$ alternative, n criteria) show that original reference sequence and comparable sequence respectively. Normalization method can be made in four ways (Fung, 2003: 299).

i) If the data have “the larger-the better” characteristic:

$$x_i^*(k) = \frac{x_i^{(O)}(k) - \min x_i^{(O)}(k)}{\max x_i^{(O)}(k) - \min x_i^{(O)}(k)} \quad (1)$$

ii) If the data have “the smaller-the better” characteristic:

$$x_i^*(k) = \frac{\max x_i^{(O)}(k) - x_i^{(O)}(k)}{\max x_i^{(O)}(k) - \min x_i^{(O)}(k)} \quad (2)$$

iii) If there is a target value to be reached for the original data (OB means target value in Eq. 3):

$$x_i^*(k) = 1 - \frac{\left|x_i^{(O)}(k) - OB\right|}{\max\left(\max x_i^{(O)}(k) - OB, OB - \min x_i^{(O)}(k)\right)} \quad (3)$$

iv) Finally, as the simplest method normalization can be made dividing sequence values by the first value of sequence.

$$x_i^*(k) = \frac{x_i^{(O)}(k)}{x_i^{(O)}(1)} \quad (4)$$

Calculating of Grey Relational Coefficient and Grey Relational Grade

After data preprocessing, Grey Relational Coefficient is calculated based on normalized sequences (Yang, 2006: 771).

$$\gamma\left[(x_0^*(k), x_i^*(k)\right] = \frac{\Delta_{\min} + \xi\Delta_{\max}}{\Delta_{0i}(k) + \xi\Delta_{\max}}, \quad 0 < \gamma\left[(x_0^*(k), x_i^*(k)\right] \le 1 \quad (5)$$

Hereby, $\Delta_{0i}(k)$is deviation sequence between $x_0^*(k)$ reference sequence and $x_i^*(k)$ comparable sequence. This deviation sequence is calculated as in Eq. 6.

$$\Delta_{0i}(k) = \left|x_0^*(k) - x_i^*(k)\right| \quad (6)$$

Similarly, the biggest deviation and the smallest deviation are calculated as in Eq. 7 and Eq. 8.

$$\Delta_{\max} = \max_{\forall j \in i} \max_{\forall k} \left|x_0^*(k) - x_j^*(k)\right| \quad (7)$$

$$\Delta_{\min} = \min_{\forall j \in i} \min_{\forall k} \left|x_0^*(k) - x_j^*(k)\right| \quad (8)$$

The term in Eq. 5 ξ is distinguishing coefficient in [0, 1] and its value is usually 0.5 in literature.

Grey Relational grade is weighted sum of Grey Relational coefficients and it can be shown as in Eq. 9.

$$\gamma(x_0^*, x_i^*) = \sum_{k=1}^{n} \beta_k \gamma\left[x_0^*(k), x_i^*(k)\right] \quad (9)$$

$$\sum_{k=1}^{n} \beta_k = 1 \quad (10)$$

In Eq. 9 $\gamma(x_0^*, x_i^*)$ Grey Relational grade represents the level of correlation between the reference sequence and comparable sequences. If two series are identical to each other Grey Relational grade equals to 1. Grey

Relational grade also shows that level of influence applied to reference sequence by comparable sequence.

Performance Indicators of Universities

Details of performance indicators of universities were used in this study as follows.

i) **Article Score for 2014 (AS):** Scientific activities are announced to the scientific world with help of articles carried out in universities. Thus, humanity's knowledge thanks to the finding of these new articles, is cumulatively increasing. In this study data on 2014 were used so that because of 2015 not available.

ii) **Total Citation Score (TC):** Publications of scientists, in scientific terms how innovative or valuable is directly related to the number of citations they receive. For instance, the article *"Control Problems of Grey Systems"* written by Deng Ju-Long in 1982 was cited 3116 times citations by the date this study prepared according to Google Scholar. Therefore, as far as the number of published papers, the number of citations of these articles determine the performance of the universities.

iii) **Total Scientific Document Score (TSD):** As a result of scientific activities carried out in the universities not only the articles but also books, journals, papers and related to artistic activities documents can be obtained. For this reason, these documents are indicator of the performance of universities.

iv) **PhD Student Score (PhD):** One of the important missions of universities is raising equipped people to carry forward the torch of science. These people have the scientific competence with the doctoral programs, they will raise new students and carry out scientific activities.

v) **Lecturer/Student Score (L/S):** In terms of students the performance of universities depends on the quality of the education they take. The most important factor in determining the quality of education is the number of lecturer per student. The higher this ratio, the higher performance of the students will be. Therefore, the ratio is also an indicator of university performance.

Performance Comparison of Turkish Universities with Grey Relational Analysis

Indicators on the performance of Turkish Universities were obtained from the website of Middle East Technical University, University Ranking by Academic Performance (URAP) research laboratory (2016). Performance data of the first 10 universities as shown in Table 1.

Table 1: Performance data on universities

Rank	University	Est. Year	AS	TC	TSD	PhD	L/S	Total
1	U1	1956	167.35	188.66	171.91	183.61	55.83	767.35
2	U2	1967	155.16	159.88	165.24	155.13	69.88	705.3
3	U3	1933	153.51	154.97	157.59	175.13	56.75	697.95
4	U4	1985	169.62	187.63	156	114.17	50.27	677.69
5	U5	1946	146.15	141.29	147.72	184.99	57.17	677.32
6	U6	1944	150.92	149.33	151.09	168.19	55.33	674.88
7	U7	2014	139.72	164.13	136.73	154.8	62.56	657.94
8	U8	1955	147.15	145.92	151.92	144.86	66.44	656.29
9	U9	1982	148.95	136.87	148.14	164.3	53.61	651.87
10	U10	1996	152.49	166.62	157.65	107.95	63.57	648.29

The performance of universities may be misleading to consider the criteria by the total score. Because of the level of development of each university, physical facilities, time difference from the establishment to the present time, the number of staff and number of students can show very large differences. For instance, the first and fourth universities in the ranking show very close performance on AS and TC criteria. But the universities were established in 1956 and 1985 respectively. For this reason the first university has more lecturers and students ahead in total score due to having. Hence, by using Gray Relational Analysis, measuring the correlation between the reference sequence and comparable sequences a different approach will be adopted for the comparison of university performance. Reference sequence and comparable sequences necessary for Grey Relational Analysis are as in Table 2.

Table 2: Reference sequence and comparable sequences

	University	AS	TC	TSD	PhD	L/S
0	Reference Sequence	169.62	188.66	171.91	184.99	69.88
1	U1	167.35	188.66	171.91	183.61	55.83
2	U2	155.16	159.88	165.24	155.13	69.88
3	U3	153.51	154.97	157.59	175.13	56.75
4	U4	169.62	187.63	156	114.17	50.27
5	U5	146.15	141.29	147.72	184.99	57.17
6	U6	150.92	149.33	151.09	168.19	55.33
7	U7	139.72	164.13	136.73	154.8	62.56
8	U8	147.15	145.92	151.92	144.86	66.44
9	U9	148.95	136.87	148.14	164.3	53.61
10	U10	152.49	166.62	157.65	107.95	63.57

There is no standard of what should be the value of the $x_0^{(O)}$ reference sequence shown on university performance indicators in Table 2. Therefore, while creating the reference sequence has benefited from the original values of the comparable sequences. All the criteria have “the larger-the better” characteristic, so that reference sequence values equal to the maximum of the column values.

The data in Table 2 don't allow for comparison because of have measurement differences. For this reason values must be transformed [0, 1] interval by normalization operation. Normalized comparable sequences are shown in Table 3.

Table 3: Normalized comparable sequences

	University	AS	TC	TSD	PhD	L/S
0	Reference Sequence	1.0000	1.0000	1.0000	1.0000	1.0000
1	U1	0.9241	1.0000	1.0000	0.9821	0.2835
2	U2	0.5164	0.4443	0.8104	0.6124	1.0000
3	U3	0.4612	0.3495	0.5930	0.8720	0.3304
4	U4	1.0000	0.9801	0.5478	0.0807	0.0000
5	U5	0.2151	0.0853	0.3124	1.0000	0.3519

Normalized comparable sequences (continued)

6	U6	0.3746	0.2406	0.4082	0.7819	0.2580
7	U7	0.0000	0.5264	0.0000	0.6081	0.6267
8	U8	0.2485	0.1747	0.4318	0.4791	0.8246
9	U9	0.3087	0.0000	0.3243	0.7314	0.1703
10	U10	0.4271	0.5744	0.5947	0.0000	0.6782

The values in Table 2 have "the larger-the better" characteristic, so that normalized values were obtained by using Eq. 1. For instance, AS for U1 $x_1^*(1)$ was calculated as follows.

$$x_1^*(1) = \frac{x_1^{(O)}(1) - \min x_1^{(O)}(1)}{\max x_1^{(O)}(1) - \min x_1^{(O)}(1)} = \frac{167.35 - 139.72}{169.62 - 139.72} = 0.9241$$

Similarly, other values were obtained by Eq. 1. After normalized sequence obtained, firstly the deviation sequence is calculated between reference sequence and comparable sequences to calculate Grey Relational coefficient. The calculated values are as in Table 4.

Table 4: Deviation Sequence

	University	AS	TC	TSD	PhD	L/S
0	Reference Sequence	1.0000	1.0000	1.0000	1.0000	1.0000
1	U1	0.0759	0.0000	0.0000	0.0179	0.7165
2	U2	0.4836	0.5557	0.1896	0.3876	0.0000
3	U3	0.5388	0.6505	0.4070	0.1280	0.6696
4	U4	0.0000	0.0199	0.4522	0.9193	1.0000
5	U5	0.7849	0.9147	0.6876	0.0000	0.6481
6	U6	0.6254	0.7594	0.5918	0.2181	0.7420
7	U7	1.0000	0.4736	1.0000	0.3919	0.3733
8	U8	0.7515	0.8253	0.5682	0.5209	0.1754
9	U9	0.6913	1.0000	0.6757	0.2686	0.8297
10	U10	0.5729	0.4256	0.4053	1.0000	0.3218

The values in Table 4 equal to absolute value of the difference between reference sequence and comparable sequence. For instance, TC for U2 was calculated as follows using Eq. 6.

$$\Delta_{02}(2) = \left|x_0^*(2) - x_2^*(2)\right| = \left|1 - 0.4443\right| = 0.5557$$

When the values of deviation sequence taken from this perspective, the deviation sequence measures the values of comparable sequences how far away to the values of reference sequence. If the value of deviation is close to 1, it is commented that comparable sequence is remote to reference sequence, vice versa if the value of deviation is close to 0, they are close to each other.

Grey Relational coefficients are calculated using Eq. 5, Eq. 7 and Eq. 8 after the deviation sequence obtained. Calculated Grey Relational coefficients are as in Table 5.

Table 5: Grey Relational Coefficients

	University	AS	TC	TSD	PhD	L/S
0	Reference Sequence	1.0000	1.0000	1.0000	1.0000	1.0000
1	U1	0.8682	1.0000	1.0000	0.9654	0.4110
2	U2	0.5083	0.4736	0.7251	0.5633	1.0000
3	U3	0.4813	0.4346	0.5512	0.7962	0.4275
4	U4	1.0000	0.9617	0.5251	0.3523	0.3333
5	U5	0.3891	0.3534	0.4210	1.0000	0.4355
6	U6	0.4443	0.3970	0.4580	0.6963	0.4026
7	U7	0.3333	0.5135	0.3333	0.5606	0.5726
8	U8	0.3995	0.3773	0.4681	0.4898	0.7403
9	U9	0.4197	0.3333	0.4253	0.6506	0.3760
10	U10	0.4660	0.5402	0.5523	0.3333	0.6084

When calculating Grey Relational coefficients, the coefficient ξ in Eq. 5 was chosen as 0.5. As an example to calculating of Grey Relational coefficient PhD for U6 firstly, the biggest deviation and the smallest deviation are needed.

$$\Delta_{\max} = \max_{\forall j \in i} \max_{\forall k} \left|x_0^*(4) - x_j^*(4)\right| = 1$$

$$\Delta_{\min} = \min_{\forall j \in i} \min_{\forall k} \left|x_0^*(4) - x_j^*(4)\right| = 0$$

After that, by the help of Eq. 5, Grey Relational coefficient was calculated as follows.

$$\gamma\left[(x_0^*(4), x_3^*(4)\right] = \frac{\Delta_{\min} + \xi\Delta_{\max}}{\Delta_{03}(4) + \xi\Delta_{\max}} = \frac{0 + (0.5)\times 1}{0.1280 + (0.5)\times 1} = 0.7962$$

The other values were obtained similarly. Grey Relational grade is calculated after all Grey Relational coefficients obtained. Grey Relational

grade is calculated by Eq. 9. For this calculation the importance of each criteria was selected equal. Obtained Grey Relational grades are shown in Table 6.

Table 6: Grey Relational Grade

	University	Grey Relational Grade
0	Reference Sequence	1.0000
1	U1	0.8489
2	U2	0.6541
3	U3	0.5382
4	U4	0.6345
5	U5	0.5198
6	U6	0.4796
7	U7	0.4627
8	U8	0.4950
9	U9	0.4410
10	U10	0.5001

Grey Relational grades equal to weighted sum of the values in Table 5. These grades represent correlation between reference sequence and comparable sequence. For this reason, the alternative with highest correlation is selected the best choice/decision. An example of calculation Grey Relation grade for U5 is,

$$\gamma(x_0^*, x_5^*) = \sum_{k=1}^{n} \beta_k \gamma\left[x_0^*(5), x_5^*(k)\right]$$

$$= 0.20 \times (0.3891 + 0.3534 + 0.4210 + 1 + 0.4355) = 0.5198$$

The reason of selecting β_k as 0.2 is 1/5=0.2 according to Eq. 10. When Grey Relational grade of alternatives is ranked from the biggest to the smallest academic performance comparison of the universities is done. The comparison of universities according to the total score and Grey Relational Analysis is shown in Table 7.

Table 7. Results of the methods

Ranking	Original Ranking	Proposed Method
1	U1	U1
2	U2	U2
3	U3	U4
4	U4	U3
5	U5	U5
6	U6	U10
7	U7	U8
8	U8	U6
9	U9	U7
10	U10	U9

According to proposed method, the first two and the fifth universities remain unchanged but the ranking of other universities subject to changes. U4, U8 and U10 are rising universities, U3, U6 and U9 are falling universities in the ranking. Ranking according to total score does not consider differences of universities too much. Grey Relational Analysis considers the correlation with the ideal value, it measures relative performance of alternatives. Therefore, the results assessed reasonable.

Conclusion

Using Gray System Theory on systems that do not have full knowledge of available data, valuable information about the system is obtained. Grey Relational Analysis is also part of Grey System Theory. Firstly, reference sequence is generated in this method. Then, normalization, calculating of Grey Relational coefficient and Grey Relational Grade is made on comparable sequences. After these operations, the correlation between reference sequence and comparable sequences can be determined. A sequence with higher correlation is determined as more ideal sequence so that, ranking is needed.

In this study 10 Turkish Universities were compared under 5 criteria with data were obtained from Middle East Technical University Ranking by Academic Performance (URAP) Research Laboratory. In comparison, URAP's total score and Grey Relational Analysis method were used. It has been observed that there are differences in the ranking of two methods. Grey Relational Analysis that measures the relative performance represents more accurately the characteristics of the alternatives. In this study, weights of criteria were considered as equal to each other. In the later studies, it is considered that different weights specific to the system can be selected for Grey Relational Analysis using the Multi Criteria Decision Making Methods (MCDM).

References:

Beamon, B. M. (1999). Measuring Supply Chain Performance. *International Journal of Operations & Production Management*, 19(3), 275-292.

Chang, C. L., Tsai, C. H., & Chen, L. (2003). Applying Grey Relational Analysis to the Decathlon Evaluation Model. *International Journal of The Computer, The Internet and Management*, 11(3), 54-62.

Fung, C. P. (2003). Manufacturing Process Optimization for Wear Property of Fiber-reinforced Polybutylene Terephthalate Composites with Grey Relational Analysis. *Wear*, 254(3-4), 298-306.

Hou, J. (2010). Grey Relational Analysis Method for Multiple Attribute Decision Making in Intuitionistic Fuzzy Setting. *Journal of Convergence Information Technology*, 5(10), 194-199.

Huang, K. Y., & Jane, C. J. (2009). A Hybrid Model for Stock Market Forecasting and Portfolio Selection Based on ARX, Grey System and RS Theories. *Expert Systems with Applications*, 36(3), 5387-5392.
Huang, S. J., Chiu, N. H., & Chen, L. W. (2008). Integration of the Grey Relational Analysis with Genetic Algorithm for Software Effort Estimation. *European Journal of Operational Research*, 188(3), 898-909.
Ju-Long, D. (1982). Control Problems of Grey Systems. *Systems & Control Letters*, 1(5), 288-294.
Julong, D. (1989). Introduction to Grey System Theory. *The Journal of Grey System*, 1(1), 1-24.
Kao, P. S., & Hocheng, H. (2003). Optimization of Electrochemical Polishing of Stainless Steel by Grey Relational Analysis. *Journal of Materials Processing Technology*, 140(1-3), 255-259.
Kuah, C. T., & Wong, K. Y. (2011). Efficiency Assessment of Universities through Data Envelopment Analysis. *Procedia Computer Science*, 3, 499-506.
Kung, C. Y., & Wen, K. L. (2007). Applying Grey Relational Analysis and Grey Decision Making to Evaluate the Relationship between Company Attributes and its Financial Performance-A Case Study of Venture Capital Enterprises in Taiwan. *Decision Support Systems*, 43(3), 842-852.
Kuo, Y., Yang, T., & Huang, G. W. (2008). The Use of Grey Relational Analysis in Solving Multiple Attribute Decision-Making Problems. *Computers & Industrial Engineering*, 55(1), 80-93.
Lebas, M. J. (1995). Performance Measurement and Performance Management. *International Journal of Production Economics*, 41(1-3), 23-35.
Lin, C. L., Lin, J. L., & Ko, T. C. (2002). Optimisation of the EDM Process Based on the Orthogonal Array with Fuzzy Logic and Grey Relational Analysis Method. *The International Journal of Advanced Manufacturing Technology*, 19(4), 271-277.
Liu, D. (2011). E-Commerce System Security Assessment Based on Grey Relational Analysis Comprehensive Evaluation. *JDCTA: International Journal of Digital Content Technology and its Applications*, 5(10), 279-284.
Middle East Technical University, University Ranking by Academic Performance (URAP) Research Laboratory. (2016). *2015-2016- Tablo 9: Tüm Üniversitelerin Genel Puan Tablosu*. Retrieved from http://tr.urapcenter.org/2015/2015_t9.php.
Newcomer, K. E. (1997). Using Performance Measurement to Improve Programs. *New Directions for Evaluation*, 1997(75), 5-14.
Parker, C. (2000). Performance Measurement. *Work Study*, 49(2), 63-66.

Pursglove, J., & Simpson, M. (2007). Benchmarking the Performance of English Universities. *Benchmarking: An International Journal*, 14(1), 102-122.
Song, Q., & Shepperd, M. (2011). Predicting Software Project Effort: A Grey Relational Analysis Based Method. *Expert Systems with Applications*, 38(6), 7302-7316.
Warning, S. (2004). Performance Differences in German Higher Education: Empirical Analysis of Strategic Groups. *Review of Industrial Organization*, 24(4), 393-408.
Wei, G. (2011). Grey Relational Analysis Model for Dynamic Hybrid Multiple Attribute Decision Making. *Knowledge-Based Systems*, 24(5), 672-679.
Wei, G. W. (2010). GRA Method for Multiple Attribute Decision Making with Incomplete Weight Information in Intuitionistic Fuzzy Setting. *Knowledge-Based Systems*, 23(3), 243-247.
Worthington, A. C., & Lee, B. L. (2008). Efficiency, Technology and Productivity Change in Australian Universities, 1998-2003. *Economics of Education Review*, 27(3), 285-298.
Wu, C. R., Lin, C. T., & Tsai, P. H. (2010). Evaluating Business Performance of Wealth Management Banks. *European Journal of Operational Research*, 207(2), 971-979.
Wu, H. Y., Chen, J. K., Chen, I. S., & Zhuo, H. H. (2012). Ranking Universities Based on Performance Evaluation by a Hybrid MCDM Model. *Measurement*, 45(5), 856-880.
Wu, H. Y., Lin, Y. K., & Chang, C. H. (2011). Performance Evaluation of Extension Education Centers in Universities Based on the Balanced Score Card. *Evaluation and Program Planning*, 34(1), 37-50.
Xuerui, T., & Yuguang, L. (2004). Using Grey Relational Analysis to Analyze the Medical Data. *Kybernetes*, 33(2), 355-362.
Yang, C. C., & Chen, B. S. (2006). Supplier Selection Using Combined Analytical Hierarchy Process and Grey Relational Analysis. *Journal of Manufacturing Technology Management*, 17(7), 926-941.
Yang, Y. K. (2006). Optimization of Injection-Molding Process for Mechanical and Tribological Properties of Short Glass Fiber and Polytetrafluoroethylene Reinforced Polycarbonate Composites with Grey Relational Analysis: A Case Study. *Polymer-Plastics Technology and Engineering*, 45(7), 769-777.
Yu, Z., Fung, B. C. M., Haghighat, F., Yoshino, H., & Morofsky, E. (2011). A Systematic Procedure to Study the Influence of Occupant Behavior on Building Energy Consumption. *Energy and Buildings*, 43(6), 1409-1417.

The Role And Objectives Of A Social Worker In Poland, In Work With A Family With Numerous Problems, Including A Family With An Untreatable Child

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Abstract

A contemporary Polish family contends with various problems which negatively influence on its structure, stability and quality of mutual relations. At present, it may be observed that there is an increasing number of families which demand help, support and care, especially families with the low economic status, but also families with a disabled child, including an untreatable one. In 2010, in Poland there were 1 375 541 with the number of 3 624 223 members in the families that were covered with help. PHelp was given to those families mainly due to poverty, unemployment, disability, prolonged or serious illness as well as helplesness in childcare issues and housekeeping (the Annual Report of the Ministry of Labour and Social Policy for 2012). This fact indicates that there is a strong demand for a professional support for the families. A social worker acts for individuals, families, groups and the social environments, that are in a difficult situation. It enables or facilitates accomplishment of aspirations and aims in life. It also strengthen capabilities of the social groups, persons, families to solve own problems and manage independently. In the families with an untreatable child, a social worker plays a special role. He or she is a a driving force of changes in the family as well as is a foundation of multifaceted help and support.

Keywords: Social work, a social worker, a multi-problem family, terminal illness

The family plays a significant role in shaping and upbringing the younger generation. It influences on its further life, determines directions of functioning as well as build up the basis for the further development. In social work concern for a family, well-being of the individual members as well as the whole groups is the main subjects of the effects. It makes the

essential point of a social worker's influence. A contemporary Polish family contends with various problems which negatively influence on its structure, stability and quality of mutual relations. At present, it may be observed that there is an increasing number of families which demand help, support and care, especially families with the low economic status, but also families with a disabled child, including an untreatable one. The notion of a care of a child system may be understood in two dimensions (Kelm, Rzeszów 2008, p. 13): *in a global perspective*, including premises and organizational and legal basis, the scope of undertaken social needs, directions and forms of care of a child as well as mutual functional relations, the institutions undertaking the tutelary actions and scope of their competence, staff - its education and professional status. The care system in the global perspective constitutes a significant element of social secure as well as in the individual perspective, meant as either the action system in the field of specified form of care of a child (the care system in a children's home, a day-care room, a a boarding house etc.) or described as a conception of protectively and educational work.

According to the regulation in the Act (the Social Assistance Act of 12th March 2004, art. 6, point 12) the social work includes:

„professional activity that is supposed to support persons and families in strengthening or regaining capability to function in society through playing specific social roles as well as creating conditions that create favorable conditions for this aim". The theory of social work is connected with Helena Radlińska, who as a forerunner of the social work, determined it as a social work, while the term of the social work means simultaneously a goal and a way of gaining this goal.

The most important tasks in the social work include providing the basic conditions of life for those who do not have them through organizing financial, material and psychological support. A social worker is supposed to satisfy the needs that cannot be satisfied individually or by other institutions.

This is a compensatory goal and the example of this may be referring the patients without insurance for free medical treatment. Another task is to minimize a negative influence of those factors, which cannot be changed or eliminated - a protective goal through e.g. Assistance and care of members of a disabled person's family. In a multi-problem family, these goals very often alternate with each other or are linked. The family copes with difficulties which significantly make a proper functioning more difficult.

The social worker helps to determine a goal for the family, because lack of him/her may considerably influence on the quality of life of the family, cause negative behaviors of the family's members as well as influence on improper adaptation to needs and abilities of forms of support and assistance.

The second very important professional goal of a social worker is strengthening the abilities of social groups, persons and families in individual solutions to own problems as well as improvement of existing forms of institutional activity and mutual help. The scope of the tasks include broad counselling based on giving information, hints and assistance in the field of solving life issues to persons who are able to solve problems individually that are the causes of their difficult situation. It will be also crucial to accompany the family with numerous problems in gaining skills or shaping its competence in coping with difficult situations.

The next task of a social worker in this scope is to stimulate social activity, inspire self-assistance in satisfying life needs of persons, families, groups and social environments, initiate new forms of providing assistance to persons in difficult life situation as well as inspire, work out, implement and develop the social programes oriented to improve quality of life.

Moreover, the very important task is to initiate and participation in the research on social problems and announcement the results of the research to bring the existing social problems to local authorities.

One of the duties of a social worker is cooperation with other professionals, specialists, institutions and organizations which are aimed at improvement of existing solutions and looking for the new ones in the field of social assistance. It has also significance in creating social consciousness and promoting social dialogue in the scope of assistance and support of those families which need it most.

According to Polish law, the work of a social worker includes especially (the Social Assistance Act of 12th march 2004, art. 119.1):

1. Social work;
2. Performing an analysis and assessment of phenomena which cause demand for services in the scope of social assistance as well as qualifying for getting these benefits;
3. Providing information, hints and help in the scope of solutions of life issues for persons who thanks to this help will solve the problems being the cause of difficult life situation independently; effective use of regulations during accomplishment of the tasks;
4. assistance in providing counselling for persons who are in difficult life situation, which concerns possibility of solving problems as well as giving help by proper state and local institutions and non-governmental institutions and supporting in gaining this help;
5. Providing assistance according to the principles of professional ethics;
6. Stimulation of social activity and inspiration of self-help activities in satisfying essential life needs of persons, families, groups and social environments;

7. Cooperation with other specialists to counteract and limit abnormalities and negative effects of social phenomena, ease results of poverty;
8. Initiation of new forms of help given to persons and families who are in difficult life situation as well as inspiration of appointing the institutions that provide services aimed at improving the situation of those persons and families;
9. Participation in inspiration, working out, implementation and development of the regional and local programes of social assistance pointed at improving the quality of life.

It is crucial that a social worker accomplishes his tasks towards the family with numerous problems, including the families with an untreatable child, with full professionalism and according to the diagnosis of the problems and needs. Due to the verification of specificity of those tasks, the families were asked to give an opinion about this issue. Among 70 multi-problem families, including those with a disabled or an untreatable child using the services of social welfare institutions in the Malopolska a diagnostic survey on the role and tasks of social worker was conducted with the use of a questionnaire. The families were asked to give a reply to three open questions about the tasks and roles of a social worker as well as the work itself performed for them. Although the research do not have a representative character, they still determine a trend of the actions and directions of modern social assistance.

Respondents indicated into a social worker's tasks in work with a family. Almost all the families (67 families) mentioned the assistance and support in difficult situation as the most import issue, then assistance in becoming independent and reaching stabilization as well as assistance in satisfying the needs. All the tasks are reflected in the Polish regulations connected with social assistance, in the regulation about a social worker's tasks. The research on families have indicated into professional roles of a social worker which are significant in their point of view, particularly importance in a professional contact with a family with numerous problems. It has been underlined that a social worker in Poland is a professional who professionally takes care of satisfying the needs as well as assistance with the use of methods of social work. Among professional roles, a role of an adviser, an assistant and a mediator have been mentioned, which when accomplished significantly support the independence process of families with numerous problems and when it comes to families with an untreatable child, it constitutes support in everyday functioning.

During the research the respondents answered also the questions: what the social work is? They accepted that the social work mainly was:

- Help given to other people,

- Support the families with problems,
- Satisfying the needs,
- Diagnosis of the needs,
- Building up the contacts and relations in the family,
- The environmental interviews.

The social work as well as the tasks and roles performed by a social worker working with an untreatable child and his family, differ a little from the standard described in the Act. A social worker working with terminally ill child and his family, especially employed in a hospice for children is included in the palliative care team. His/her task is a specialist support an untreatable child and his family at his place of life since the moment when parents and the doctors make a decision about finishing the treatment in hospital. A social worker provides social assistance, multi-dimensional support, including the emotional one, he/she organizes help and support of the other specialists, accompanies the family in all the matters and situations in which they require support. He/she also provides care, psychological support and friendship for the family through the whole period of a child's illness, as well as after the child's death as long as it is needed.

In the last decades, many things were said about the crisis in families. Confronted with the increasing number of divorces, decrease in fertility, pathological changes in families, violence among teenagers at schools, there has a general demand appeared that the family system in the modern social reality is inefficient (Duda, Gulla, 2009, s.7). The range of activities of a social worker towards families is very broad. It demands professionalism and complex preparation of the worker to perform professional role and accomplish the tasks. The modern Polish family contending with various problems, puts out challenges to the social work - social assistance. The standards of social work in Poland try to face up to expectations and introduce far-reaching changes in the Polish family.

References:

Kelm A., *Problematyka rozwoju systemu opieki nad dzieckiem*, [in:] *Opieka i pomoc społeczna wobec wyzwań współczesności*, Wydawnictwo Św. Stanisława BM, Rzeszów 2008.

Duda M., Gulla B., *Pozytywne spojrzenie na rodzinę*, [in:]Silna rodzina, Duda M., Gulla B., Wydawnictwo Św. Stanisława BM, Kraków 2009.

The Annual Report of the Ministry of Labour and Social Policy for 2012.

The Social Assistance Act of 12th March 2004.

Locating Gendered Resistance: Interethnic Conflict, Environmental Disaster, and Feminist Leadership in Sri Lanka

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Abstract

In geographically vulnerable and politically unstable regions such as Sri Lanka, I argue that linking natural hazards and climate-induced disasters to existing social problems is more pressing than ever. In the case of the 2004 *Boxing Day* tsunami, it was impossible to dissociate the two. This paper examines the following questions: Within the geo-political context of Sri Lanka, how does trauma (human-made or environmental) produce resistance to patriarchal traditions in communities along gender lines? What gaps do women-led groups and coalitions fill in responding to the needs of women in conflict and post-disaster landscapes? And how has the public participation of women in armed conflict and coalitions provided space for transgressive agency to redefine traditional expectations? I argue that a greater understanding of the ways in which women are resisting their construction as partial citizens can provide insight to their strength and role in shaping their personal identities as well as that of the state. Looking though the lens of distress, in conflict and environmental disaster, this paper explores how women have transformed moments of victimization into opportunities for resistance and agency.

Keywords: Conflict, environmental disaster, gender, resistance, and crisis management

Introduction

In Sri Lanka, the civil war between the Liberation Tigers of Tamil Eelam (LTTE) and the government of Sri Lanka (GoSL) formed the background against which the 2004 *Boxing Day* tsunami occurred. Understanding Sri Lanka's geo-political past is crucial to ensure that gender and conflict sensitivity are prioritized in international disaster relief. Since Sri Lanka's independence from British Rule in 1948, interethnic conflict and violence between the GoSL and the LTTE has been relatively constant. Given Sri Lanka's history with both the civil war and major environmental

disaster, the country presents an important case study to examine the experiences of women in both contexts and how they have resisted patriarchal traditions of war and relief. When the tsunami occurred, the GoSL and the LTTE had only recently agreed to a mutual ceasefire in 2002 (Bandarage, 2010). However, in the aftermath of the disaster, the ethnic borders drawn previously during the civil war became more clearly defined by the disproportionate response and impacts endured.

LTTE controlled coastal areas in the north and east, where the majority of Tamil people lived, experienced the greatest devastation when the waves struck. Three eastern districts alone made up almost 40 percent of all tsunami casualties in Sri Lanka. In addition to this, the North accounted for about 16 percent of the death toll, even though the southern portion of the country was more densely populated (Thurnheer, 2014). In a fateful few minutes, it is estimated that over 30,000 people were killed, thousands went missing, and over half a million people were displaced throughout Sri Lanka. However, the tsunami did not occur in a vacuum; during the civil war in Sri Lanka, it is estimated that over 100,000 lives were lost between 1983 and 2009 (Mahr, 2013). In this paper I examine the ways that women have responded these crises.

The women's movement in Sri Lanka gained initial traction in the 1980s, during the *Reign of Terror*, a period in which thousands of primarily male youth were murdered or 'disappeared' across the island (De Mel, 2001). Anyone the state suspected to be a 'subversive' (i.e. a left-wing activists, playwrights, lawyers, and journalists who were monitoring human rights violations) was targeted during this time (De Alwis, 1998). In protest of state oppression, the Mother's Front and the Women's Action Committee (WAC) were created (De Mel, 2001). These coalitions, and others like them, allowed new space for women to develop interethnic and inter-class linkages with one another across political borders to address mounting disappearances and human rights violations. In July 1984, the first Mother's Front was formed in the northern district of Jaffna. Six years later during in July of 1990, the first southern branch of the Mother's Front was formed in Matara, a district affected severely by disappearances (De Alwis, 1998). In just six months, the Mother's Front had spread to ten other districts.

The public presence of women within and outside the conflict has shifted traditional gender relations and shaped how women are seen in Sri Lankan society today. Neloufer de Mel, a prominent scholar on gender and nationalism, argues that women on the frontlines of combat and in coalitions actively participate in the transformation of the nation's narrative as well as their own (De Mel, 2001). Through participation in armed conflict and public activism I argue that women have strategically deployed the image of motherhood to advance their political position, reinvent tradition, and

redefine their roles in Sri Lankan society. This paper maps the forms of resistance women have used during periods of crisis and sustained interethnic violence.

The State of Gender and Crisis Management in Sri Lanka

While significant research has investigated gender dynamics within the context of conflict, it was not until the 2004 *Boxing Day* tsunami that scholars began to draw parallels between women's experiences in war with those of women following disaster (Siapno, 2009; Thurnheer, 2014; De Mel, 2008; De Alwis & Hedman, 2009; Le Billon & Waizenegger, 2007) In the aftermath of the tsunami, it became impossible to dissociate pre-existing interethnic tension or gender relations. However, aside from the recent work of scholars in Sri Lanka, the overwhelming majority of disaster research has yet to thoroughly examine gendered impacts with the added stratum of conflict. Greater cross-pollination between scholars in the fields of gender, conflict, and disaster social science is critical. Communication and collaboration among scholars in these areas is needed to ensure the needs of diverse communities in complex socio-economic contexts are identified and met during periods of crisis. Disasters are inherently interdisciplinary and the literature should reflect this.

Sri Lanka as a Case Study

There is an assumption in the literature that violence caused by weapons and violence caused by waves will result in different outcomes—as the case study of Sri Lanka proves, this is incorrect (Catani, et. a., 2008; Hyndman, 2008; De Mel, 2008). In the overwhelming majority of large-scale climate-induced and periods of crisis, social disparities are magnified and tensions are exacerbated. In the case of Sri Lanka, sustained crisis has also opened up opportunities for women to enter the public sphere and disrupt traditional gender norms. This paper examines the strategies women have used to navigate these complex spaces and build social resiliency. Examining the active role of women in coalition building and context sensitive community engagement during the war and after the tsunami, can provide important information and insight to practitioners in the fields of disaster, conflict and crisis management.

Ethnography of Political Violence

In 2002, with the assistance of Norwegian officials, the GoSL and the LTTE agreed upon a ceasefire. The GoSL was still in the midst of peace talk negotiations with the LTTE when the 2004 Tsunami struck Sri Lanka's coast, interrupting the process and resulting in increased tensions. The ceasefire agreement held very little weight in the aftermath of the tsunami. It

did not take long for cease-fire violations and conflict to escalate between the two groups, as concerns were raised over the distribution of foreign aid, the implementation of disproportionate coastal buffer zones, and proposed plans for post-disaster development. August of 2006, an undeclared war broke out, but it took until January 2008 for the Sri Lankan government to officially declare the Cease-Fire Agreement void (De Alwis & Hedman, 2009). On May 18, 2009, after taking control of the entire island and killing Velupillai Prabhakaran, the leader of the LTTE, the GoSL declared a formal end to the twenty-five year long civil war (Weaver & Chamberlain, 2009). It is estimated that over 7,000 ethnic Tamil civilians were killed between January and May of 2009 in the final and brutal attacks by Sri Lankan government forces (Weaver & Chamberlain, 2009).

Women in War: The Recruitment of Female Combatants

To understand the current status of women in Sri Lanka, it is necessary to observe their roles as both perpetrators of violence and upholders of peace within the civil war (Bandarage, 2010). Beginning in the 1980s, the LTTE began the recruitment and training of Tamil female-combatants to aid in the fight against the separatist Sinhala-Buddhist state (Parashar, 2009). The participation of Tamil women in the LTTE provided unmapped terrain for women to publically display their choice to sacrifice for the Tamil people and their resistance to gendered and ethnic oppression by the state. Eventually, LTTE forces consisted of about one-fifth women; this was unprecedented for the time and defied the gendered tradition of war (Parashar, 2009). Within the LTTE, women played an active role both behind the scenes and on the frontlines of the civil war, including logistical activities and carrying out suicide bombings. The transition of women from the private sphere of the home into military training camps has had an indelible impact on the nation. Through engaging in traditionally ‘masculine’ activities, and confronting patriarchal gendered norms, women have transcended their prescribed socio-cultural roles (De Mel, 2001). As Miranda Alison (2013) emphasizes, women do not lack agency in this space (Alison, 2013).

While it is important to be critical of women’s agency and its limitations in the context of the LTTE, the symbolic significance and impact of their involvement should not be overlooked. For example, through the women’s wing of the LTTE, the Freedom Birds, female combatants played a crucial role in the armed force during the war (Bandarage, 2010). The national image of women as peaceful, docile, and weak was quickly ripped away as women became involved in the LTTE fight. As Bandarage reports, “The young women cadres were known for their harsh treatment not only of the ethnic and gender other—the Sinhala males—but also non-LTTE Tamil

women, especially women from rival militant organizations" (Bandarage, 2010, p. 658). These women were brutal, unforgiving, and committed to the Tamil cause. In such examples, it is clear how women in Sri Lanka have used their agency in periods of crisis to chip away at the base of gender constructions and patriarchal infrastructures. In Sri Lanka, the involvement of women in war, a highly gendered space, has aided in this deconstruction.

Disappearances and Killings: A Cause for Resistance

Between the years 1987 to 1991, Sri Lanka experienced an uprising from the Janatha Vimukthi Peramuna (JVP), a group of Sinhala nationalist youth in opposition to the actions taken by the Sri Lankan Government (De Alwis, 1998). JVP militants terrorized and murdered anyone who criticized their group or whom they suspected of collaborating with the state. In response to the uprising, the Sri Lankan government fought fire with fire, but on a much larger scale. The GoSL enacted a *Reign of Terror* in which anyone suspected of being a subversive of the state was murdered or disappeared (De Mel, 2001). Subsequently, JVP Sinhala youth became a primary target of the government during this time. Between the years, 1988 and 1990, "bodies, rotting on beaches, smoldering in grotesque heaps by the roadsides and floating down rivers, were a daily sight during the height of state repression" (De Alwis, 1998, p. 152). Second to Iraq, Sri Lanka is reported by the United Nations to have the highest number of disappearances in the world (Manimekalai, 2013). During this period, terror became a formal mechanism of control by the Sri Lankan government.

Despite the pervasive culture of fear and abuse perpetrated by the Sri Lankan government, women came together as mothers to protest the disappearances of their sons publically. I argue that the magnitude of social stress mothers endured as a result of the kidnappings and murders of their children, created an environment in which women could no longer conceal their opposition to the state. Unified as mothers, sisters, and wives, women took to the streets and demanded that justice be served and the government be held accountable. It was during this period of terror and militancy that the first southern Mother's Front was founded in the province of Matara (De Mel, 2001). Two year later, in 1992, the Mother's Front membership soared to over 25,00 (De Mel, 2001). This marked an incredible transition of women from the private sphere of the home to the public space of protest. Protests led by the Mother's Fronts drew international attention to the human rights abuses in Sri Lanka.

Feminist Cultures of Resistance

For a long time, scholars have had a contested relationship with nationalism and feminism. Does separatist nationalism in Sri Lanka open

space for women's resistance? Or does it instead confine women to the boundaries of nationalist goals and projects, further reinforcing their roles as reproducers and bearers of cultural tradition? The argument many scholars have adopted is that while gendered restrictions exist within this framework, the social transformation of women's roles in armed conflict and activism cannot be denied in Sri Lankan society (Coomaraswamy & Perera-Rajasingham, 2009). Greater examination of the moments where feminism and nationalism intersect can further this understanding. Historically, the nationalist state has sought to suppress the modern woman, for her body is the "discursive terrain on which significant socio-cultural tenets of the nation are produced" (De Mel, 2001, p. 16). In this sense, to preserve the traditional women is to preserve the nation. While the GoSL has been proactive in controlling and suppressing the status of women in the nationalist framework, the LTTE has been vocal in claiming the liberation of women as one of its primary tenants. However within both organizations, control over women's bodies is being exercised. The moments in which feminism and nationalism intersect, draw attention to the mechanisms of resistance women are using to oppose their construction as partial citizens in the nationalist patriarchal framework. Kumari Jayawardena, in her work, *Feminism and Nationalism in the Third World*, seeks to "'uncover' the role played by women in nationalist struggles rather than highlight their subordination within them" (De Alwis, 2003). Using tears on the streets and guns on the battlefield, I argue that these women have deployed both feminine and masculine strategies of resistance to their advantage.

Public Sacrifice and Resistance: Women in the LTTE

In 1983, the LTTE set up it's first special unit for women called the *Vituthalai Pulikal Munani* (Women's Front of the Liberation Tigers), This move by the LTTE forwarded a great transformation in the role of women in Sri Lanka. Within the LTTE, and other Tamil militant groups, a strong commitment to linking women's liberation with their goal of national liberation has been expressed (Alison, 2003, p. 45). In a speech given by LTTE leader Prabhakaran, he states that "'[t]he Tamil Eelam revolutionary woman has transformed herself as a Tiger for the Liberation of our land and liberation of women. She, like a fire that burns injustices, has taken up arms" (Alison, 2003, p. 45). While the sincerity of the LTTE's commitment to women's liberation is debatable, it has great symbolic significance.

Miranda Alison's work, *Cogs in the Wheel? Women in the Liberation Tigers of Tamil Eelam*, provides important insight to the gender-specific reasons behind women's choices in joining the movement. In her analysis Alison (2003) includes interviews with fourteen female LTTE combatants and ex-combatants to gage their perspective on liberation within the conflict.

While nationalist sentiment may have been one reason behind women's choice to join the fight of the Tamil Ealam, Alison argues that there are "more personal factors operating" (Alison, 2003, p. 40). She notes that many of the women who chose to join the LTTE cadres also came from families and regions that had been particularly affected by the war, their motivations were both political and personal.

Many scholars have leapt to the conclusion that female combatants are pawns at the disposal of male LTTE superiors. Radhika Coomaraswamy states that, "[the LTTE women] are not initiators of ideas. They are only implementers of policy made by someone else…" (Parashar, 2009, p. 241). This assumption discounts the agency and personal narratives of women in spaces of extreme violence. James Scott (1990), an expert on domination and resistance, suggests that "To do so is to see the performance as totally determined from above and to miss the agency of the actor in appropriating the performance for his own ends" (p. 34). The majority of women interviewed in Alison's study outlined disruption to education and protection as two important motivating factors for joining the LTTE. Five of the fourteen women interviewed stated that because of displacement caused by the war and discrimination against Tamil youth in university entrance, access to higher education was limited. One woman reported explicitly that she joined the movement because "She does not want this disruption to education to happen to future generations and wanted to help end this" (Alison, 2003, p. 42). Another reason behind women's participation was anger and fear towards the Indian Peacekeeping Force (IPKF), of which members had raped and molested hundreds of Tamil women between 1987-90 in the northeast. In one interviews, a woman explained that fear of sexual violence was a primary motivating factor for her choice to join the LTTE, she explained that "Everyone has to protect themselves" (Alison, 2003, p. 43). As expressed in these examples, the social stress caused by the war motivated women to take up arms of their own, to fight against the atrocities of the Sri Lankan Armed Forces and IPKF in their communities, and participate in the struggle for Tamil liberation. While women's involvement in the LTTE may not have resulted in the overall emancipation or liberation of women in Sri Lanka, I argue it created space for *liberating* experiences during the conflict. The involvement of women in the LTTE armed forces not only changed the way society saw them but also how they viewed their own capacity for action.

Female Suicide Bombers: An Examination of Empowerment

During the civil war, women made up one-third of the LTTE's suicide unit (Bandarage, 2010). In committing extreme acts of self-sacrifice, these brave women broke taboos and impositions of female identity. (De

Mel, 2001). De Mel (2001) argues that such acts "can be viewed as an agentive moment in the militant's life, the pinnacle in a career of dedication" (p. 225). While coercion is likely to have played a role in women's sacrifice, the choices women make in this space are often more complex. Dhanu is one of the most well known female suicide bombers in the LTTE. When she was just seventeen years old, she carried out an attack on Rajiv Gandhi, the former Indian Prime Minister (Bandarage, 2010). While her suicide was one of sacrifice, it was equally if not more so, one of revenge. After the attack, the LTTE came forward stating that Dhanu chose to avenge herself after being raped by members of the IPKF who had been sent to Sri Lanka under the supervision of Gandhi (Bandarage, 2010).

In the fourth clause of the LTTE's Women's Manifesto, one of the tenets listed is to "Ensure that women control their own lives" (De Mel, 2001, p. 222). De Mel (2001) critiques this claim and those made by Velupillai Pribakaran, the leader of the LTTE and founder of the Women's Military unit of the Liberation Tigers. She states that despite these declarations for equality and liberation, Pribakaran is only the "midwife of their agency" reinforcing the "gender hierarchies which keep women in reliance on men…" (De Mel, 2001, p. 222). While De Mel (2001) recognizes the complex nature of female combatants in her work, I disagree with the absolute nature of this statement. I argue that women's empowerment is a process. Women are continuously conforming, transforming, and re-creating themselves in the face of patriarchy and in their active resistance to it. It is important to critique the structures that limit women's potential for agency, but scholars must be cautious of how these limitations are perpetuated in their work.

Backing Away from Binaries: Women in War

"Looking at women as vulnerable, passive and acted upon…reinforces the maleness of agency" (Tuana, 2013, p. 29)

In the literature on conflict, but also environmental disaster, women are overwhelmingly depicted as victims of cultural traditions, gendered stereotypes, the nationalist struggle, and other patriarchal structures. However, the situation for women is neither black nor white. While it is important to understand how women are vulnerable to certain forms of violence, it is equally important that their strengths individually and collectively are recognized in the face of adversity. Significant social stress (during the conflict and following the tsunami) has generated resistance to state sanctioned violence and provided an opportunity to for women to transform their social and political identities. I agree with Parashar (2009) that with regards to women in crisis, "The reality is somewhere in between the binaries of agency and victimhood, private and public, voice and

silence...” (p. 254). Given choices under conditions of social stress, I argue that Sri Lankan women have chosen to abandon cultures of patriarchy. Women’s involvement in the LTTE illustrates a vast departure from the tradition behavior of Tamil women. Under extreme social stress, these women have chosen to resist the status quo, take up arms, and become agents in the fight for social change.

Within the discourse on women in war, scholars have had difficulty reconciling the roles of women in peace activism with those in armed combat. Parashar (2009) states that, “Women are often labeled as inherently peaceful and their violence is explained as the consequence of male victimization and maneuvering” (p. 251). Such labels depict women as lacking personal political motivation or nationalist aspirations, presenting a major obstacle to their agency. We cannot mainstream women’s voices effectively into discussions of peace if we do not understand their motivations for violence. The field of Feminist International Relations will need to accept the diversity and legitimacy of women’s experiences in conflict so that the women’s participation in violence is no longer marginalized, but rather understood through the lens of agency.

Gendered Struggle and Public Resistance: The Rise of Women’s Groups

Over the last several decades, women in Sri Lanka have made their presence known in the political and public sphere. Periods of increased trauma and social stress have resulted in new opportunities for resistance among women of all ethnic groups and classes. As such, female-led organizations have been overwhelmingly successful in speaking across geopolitical and methodological borders to address issues of nationalism, militarization, and gender violence in the context of war (Giles, 2003). The formation of the Women’s Action Committee (WAC) in 1982 marked the beginning of contemporary feminist peace activism in Sri Lanka (Bandarage, 2010). However, the WAC was eventually forced to disband after supporting the controversial entrance of the IPKF to Sri Lanka as well as after having received serious threats from the JVP (Bandarage, 2010). After a period of hiatus, these women re-emerged in 1989 when the group Mothers and Daughters of Lanka (MDL) was formed. Similar to the WAC, the MDL worked primarily on creating a political platform for devolution and to negotiate an end to the war (De Mel, 2001). During the same year that the WAC was formed, Tamil women in the Northern city of Jaffna mobilized the first Mother’s Front (Samuel, 2003). Two years after the formation of the WAC, in 1984 the Northern Mother’s Front was formed in Jaffna and six years later in 1990, Sinhalese women expanded the Mother’s Front in the southern province of Matara (Samuel, 2003). While these women’s

organizations oppose dominant nationalism, it is important to remember that they also function within it.

The Mother's Front: The Politics and Strategy of Motherhood

The emergence of Mother's Fronts during the height of the Reign of Terror, demonstrated tremendous courage. During this time Tamil women in the north and Sinhalese women in the south took to the streets and demanded justice. Together they protested the arbitrary disappearances and murders of their sons by Sri Lankan state forces (Bandarage, 2010). Wenona Giles (2003), a prominent feminist scholar, explains that "In times of war and socio-political insecurity, the figure of the mother becomes a central signifier of racial and cultural values, national pride and purity, and is intrinsically connected in this way to the nation's honor" (p. 167). While historically the Sri Lankan government has used motherhood as a tactic of oppression—members of the Mother's Front chose to reclaim motherhood as a site of protest, demonstrating their collective unity and potential. Through public activism and the deployment of "Mother Politics," women have brought about significant changes in the balance of political power (Giles, 2003). While motherhood may not have been the most transformative feminist tactic, it was effective in elevating the concerns of women, offering protection in the dangerous and politically unstable context of the Sri Lankan civil war.

In James Scott's work, *Domination and the Arts of Resistance* (1990), he sates that "Conformity in the face of domination is thus occasionally—and unforgettably—a question of suppressing a violent rage in the interest of oneself and loved ones" (p. 37). While women might have expressed varying degrees of rage publically, they had to be careful of where and how they did so. Motherhood as a strategy allowed women to balance the need to protection with that of remaining heard. The international attention attracted by the mothers of the disappeared, combined with the government's efforts to cover up human rights abuses, afforded women both moral legitimacy and political protection in activism.

When Waves Crash on a Broken Shore

When the tsunami struck Sri Lanka's shore in 2004, Sri Lanka was already broken. Not only had 80,000 people been killed and more than 800,000 people displaced, shortly after the disaster, war was resumed in 2006. The ceasefire agreement signed between the GoSL and LTTE in 2002 quickly fell apart as tensions mounted over foreign aid. During the second phase of the war, another estimated 21,000 people were killed followed by tens of thousands more in the final military campaigns of 2009 (Thurnheer, 2014). With the influx of foreign aid focused solely on victims of the

tsunami, previously Internally Displaced Persons (IDPs) from the war who were not tsunami-affected received little, if any, aid (Hyndman, 2009). Tensions arose due to aid reserved for those affected by the tsunami *versus* those affected by the war (Thurnheer, 2014). The lack of gender, political, and socio-cultural sensitivity by international relief, furthered the conflict in the country.

The Gendered Terrain of Disaster

Kathleen Thurheer, an anthropologist who has written significantly on violence and disaster in Sri Lanka, states that while disasters discriminate based on established differences such as class, caste, gender, ethnicity and age, "ultimately, power relationships lie at the core of a disaster's impact" (Thurnheer, 2014, p. 110). In the aftermath of the 2004 tsunami, it was estimated that approximately three times as many women than men were killed between the ages of sixteen and thirty years old (Hydman, 2008). This sparked concern among scholars, thus spurring an academic movement to look at gendered data in disasters more closely in order to better understand the multiple layers of women's vulnerability.

When determining who is most vulnerable in a disaster situation, it is important to look at who has the least assets and capacity to adapt to such changes. By this equation, women who work as substance farmers and land managers in the rural north and east worn-torn territories are the most vulnerable, provided their dependent position on their land, in most cases their husband, and the responsibility to their family to provide food, care, water, etc. As stated by Chew, in *Caught in the Storm: The Impact of Natural Disasters on Women*, in countries similar to Sri Lanka, "Women are especially likely to work in agricultural industry or the informal economy, both of which tend to be heavily impacted by natural disasters." (Chew, 2005, p. 3). In addition, due to head-of-household rules governing eligibility for assistance, after the tsunami women who had become widowed were put at a significant disadvantage in their recovery. Inheritance and property laws also limited women's ability to acquire assets for recovery (Tierney, 2007). Women play keys roles in their homes and communities. As Elaine Enarson, an expert on disaster sociology states, "women are significant economic actors whose time, efforts, and income sustain life for others, and their economic losses impact overall household and community recovery after disasters" (Enarson, 2000, p. 9). Enarson emphasizes that the inclusion of women in development projects, relief efforts, and decision-making is critical to move entire communities forward.

In addition to lacking certain financial resources to adapt, due to cultural norms and socialization women were placed in especially vulnerable positions when the waves struck. In addition to wearing restrictive and long

clothing, which made it difficult to swim, many women lacked certain survival skills (generally taught to males) such as tree climbing and swimming (Thurnheer, 2014). A number of women also reported being unable to evacuate their homes in time because they were traveling with smaller children who could not walk or run as fast.

Pre-Existing Gender-Biased Policies: Socio-Economic Vulnerability

In comparison with other South Asian countries, women in Sri Lanka rank highly in terms of literacy and health. However, these rankings do not necessarily equate to economic or social security. Studies show that in post disaster circumstances women often face heightened risk of inequality and violence. According to scholarship conducted on ecofeminism and natural disasters in Sri Lanka, policies that favor men financially such as gender-biased inheritance allow for a culture where women are forced to remain dependent on men for their survival (Banford & Froude, 2015). For instance, "Many Sri Lankan women whose husbands died in the tsunami were left without their former property because of inhibition under Sharia law prohibiting women from property inheritance (Banford & Froude, 2015). This is just one example of how pre-existing structures made it more difficult for women to cope and adapt—women are more vulnerable not because they are less capable but because they have been historically and structurally disadvantaged in society. Because of these restraints on women, resources allocated towards building their economic and adaptation capacity should be prioritized.

A study of 200 homes in the eastern Tamil province of Batticaloa found that 80% of the people who died in the tsunami were women, in addition to the loss of lives, "women's wealth, often in the form of gold jewelry (but also bicycles), was also swept away by the destructive waves" (Hydman, 2008, p. 108). The loss of lives and capital among women was grave throughout Sri Lanka and was more severe in marginalized communities, such as Batticaloa. Women who were widowed after the tsunami faced significant challenges in accessing emergency relief and overcoming cultural stigmatization. In the aftermath of the tsunami, "52.2 percent of Sinhala women heads interviewed were widows, 67.2 percent of Tamil women and 61 percent of Muslim women heads were widows" (Hydman, 2008, p. 112). Jennifer Hydman (2008), a researcher on feminism, conflict, and disasters in post tsunami Sri Lanka, advocates for greater analysis of the power relations between men and women that result in social reproduction and deep-rooted inequality. Hydman's states that, "The practices of aid, policy and history which position certain groups of people in hierarchical relation to others are not easily unraveled" (Hydman, 2008, p. 118). However, Hydman (2008) suggests that through a feminist lens and

approach these structures can be dissembled.

Increased Ethnic Tensions

As foreign aid flowed into the country, its distribution was shaped unevenly by the pre-existing political geography. Hyndman (2009) argues, and I agree, "Without a strong understanding of 'new political formations emerging on the global periphery,' humanitarian aid will be incorporated into the fabric of political violence" (Hyndman, 2009, p. 57). This was precisely the case in Sri Lanka: the concentration of aid in the hands of the government sparked resentment and polarization within the LTTE (Thurnheer, 2014). In the immediate aftermath of the tsunami the LTTE and GoSL had agreed to a joint mechanism to distribute aid, the Post-Tsunami Operational Management Structure (P-TOMS), this plan was never actually implemented (Thurnheer, 2014). Regional aid was prioritized not based on need; instead, the areas that were politically more dominant (i.e. Sinhalese communities in the south) saw more access to relief personnel, humanitarian items, and financial aid (Thurnheer, 2014). In Hambantota, a southern province, a year following the tsunami it was reported by a local aid official that agencies were constructing 4,478 homes, even though only 2,445 were needed. As this was happening in the south, in the Tamil district of Ampara (reported to have been hit hardest by the tsunami), only 3,136 homes were being built for over 18,000 families whose homes had been destroyed (Hyndman, 2009). Following the norm in large-scale environmental disasters, NGOs implemented band-aid solutions rather than using their potential power to promote political solutions and long-term reconstruction (Thurnheer, 2014). Instead, devastation caused by the tsunami and insensitive relief operations, led to further conflict and lives lost.

Role of Women in Meeting Survivor Needs

In post-tsunami Sri Lanka, I argue local women's organizations were more effective than formal aid institutions in meeting the diverse needs of women and marginalized communities. Their prior-experiences working during the conflict years, provided them with a level of sensitivity and consciousness that lacked in foreign aid interventions. Women's activism for human rights provided a useful frame of reference, enabling them to "draw attention to the contiguities between the political and 'natural' disasters of the war and the tsunami, and to go beyond the actual events themselves towards a feminist understanding of their impact as dynamic processes that affect women in particular gendered ways" (De Mel, 2008, p. 252). In this section I uncover the critical role women's groups played in responding to the tsunami and how this was influenced by their activity during the war.

When the tsunami occurred, women's organizations were already deeply embedded in women's issues in Sri Lanka, such as gendered violence, displacement, and the livelihoods of widows. This prior knowledge formed the basis for their work following the disaster. As Del Mel (2008) states, "A significant feminist trend in this post-tsunami activity…drew from prior experience in the work of gender and human rights in the context of armed violence" (De Mel, 2008, p. 247). In addition to pre-existing organizations, the Coalition for Assisting Tsunami Affected Women (CATAW) was formed. CATAW is an example of a feminist group that saw its purpose as linking developmental and rehabilitation goals with human rights (De Mel, 2008). This group was one of the only ones to send out a fact-finding team to gather specific information on the impacts of the tsunami on women (De Mel, 2008). Most of CATAW's work took place in conflict areas and focused on bringing awareness to women about their rights through legal clinics (De Mel, 2008). CATAW also advocated that the state allow women complete ownership over personal property or at least joint-ownership with their husband, or children if they were widowed (De Mel, 2008). However, due to some ethnic bias of the CATAW, Tamil and Muslim women have been relatively more aware of their rights than less dominant ethnic minorities such as the Burghers, who were less directly involved in the war (De Mel, 2008). While CATAW assisted in meeting the immediate needs of women and providing important information related to women's rights—the goals and mission of the organization moving forward would be benefited by a more progressive agenda, using disaster as a way to promote women's advancement rather than a return to pre-tsunami status quo.

International Disaster Aid- Moving Forward From Sri Lanka

Unlike during the war years, Sri Lanka experienced a massive influx of foreign aid following the tsunami. In many ways the internal shock of the disaster also led to the marginalization of war-related deaths as tsunami relief efforts became increasingly politicized in the country (De Mel, 2008). Israel and Sachs (2013) argue that if international aid agencies continue to operate under the guise of "partial knowledge" with regards to gendered and social impacts, they cannot adequately manage and respond to disasters. Feminist scholars call for greater engagement with diverse stakeholders and vulnerable populations in disaster planning and relief decision-making.[2] Locating differences between social groups and being able to critically assess their needs, as well as strengths, will allow foreign aid to better prepare against the further marginalization of vulnerable communities following an environmental disaster.

[2] Enarson, 2013; Israel & Sachs, 2013

Within international aid agencies women are overwhelmingly labeled as victims. This narrative is both pervasive and problematic. It causes women to become dependent on relief handouts rather than building their own capacities and lives outside of the aid framework (Rajasingham-Senanayake, 2004). For example, rather than helping to promote positive changes in social relations, international aid agencies found it easier replace boats that had been lost instead (Hyndman, 2009). While NGOs provide a number of services, such as education, health care, and economic empowerment, it has been critiqued by Asoka Bandarage (2010) that many still "represent a form of 'Neo-Orientalism,' upholding the long-standing hierarchal power dynamics between the Western donors and native subjects" (Bandarage, 2010, p. 656). In Argenti-Pillen's work, *Masking Terror: How Women Contain Violence in Southern Sri Lanka,* she studies Euro-American methods of dealing with trauma survivors during the war. These findings are equally relevant in the context of the tsunami. Argenti-Pillen argues that the Euro-American methods used by foreign NGOs pose a threat to culture-specific methods local women use to contain violence (Argenti-Pillen, 2003). Not only must foreign NGOs and international aid agencies navigate the political terrain of Sri Lanka sensitively, but also the cultural terrain.

Male dominance in relief and recovery work, as well as in important decision-making, is a central issue in Disaster Risk Management (DRM). A major concern in male dominated decision-making is the likelihood of erroneous gender assumptions. Madhavi Ariyabandu (2005), an expert on gender issues in recovery following the 2004 tsunami, worries that these "assumptions by policy makers and practitioners may not only deny benefits to women, but also worsen the situation for women, in terms of their social and economic position" (Ariyabandu, 2005, p. 7). Systematic exclusion on this level must be addressed in order for disaster risk management to be streamlined effectively and for relief to be administered equitably.

Conclusion

Policy recommendations and discussions cannot be made unless women's vulnerability and agency are fully understood and recognized in the context of crisis. If policy-makers and project managers view women as being acted upon, this leaves little room in the way of policy prescription. Working with existing agency is an entirely different policy discussion than assuming women lack agency to begin with. Difference in vulnerability is identified among men and women during crisis, however differences in strengths overwhelmingly are not. It is time that the knowledge, past experiences, and capacities of women are taken more seriously in disaster response and crisis management. However, there is still a critical need for more people out in the field, collecting data, and drawing attention to this

issue. Unless urgency is demonstrated in the research agenda and literature, we cannot expect to see changes being made in the political sphere.

References:

Alison, M. (2003). Cogs in the Wheel? Women in the Liberation Tigers of Tamil Eelam. In Kennedy-Pipe, C. & Keithly, D. M. (Eds.), *Civil Wars Vol 6 No 4* (pp. 37-54). Taylor & Francis Ltd.

Argenti-Pillen, A. (2003). *Masking Terror: How Women Contain Violence in Southern Sri Lanka*. Philadelphia, Pennsylvania: University of Pennsylvania Press.

Ariyabandu, M. (2005). *Gender Issues in Recovery from the December 2004 Indian Ocean Tsunami- The case of Sri Lanka*. Development Research, Gender Expert, Colombo, Sri Lanka.

Bandarage, A. (2010). Women, Armed Conflict, and Peacemaking in Sri Lanka: Toward a Political Economy Perspective. *Asian Politics and Policy*, 2(4), 653-677. DOI: 10.1111/j.1943-0787.2010.01218.x

Banford, A. & Froude, C. (2015). Ecofeminism and Natural Disasters: Sri Lankan Women Post-Tsunami. *Journal of International Women's Studies*, 16(2), 170-187.

Catani, C. Jacob, N., Schauer, E., Kohila, M., & Neuner, F. (2008). Family violence, war, and natural disasters: A study of the effect of extreme stress on children's mental health in Sri Lanka. *BMC Psychology*, 8 (33). DOI: 10.1186/1471-244X-8-33

Chew, L., & Ramdas K.N. (2005). Caught in the Storm: The Impact of Natural Disasters on Women. *Global Fund for Women*. Retrieved from: http://www.globalfundforwomen.org/wp-content/uploads/2006/11/disaster-report.pdf

Coomaraswamy, R. (1997). *LTTE Women: Is This Liberation?* Retrieved from:
http://www.sundaytimes.lk/970105/plus2.html

De Alwis, M. (1998). Motherhood as a Space of Protest: Women's Political Participation in Contemporary Sri Lanka. In Jeffery, P. & Basu, A. (Eds.), *Appropriating Genger: Women's Activism and Politicized Religion in South Asia*. London, Great Britain: Routledge.

De Alwis, M. & Hedman, E. (2009). *Tsunami in a Time of War: Aid, Activism, & Reconstruction in Sri Lanka and Aceh*. Colombo, Sri Lanka: International Centre for Ethnic Studies.

De Alwis, M. (2003). Reflections on Gender and Ethnicity in Sri Lanka. In Giles, W., de Alwis, M., Klein, E., & Silva, N. (Eds.). *Feminists Under Fire: Exchanges across War Zones*. Toronto, Ontario: Between the Lines (pp. 15-25). Toronto, Ontario: Between the Lines.

De Mel, N. (2008). *Between the Sea and War*. Interventions: International Journal of Postcolonial Studies, 9(2), 238-254. DOI: 10.1080/13698010701409178
De Mel, N. (2001). *Women & The Nation's Narrative: Gender and Nationalism in Twentieth Century Sri Lanka*. Lanham, Maryland: Rowman & Littlefield Publishers, Inc.
Tierney, J. K. (2007). From the margins to the Mainstream? Disaster Research at the Crossroads. *Annual Review Sociology,* 33, 503-25. DOI: 10.1146/annurev.soc.33.040406.131743
Enarson, E. (2000). Gender and Natural Disasters. *InFocus Programme on Crisis Response and Reconstruction-Working Paper* 1, 1-73.
Giles, W. (2003). Introduction: Feminist Exchanges across Conflict Zones. In Giles, W., de Alwis, M., Klein, E., & Silva, N. (Eds.) *Feminists Under Fire: Exchanges Across War Zones*. Toronto, Ontario: Between the Lines (pp. 1-14). Toronto, Ontario: Between the Lines.
Hyndman, J. (2009). The Geopolitics of Pre-Tsunami and Post Tsunami Aid to Sri Lanka. In de Alwis, M. & Hedman, E. (Eds.), *Tsunami in a Time of War: Aid, Activism, & Reconstruction in Sri Lanka and Aceh,* (pp. 29-59). Colombo, Sri Lanka: International Centre for Ethnic Studies.
Hydman, J. (2008). Feminism, Conflict and Disasters In Post-tsunami Sri Lanka. *Gender, Technology and Development,* 12(1), 101-121. DOI: 10.1177/097185240701200107
Jordan, K. & Denov, M. (2007). Birds of Freedom? Perspectives on Female Emancipation and Sri Lanka's Liberation Tigers of Tamil Eelam. *Journal of International Women's Studies,* 9(1), 42-62.
Le Billon, P. & Waizenegger, A. (2007). Peace in the Wake of Disaster? Secessionist Conflicts and the 2004 Indian Ocean Tsunami. *Transactions of the Institute of British Geographers,* 33(3), 411-427.
Mahr, K. (2013, November 28). *Sri Lanka to Start Tally of Civil-War Dead*. Time Magazine. Retrieved from: www.world.time.com
Manimekalai, L. (Director). (2013). *White Van Stories*. Retrieved from: http://www.channel4.com/news/white-van-stories-sri-lanka-disappeared-video
Parashar, S. (2009). Feminist International Relations and Women Militants: Case Studies from Sri Lanka and Kashmir. Cambridge Review of International Affairs, 22(2), 235-256. DOI: 10.1080/09557570902877968
Rajasingham-Senanayake, D. (2004). Between Reality and Representation: Women's Agency in War and Post-Conflict Sri Lanka. *Sri Lanka: Social Scientists' Association,* 16(2-3), 141-168. DOI: 10.1177/0921374004047741
Samuel, K. (2003). Activism, Motherhood, and the State in Sri Lanka's Ethnic Conflict. In Giles, W., de Alwis, M., Klein, E., & Silva, N. (Eds.),

Feminists Under Fire: Exchanges across War Zones (pp. 167-180). Toronto, Ontario: Between the Lines.
Scott, J. (1990). *Domination and the Arts of Resistance: Hidden Transcripts*. New Haven, CT: Yale University Press.
Siapno, J. A. (2009). The Politics of Reconstruction, Gender, and Re-Integration in Post-Tsunami Aceh. In de Alwis, M. & Hedman, E. (Eds.), *Tsunami in a Time of War: Aid, Activism, & Reconstruction in Sri Lanka and Aceh* (pp. 163-190). Colombo, Sri Lanka: International Centre for Ethnic Studies.
Thurnheer, K. (2014). *Life Beyond Survival: Social Forms of Coping After the Tsunami in War-affected Eastern Sri Lanka*. Gmgh, Wetslar: Majuskel Medienproduktion.
Tuana, N. (2013). Gendering Climate Knowledge and Climate Justice. In Alston, M. & Whittenbury, K. (Eds.), *Research, Action, and Policy: Addressing the Gendered Impacts of Climate Change* (pp. 17-32). New York, NY: Springer. Vanati. *She, The Woman of Tamil EELAM*. Tamil Nation. Tamilnation.com.
Weaver, M. & Chamberlain, G. (2009, May 19*). Sri Lanka Declares End to War with Tamil Tigers.* The Guardian. www.theguardian.com.

Role And Influence Of Local Governments In Poland On Creating The Social Policy Of The State, In Scope Of Social Assistance

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Abstract

Te social policy constitutes fundamental instrument of the state in realization of the tasks concerning protection of the citizens from the social risks, supporting social development, along with the simultaneous respecting the rules of social justice. Local governments in Poland,which originally are supposed to function close to a citizen, according to the decentralization's rules in their scope of competence they realize broad catalogue of the tasks in the field of the social policy. At the same time, the bodies of the local governments seem to be proper when influencing on and creating principles of the social policy in the state, in the range of their competence, taking into consideration the needs and local determinants.

Keywords: **S**ocial policy, local government, social assistance, decentralization of public finance

The social policy system in Poland, which has its legal location in the part of the Constitution named the freedom and economic, social and cultural rights, is based on three pillars: (1) the social assistance system, (2) the prevention of unemployment system and (3) the broadest - the national insurance system. The role of the public authorities, meant here as the government administration and the local governments (local) - is still the social policy that is supposed to be conducted in the way when respecting the rights of the citizens who are entitled to be the beneficiaries of the system, the public finance discipline isn't breached. What, on the other hand, could lead to risk that the economic stability of the state may be threatened.

The effectiveness of realization of the tasks by the local governments, especially in the aspect of expenditure of the public finances, is based on assumption, according to which the authorities being the nearest to a citizen in the administrative system, have competence and human resources to verify and implement actions with the supportive nature as e.g. social assistance. It's worth emphasizing that in the doctrine there is view that

dominatesthat decentralization is a significant factor of improving the effectiveness in managing the public sources [Guziejewska, 2008]

In the range of realization of the tasks which the legislator puts on the local government's bodies in Poland, the role of a district dominates - this is basic unit of the local governments, which was given a broad catalogue of responsibilities, qualified in the acts {the Local Governments Act, art. 7] as the obligatory, own and commissioned task.

From this article point of view, the basic question is still not only performing the tasks commissioned to the local governments in the field of social policy, but first of all entitlements and possibilities of influence of the local governments' bodies on creating the performed and future actions in these aspects which have direct reference in the prescriptive acts, being universally in effect, e.g. acts and orders.

Particular catalogue of the tasks which have been commissioned to the local governments in the aspect of social policy, are those in the field of social assistance, because of sensitiveness of issue, but also due to the amount of financial resources given to their disposal, according to the Polish law.

Social policy is a social action of the state, local government i and non-governmental organizations, which are aimed at improvement of material status, a safeguard against life risks and give equal opportunities in social groups which are economically and socially the weakest [Auleytner, Głąbicka 2000]. It's worth noticing that even the states that are highly economically developed implement and perform social policies that are adjusted to the legal and economic conditions, while considering social risk of the occurences that are supposed to be counteracted by the public authorities according to their duties. Since it's not possible to provide the appropriate level of well-being for all the citizens, even when there is an assumption that everyone should be given that in equal parts, dependent only on work load.

It's necessary to take into consideration the situations that prevent somebody from support themselves and their families because of the state which they're in (prolonged disease or disability). The vital part of social needs is going to have here non-economic character. [Szarfenberg, 2009]

In the scope of performing individual tasks of social policy by the local governments, the social assistance attracts special attention, which realization according to the Social Assistance Act of 2004 was constructed in a way that the proper bodies to perform the tasks are the local governments' bodies.

According to the Act: Social assistance is the social policy institution of the state, that is aimed at enabling persons and their families to

overcome difficult life situations which cannot be overcome by them, with the use of own entitlements, resources and opportunities.

It should be marked here that according to the doctrine - social assistance has always a subsidiary character towards individually undertaken actions by a client. Common opinion in the judicature concerning legitimacy and forms of the assistance benefits granted by the local governments is approaching maximization of autonomous actions of a beneficiary. Social assistance is aimed at supporting persons and families in their effort heading to satisfy basic needs, life independence and social integration and the granted benefits should be appropriate to the situation of the beneficiaries. Its granting is dependent on the entire situation of a person or a family applying for a benefit as well as the amount of resources alloted for this aim. However, it doesn't mean that the right to grant the benefit from social assistance to a person meeting the requirements is an unconditional right i and is connected with offloading the costs of living onto the bodies of social assistance which have the public resources destined for accomplishment of the assistance actions. [WSA in Opole, II SA/Op 414/10]

In this aspect it's worth mentioning that the local governments' bodies realize the social assistance policy and are given rights on the basis of the Act both in a form of money benefits and the non-money ones.

The money benefits constitute the fundametal form of realization of social assistance in Poland, which is 67% [GUS, 2014] of the whole budget expenditures in the scope of assistance actions. Compared to the result, a thesis seems to be legitimated that they're the most desired form of support by the beneficiaries. In 2014 the share of districts in the whole expenditures for social assistance was 50,5%, whilst cities on the right of district came to 29,4 %, districts 16,8%, and viovodeships only 3,3% [GUS, 2014]. Simultaneously, the bodies of local governments conducting municipal social welfares constitute fundamental organizational structure for the assistance system. The number of persons employed in the municipal social welfares in 2014 was 51 738. The largest group of people employed in MSW was made of so called the other employees, which was about 41% of all employees. The second largest group of employees in the municipal social welfares was made of social workers whose share was around 38% and came to over 19 thousand people. From the introduced data it may be assumed that the position of gmina is definitely the strongest one as the unit which has the widest range of assistance in the government social policy system. [Information about MSW, 2014]

On the basis of the introduced data, there is a justified thesis that the bodies of the local governments, especially the gmina, constitutes the most

important and fundamental element of the social assistance system. On the one hand it performs a number of tasks arising due to the statutory catalogue with the simultaneous limited opportunities of influence on the state frames of social policy.

According to the art. 16a of the Act Art. 16A the bodies of the local governments have duty to conduct the annual evaluation of resources of social assistance. 1.Gmina, district and local government of the voivodeship prepare an evaluation of resources of social assistance based on an analysis of the local social and demographic situation. These resources include particularly the infrastructure, human resources, non-governmental organizations and financial expenditures for the tasks in social assistance, regardless of the subject which realizes and funds it.

On the basis of the conducted evaluation of the resources, the executive body of the local government (a voit, a mayor or a president of the city, in the district and voivodeship - the board), introduces the evaluation of the resources annaully till 30th April to the council of the gmina or the council of the district appropriately, and till 30th June to Sejmik of the Voivodeship of the suitable unit of the local government. The evaluation along with the recommendation are the basis of planning the budget for the following year.

The evaluation submitted by the suitable bodies is the basis of evaluation of the annual reports on the resources of social assistance at state level, however it has only statistical dimension. It seems that the information potential of gmina is not used properly, especially information possessed by the employees in particular units, whose information based on experience and practice have significant meaning, without deprecating the purely statistical data. However they could be at least supplementary.

The legislator puts on the units of the local governments duty to work out the strategy as well: The gmina and the district work out the strategy of solving the social problems and local government of the voivodeship the strategy in the field of social policy. In the article 16b of the Act, there is included especially: diagnosis of the social situation; forecast of changes in the field covered by the strategy; as well as determination of: the strategic project goals of changes, directions that are crucial for the action, ways of realization of strategies as well as its financial frames, indicators of realization of the actions.

The worked out documents have a local character, directly connected with the jurisdiction of the local government's unit. The legislator hasn't legislated a rule according to which it would be obliged to get the information. In practice, it is accepted to take into consideration the data, especially concerning the budget needs of the units in the field of social

assistance, along with the budget works. However, this will be only a non-obligatory actions, not arising strictly due to the rule.

It's worth noticing that the strategy will always be the act of local law with the binding character for the given unit. Supreme Administrative Court of Poland (NSA) noted that when stated that: in case of periodic benefits gmina cannot (..) refuse the benefit because of running out of the financial resources. On the strength of art. 16 section 2 of this Act gmina has a duty to provide realization of the tasks in the field of social assistance. Moreover, it should be emphasized that the Social Assistance Act in the article 16b obligates gminas to work out the strategies solving social problems which realization is coordinated by municipal social welfares. [NSA, I OSK 2061/11]

A peculiar form of the act with the universally application and which may be influenced by the local government is the National Counteract Poverty and Social Exclusion Program 2020 - new dimension of active integration ,passed in 2014. It's an operational and implementation document, constituted due to realization of medium-term strategy of development of the state - "the National Development Strategy 2020" as well as the Social Capital Development Strategy, the National Regional Development Strategy and other development strategies. So it has strictly program dimension and doesn't bring real, individual effects of its binding, including the legislator the financial ones. According to the authors of the study: The National Program Project was turned to the inter-ministry consultations and to broad public debates, among others to around 50 non-governmental organizations. It's been discussed in the Centres of Social Integration Forum, as well as presented and discussed during many meetings in Poland. Due to the character of the document, which contains actions of social policy in the field of counteracting poverty and social exclusion, the public consultation took place between July and December 2013. During the consultation, there were opinions, comments and recommendation given by both the resorts and **the units of the local government** as well as non-governmental organizations [KPPUiWS, 2014].

The Polish social policy system in the range of social assistance is performed through activity of the units of the local governments, especially the gminas.

The role of the bodies of the local government in the field of assistance activities is undoubtedly broad, including the aspect of providing the public funds for this aim, but also the administrative process itself.

It seems that influence of the units of the local government on the process of establishing law in this issue as well as proceeding the executive acts are limited. In any case,there is lack of sufficient data to state that this influence might be accepted as adequate.

It should be noticed that the social assistance system apart from the obvious legal norms, is created by persons with various competence and experience, whose opinion should be obligatory considered while establishing universal laws.

Therefore, it seems that the bodies of the governmental authorities as well as the bodies of the legislative authorities should broaden the scope taking into consideration the effectiveness of the social assistance, not only the statistical data provided by the gminas but also information and comments that are practical and legal.

References:

Auleytner, Julian, Głąbicka Krystyna. Polityka społeczna pomiędzy opiekuńczością a pomocniczością, Warsaw: Wydawnictwo Wyższej Szkoły Pedagogicznej TWP:2000.

Guziejewska, Beata. Efektywność finansów samorządu terytorialnego, Gospodarka Narodowa, Warsaw: SGH 2008

Szarfenberg, Ryszard. Definicje, zakres i konteksty polityki społecznej, [in:] Firlit-Fesnak G., Szylko-Skoczny, M. Polityka społeczna. Academic textbook. Warsaw: PWN, 2009.

Pomoc społeczna i opieka nad dzieckiem i rodziną w 2014 roku, Warsaw: GUS, 2015

the National Counteract Poverty and Social Exclusion Program 2020. New dimension of active integration. Warsaw: MPiPS, 2014.

the Social Assistance Act of 12th march 2004 (Dz.U. No 64, item 593)

Information about functioning of municipal social welfare in Poland, Warsaw; MPiPS, 2015

Sentence of the Supreme Administrative Court in Poland of 17th May 2012 I OSK 2061/11

Sentence of the Voivodeship Administrative with the seat in Opole of 7th April 2011, II SA/Op 414/10

If You Teach Them To Write They Will Read

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Abstract

There is a reading crisis in the U.S. where many teachers do not know how to teach children to read. "You learn to read from kinder to 3rd grade, so that you can read to learn from 4th grade on." Unfortunately sixty five percent (65%) of all US fourth graders cannot read at grade level. (The Annie E. Casey Foundation: *National KIDS COUNT*. 2015). Research makes it clear that most children require direct instruction in order to learn to read. ("National Reading Panel" Chapters 2 & 3. 2000) Over a period of 40 years, the writer has prepared more than 2,500 Montessori Teachers in Canada, U.S.A., Mexico, Costa Rica, Panama, Ecuador, Brazil, France and Switzerland. His alumni have opened 25 Montessori schools in Costa Rica and more than 100 Montessori schools in Mexico. The author and his alumni have used the teaching strategies described in this monograph to teach thousands of children to write and read successfully. This study also challenges the ***Conventional Wisdom*** that "books are in print so we must teach children to print." The writer's research demonstrates that ***Conventional Wisdom*** is wrong and he challenges the reader to consider the benefits of teaching children to master longhand cursive writing instead of print, because it facilitates both the process and the quality of writing and reading.

Keywords: Phonemic awareness, writing to read

Introduction

There is a reading crisis at all levels in the United States. Thousands of preschool programs offer no reading instruction of any kind to children from 3 to 5 years of age, a time in their lives during which they have a sensitive period for the development of literacy skills. Many universities are notably inept at preparing teachers that can teach children to read. Sixty five percent (65%) of U.S. fourth graders cannot read at grade level. In Georgia

that number is sixty six (66%). That is one of the reasons that Georgia ranks 47th out of 50 states in Education.

The ***Annie E. Casey Foundation*** produced a research study entitled "Early Warning! – Why Reading by the End of Third Grade Matters" (2010). The Annie E. Casey Foundation's ("National KIDS COUNT", 2015) indicates that 4th Graders in Georgia now have the following reading skills:

Location	Achievement Level	Data Type	2007	2009	2011	2013	2015
Georgia	Below basic	Percent	34%	37%	34%	33%	32%
	At or above basic	Percent	66%	63%	66%	67%	68%
	Below proficient	Percent	72%	71%	68%	66%	66%
	At or above proficient	Percent	28%	29%	32%	34%	34%

According to the National Assessment of Educational Progress Report, fewer than one third of eighth graders read at a proficient level ("NAEP -*The Nation's Report Card"*, 2015). Today millions of students are leaving school unprepared for college, for work, or for the many demands of adulthood.

According to *Business* magazine, in the United States, an estimated 15 million functionally illiterate adults held jobs at the beginning of the 21st century. The American Council of Life Insurers (2016) reported that 75% of the Fortune 500 companies provide some level of remedial training for their workers. All over the U.S.A. 30 million (14% of adults) are unable to perform simple and everyday literacy activities ("National Assessment of Adult Literacy–Demographics–Overall", 2003)

The *Scientific Continuum*

When I visit public school Kindergarten classrooms, I find teachers presenting one capital letter per week for 26 weeks and at the end no child can read and no child can write. If we want to teach **all** of the children to read, then first we must teach them to write. I know, this idea may seem counterintuitive, because most teachers in both public schools and in university classrooms are doing the exact opposite, but please hear me out.

The idea that I would like to share with you here is that my research clearly demonstrates that learning to read is achieved most easily when you respect the ***Scientific Continuum*** that contains the logical order and

sequence of steps that will inevitably lead to reading. Here is the conceptual framework for that continuum.

First, tell me how many letters you can write at one time. You can only write **one** letter at a time, right? But, when you read you have to read **many** letters at the same time! Writing one letter at a time is **easy** but reading many letters at one time is **hard!**

The ***Scientific Continuum*** which identifies the most effective way to teach reading says the same thing: we need to learn to write first, because it is easy and we need to develop the skills to read second, because it is hard. In any event, I should think that logic should lead us to come to the same conclusion, don't you? It is better to **proceed from easy to hard**. So, let's teach writing first and then teach reading second, not the other way around. Now take a look at the rest of the requirements of the ***Scientific Continuum.***

First We Write, Then We Read

1. Writing comes first because writing one letter at a time is **a simple task**.

Reading comes second because recognizing many letters at one time is **a complex task**.

The ***Scientific Continuum*** requires us to **go from the simple to the complex**, from writing to reading, not the other way around.

2. Writing comes first because writing one letter at a time is **analysis.**

Reading comes second because reading many letters together is **synthesis.** Here again, the ***Scientific Continuum*** requires us to go **from analysis to synthesis**, from writing to reading, not the other way around!

3. Writing comes first because you can **only write what you know**.

Reading comes second because you **read what you don't know.**

You *literally* **cannot** write what you don't know (no pun intended). When we have taught children phonemic awareness, and they know both the sounds and the symbols of the letters, they can write them down one at a time and say their sounds. They can also write the name of a known object such as "cat" by sounding out the letter sounds in that word as they write down the corresponding letters: ***c, a, t*** one at a time**.** Even a three year old child can do that with the moveable alphabet. But a child cannot write down the letters of a word that s/he doesn't know and has never heard, **and neither can you.**

If I ask you to write the English noun ***lucky*** in German, you will not be able to write it if you don't know German. Even if I give you a hint that it sounds and looks a lot like the English word, you will not come up with ***Glücklich***, unless you know the word and know that the word has an umlaut over the ***ü,*** that the "k" sound requires both "c" and "k" and, that all German

nouns are capitalized. It is very clear then that **we can only write what we know**!

Reading comes second because **you read what you don't know**. When you receive a letter or pick up a book, a newspaper or a magazine, you have no idea what message it contains until you read it. We write what we know and we read what we don't know. The ***Scientific Continuum*** requires us to go **from the known to the unknown**, from writing to reading, not the other way around!

In our Montessori classrooms we teach 3 year old children to recognize the initial sound of each letter with a research based set of Key Words: ***cup – "c", apple – "a", mitten – "m"*** etc. Then we teach them to recognize the final and medial sounds of the letters in many short, three letter words with the ***I Spy Game***. Soon we show our 3 and 4 year old children how to trace the sandpaper letters so that they learn to recognize the symbols for those letter sounds. They remember those letter symbols more easily because they already know a key word that tells them the sound of that letter.

Young children do not yet have the skill to use a pencil for writing, however, once they know the sounds and symbols of the letters, our 3 and 4 year old children are able to write words they know with the movable alphabet. Dr. Montessori designed a Cursive Movable Alphabet made up of red vowel letters and blue consonant letters stacked in separate compartments in a box. Vowels are red because they are the loudest part of speech and consonants are blue because, as the word indicates, they "sound along" with the vowels. (Montessori, 1912, p. 261)When we present writing to a child, we first give him some familiar objects for three letter words that have a short vowel in the middle. We have lots of short vowel words in English for that purpose: ***cat, bed, pin, top, cup, hat, mat,*** etc.

We invite the child to say the name of the object: ***cat,*** and then to say the sound of each letter in the word as she picks up the corresponding letters from the movable alphabet box. We show the child how to place the selected letters in her hand, because she is symbolically putting them together into a word. Then she places the letters in random order on the felt below the line. She points to the object and says ***cat*** again and then sounds out the letters as she places them in order one at a time on the line.

The child makes sure that the cursive letters all ***walk on the line and hold hands***, as she has been shown. One of the many benefits of cursive writing is that there are no spaces between the letters in a word. The purpose of this activity is to empower the child to perform the ***analysis*** of writing many words that she knows even before she is able to use a pencil. She is writing, not reading. To help her focus on writing, we NEVER say the word ***cat*** after all the letters have been placed on the line in this exercise, because

that would be reading. At this stage the child is developing the analytical skill of writing one letter at a time!

One day **the CHILD himself discovers the synthesis of reading!** Quite suddenly the child becomes aware that the letters he has just set down together, the three letters that are *holding hands on the line*: ***cat,*** are the word itself and he has just recognized it. That is a wonderful, empowering moment in the child's life. It is better than all the holidays and birthdays put together. No one has "taught" this child to read. **He has discovered reading "all by himself!"** He often happily tells everyone that he can read, and he wants to write and read all of the words he knows.

There is a sense in which Montessori teachers do not teach children to read, as guides, they simply "show the way" so that each child will discover reading for himself or for herself. All of the children in a Montessori classroom learn to read because the Montessori Guide has diligently followed the research based, ***Scientific Continuum***, which has prepared her students to discover the synthesis of reading for themselves.

Once their reading skills are established, children are soon reading the many classroom language materials as well as the words on signs, in books and magazines. Children especially enjoy sounding out and reading very long, unknown words like *antidisestablishmentarianism* and the delightful 34 letter word *supercalifragilisticexpialidocious,* sung by Julie Andrews and Dick Van Dyke in Disney's 1964 Musical Film: *Mary Poppins*. As they increase their ability to read unknown material with understanding, they will acquire the ability to read hundreds of "sight words" at a glance. Many will also develop the skill of reading whole sentences and scanning entire paragraphs quickly for meaning as they progress through the grades.

Thus, when we teach children to write and to read, the ***Scientific Continuum*** requires us:

- **to present what is easy first** and **what is hard second**
- **to go from the simple to the complex**
- **to go from analysis to synthesis**
- **to go from the known to the unknown**

The research based ***Scientific Continuum*** requires us to teach writing first because it will lead to the discovery of reading, not the other way around. The logic is clear: **If you teach children to write <u>they</u> <u>will</u> <u>read</u>!**

<u>The Scientific Analysis of Writing</u>

The scientific analysis of the writing process reveals that it is composed of three factors.

1. <u>The Alphabetic Factor</u> -- *The ability to associate the sounds of letters to the letter signs used to compose words in the written language*. In

the Montessori classroom, children develop ***phonemic awareness*** by learning the sounds of the letters with Key-Word objects and cards. Then, when they are presented the letter symbols with the **Sandpaper Letters,** the Key-Word serves as a mnemonic device to help them recall the sound of each letter. As the child traces the rough texture of the letter sign on the Sandpaper Letter board, the teacher will give him the sound of that letter and will remind him of the Key-Word associated with that letter.

2. The Orthographic Factor -- *The ability to identify all of the sounds in a spoken word and to collect the symbols which represent them in the correct order.* The next step in developing the skill of writing is to show the child how to collect the letters for a word s/he knows in the correct order from the **Movable Alphabet**. The Movable Alphabet makes it possible for 3 and 4 year-old children to write the words they know, even though they have not yet developed the skills required to use a pencil or a pen.

3. The Manual Factor -- *The ability to hold and use writing instruments*. Finally, Montessori Guides use **Metal Insets** of Geometric figures to help the child develop the skills s/he needs to use the implements of writing. She demonstrate how to use colored pencils to trace around the metal frames (counterclockwise from 12 o'clock) and around the metal insets (clockwise from 7 o'clock). Then she demonstrates how to fill in the single and combined geometric figures that the child has traced with contiguous short strokes with colored pencils.

Teach Them to Write Cursive, Not Print

I know, I know, this is another counterintuitive statement that you probably do not think should even be considered because ***Conventional Wisdom*** states that books and magazines are in print and computers and tablets are in print, so we must teach print. Anyway, we are told that we can't teach cursive because every teacher in every public school classroom in the U.S. teaches print not cursive, and many schools no longer even teach cursive writing in the second grade, as they used to.

It is probably also the opinion of the vast majority of parents that we should only teach print and that anyone who suggests otherwise ought to have his head examined. So, since the ***Conventional Wisdom*** of our times, the school systems, the teachers, and the majority of the citizens of the U.S. all think that we should only teach print and not cursive, then, we should only teach print, right?

Wrong! The historical record is full of long periods of time during which the entire world believed something that was completely false. For over one thousand years the conviction that the sun rotated around the earth was the ***Conventional Wisdom*** of the times. This universally held belief was presented by Aristotle, refined by Ptolemy and assimilated into a religious

dogma by Thomas Aquinas so that during the Inquisition, everyone was required to believe it. Finally, a few brave souls discovered evidence that the ***Conventional Wisdom*** of the times was totally wrong -- and not at all wise.

Let me share with you the scientific discoveries which make clear that the ***Conventional Wisdom*** of our time, which says that we must teach only print, is also totally wrong and not wise.

Manuscript Writing

For centuries very few people could read. The reading material that was available was laboriously produced by highly skilled calligraphers. The Scribes and Monks used highly stylized, frozen letters, meticulously copied from other texts onto papyrus or sheets of parchment. Their goal was to reproduce the letters exactly like they had been drawn in the document they were copying. Each letter of the alphabet was copied **exactly the same way every time** so that the reader would have no trouble recognizing it wherever it was used.

For several centuries, a highly skilled but very small number of men (yes, mostly men) were the scribes and recorders of the written word. The work of these calligraphers was called a “manuscript” because it was the product of a man's **hand** (*manus*) in a "written" (*scriptum*) form. Originally, the word "manuscript" meant "hand written," because for centuries texts written by skilled calligraphers were the only kind of writing that there was. Today, the art of “manuscript” writing is still limited to a few highly skilled **calligraphers**.

When Gutenberg invented the printing press, it soon replaced the writing of books by hand. However, the word “manuscript” continued to identify the letters used to print books and **the word “manuscript” is still used to identify print style writing by children in U.S. schools today!**

Amazingly, “manuscript” or “print” writing, the skillful drawing of separate, identical letters, is now the form of writing that is being taught in American schools **to our youngest children: who have the least developed coordination skills**. American Education has taken the most difficult and stylized form of writing -- that form of writing which for centuries was only reproduced by the most highly skilled calligraphers -- and has determined that this form of writing should be taught to our youngest children!

Longhand Writing

A century before the invention of the printing press, the need for a convenient means of ***personal communication*** ushered in **a new form of writing** in Europe. By the 14th century men of science and letters, and especially of the Church, were writing to each other. The scientists and Vatican scholars used a slim, ***connected form of writing that was much***

easier to produce. In fact, this was the first true form of "handwriting" because it did not need to be carefully **drawn** like the frozen, separate letters used by calligraphers in their medieval manuscripts.

After the printing press was invented, a printer in **Florence, Italy**, liked the looks of longhand, cursive handwriting so much that he created a new font that looked like it. Because the first book that he published with that font was about Italy, from that day to this, the new font he created, which resembles cursive longhand, has been known as ***italic***.

We now call the connected form of handwriting: ***cursive*** or ***longhand*** or ***running hand.*** The dictionary describes it as ***a rapid handwriting in which letters are set down in full and cursively connected within words without lifting the writing implement from the paper***. The handwriting created by the scientists of the 14th century evolved into the beautiful, cursive ***longhand*** that has been used in Europe and America to effectively teach writing and reading for more than 500 years. It was ***longhand*** **writing** which made it possible for more and more people finally **to learn first how to write and then, how to read**.

Cursive *longhand* took the pen out of the hand of the professional calligrapher and placed it into the hand of the common man, and finally, into the hand of the child! By the 18th Century, every educated person could write in cursive longhand. Witness the beautiful handwriting of Thomas Jefferson in the Bill of Rights and the Declaration of Independence of 1787, as well as in the Federalist Papers and other documents written by Alexander Hamilton, James Madison and John Jay.

At the beginning of the 20th Century, Dr. Maria Montessori taught every child in her ***Casa dei Bambini,*** in the San Lorenzo district of Rome, to write and to read with beautiful cursive longhand letters! The museum in the Apartment where Maria Montessori was born, in the village of Chiaravalle near Mantova on the Adriatic coast of Italy, still has a set of the graceful cursive capital letters that Dr. Montessori herself cut out so carefully, as well as sets of the cursive sandpaper letters and movable alphabets that she used to teach children to write and read.

Any of you, who like me, grew up in the first half of the 20th Century and was educated in Europe or Africa or North or South America, learned to write with cursive letters. The Palmer Method of cursive writing was most prevalent in the United State for half a century. It was routinely used in most schools to teach writing as well as to practice writing until one was highly skilled in doing so. Even though we learned to write cursive longhand, we had no difficulty learning how to read the <u>printed</u> word in books.

In the middle of the 20th Century educators in both the U.S. and France began considering the ***Conventional Wisdom*** that we should teach

print instead of cursive, **because books were in print**. Unfortunately, **no careful research was conducted in the U.S. to challenge that idea.**

Experiments in the U.S. and France

In the nineteen forties and fifties American and French educators sought to "improve education**."** Both countries began to teach children to print in school. Within two years, French educators evaluated the results and discovered that it had been a horrendous mistake, so **they changed back to teaching cursive writing in the French schools!**

Most American Educators **still have not discovered the damage this process has caused!** The insistence that all young children in U.S. schools must learn to draw identical print letters, like calligraphers, instead of using the natural, flowing longhand form of writing, that was so successful in promoting literacy in Europe, Africa and North and South America for over 500 years, has contributed dramatically to the exponential increase in the number of school children that do not learn to read by third grade. As a consequence, they are unable to learn by reading from fourth grade on, and they begin dropping out of school in middle school and high school. Many of those children grow up unable to continue their education, unable to get an a job and when they get into trouble they end up in overcrowded jails across the U.S. The U.S. has the highest number of its citizens in jail than any other country.

The Paradoxes of Science Show a Better Way

In 1543 a Polish mathematician named **Nicolaus Copernicus** published a scientific treatise entitled ***De Revolutionibus,*** in which he demonstrated mathematically that it was the earth which revolves around the sun and not the other way around, as everyone on earth had believed from time immemorial. The great Dutch Scientist, **Erasmus**, stated that it was the most important study he had ever read. Some 60 years later a copy of that treatise fell into the hands of Galileo Galilei, an Italian optical instrument maker who invented the first telescope.

By his own account in 1610, Galileo stated that he had tested his telescope ***100 times on 100,000 stars*** and he was convinced that his observations proved that Copernicus' discovery of a heliocentric solar system was correct. Galileo had already been an object of great controversy in Italy, because he had asserted that all objects fall at the same rate of speed, even if they are of different weights. He proved it by dropping objects of different weights simultaneously from the Leaning Tower of Pizza. My family and I had the fun of replicating that experiment when we visited Pizza in 1980. We proved again that Galileo was right!

When Galileo also stated that the earth rotated around the sun, the Jesuits tried him for heresy in 1633. He was 70 years old and infirm. Threatened with torture, he recanted all of his works and died a prisoner of the Inquisition.

By demonstrating that all objects fall at the same rate, regardless of their weight, and by observing that the earth rotates around the sun, **Galileo became a Crusader for the Paradoxes of Science against the Tyranny of *Conventional Wisdom*!**

Research Now Gives Us a New Scientific Paradox

This New Scientific paradox again challenges us to do the exact opposite of what ***Conventional Wisdom*** currently demands that we do.

1. It flies in the face of the most widespread teaching methods used in the United States.
2. It is contrary to what many parents and most U.S. teachers consider to be "common sense."
3, But please do not pre-judge this New Scientific Paradox.
4. Do your very best to set aside your own prejudices and disbelief.
5. If, like Galileo, you take the time to look carefully at this new scientific paradox through the telescope of research and the lens of understanding, you may also be convinced to become a **Crusader for the Paradoxes of Science against the Tyranny of *Conventional Wisdom*!**

The New Scientific Paradox

Thirty years of research in the development of language and literacy skills with young children has provided us with new insights (Meadows.1979). I have worked with children who spoke English, Spanish, French, Chinese, Japanese, Vietnamese, Korean, Farsi and the Mexican Indian dialects of Nahuatl and Otomí. Research with all of these children produced three clearly defined principles:

1. **Children learn to read more easily if we teach them to write first!**

2. Children learn to write and read more easily if we teach them to write cursive longhand first!

3. Children can transfer their ability to read cursive writing easily to the reading of print, without ever having to write printed letters!

Research Shows that Cursive Writing is Easier for Perceptual Reasons

1. There are almost no straight lines in nature. As a species, our eyes have not seen and our brains have not perceived straight lines for very many

years. Our brains do not recognize straight lines as easily as they do the graceful curving lines of cursive letters.

2. Many print letters are composed of straight lines connected to perfect circles. This makes it harder for the visual sensory integration centers in the brains of young children to decipher them.

3. Many children are slow to develop certain perceptual skills and so take even longer to be able to decipher the straight lines and perfect circles of printed letters.

4. Children with **Specific Developmental Learning Disabilities** have an especially hard time recognizing and reproducing the straight lines and perfect circles of printed letters. For over 60 years, these children have been subjects of careful research by the **Luke Waites Early Learning Center** at the Scottish Rite Crippled Children's Hospital in Dallas, Texas. Studies by Dr. Lucius Waites, a Board Certified Neurologist and Ailet Cox, a Language Therapist and their staff at the Dallas Early Learning Center, have demonstrated that **cursive writing and reading** is much easier for dyslexic children to perceive, to decode and to master.

5. This writer's own research and implementation of these principles has shown the very same results with thousands of normal children in nine countries. They have learned to write and read more easily and effectively with cursive letters than they have with print.

6. Cursive letters provide more visual clues than print letters which makes them much easier to identify.

7. Printed letters sometimes have "serifs," those extra little lines at the top and bottom of the letters like the ones in this manuscript, which make them easier to identify. The print letters that children are taught to write have no serifs. They are like the letters now being used in this paragraph. They are much more difficult to distinguish one from the other. For instance, the "d," "b," "p" and "q" are all the same letter just turned four different ways. These letters are especially difficult for dyslexic children to distinguish one from the other. To many children, printed letters look like a jumble of circles and sticks: "o l l d o o l o lo p ol o" which mean nothing.

8. The longhand d,b,p,q letters look entirely different and cannot be confused with each other.

9. Printed letters are all separate. Children cannot always tell if the next space is between two words or just between two letters. For them a line of text can look like this:

C a n y o u r e a d t h i s s e n t e n c e a s e a s i l y a s t h e r e s t o f t h i s t e x t ?

10. Cursive letters go hand in hand.

Spaces only appear between the words so that there is no confusion regarding where each word begins and where it ends.

Research Shows that Cursive Writing is Easier for Physical Reasons

1. Drawing straight lines and perfect circles is extremely difficult for a child with minimal sensory and motor skills to achieve.
2. It is hard to draw perfect vertical lines because the weight of the arm makes one draw a curved line instead of a straight line.
3. Perfect circles are even harder to draw because they require an imposed, sequence of movements across the midline, unlike any natural movements the child might normally make.
4. Being required to make lines and circles come together tangentially increases the difficulty exponentially.
5. Each time you pick up the pencil from the paper, in order to draw another part of a letter or a separate print letter you increase the potential for error.
6. All but 7 printed letters require precise, stylized movements that must be drawn instead of written.
7. Cursive letters are easier because they are made with one continuous movement which can be corrected and refined as you go.
8. Printed letters start at many different positions.
9. Cursive letters all start on the line with an approach stroke that moves upward and to the right. This is the easiest and most natural movement to make and to control.
10. Children have trouble with left to right orientation. The approach strokes of cursive letters help establish left to right orientation because cursive letters all start **from the left and continue toward the right**.

Brain Research Shows that Cursive Writing Provides Multiple Benefits

1. Brain imaging studies show that when you write a print letter, **only the *pattern recognition area*** on the right side of your brain lights up. Whereas, when you write a cursive letter, **all the parts of your brain that are used for reading light up!** "Brain imaging studies reveal that multiple areas of brain become co-activated during the learning of cursive writing … as opposed to typing or just visual practice."

   (Klemm, William R. in "Psychology Today", March 14, 2013)
2. A University of Indiana study found that the brain's "reading circuit" of linked regions that are activated during reading, was also activated during hand writing, but *not* during typing. This lab has also demonstrated that writing letters in meaningful context, as opposed to just writing them as drawing objects, produced much more robust activation of many areas in both hemispheres. Reported by James and Engelhardt: *The effects of handwriting experience on functional brain development in pre-literate children* in Trends in Neuroscience and Education (James & Engelhardt. 2013)

Cursive Writing Enhances Creativity and Improves the Quality of what is Written!

1. MRI studies show that the ability to write cursive longhand quickly and well improves the quality of composition because the brain of a person with good handwriting skills activates more areas associated with cognition, language, and executive function than those with poor handwriting skills. "Lacking fluency in handwriting causes difficulty in composition, as thoughts cannot get on the page fast enough." (Doverspike, Jennifer in "The Federalist", 2013)
2. Cursive writing helps you integrate knowledge -- "Cursive writing helps train the brain to integrate visual, and tactile information, and fine motor dexterity. School systems, driven by ill-informed ideologues and federal mandate, are becoming obsessed with testing knowledge at the expense of training kids to develop better capacity for acquiring knowledge." (Klemm, William R. in "Psychology Today", March 14, 2013)

Like Galileo, let us also Challenge the Tyranny of Conventional Wisdom

Conventional Wisdom Says: "You can teach a child the alphabet but you should not attempt to teach a child to read and write until he is five or six."

Research Has Demonstrated: that children pass through important sensitive periods for the acquisition of language and literacy skills long before they are six

After she became acquainted with the work of the Dutch Biologist, Hugo DeVries, Dr. Maria Montessori's scientific observation of children lead her to discover the ***Sensitive Periods of Development,*** which contemporary brain studies have also confirmed. ! (Montessori, 1972)

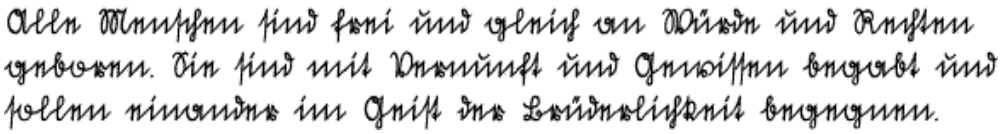
Montessori's research shows that:

1. The primary sensitive period for the acquisition of oral language is from birth to 3 years of age, which coincides with a period of massive growth of the child's brain.
2. The sensitive periods for the refinement of small motor prehensile skills that are used in writing, and the further development of oral language skills, occur between 2.5 and 5 years of age, during another important period of brain growth.
3. The sensitive period for the development of phonological awareness (sound recognition), sound/symbol association (analysis) and reading (synthesis) which are required for a child to learn to write and read successfully also occur between 3 and 6 years of age!

Conventional Wisdom Says -- "If you are taught to write cursive you won't be able to read books."

Research has Demonstrated – That millions of people all over the world have learned to read completely different alphabets by association

When I was three years old my parents enrolled me in a German school in Puebla, Mexico where I had a Montessori Teacher. By the time I was four I had learned to write and read in German with the ***Sütterlin script,*** a form of German cursive longhand that was modeled on the elegant style of writing used in the old German Chancery in Berlin. It was taught in German schools both at home and abroad from 1915 to 1941. It looks like this:



I was then able to transfer those reading skills to the reading of books that were printed in the **Fractur Alphabet,** which was used for printing German books from the 16th century until 1940. In the past it was called ***Deutsche Schrift*** (German writing). Fraktur was also used for a number of other languages, including Finnish, Czech, Swedish, Danish and Norwegian. It looks like this:

Alle Menſchen ſind frei und gleich an Würde und Rechten geboren. Sie ſind mit Vernunft und Gewiſſen begabt und ſollen einander im Geiſt der Brüderlichkeit begegnen.

This text is a translation of Article 1 of the "Universal Declaration of Human Rights" which reads:

All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

Because I could already speak Spanish and English, within a year of learning to write and read in German, I was able to transfer my German literacy skills to the writing and reading of Spanish and English with the Roman alphabet **without any instruction!**

Some may consider this to be unusual but it is not. Literally millions of children, who have learned to write and read with other forms of writing such as the Cyrillic, Greek, Persian, Arabic, Hebrew, Korean, Vietnamese and other alphabets, have been able to transfer those skills to writing and reading with the Roman alphabet, in their own or other languages, with relative ease. This is the reason that children who are literate in another language before immigrating to the U.S. progress more rapidly in the learning of English than younger children who are not yet literate. Even children who learn to write with the Japanese Hiragana syllabic symbols and those who have learned to read and write Chinese logographs are able to

transfer those skills to writing and reading the Roman alphabet in other languages.

Conventional Wisdom Says: The best way for children to learn to read and write is to teach them both simultaneously, because each one will help the child learn the other.

Research Has Demonstrated That children acquire literacy skills much more easily and successfully when each element of the process is presented separately. Montessori calls this: ***isolating the difficulty.*** Contemporary research has also confirmed Montessori's observation that the skill of reading for most children begins with what today is called ***phonological awareness.***

1. Children who will become good readers will first develop the ability to hear and identify individual sounds within words **before** they need to learn anything about the names of the letters and their symbols!
2. Children who are presented a specific set of ***Key Words***, which provide the sound of each letter at the beginning of the word, find it much easier to remember and identify the sounds of the letters. (Montessori, 1912, p. 262)

Our research shows that the following Key Word order is the most effective: c-a-m; l-e-d; t-i-s;

g-o-n; p-u-r; b-k-f; v-x-y; w-j-q; h-a-z: because that order is based upon the frequency of the use of the letters in the language, not upon alphabetic order, which you can only use after you learn to read.

3. Once they can identify the various sounds which make up each word, children can learn more easily to associate the sounds they know with the specific letter symbols that represent them. This can be confusing in English and other languages in which many letters have more than one sound. In English the same vowel symbols stand for both short and long vowel sounds. For that reason we teach children to write and read words with short vowel sounds first. They learn to read by writing words with short vowels first and then we are able to introduce them to the sounds of long vowels. They have to know how to read first, because in English it is the very spelling of the words that tell us that a long vowel must be used.

Conventional Wisdom Says: all you have to do is to read to children and show them books and expose them to lots of print so that they will develop reading skills through ***emergent literacy***.

Research Has Demonstrated That children who are read to by their parents and grow up in a print rich environment do develop an awareness of the importance of literacy and become interested in reading. Some, but not all of these children are able to discover the secret of literacy on their own. However, millions of children from literacy poor environments will not become readers through what is called ***emergent literacy***.

Research shows that literacy does not “emerge” on its own, like the biological emergence of the child’s abilities to crawl, walk and run. For many children, especially those from lower socioeconomic levels where vocabulary development tends to be limited, the development of literacy skills is best accomplished through age appropriate motor activities and sensorial preparation, **and through research based, direct instruction**!

Research shows that teachers who use the following strategies with children from 2.5 to 5 years of age are the most successful in teaching children to write and read.

1. They provide plentiful **practical life** materials and activities which help children develop the motor skills and refined control of movement they will use in writing.
2. They provide plentiful **sensorial** activities for the development of the child’s visual, proprioception and vestibular senses which help prepare the visual integration centers in the child’s brain to perceive finely delineated figures like letters and numerals.
3. They introduce children to the sounds of letters by identifying them with a specific set of "Key Word" objects and illustrated cards. (*Op. cit*.) The initial sound of each word gives the child the precise sound of a particular letter, for instance: **cup** “***c***”, **apple *“a”*, mitten *“m”*.** The key word is always said first because it is the word which gives the child the sound of the letter being presented or reviewed. In this way children develop phonemic awareness of all of the letter sounds as the first step toward sound/symbol association and writing.
4. They use the "I spy game" with many objects to help children hear all the letter sounds within words.
5. They provide children with multi-sensory opportunities to associate letter sounds with their symbols by tracing the letters and saying their corresponding sounds with the Sandpaper Letters. They also help them associate the sound with the symbol, by reminding them of the “key word” for that sound which they already know.
6. They help children ***analyze*** all the sounds in a word by using the Moveable Alphabet to string letters together to form known three and four letter words with a short vowel in the middle. This allows younger children to “write” the sounds down even before they are physically capable of writing with a pencil or pen.
7. They prepare the child’s hand to use the instrument for writing through activities with sensorial materials and by tracing geometric figures with the metal insets and then refining their skill by filling in the figures with lines and with small controlled strokes with various colored pencils.
8. The child has the opportunity to **discover the *synthesis* of reading spontaneously** by putting letters together with the Moveable Alphabet. The

child looks at the picture of a cat and puts down the three letters for "cat," sounding them out by saying "***c" "a" "t***". Suddenly, one day the child himself discovers that together those three letters say ***cat!*** He can now read what he has written and will soon be reading everything else.

9. Research shows that if you present the analysis of writing first it will lead naturally to the spontaneous discovery of the synthesis of reading. Writing leads to reading because ***you write what you know*** but ***you read what you don't know***. To be successful, we must proceed from the known to the unknown, not the other way around as many do. By effectively presenting writing to children first, they will inevitably proceed to the discovery of reading!

10. Some teachers, who are still trying to teach reading by using whole words alone, are not as successful because the whole word does not lead to the development of the analytical decoding skills that the child will need to decipher words s/he does not know. The *whole word* approach provides **no** opportunity for the development of the essential skills produced by the analysis of writing, thus, it will never lead to the spontaneous discovery of the synthesis of reading.

Conventional Wisdom Says -- Teach the names of the letters at the same time as you teach the sounds of the letters and do both in alphabetic order.

Research Has Demonstrated –That the child does not need to know the names of the letters until much later. The child will not need alphabetic order until s/he is prepared to use the dictionary and the phone book, **after s/he has learned to read**. Most children learn alphabetic order from the song anyway so teachers do not need to spend time trying to "teach" it.

Conventional Wisdom Says -- People who read fast know many "sight words" therefore use the "look say" global approach. Teach the whole word at one time with flash cards and books that repeat the same words over and over. Don't waste time on phonics.

Research Has Demonstrated That

1. When the U.S. reading teachers abandoned alphabetic phonics and the alphabetic code in the late 1930's, in order to use the "look-say" approach of guessing and memorizing the meanings of tens of thousands of words in print, they imposed an immensely more difficult task upon every child.

2. Even the Chinese, who must commit many logographs to memory, know how to break them down into their component parts. They also know how to construct logographs by combining the symbol of a root word with other logographic symbols to form other words.

3. Many children who have been exposed to the "Flash-Card/Look-Say" approach can in fact read many words quickly, however, when they encounter a new word, they do not possess the decoding skills with which to

sound it out so as to be able to pronounce it correctly in order to discover if they know it or not!

4. A child may have learned to read **"STOP"** on a flash card, but he will not be able to read "**POTS"** or **"TOPS"** or **"SPOT"** or **"POST** four other words that are composed of the very same letters, unless he has learned the phonetic code.

WE MUST TEACH THE ALPHABETIC CODE WITH PHONICS

Most English words are spelled by the alphabetic code. It is composed of fewer than 200 letters and letter groups which stand for one or more of 45 basic sounds used in speaking English. Romalda Spalding, a renowned reading specialist, identifies 26 single letters plus 44 fixed combinations of two, three and four letters which together produce the 70 phonograms that we use to write the English language. (Spalding, 1957)

If we ever hope to reduce the tremendous illiteracy rate in the United States, American teachers must again teach children the sounds of the English language, so that they will be able to learn to write and read and spell words correctly like Thomas Jefferson and Benjamin Franklin and their contemporaries did so effectively!

Conclusion:

THE PARADOX OF SCIENCE TEACHES US

That we must teach Writing First Because:

1. We write what we know.
2. We read what we don't know.
3. Therefore, we must move logically from the known to the unknown.

That we must teach Cursive Writing Because:

1. If you teach print you increase the difficulty of both writing and reading enormously.
2. Children who were taught to write print found it much more difficult to master cursive longhand in second grade, when it was previously taught. The sensitive period for writing was long past and they already knew how to write print, so they did not have a strong motivation to learn to write cursive longhand.
3. If you offer cursive longhand first, you facilitate and enhance both the writing and reading acquisition process, because it is much easier for young children to achieve.
4. Children who learn to write and read cursive learn to read print by association in a week or less.
5. The Printed Word is all around us. Just about everywhere you look, there the printed word is! It produces enormous motivation for children to

learn to write and read it. Research shows that cursive writers develop the skill to print spontaneously. They do not have to be taught!

6. Print writing **never** produces the ability to write and read cursive longhand spontaneously.

A TWO YEAR SCIENTIFIC EXPERIMENT HAS PROVEN THE PARADOX

This writer conducted a two year experiment with four groups of children 3, 4 and 5 years of age in Montessori classrooms. All programs were developmentally based and children had ample opportunities to develop both motor and sensorial skills through the use of scientifically designed Montessori materials before attempting the development of writing and reading skills.

Group "A" was taught to write and read Cursive Longhand the first year and then learned to read Print by association the second year.

Group "B" was taught to write and read Cursive Longhand the first year and then was taught to write and read Print the second year.

Group "C" was taught to write and read Print the first year and then was taught to write and read Cursive Longhand the second year.

Group "D" was taught to write and read Print the first year and then learned to read Cursive by association the second year.

All four groups were monitored with regard to the rate at which they acquired writing and reading skills over the two-year period. They were also compared to each other with regard to the level of skill each group was developing in both writing and reading by both teacher observation and testing over the two year period. The results of the study are outlined below.

GROUP	WROTE	READ	LEARNED BY ASSOCIATION	SKILL LEVEL
A	Cursive	Cursive	Read Print	1
B	1 Cursive 2 Print	1 Cursive 2 Print		2
C	1 Print 2 Cursive	1 Print 2 Cursive		3
D	Print	Print	Read Cursive	4

Children in **Group A**, who learned to write and read Cursive Longhand and learned to read Print by association progressed at a faster rate and developed more effective writing and reading skills than children in all other categories!

Children in **Group B**, who learned to write and read Cursive in the first year, progressed at the same rate as their peers in Group A during that year. However, when they switched to writing and reading Print in the

second year, group B children soon fell behind the children in Group A, who only learned to read print by association.

Children in **Group C**, who started with Print progressed at the same slow rate as the children in Group D until they began to write and read Cursive in the second year. During the second year, the introduction of writing and reading Cursive allowed them to developed more effective writing and reading skills than children in Group D.

Children in **Group D**, who were taught to write and read in Print during both years and only learned to read Cursive by association developed much less effective writing and reading skills than the other three groups.

This research demonstrates that we have been using the least effective process to teach literacy skills to children in the U.S. for more than 50 years!

HERE IS WHY "JOHNNY CAN'T READ" IN U.S. PUBLIC SCHOOLS

1. His prehensile skills are not prepared adequately before he is required to use a pencil.
2. He does not receive sensorial preparation to enhance and refine the perception skills he will need to write and read.
3. He is not taught key words that identify letter sounds to develop phonemic awareness.
4. He is not taught to master sound/symbol association before attempting the synthesis of reading.
5. He is taught letter names at the same time as letter sounds, which is confusing.
6. He is often taught only one capital letter a week in Kindergarten so he enters first grade without knowing how to read.
7. He does not receive adequate instruction on how to write in Kindergarten so his writing is either atrocious or nonexistent when he enters first grade.
8. The first real attempts to teach him to read are inept or too late, often after he is six years old.
9. Teachers confuse him by attempting to teach him reading and writing simultaneously.
10. His teachers do not isolate each difficulty.
11. His teachers usually begin by trying to teach him reading before writing instead of going from the known (writing) to the unknown (reading.)
12. His teachers try to teach him the most difficult form of calligraphy -- the drawing of separate identical print letters first, often starting with capital letters which are only used at the beginning of a sentence and

for proper nouns. Two or three years later, they try to teach him the natural cursive form of writing**, long after the sensitive period for the development of writing skills has passed.**

13. Many University Faculty members who "teach reading" have themselves never taught a child to read. Many of them can theorize about how children are said to learn to read, however, they themselves do not really know how to teach a child to read.
12. Many curricula and the accompanying sets of texts that are selected officially by school district administrators, in response to pressure from publishers, require the teacher to use the least effective approach to teaching literacy skills to children.

NOW YOU KNOW WHY "JOHNNY STILL CAN'T READ!"

This serious national problem will not be solved until, like Galileo, many more teachers become Crusaders for the Paradoxes of Science against the Tyranny of *Conventional Wisdom*.

References:

American Council of Life Insurers. (2016) www.acli.com/Tools/Industry%20Facts/Life%20Insurers%20Fact%20Book/Documents/FB15_All

Doverspike, Jennifer. (2015) *Ten Reasons People Still Need Cursive* in The Federalist, (February 25, 2015)

James, K.H. and Engelhardt, L. *The effects of handwriting experience on functional brain development in pre-literate children* in Trends in Neuroscience and Education. (2013)

Klemm, William R. in *Psychology Today* (Mar 14, 2013)

Meadows, Feland L (1979) Why Johnny Still Can't Read. Mexico City, Mexico. Pan American Montessori Society

Montessori, Maria (1912) The Montessori Method. New York, N.Y. Frederick A. Stokes Co.

Montessori, Maria (1972) The Secret of Childhood. New York, N.Y.: Ballantine Books

National Assessment of Adult Literacy (NAAL) – *Demographics – Overall,* (2003)

National Assessment of Educational Progress (NAEP) -*The Nation's Report Card* (2015) http://nces.ed.gov/nationsreportcard/

Spalding, Romalda. (1957). The Writing Road to Reading. New York, NY: Harper Collins

The Annie E. Casey Foundation. (2010). *Early Warning!–Why Reading by the End of Third Grade Matters*. Baltimore, MD:

http://www.aecf.org/resources/early-warning-why-reading-by-the-end-of-third-grade-matters/
The Annie E. Casey Foundation. (2015). “National KIDS COUNT” Baltimore, MD: http://datacenter.kidscount.org/data#GA/2/0/char/0
US Department of Health and Human Services, National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development - “National Reading Panel”, (2000)

Illegality of Imposing Comprehensive Sanction on Iraq: Contradiction Policy of Security Council

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Abstract

During the history of the United Nations, Security Council have imposed partial and comprehensive sanctions on some countries. In all these resolutions, humanitarian commodities including foodstuff and medicine were exempted except in Iraq where foodstuff and medicine were included in the sanction regime. This has resulted to large scale of humanitarian crises during the thirteen years of sanction. The aim of this paper is to examine whether or not the Security Council has authority to adopt such complete siege in preventing Iraq from importing humanitarian commodities. It also aims to ascertain whether or not the Security Council exceeded its authority illegally and punished the whole Iraqi people for political reasons.

Keywords: Partial sanction, comprehensive sanction, foodstuff, medicine, Geneva Convention, Large scale crises

Introduction

Historical Review of Security Council Sanctions

In the historical review of Security Council sanction, Article 41 of chapter VII of United Nation charter was used by Security Council to enforce sanction on some countries. This sanction is according to the objective stated in each resolution.

Article 41 states:

"The Security Council may decide what measures, not involving the use of armed forces, are to be employed to give effect to its decisions, and it may call upon the Member of the United Nation to apply such measures. They may include complete or partial interruption of: economic relations and of rail, sea, postal, telegraphs, radio, and other means of communication and the severance of diplomatic relations."[2]

Security Council Report about U.N. Sanction stated: "While Article 41 does not specifically mention the word sanction, it lists specific sanction

measures to be taken; while at the same time, making the list is not exhaustive."[2]

Accordingly, neither basic humanitarian requirements (food, medicine and medical equipments, purification of water materials, education, civilian commodities) nor comprehensive sanction were covered in this article.

Since the establishment of the United Nation Organization, Security Council has adopted several resolutions of sanctions. However, these resolutions vary in terms of the objective and scale of coverage from targeting individuals, companies, organizations, and countries. Also, resolutions adopted include partial and comprehensive sanctions.

Partial Sanction

All partial Security Council resolutions at countries level targeted certain objectives. These include military and military equipments, non-proliferations, assets, products, and terrorist activities. Therefore, this is without reference to civil and humanitarian commodities. These resolutions was adopted by Zambia 326 (1973), Libya 748 (1973), Somalia 751 (1992), Liberia 778 (1992), Angola 864 (1993), Rwanda 918 (1994), Sierra Leone 1132 (1996), Kosovo 1160 (1998), Afghanistan 1267 (1999), Democratic Republic of Congo 1533 (2004), Cote d'ivoire 1572 (2004), Sudan 1591 (2005), Democratic People's Republic of Korea 1718 (2006), and Iran 1737 (2006).

Comprehensive Sanctions

Security Council adopted comprehensive sanction in three countries (Southern Rhodesia, Yugoslavia, and Haiti). This was with the exemption of some basic commodities such as food, medicine, and other humanitarian requirements. In the case of Iraq, Security Council took severe measures which cover all commodities. Subsequently, these commodities include food and other humanitarian needs in sanction regime as will be mentioned later.

Southern Rhodesia

The first comprehensive sanction imposed by the Security Council was on South Rhodesia as referred to in paragraphs 3, 4, and 5 of 253 (1968) resolution:

"All States Members of the United Nations shall prevent:

(a) The import into their territories of all commodities and products originating in Southern Rhodesia and exported them from …;

(b) Any activities by their nationals or in their territories which would promote the export of any commodities or products from Southern Rhodesia…;

(c) The shipment in vessels or aircraft of their registration or under charter to their nationals, or the carriage (whether or not in bond) by land transport facilities across their territories of any commodities or products originating in R products… to any person or body;
(d) The sale or supply by their nationals from their territories and of any commodities or products (whether or not originating in their territories, but not including supplies intended strictly for medical purposes, educational equipments, and materials for use in schools and other educational institutions, publications, news materials, in special humanitarian circumstances, food-stuff) to any person or body in Southern Rhodesia or to any other person or body for the purpose of any business carried out or operated from Southern Rhodesia…" [1]
Paragraph 4: "All States Members of the United Nations shall not make available to the illegal regime in Southern Rhodesia or to any commercial , industrial or public utility undertaken, including tourist enterprises in Southern Rhodesia and any funds or investment or any other financial or economic recourses; and shall prevent their nationals and any person within their territories from making available to the regime or to any such undertaking any of such funds or recourses and from remitting any other funds to persons or bodies within Sothern Rhodesia, except payments exclusively for pensions or for strictly medical, humanitarian or educational purposes, or for the provision of new material and in special circumstances, foodstuff." [1]
Despite the comprehensive nature of sanction regime imposed on Southern Rhodesia, exemption of some basic commodities and their financing were clearly indicated in the resolution. However, this was done so that the continuation of imports of these basic commodities can be maintained for the requirements of the population.

Former Yugoslavia

Security Council adopted resolution 757 in May 30, 1992, under chapter VII o**f** the Charter of United Nations. Consequently, this sanction imposes sanction on former Yugoslavia as stated in paragraphs 4, 5, 6, and 7.

Paragraph 4 prevented import and export to and from Yugoslavia for all commodities except "supplies intended for medical purposes and foodstuff notified to the committee established pursuant to resolution 724 (991)";

Paragraph 5 prevented the making of available fund or any other financial or economic resources to any person or body in Yugoslavia except "payments exclusively for strictly medical or humanitarian purposes and foodstuff";

Paragraph 6 denied permission to any aircraft to takeoff, land or fly over their territory if it is destined to land, or except it is arriving for humanitarian purposes. Also, it prohibit the engineering and maintenance or servicing of Yugoslavian aircrafts; and

Paragraph 7 reduced the level of diplomatic mission and consular staff in Yugoslavia. This prevents the participation of Yugoslavian sport groups abroad. Also, it results in the suspension of scientific, technical, and cultural cooperation with Yugoslavia.

Haiti

Under chapter VII, the Security Council adopted 841 Resolution on the 16th of June 1993. However, this resolution enforces sanction for the purpose of restoring elected government after being removed by military coup in paragraphs 5, 6, 7, and 8.

Paragraph 5 prevented all countries to export petroleum or petroleum products or arms. This includes all arm materials and equipments including weapons and ammunition to Haiti except limited quantities of petroleum products under the approval of the Committee established according paragraph 7;

Paragraph 6 prohibited all traffic entering Haiti territories carrying commodities referred to in paragraph 5;

Paragraph 8 froze all funds related to Haiti government.

Iraq

Acting under chapter VII, the Security Council adopted sanction on Iraq on the 6th of August 1990. Therefore, resolution 661 aims to force Iraq to withdraw from Kuwait and to restore the Legitimate Government of Kuwait.

Paragraph 3 of this resolution outlined sanction regime as a total blockade.

"Decides that all States shall prevent:

(a) The import into their territories of all products origination in Iraq ...;

Any activities by their nationals or their territories which would promote or are calculated to promote the export or trans-shipment of any commodities or products from Iraq…; and any dealings by their nationals or their flag vessels or in their territories in any commodities or products operating in Iraq and exporting them from after the date of the present resolution, including, in particular, any transfer of funds to Iraq of such activities or dealings;

(b)-The sale or supply by their nationals or from their territories or using their flag vessels of any commodities or products, including weapons

or any other military equipment, whether or not originating in their territories; but not including supplies intended strictly for medical purposes and, in humanitarian circumstances, foodstuff, to any person or body in Iraq or Kuwait or to any person or body for the purposes of any business carried in or operated from Iraq or Kuwait , and any activities by their nationals or in their territories which promote or are calculated to promote such sale or supply of such commodities or products;

(c)-Decides that all States shall not make available to the government of Iraq or to any commercial, industrial or public utility undertaking in Iraq or Kuwait, any funds or any other financial or economic recourses and shall prevent their nationals and any person within their territories from removing from their territories or otherwise making available to that Government or to any such undertakings any such funds or resources and from remitting any other funds to persons or bodies within Iraq or Kuwait, except payments exclusively for strictly medical or humanitarian purposes and , in humanitarian circumstances, foodstuffs."[1]

Paragraph 6 stated: "Decides to establish, in accordance with rule 28 of provisional rules of procedures of the Security Council, a Committee of the Security Council consisting of all the members of the Council, to undertake the following tasks and to report on its work to the Council with its observations and recommendations:

(a) To examine the reports on the progress of the implementation of the present resolution which will be submitted by the Secretary-General;

(b) To seek from all States further information regarding the action taken by them concerning the effective implementation of the provisions laid down in the present resolution." [1]

Resolution 661 enforced total blockade on Iraq. Despite there is reference to the exemption for medical purposes and foodstuff in humanitarian circumstances (but not in normal daily requirement), security council did not give to the mentioned above committee any authority to permit the export of food and medicine for Iraq as it did for Yugoslavia. Also, they restricted the authority of the Committee to follow the implementation of the resolution.

After the second gulf war in 1991 and the withdrawal of Iraq from Kuwait, Security Council should have lifted sanction in accordance with resolution 661 and international law. In contrary, Security Council kept sanction in force and linked lifting sanction with new objective. Thus, this objective entails destroying chemical, biological, and nuclear weapons as stated in paragraphs 22 of resolution 687 adopted in 8th of April 1991. Furthermore, this objective has no relation with the objective of enforcing sanction on Iraq as stated in 661 resolutions.

However, resolution 687 allowed Iraq, after eight months of total blockade to import foodstuff, medicine, and other civilian commodities under the approval of sanction committee mentioned above. Consequently, this was as stated in paragraph 20 as shown below:

"Decides, effective immediately, that the prohibitions against the sale or supply to Iraq of commodities products, other than medicine and health supplies, and prohibitions against financial transactions related thereto contained in resolution 661 (1990) shall not apply to foodstuffs notified to the Council Committee established by resolution 661(1990)…, with approval of that committee, under the simplified and accelerated "no-objection" procedure, tos and supplies for essential civilian needs as identified in the report of the Secretary-General dated 20 March 1991, and in any further findings of humanitarian need by the Committee." [1]

In 15th August 1991, the Security Council adopted 706 resolution permitting Iraq to export oil during a period of six months not more than $ 1.6 billion. Third of which is to be designated to war compensation referred to in 687 resolution and U.N. expenses. In 19th September 1991, the Security Council adopted 712 resolutions regulating the distribution of $ 1.6 billion between foodstuff and medicine. Thus, this is to be procured under full control of procurement and distribution of U.N. and U.N activities and compensation of war. In addition, escrow account of oil revenue is under control by the United Nations.

The agreement between Iraq and U.N. in New York towards the end of 1991 broke due to the very limited amount of oil revenue allocated to foodstuff and medicine compared with the need of the Iraqi people referred to in the report of the Secretary General mentioned above. The Iraqi people were deprived of obtaining their requirements after more than one year of total prevention of import of humanitarian commodities. Consequently, this was in addition to the large scale damage of Iraqi infrastructure during 1991 war. Also, it requires reparation, namely: water treatment, electricity, grain silos, educational institutions, schools, hospitals and so on, which were targeted during the military attack.

However, in response to paragraph 20 of 678 resolutions mentioned above, some countries released part of Iraqi frozen assets so as to enable them buy foodstuff and medicine. Thus, such countries include Switzerland ($ 300 million), Britain ($ 100 million out of one billion), Spain ($ 20 million), Tunisia ($ 20 million), Morocco ($12 million), Italy ($ 4 million), and Canada ($1 million). Moreover, the United States Government refused to allow Iraq to buy food and medicine. This was despite the fact that the main bulk of frozen assets which exceeds two billion US dollar were in U.S.A. local banks.

In late 1992, the Security Council took harsh measure against Iraqi people by re-frozing again Iraqi assets. Thus, they asked countries to transfer Iraqi funds oil revenue available in their countries to the escrow account referred above according to 778 resolution (2nd October, 1992).

Iraq and U.N. agreed to export oil in amount of $2 billion every six months (986 resolution, 1995) through oil-for-food program. It increased to $ 5.2 billion in 1998. The limit was removed in 1999 and the program continued until the 2003 war of Coalition Forces led by United States against Iraq.

Contradicting Policy of Security Council against Iraq

Nine days after the eruption of military operation against Iraq in 2003, Security Council adopted 1472 resolution on the 28th of March. This resolution clearly indicated that imposing sanction on food, medicine, and humanitarian commodities were included in 661 (1990) violating Article 55 of Fourth Geneva Convention, the Hague Regulations, and international law.

Resolution 1472 stated in its preface:

"The Security Council,

Noting that under the provision of Article 55 of the Fourth Geneva Convention (Geneva Convention Relative to the Protection of Civilian Persons in the Time of War of August 12, 1949), to the fullest extent of the means available to it, the Occupying Power has the duty of ensuring the food and medical supplies of the population; it should, in particular, bring in the necessary foodstuff, medical stores and other articles if the resources of the occupied territory are inadequate."[1]

In addition to that, this resolution stated:

"Acting under chapter VII of the Charter of the United Nation,

1-Request all parties concerned to strictly abide by their obligations under international law , in particular the Hague Regulations, including those relating to the essential civilian needs of the people of Iraq, both inside and outside;

2- Call on international community also to provide immediate humanitarian assistance to the people of Iraq…" [1]

However, this clearly indicate that imposing comprehensive sanction and the preventing of Iraq from importing food and medicine is illegal according to article 55 of Geneva convention, Hague Regulation, and international law.

Evaluation of Security Council Policy of Imposing Sanction

Neither Article 41 of Charter VII of the United Nation Charter nor Geneva Convention (Article 55), Hague Regulation, and International Law permit the Security Council to impose comprehensive sanction on countries.

This can be seen in the case of Iraq during the thirteen years of sever sanction.

When Security Council permit Iraq to export oil to buy food and medicine, the council did not treat Iraq as other countries. In contrary, export of oil and import of foodstuff and medicine was controlled by U.N. The U.N fully controlled the process from the beginning of exporting the oil to transferring the value of the oil to the escrow account. Similarly, procurement of foodstuff and medicine as well as the distribution of these commodities was done under the approval and supervision of U.N.

Subsequently, sanction was lifted after achieving the objectives set in the resolutions of all the above motioned countries, except in the case of Iraq where Security Council changed its objectives to keep sanction in place until the fulfillment of the objectives of some members of the Security Council (U.S.A and Britain). Thus, this is aimed at changing political regime in Iraq. Sanction should have been lifted after Iraqi withdrawal from Kuwait according to 661 resolutions. Nevertheless, Security Council enforced new objective of destroying chemical, biological, and nuclear weapons. Sanction was kept on for thirteen years as a result of the objective declared by some members of the Security Council to remove the political system of Iraq. When the sanction failed to achieve this objective, war was waged against Iraq and its political system was removed. However, the major victim of this policy was the Iraqi people.

Impact of Sanction on Iraq

Sanction imposed on Iraq has damaged the Iraqi society. United Nation reports (Annex II of S/1999/356) submitted to the secretary general stated that:

1- Iraqis social and economic indicators were generally above the regional and developing country averages. GDP in 1989 stood at $ 75.5 billion for population of 18.3 million. GPD growth had an average of 10.4% from 1979 – 1980. By 1988, GDP per capita totalled 3510 US dollar.

2- As highlighted by FAO which was approximately 79% to 97% at that time, Iraq had one of the highest per capita food availability indicators in the region. Dietary energy supply averaged 3120 kilo calories per day. Due to its relative prosperity, Iraq had the capacity to import large quantities of food, which met third of its requirements at an average estimated cost of 2.5 billion US dollar a year. Although, in poor production years, the food bill could rise to 3 billion.

3- According to WHO, prior to 1991b, health care reached up to approximately 79% of the urban population and 78% of rural residence. Thus, a major reduction of young child mortality took place from 1960 to 1990 with mortality rate at 65 per 1000 lives per birth in 1989 (1991 Human

Development Report). The average for developing countries was 76 per 1000 live births. UNICEF indicated that national welfare system was in place to assist orphans or children with disabilities and to support the poorest families.

4- As described by UNICEF, the government of Iraq made sizable investment in the education sector from mid-1970 until 1990. By 1989, the combined primary and secondary enrolment ratio stood at 75%. This is slightly above the average for all developing countries at 70%. As a result, illiteracy had been reduced to 20% by 1987 and education accounted for over 5% of the state budget in 1989. This was above the developing country average of 3.8%.

5- WHO estimates that 90% of the population had access to an abandoned collection and sanitary disposal.

After the impact of sanction:

1- "The Iraqi GDP may have fallen by nearly two-third in 1991, owing to an 85% decline in oil production in the devastation of the industrial and service sectors of the economy. Also, per capita income had fallen from 3416 US dollar to 450 US dollar in 1995." [1]

2- The maternal mortality rate increased from 50/100000 live births in 1989 to 117/100000 in 1997.

3- The dietary energy supply had fallen from 3120 to 1093 kilo calories per capita a day in 1994-95. The prevalence of malnutrition in Iraqi children under five almost doubled from 1991 to 1996 (from 12% to 23%).

4- "In addition to the scarcity of resources, malnutrition problems also stem from the massive deterioration in basic infrastructure, particularly water-supply and waste disposal system. The WFP estimates that access to potable water is currently 50% of the 1990 level in urban areas and only 33% in rural areas." (2)

Accordingly, Iraqi people were put in a very sever humanitarian condition for thirteen years under illegal comprehensive sanction which deprived them from their daily basic requirement. One and half million Iraqi died, with more than one-third of them comprising of children. Thus, this was because the Security Council failed to protect the sufferings of human in Iraq for thirteen years.

Joy Gordon, an American writer, in her book titled "THE INVISIBLE WAR: The United States and Iraqi Sanction," summarized the impact of sanction on Iraq as complete destruction of Iraq and Iraqi people. She stated: "What I want to explore now is the question of how human catastrophe of this magnitude came about: what policies and practices here that caused hundreds of thousands of deaths; decimated the health of several millions of children; destroyed the whole economy; made a shamble nation's education and health care system; reduced sophisticated country, in which

much of the population lived as the middle class in the first world, to status of Fourth World countries- the poorest of the poor, such as Rwanda, Somalia, Haiti; in a society notable for its scientist, engineers, criminals, and black makers. These things do not come from blocking shipments of glue and laundry detergent, or even from building palaces. They are the result of measures that compromised the economy as a whole by broadly restricting imports in a society that was heavily dependent on imports: by restricting or undermining oil sale in an economy that was heavily dependent on oil sales for its gross domestic products (GDP); and by undermining the infrastructure-electricity production, telecommunications, transport, and water and sewage treatment- in an advanced industrialized society that was highly dependent on modern infrastructure." [3]

Sundy Pirger, the national advisor to President Clinton, stated in 1999 before the eruption Fox Storm of attacking Iraq; we have imposed the most pervasive sanction in the history of mankind and prevented Saddam Hussein from $ 150 billion value of oil revenue not been used for building mass destruction weapons.

Therefore, the Security Council has failed to protect the human rights of Iraqis' during thirteen years of imposing illegal sanction. Furthermore, "Sanction failed to force Iraq to withdraw from Kuwait as it was the object of Security Council resolution 661. It failed to force Iraqi people to topple their political regime under its hardship. This is the real objective of keeping sanction going on for thirteen years, not for dismantling Iraqi mass destruction weapon which the invasion of Iraq in 2003 proved to be clean from these weapons. The only victim of imposing sanction is people. International community and Security Council are called to abandon imposing comprehensive sanction in the future, whatever the objective is maimed to achieve."[4]

Consequently, Security Council is responsible for the impact of sanction on Iraq as stated before. Therefore, they have to take responsibility for compensating Iraq as a country and the Iraqis people whom have lost their lives and lived under human suffering of continuous sanction for thirteen good years.

Conclusion

This paper found that Security Council had no authority to impose comprehensive sanction according to 661(1990), and to prevent Iraq from importing food and medicine and other civilian commodities. Security Council violated Geneva Convention Relative to the Protection of Civilian Persons in Time of War of August 12, 1949. However, this has led to the creation of large scale humanitarian crises in Iraq and resulted in hundreds of thousands of deaths, thereby damaging the whole society. Security Council is

obliged to compensate Iraq as a country and those individuals who were affected by the sanction.

References:

Security Council Report, Special UN Sanctions, Special Research Report, November 2013.
United Nation Report (1999). Annex II, S/1999/356.
Gordon Joy (2010). Invisible War. Harvard University Press, pg. 91.
Saleh Mohammed Mahdi (2015). Towards Abolishing Imposing Comprehensive Sanction: Sanction Damaged Iraqi Society and Food Ration System saved it from Famine. *Third International Conference on Advances in Social Science, Management and Human Behavior*, pg. 10-11.

FASTIP Intranet: Improvement, Training and User Rights Policy

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Abstract

While much importance is given for protecting one's data and confidential information from outside one's boundaries little is talked about the risks involved inside the organization. Users inside an organization had direct physical access to confidential information and are well aware of the resource access controls. Hence securing the intranet from its trusted users becomes critical. Statistics show that 80% of all computer frauds is committed by internal end users.

This paper briefly explains the definition and the architecture of the intranet and discusses the physical security of the intranet components and also security of the organizations data both from the internal users and also from the outside world (Internet).

Keywords: Intranet Security, Joomla, FASTIP, Firewall, FTP

Introduction

The web defines intranet as a private network inside a company or organization, which uses software like that used on the Internet, but is for internal use only, and is not accessible to the public. Companies use Intranets to manage projects, provide employee information, distribute and share data and information.

Log in Intranet http://192.168.1.187

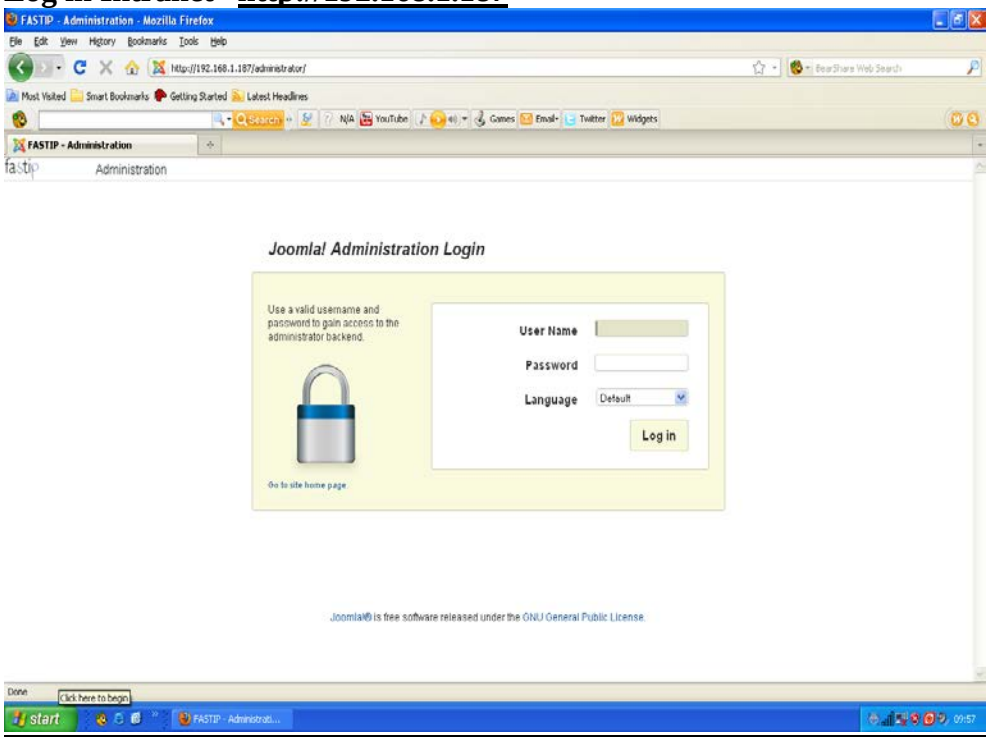

Figure 1 Interface

Brief History of Internet

The birth of the interne takes place in 1969 when Advanced Research Projects Agency Network

(ARPANet) is commissioned by the department of defence (DOD) for research in networking.

The ARPANET is a success from the very beginning.

Although originally designed to allow scientists to share data and access remote computers, e-mail quickly becomes the most popular application.

The ARPANET becomes a high-speed digital post office as people use it to collaborate on research projects and discuss topics of various interests.

The InterNetworking Working Group becomes the first of several standards-setting entities to govern the growing network. Vinton Cerf is elected the first chairman of the INWG, and later becomes known as a "Father of the Internet." In the 1980s, Bob Kahn and Vinton Cerf are key members of a team that create TCP/IP, the common language of all Internet computers. For the first time the loose collection of networks which made up the ARPANET is seen as an "Internet" and the Internet as we know it today

is born. The mid-80s marks a boom in the personal computer and super-minicomputer industries. The combination of inexpensive desktop machines and powerful, network-ready servers allows many companies to join the Internet for the first time. Corporations begin to use the Internet to communicate with each other and with their customers. In the 1990s, the internet began to become available to the public. The World Wide Web was born. Netscape and Microsoft were both competing on developing a browser for the internet. Internet continues to grow and surfing the internet has become equivalent to TV viewing for many users.

Objectives and duration of the mission

The objectives of the assignment are:

- Advice on substantial improvement of the range and functions of the FASTIP intranet.
- Provision of training for FASTIP staff in using, maintaining and using the intranet.
- Advice on and working out a concept for FASTIP administrative rights policy.

Considering the above goals the structure of this report is based on the assignment specifications:

1. System design and development
2. Capacity building and training
3. Administrative rights policy

Background

The Faculty of the Studies integrated with Practice is the first faculty in Albania where the theoretical studies are integrated with practical knowledge. FASTIP students receive job training during their studies which gives them insights to be more prepared for their future work.

Established in October 2008, FASTIP is based on the successful dual education model operating since over 30 years in the Berufskcademie of Baden-Württemberg Land, Germany.

FASTIP is the only higher public education institution in Albania that carries out the teaching process only in English and only with foreign lecturers.

System design and development

Analysis

The previous situation of the FASTIP hardware infrastructure was the provision of a Server and a Router. The Server is an HP with 2 Quadcore processors of 2.4 Ghz. The RAM memory is 16 GB and it has a 1Gbe NC326i 2 Ports network controller. There is also an inverter allocated for the

server in case of electricity problems. The operating system installed on the server is Fedora version 13 based on Linux Kernel. The server was not used and was always on a shut down mode. Furthermore, the server room had significant problems in order to guarantee server technical operation. The router creates the overlay for the internet communication and the Local Area Network. The internet is provided by ABCOM with a broadband of 2 MB/s download and 4 MB/s upload based on the Speed test performed on 01/06/2011.

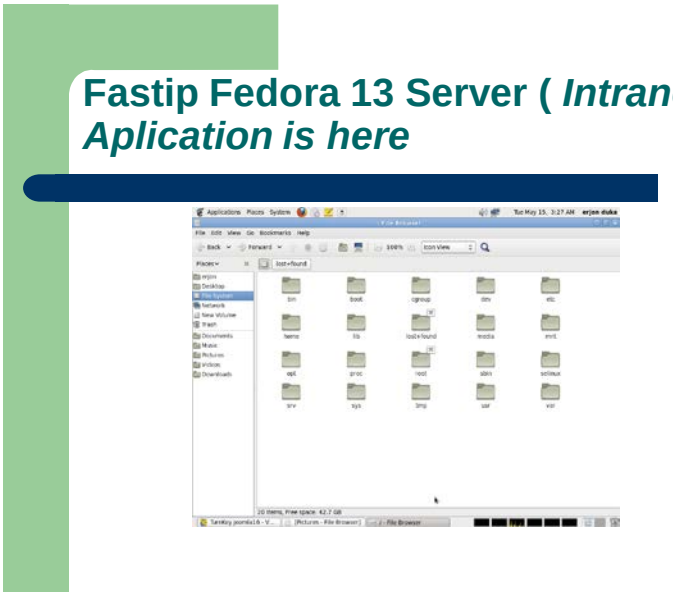

Figure 2 Fedora Server :

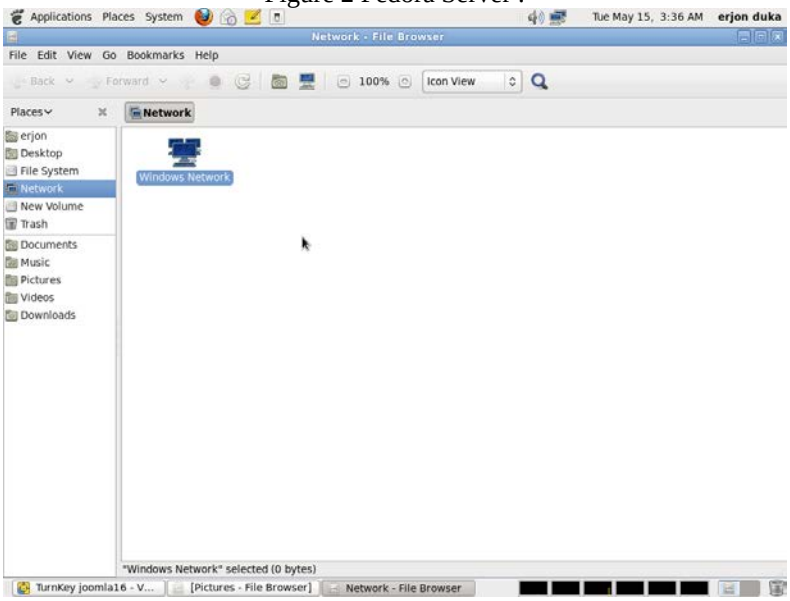

Figure 3 Network Interface Fedora Server

Improvements

The server was successfully made operational and an intranet platform was installed. Furthermore, the urgent recommendation of environment security has been implemented. The window was fixed and the air room condition is now at the level of required standards.

Joomla 1.6 version was installed for the intranet software platform. This is a free, open and available software application which is based on PHP and MySQL technology as a consolidated platform that anyone can use, share and support. Joomla is a content management system that can allow in a very simple way to publish text, documents, images, videos etc. This intranet platform doesn't require any technical skills and therefore a normal PC user can manage it.

Figure 4 Joomla 16 WMWare Player Application

The core features of the intranet system are: user management, media manager, language manager, banner management, contact management, polls, search, web link management, content management, syndication and newsfeed management. The user management features and enforcements made will be explained in detail in the administrative rights policy chapter. However it must be said that Joomla has a registration system that allows users to configure personal options. The intranet has also an integrated help system to assist users to find what they need. Moreover, the system features offers the possibility for the administrator to communicate quickly and efficiently with users one-on-one through private messaging via the mass mail system. These are just some of the basic Joomla features because through powerful extensions the intranet system can be fully customized.

Intranet User Categories

We can 3 different user Categories : Student, Professor and Administrative Staff. They are all users.Professors must be editors and some of Administrative Staff Members. The Intranet has all digital free online libraries links. Intranet is connected to internet (Optic Fibre).

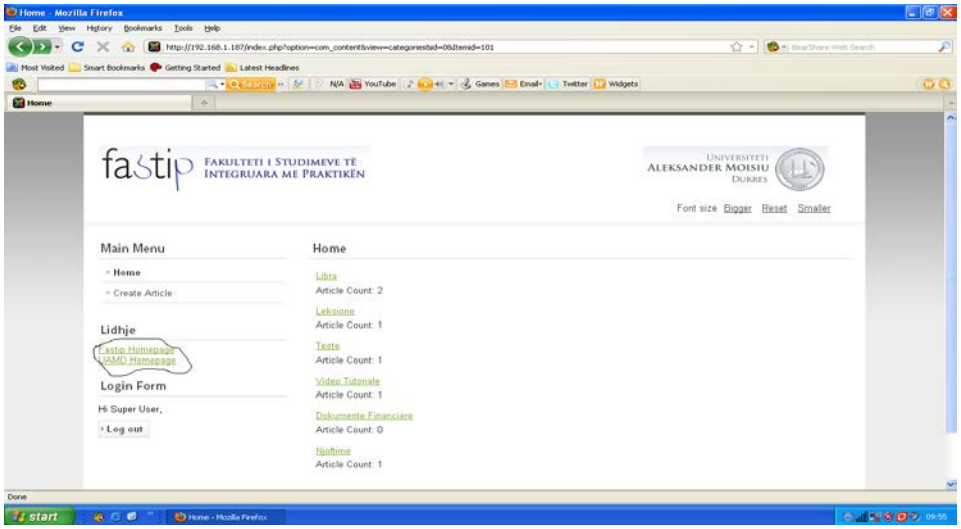

Figure 5 : Intranet Application Interface

Recommendations

The essential recommendation is to maintain the infrastructure based on the standards required. The environment and hardware conditions should always be guaranteed in regime.

The system should be enhanced successfully through usability at all levels from the top to the bottom of the FASTIP hierarchy. Academic staff and students must interact on the platform for any particular issue in order to keep track of every piece of content with no requirement of information duplication or redundancy.

New application and modules should be installed in the system according to the institution needs. Some of these modules are freely available at the joomla extensions link: http://extensions.joomla.org/. However, many of them can already be created in the system as for example: the student information management, didactics administration, news and information updates, marking scheme and grades publication etc. Moreover, the internal electronic secretary for the document management system can be implemented through a system component. On the other hand, financial and planning modules require a more specialized system development.

Capacity building and training

Analysis

The FASTIP staff had a general overview about the need for internal communication. The Dean was primarily focused on improving the IT FASTIP specialist and making the hardware/software available for intranet use. The Dean suggested, as it is was also written in the terms of reference of the service, to work closely with the IT specialist in order to transfer knowledge and to raise awareness among all other FASTIP staff about intranet purpose and user implementation.

The Chancellor raised as primary concerns the personal data protection and the guarantee of intellectual property rights. He suggested having a user management in place and a strong security level in order to avoid copyright or data breach issues.

The IT specialist has already a good grasp of knowledge about the technical needs and requirements. He also has a good preparation in order to maintain the intranet implementation.

All the staff stressed the fact that the server needs to be available and workable in order to be used for the intranet services.

Implementation

The IT specialist was largely trained and was participant during all system implementation activities. He was provided with all the IT administrator knowledge in order to manage FASTIP intranet users and enrich the Joomla platform. He was introduced how to extend system plug-in and how to integrate new modules to the intranet application. The special focus on user management and security was part of the head staff requirements but also of the terms of reference. The IT specialist was also provided with a back-up copy of the application in the installation format.

The FASTIP staff was trained during a dedicated workshop with the purpose to present the work and introduce the new system. The head staff was also present and they were eager to know about the project implementation. First, a presentation and an overview of the intranet system, functionalities and benefits were provided. The main purpose of the presentation was to raise awareness but also introduce the staff to the methods in order to improve the system and ensure usability. At the end of presentation recommendations were given with a particular focus on the necessity to have an administrative rights policy document. After the presentation, the staff was introduced to the system itself through the possibility given to all of them to access the system in the lab room. They were trained on the main aspects of the system interface and how to access the system. They were largely explained the techniques on how to create,

edit, publish and delete information on the intranet. Furthermore, it was explained to the staff how to introduce new features.

Fastip FTP :

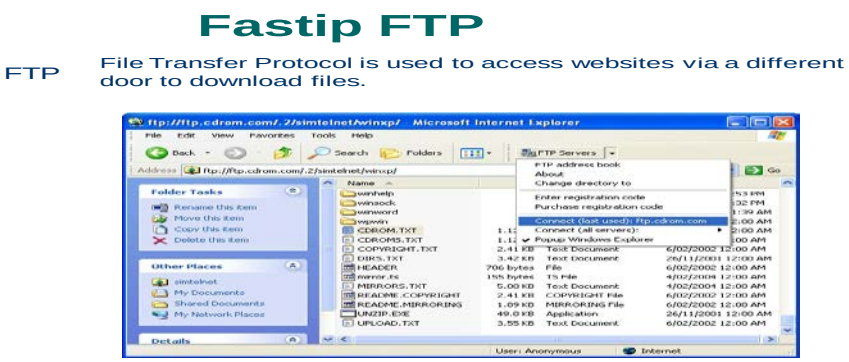

Figure 6 : FASTIP FTP

Recommendations

The joomla platform is very flexible and new modules can be introduced for the activities of the department. However, prior to any further implementation an extensive mapping of the activities should be performed in order to define the system requirements analysis.

Fastip Firewall :

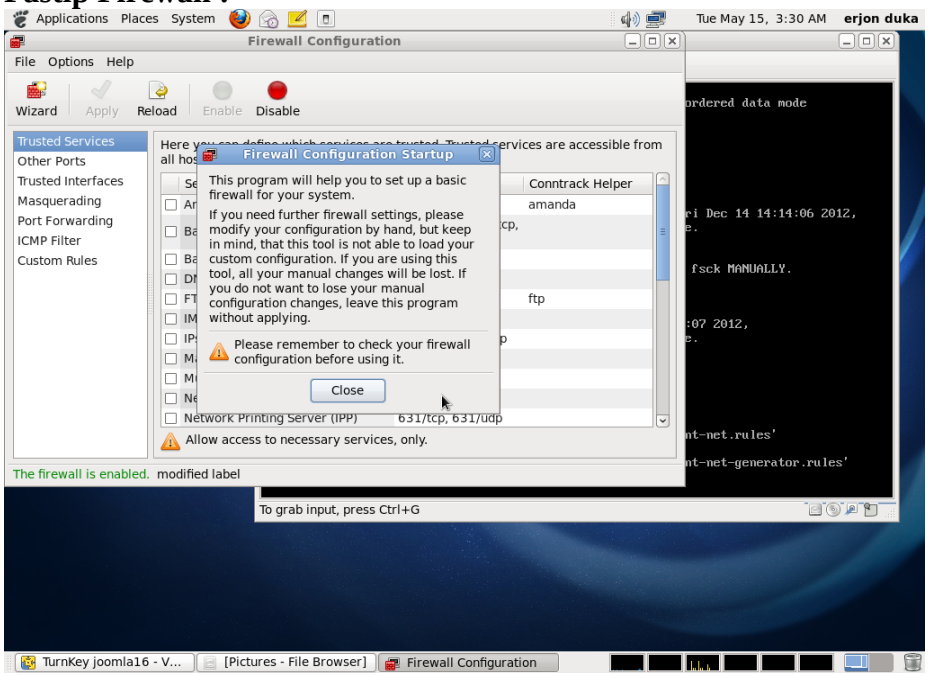

Figure 7 Intranet Firewall

Administrative Rights Policy

Analysis

FASTIP doesn't have any document which regulates the data processing by software application and that can act like an internal regulation. However, the data is mainly used by the employees who are required by job description to do it. The lack of this internal regulation might create difficulties for the administrative staff responsibilities and also not be able to guarantee a fair personal data processing. Furthermore, the absence of administrative rights policy makes very hard for the IT specialist to perform his intranet activities of audit and control. During the meeting held with the IT staff of the UAMD was noticed that despite the significant system improvements made by the university, the also require policy documentation for the IT and administrative rights.

Improvements

The presentation performed during the training activities introduced the staff to the core concept of the administrative policy rights. These administrative policy rights are based on the concepts of information system security which are confidentiality, integrity, availability and authentication. In order to help FASTIP to have an appropriate document a draft format has been prepared and submitted in Albanian language. This document should be approved by the Dean and can act fully as an internal regulation of the faculty. The objective of the document is to define the general rules and the security measures for the appropriate management of the intranet. The policy document also provides the methods in order to ensure security from both technical and organizational perspective. Additional measures are conceived in the document for the database.

Recommendations

The administrative rights policy in order require legal basis framework in order to be enforced. Therefore is necessary to approve an internal regulation document that guarantees such obligations. The draft submitted during the report activities can serve as guidance for the final document. However, modifications must be made by a lawyer who can collaborate with the FASTIP staff for an approved document. Nevertheless, these amendments as the final document should be based on the above Albanian laws:

- Law No. 9741, date 21.5.2007 on Higher Education in the Republic of Albania, amended by law No. 9832, date 12.11.2007 and No. 10 307, date 22.7.2010.
- Law No. 9918, date 19.5.2008 on Electronic Communication in the Republic of Albania.

- Law No. 9887, date 10.3.2008 on Personal Data Protection.
- Law No. 9380, date 28.4.2005 on Copyright and the other related rights to it.

Conclusion

The project can be considered as successful due not only to the consultant service but also thanks to the involvement of the FASTIP staff in the process. Therefore, the situation can be improved through participation and commitment. However, the system development is an ongoing process that requires continuous attention of all the staff. The next step of the system is to ensure usability through the transfer of paper-based activities on the intranet. The enlargement of the system with new modules and features is necessary to favour usability. The student and academic staff administration, financial and document management system can distinguish the next steps of the intranet improvement. However, it is very important to underline that this requires specialized and outsource competence that must be provided in conjunction with training activities.

Future Work :

The project of Inranet must be implemented in other faculties of Aleksander Moisiu University. In the categories of users we must add an filed (faculty member). Intranet security is in high level and it is not important in what operating systems must be implemented in other Faculties but we prefer Fedora Sever (Unix Family) as an open source one .

References:

http://www.robertgraham.com/pubs/network-intrusion-detection.html
http://online.securityfocus.com/infocus/1527
http://www.snort.org/
http://www.cert.org/
http://www.nmap.org/
http://grc.com/dos/grcdos.htm

Anglophone And Civilian: Two Legal Cultures For The Global Age

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Abstract

This paper compares two methods of law, Civilian and Anglophone. It discusses how any legal culture must have two aspects, the adjudicative and the educative. It explores the origin of both legal traditions in the medieval world, and how thy both were transformed by the great technological developments of the fifteenth century. It examines how both traditions adapted themselves to the new circumstance of modernity. Finally, it shows how the rise of a new style university and school in the nineteenth century completed a modern type of legal culture. The paper concludes by reviewing the implications of these past events, in assessing the effect of either law, as a basis of global order in the future.

Keywords: Civilian, Anglophone, law, legal culture

THE ORIGINS OF MODERN LAW

The advance of globalization taking place around the world today is commonly viewed in terms of its technological, political, and economic aspects. However, the foundation of the global project has a great deal to do with methods of law, and the legal cultures they represent. This atmosphere of legality is not only fundamental to the structure of the global system, but it also greatly determines how that system can be understood and the vocabulary best employed to describe it.

Every legal regime is comprised of two elements, the adjudicative and the educative. One element is employed to order human action, the other to shape human thought. For a legal method to operate with stability and continuity, the public within its jurisdiction must understand its actions in terms of the benefits it confers. They must be taught the habit of compliance and obedience to authority. Together, the tandem elements of judicial and educational, form a legal culture.

The two great traditions of Western law, the Continental or Civil, and the English Common or Anglophone law, both grew out of the same

medieval world. But their modern origins in the seventeenth century were very different, and their subsequent development shaped them in even more divergent ways. Although England was part of Latin Christendom, it was geographically detached; and because it had for centuries been ruled as a vassal kingdom, it had become insular in other ways as well. Over centuries, it developed an organic tradition of legality different in important respects from the pattern that prevailed on the Continent.

The catalyst for the rise of a modern incarnation of both traditions, was the great technological advance occurring around 1500. That event came to be symbolized by what were called the three great inventions: maritime compass, gunpowder weapons, and printing press. Combined together, these three innovations produced tumultuous effects: an enormous increase in sea trade and monetary wealth, mass armies and catastrophic warfare, and a phenomenal increase in the creation and dissemination of knowledge. Much of that increase of knowledge was in the realm of law.

The first impact of the printing press had been a dramatic efflorescence of culture and learning that occurred during the period of what historians call the Renaissance. But at the same time, the new technology also had an enormous impact on legal practice as well. Books of law no longer needed to be inscribed by hand, printed copies of the ancient Roman Codes were made widely available, and there was a corresponding increase in legal scholarship. Moreover, books were no longer published only in Latin; by simply changing the order of characters, valuable texts could be published in many languages. This gave rise to entirely new national jurisdictions, and eventually the rise of new polities and new forms of rule.

However, these sweeping changes were not without disturbance and controversy. The sixteenth century would be consumed by civil and religious warfare, resulting in a breakdown of the old medieval order. The world of lord and manor, of kingdom and empire, of village and town was no longer tenable. Along with that, the universal authority of a single ecclesiastical hierarchy could no longer resist the challenge of rising factions who sought to break it into parts. At the heart of these convulsions was an ascending and affluent merchant class who used the new inventions to advance and fortify their cause.

Within this cauldron of competing interests and violent conflict, important questions would ultimately revolve around the new concentrations of wealth and power that the technologies had made possible: What man, or group of men, should hold authority? How would succession to power be accomplished peacefully? By what means would the new accumulations of wealth be appropriated? How would the people of each nation be taught to submit and comply within a new structure of rule?

Philosophical and collegial law

Despite profound changes taking place in the sixteenth and seventeenth century, viewed another way, they were also the continuation of themes that had taken root centuries before. Historians mark the beginning of the Continental legal tradition with the founding of the University at Bologna, Italy, in 1088. Since that time the study of law had passed down through the universities. In doing so, that law had inevitably imbibed the influence of a classical heritage that was so much a part of the European tradition.

It might be said that in Continental law, the legitimacy of legal authority would come to rest on the extent to which it gave expression to the heritage of culture and learning that prevailed among the population generally. For this reason European law came to be admired for its adherence to principles of reason, its scholars and jurists admired for their high level of academic attainment, and strong principle.

The Continental law had been born out of a tradition where the influence of theology and jurisprudence were almost inseparable. Even though it would eventually become avowedly secular, that law still retained many ideals and assumptions patterned on its Christian predecessor. Nonetheless, the fundamental outlook of the tradition, and the basis of its legitimacy among the public, was its deep philosophical bearing.

By contrast, the Anglophone law began as a collegial tradition and was founded on a very different basis. Within a century after the Norman Conquest in 1066, England had developed a very unique system of adjudication; it emanated from the person of the king and from his three Royal Courts of Justice. Those courts, located in London, were administered by guildsmen of the Inns of Court. Like other fraternal tradesmen, their specialized service was based on their own proprietary knowledge and on the monopoly granted to them by the king. They would grow prosperous on the fees and gratuities accruing to them in the transactions of law and the procedures of litigation.

Originally, the three Royal Courts had been assigned the crucial task of processing cases of dispute among the noble landholders. Land was the primary form of wealth during the medieval period, and a main source of revenue for the king; questions of title and possession were of fundamental importance to the realm. Only later, with the new technical innovations around 1500, did new forms of coinage and bills circulating among a rising and prosperous merchant class, begin to draw the attention of these courts.

Under the influence of the great judge Edward Coke, after 1600, the procedures of the courts were enlarged to include not only questions of landed, but also of monetary riches. Over time, a confluence of legal authority and financial power came not only to predominate within the Royal

Courts, but also the High Court of Parliament, and even within the Monarchy itself. From that time forward, the progress of Anglophone law was tied to the production and accumulation of wealth.

The guild tradition of English law was very different from the academic tradition that came to prevail on the Continent. It was detached from the atmosphere of culture and learning of the university, as it was detached from the Roman legal heritage. Although it retained a strong element of religiosity, it was implacably skeptical toward philosophical speculation. Most of all, the legal culture it shaped had a close tie to instruments of property and wealth that were directly held by a very narrow and privileged class. Thus, its legitimacy rested not only on religious teachings, but also on an assumption that any increase in aggregate wealth within the Kingdom, would amount to a benefit for all its subjects, even those at the bottom.

A crisis of learning

Originally, both the Civil and Anglophone laws had emerged out of the medieval legal culture. That regimen had been administered by an ecclesia of bishops who combined the two elements of theology and jurisprudence. Together, they recognized the Bishop of Rome as inhabiting the old seat of empire, and as holding precedence over the entire hierarchy. In the authority of their offices the bishops were, in effect, priestly magistrates; they applied a Canon law that was part of the wider *Jus Commune*, or Common law of Christendom.

The bishops also exercised oversight in what might be called the high politics of the Latin world, their power and prestige symbolized by the great cathedrals that still survive in Europe. But, of course, these men had an important educational function as well. Teachings of the Church were formulated by its doctors, then taught by masters in the cathedral schools to the monastic bachelors who, in turn, would become priests to teach the population generally. The educative reach of the Church was impressive; its generally uniform doctrines descending down through every class of person and into every region.

However, beginning in the sixteenth and seventeenth centuries, the Roman ecclesia had been overthrown as the universal arbiter of Christian affairs. Its law was displaced by two modern Civil and Anglophone successors. Because of this, there occurred for a period of time a deficit, a breakdown, of the religious learning necessary for a complete legal culture to function. Neither of the two modern legal modes had successfully developed a replacement for the old Catholic instruction. The result of this lack was twofold: On one side harsh and repressive measures of torture and

execution—often in the form of judicial terror—were imposed to subdue unruly subjects, who would not accept the new religious teachings.

On the other side, beginning in the seventeenth century, a search was carried on by some of the leading lights of the era, for an alternative *methodus*, to replace religion as the educative half of legal rule. The most notable of these attempts were those of Descartes, and his rational philosophy, along with Bacon, and his proposed empirical science. Nonetheless, there continued into the eighteenth century a kind of anarchy of learning, as the old religious plenitude had broken down, with no cohesive successor. One fruitful result during this period of confusion, however, was an outpouring of ideas and proposals, during what historians call The Enlightenment.

Two modern universities

By the nineteenth century, however, an answer to this lack of educative function was coming into view. It began with the founding of the University of Berlin in 1810, an institution intended to create and dispense authoritative learning. Under its plan, the entire realm of knowledge was divided into strict categories, set forth in self-contained books, and taught by licensed professors. Within this modern institution of higher learning, the lessons of history, ideals of the nation, standards of culture, and methods of science were set forth.

From that high edifice, teachings of diligence and loyalty, literacy and numeracy, would descend down to all children through a system of schooling based on the Prussian model. The idea was to instill a permanent structure of knowledge in the mind of the student, an indelible framework through which the duties of the productive citizen could be understood. With the advent of such national universities and public schools, the second half of the tradition of law and learning had been established to complete a modern legal culture.

The progress of this type of university and school was immediate across Europe, Asia, and the Americas. Countries around the world that were attempting to modernize or westernize, quickly began to emulate its methods. The important benefits it provided, by educating a population for the industrial age, made its program irresistible, even in England.

In this worldwide advance, the modern universities of the European model would, however, differ in important ways from their Anglophone counterparts. The Continental university, after all, had emerged from the ancient tradition of culture and learning in which the study of law was an integral part. In its philosophical view all human knowledge was part of one vast continuum. All those who participated in the pursuit of academic work were part of a common enterprise. Thus, law, although an especially honored

discipline, was recognized as being inseparably connected with all other branches of knowledge.

By contrast, in the Anglophone world, the Common law was studied and taught in a different location, separate from the work of the university. There had long existed the ancient universities of England, Oxford and Cambridge, but their purposes were aristocratic distinction, not public enlightenment. The modern educational institutions in England were different, more scientific and practical, but, most of all, their course of study was still marked by a strictly proscribed atmosphere of learning.

The two modern types of education, the Civilian, based on a unity of knowledge, and the English, based on a division of knowledge, were very different from one another. Hence, the two legal cultures which they helped to shape, were also very different from one another. Inevitably, both the philosophical basis of the one and the collegial purposes of the other, were reflected in the ways of living and ways of thinking that prevailed among their two different populations.

It would not be possible to exclusively credit or blame either legal culture for the pattern of life among its people, but that basis would certainly have a fundamental impact. After all, its mandate insured that such influence would be pervasive, and even decisive. In any case, speaking in broad terms, and historically, certain obvious differences began to distinguish the effect of each legal culture, on the people living within its authority. Those traits became especially noticeable, when the two modes of living were contrasted with one another.

A global legal culture

In the technological transformation taking place during the twenty first century, there is a natural question, as to how either one of these two methods of law, would manifest itself as a plenitude of global authority. Although both traditions have demonstrated a remarkable ability to adapt to new technical advances, it is impossible to look into the future. Nonetheless, the record of the previous five hundred years does provide useful clues. To indulge in such speculation, there are advantages to posing it in the form of questions.

In the nations where Civil law, and its derivatives, came to prevail, such as Italy, France, Germany, Japan, and Argentina, for example, a great stress was placed on culture and learning among the population generally. In those nations culture was understood especially in terms of personal thought, speech, and manner. The assumption was that persons of cultivation would be able to govern themselves. The coercive power of law, though at times necessary, was viewed primarily as a supplemental instrument, held in

reserve. Thus, such peoples, consistently, and over time, had a reputation throughout the world for intellectuality and cultivated manner.

For purposes of contrast, the United States, is the one nation most wholly under the auspices of Anglophone law, while at the same time, being both the harbinger and hegemon for that global version of legality. Because of its singular and exceptional role, its legal culture is most useful in projecting a future comparison. England, on the other hand, although the source of Common law, continues to be governed by an idiosyncratic combination of class and law, unique to itself. Similarly, the Commonwealth nations fit an interim category, although they have certain underlying commonalities with the United States. Nonetheless, the latter stands as the epitome, the template of an advancing global way of life, under an Anglophone Rule of Law. Thus, the character of its people are of essential relevance.

America, probably more than any other single nation, is associated in the popular mind with material values, and a way of life based on labor and consumption. Culture among the general population is assumed to be primarily an embellishment, frequently a type of commodity. At the same time, within its prevailing values, intellectual attainment has less relevance as a personal attribute. America also represents an atmosphere of freedom in personal thought, speech, and manner, allowable, because the basis of public order is located, not among the public, but in an overarching authority. The fundamental premise of the American system, as a whole, is an unquestioned obedience to legal authority.

In making such a comparison, the purpose need not be judgement, regarding the superiority of inferiority of one tradition in relation to the other. Each way of ordering human life and shaping human thought has its particular advantages. In the present age of technological transformation the two modes of law are once again changing, adapting to circumstance. The educative element of both methods have become more reliant on electronic dissemination of sound and image. They both now manifest themselves in new forms of transnational and transcendent governance.

The parallel development of the two traditions continues on, but this time their historic convergence or divergence is being played out on a global scale. Within the cauldron of national rivalries and violent conflict, differing beliefs and competing interests, important questions revolve around the new concentrations of wealth, power, and knowledge that technology has made possible. The situation resembles the seventeenth century, when the instruments of law were highly developed, but questions about structures of rule and the mode of public learning, were not yet decided:

What person, or group of persons, should hold authority? How can succession to power be accomplished peacefully? By what means will the

new accumulations of wealth be appropriated? How would all the people of the world be taught to submit and comply within a single regimen of law? Will the answer to these questions be reflective and philosophical, or pragmatic and collegial? The answer chosen will determine the way human life is ordered and the way human thought is shaped, in the age of globalization.

References:

Arnold, Matthew: *Culture and Anarchy*, Oxford, 2006
Bush, M.L.: *The English Aristocracy*, Manchester University Press, 1994
Butts, R. Freeman: *The Education of the West*, Columbia University, 1973
Cosgrove, Richard: *Our Lady the Common Law*, New York University, 1987
Dupuy, Jean-Pierre: *The Mechanization of the Mind*, Princeton, 1994
Dworkin, Ronald: *Law's Empire*, Harvard, 1986
Habermas, Jurgen: *The Divided West*, Polity, 2008
Lambropoulos, Vassilis: *The Rise of Eurocentrism*, Princeton, 1993
Lesaffer, Randall, *European Legal History*, Cambridge University, 2009
Ong, Walter: *Orality and Literacy*, Routledge, 1988
Tiger, Michael: *Law and the Rise of Capitalism*, Monthly Review, 1977
Williams, Raymond: *Culture and Society*, Columbia University, 1983

Parents' Liability For The Damage Caused By The Child

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Abstract

Parents' liability for the damage caused by the child is a kind of liability for the others. Regarding the meaning of the terminology of liability for the others we should say that various authors have used different terminologies, however it is important to be understood that the essence of this liability remains unchangeable to all authors and to all normative acts of various states regulating this kind of liability.

Parents' liability for the damage caused by their child shall mean cases when the parents should compensate the damage caused by their minor child, so when they have been liable for the damage caused by the child. In order that this liability to come into consideration there should be fulfilled the conditions such as: a) Child that causes the damage should be minor, b) Child should be living with one or both parents. It is important to emphasize that parents shall be together liable for the damage caused by their child in cases when they live together, however in cases when they live separately, the parent to whom the child is entrusted for maintenance and care shall be liable for the damage caused by the child.

Legal framework has regulated noticeably clear this matter by dividing into categories the parents' liability for their children. In the first category are all minors up to the age of seven (7) and in this case parents are liable without taking into consideration the fault. A similar regulation is that of Kosovo, Croatia and Serbia while Albania does not have such a regulation. In Albania there are excluded from the liability all minors under the age of fourteen (14) and for the damage caused by them there shall be liable the parents or custodian, so it depends who takes care after them. The second categorization is related to the minors form the age of seven (7) until the age of fourteen (14). In these cases, Kosovo, Croatia and Serbia have determined that parents shall be obliged to be liable for the damage caused by the minor of such age except if they can prove that they are not liable for the damage caused by the child. Hence, we continuously have to do with a similarity in legal framework between Kosovo, Croatia and Serbia regarding the

regulation of this liability. The third category shall include the minors from the age of fourteen (14) until the age of eighteen (18) where they shall be liable according to general rules of liability. Regarding the comparative aspects of normative regulation of parents' liability for the damage caused by the children we should say that Kosovo, Croatia and Serbia have regulated similarly this kind of liability but there are some differences in the legislation of Albania based on which there are categorized differently the minors that are excluded from the liability for the caused damage.

Keywords: Damage, Liability, Minor child, Parent

Introduction

Cause of damage in the most rights is part of formal sources of obligational right. It is a rule that the person who has caused damage to the other should be liable for the damage caused. However, in some cases there is an exception from this rule since regarding the damage caused by a certain category of persons, such persons are not liable for the damage caused but there the persons that have been responsible and supervisors towards them shall be liable, hence they are liable for the damage caused by the others. Parents' liability for the damage caused by the minor child is part of the liability for the others. This liability in the theoretical treatments is found in various designations however in its content it is completely the same to all authors that treat it.

In this paper, we will focus at parents' liability for the damage caused by their minor children. It is important to identify the cases in which the parents are liable for the damage caused by their children and cases in which they are exempted from this responsibility. Regarding this, we will analyse the authors that have treated this kind of liability as well as legal framework focusing in the Laws on obligational relationships and civil codes of some countries such as Kosovo, Croatia, Albania and Serbia. Through this analysis and comparison we will come at identification of similarities and differences in theoretical treatments and legal framework of the abovementioned states.

Methodology

Regarding the completion of this paper there shall be used the contemporary research methods. The focus will be on the cases of causing the damage by the minor persons and parents' liability for the compensation of that damage. Through the analytical method there shall be done the analysis of theoretical and normative treatments regarding this issue. Moreover, we will point out the comparison of normative framework of some states with the purpose of identification of similarities and differences regarding the liability of the parents for the damage caused by the minor

children. It is obvious that in such cases there are shown distinctive and similar circumstances but through the comparison method there shall be compared the legislations of the abovementioned countries and there shall come the concrete theoretical and normative conclusion regarding this kind of liability.

Meaning of terminology "liability for the others"

Parents' liability for the damage caused by the children is a kind of liability which is part of liability for the others. At the liability for the others, the liable person for compensation of the damage shall not be the person who has caused that damage but the other person who has legal relation with the person that has caused the damage (Alishani, 2002, 487).

When we talk about the liability for the others, it is important to mention that various authors have used various terminologies. They have designated this kind of liability as: "Liability for the others" (Alishani, 2002, Radišić, 1979, Živković, 1972), "Liability for the cause of damage dependent on the kind of subject "(Semini-Tutulani, 2006), "Liability for the actions of the other "(Millosheviq, 1972, Dauti, 2013), "Liability for the actions of the others "(Légier, 2008).

Besides the theoretical treatments this issue is covered even by legal framework of various states. Kosovo has, in the Law on Obligational Relationships in Kosovo, designated this kind of liability as liability for the other (LORK, 146), this is completely similarly determined even by Serbia in the Law on Contracts and Torts (LCT, 164), even Montenegro similarly to Kosovo and Serbia, through the Law on Obligations has determined this liability as liability for the other (LOM, 158). Unlike the abovementioned countries, Croatia, in its Civil Obligations Act, has designated this liability as liability for another person (COAC, 1055). In the Republic of Albania this kind of liability is not mentioned expressively in the Civil Code however it is included in general within the obligations deriving from the cause of damage (CCA, 608). France regulates this matter with a Civil Code and has determined it within "Crimes and Quasi-crimes" (KCF, 1384).

Among all theoretical and normative designations mentioned by authors and Laws of various countries there can be ascertained that this kind of liability has various designations either in theory or framework however in the content it is completely the same; hence only the designations are different but the content completely the same.

Hence, there should not be any conjecture when we come across various designations of this liability, since in content we should know it is the same kind of liability.

Meaning of the parents' liability for the damage caused by the chlidren

This kind of liability is part of the liability for the others. This liability shall mean the fact that the parents are liable for the damage caused by their minor child. Thus, parents are liable for the damage caused by their minor child and are obliged to make compensations of the damage (Alishani, 2002, 489). It is important to mention that this kind of liability goes to the parents without taking into consideration whether they are biologic parents or adoptive parents of the child (Légier, 2008, 154), so it may be ascertained that is no importance of the relationship aspect of the child with the parents.

Parents are liable to grow upwell and educate their children (Tahiri, 2-nd-ICBLAS, 2015, 270), in order that they, in the future, shall not be destructive persons for the society. We say this since in case of adequate grow up and education, it is more difficult that the children to undertake illegal actions from which there will be caused damage to other persons. However, despite the abovementioned explanation, in practice there are cases when children commit illegal action as a result of which there is caused damage to other persons. In such cases when the children conduct illegal actions and cause damage to other persons, the parents of the children are liable for the damage compensation. This derives as a consequence of parents' liability towards their children. Both or only one parent may be liable for the compensation of the damage caused by the child. This is dependent on the access the parents have had over their child. Both parents are liable for the damage caused by their child since they are guaranteed by international and national framework to take care after their children together or upon agreement (Commentary UDHR,2008, 86, CRCH,7 and 9),

Obligation that the states should harmonize their internal legislation with the international one has derived from the international legal framework and regarding this we should have into consideration that in national laws there is determined the obligation of both parents to take care after their child together and based on this determination they shall be liable for the compensation of the damage caused by their child.

However, except the cases when both parents are liable for the damage caused by their minor child, there are cases when only one parent is liable for the damage caused by their minor child. This is applicable in those cases when only one parent takes care after the child, in cases of the limitation or deprivation of parental responsibility as well as when parents live separately (Tahiri, 2-nd ICBLAS, 2015, 271, Tahiri, Reforms RJSS No 2/2015, 96 and 99). Hence, in these cases only one parent shall be liable for the child and in case the child causes damage to other persons, then the compensation of the damage should be carried out by the parent that is liable to take care after and supervision of the child. However, in case the child is at the other parent's home with whom he does not live but is visiting him and

at this time the child causes damage, then in this case the liable person for the compensation of the damage shall be the parent who is liable for supervision of the child but not the parent who is being visited by his child (Légier, 2008, 155), so, in such cases as a determinant fact shall be taken the liability of the parent whose duty is to take care and supervise the child but not the parent at the home of whom the child was staying temporarily while he is not liable for the care and supervision of the child.

Legal framework of Kosovo has determined clearly that the parents are liable for the damage caused by their minor child (LORK, 142 and 147). Similar to Kosovo, Croatia with its Civil Obligations Act, has determined that the parents shall be liable for the compensation of the damage caused by their minor child (COARC, 1056).

In order this kind of liability to be determined and realized there should be fulfilled some conditions in advance.

A) The child that has caused the damage should be minor,

This is the fundamental and general condition upon which in order the liability for compensation of the damage to be taken into consideration, firstly there should be caused the damage, while in this case the damage should be caused by a minor child. This is determined in this manner since the minor child is not conscious for the illegal action from which there will be caused the damage which means the minor child has no delict capability.Even that a minor child's age is considered the age until the minor reaches the adulthood, in our case this is not completely with the same meaning since at this kind of liability thereare categorized the cases of parents' liability for the damage caused by their children. This categorization is regulated in details by the Laws on obligational relationships and civil codes of various countries.

B) The child should be living with both parents or with one of the parents (Dauti, 2013, 189).

In this case, the child should be living with both parents or only with one of them, if this is determined by a decision of the competent body. In the first case, both parents are liable for the damage that would be caused by the child, while in the second case the parent who is liable for supervision of the child shall be liable for the damage caused by the child. Parents shall also be liable for the damage caused by their child even when the child is under care of another person but the action of the child derived as a consequence of bad education by the parents. Hence, in this case the bad education by the parents shall be the crucial fact based on which the parents are obliged to compensate the damage caused by their child. This is directly related to the obligation of the parents to care for and educate their child in order that he/she will not be a member who brings damage to society and if parents fail

to fulfil their obligation in this aspect, then they will be liable for the illegal actions of their children.

Legal framework has determined clearly the cases when the parents are liable for the damage caused by their child. Law on Obligational Relationships No. 04/ L-077 in the Republic of Kosovo has expressively determined that parents are liable for their minor children in the following cases:

1) The minor until the age of seven (7) shall not be liable for the damage caused by himself/herself, but the parents shall be liable regardless to the fault(LORK, Article 142.1 and 147).

In this case if a minor until the age of seven (7) causes a damage to the other, he/she shall not be liable for the damage he/she has caused. Legal framework has protected the minors of this age but it has conveyed the liability for their damage to the parents since they are liable for the damage regardless to the fact of they are guilty or not(FLK, Article 15.2).Hence, the purpose of lawmaker was not to let the damaged person uncompensated, however, at the same time it has protectedthe position of the minors of this age since if there would be required liability for the damage caused by the minors of this age, it would be unfair for sure since they do not enjoy the delict ability, which means they do not have the ability to be liable for the illegal actions (Dauti&Berisha&Vokshi&Aliu, 2013, 173), and for this reason, parents shall be liable for the damage caused by the children for that period of time the children are under the care and supervision of their parents.

Similar to Kosovo, but in a more advanced manner, Croatia has regulated the parents' liability for the damage caused by their minor children. Croatia has determined that parents shall be liable for the damage caused by their child until the age of seven (7) regardless to the fault (COARC, Article 1056).Parents shall be excluded from the liability for the damage caused by their child only in case that at the time of causing the damage the child had been entrusted to another person and he is liable for the cause of damage (COARC, 1056.3).In this case, parents should prove their innocence by giving evidence that the child had not been under their care and supervision at the time of the cause of damage and that they are not related in any way to the actions of their child who has caused the damage. However, in some other cases, Croatia has determined clearly that even if the child is under the care of any other person, but the cause of damage has derived as a consequence of bad education by the parents, then the parents of the child shall be liable for the damage and are obliged to make the compensation. In such cases if the person, under the care of whom there has been the child, has made the compensation of the damage caused by the child, he/she has the

right to require form the parents of the child to return the compensation he/she has made to the damaged party (COARC, 1059).

A completely similar presentation is noticed even at the legislation of Serbia, according to which parents shall be liable for the damage caused by their child until the age of seven (7) regardless to the fault(LCTS, 160 and 165). In Serbia, parents shall not be liable if their child is entrusted to another person for supervision and care and at the moment of the cause of damage that person shall be liable and obliged to respond for that damage(LCTS,165.3). Thus, in this case the lawmaker has excluded the parents from the liability since they are completely out of control and supervision towards they children and the cause of damage should derive as a consequence of the carelessness of the person the child had been entrusted to.

Unlike Kosovo, Croatia and Serbia, the Republic of Albania has regulated this liability differently. In Albania, persons that have not reached the age of fourteen (14) and persons with a full disability to act shall not be liable for the damaged caused (CCA, 613).Here, they have not categorized the minors until the age of seven but they have included all the minor without distinction under the age of fourteen (14) by exempting them from the liability for the caused damage. In such cases, according to Civil Code of Albania, the parents of the minor or his/her custodian shall be liable, depending on the fact that who has been liable and supervisor of the minor that has caused the damage(Tutulani-Semini, 2006, 256).

Based on all that was said above there should be made an exclusion which is related directly to the rightness principle upon which the damaged party cannot remain without compensation. In these cases when parents that are liable for the compensation of the damage caused by their minor child are not capable of compensating the damage, while the minor child has a property from which there can be made the compensation for the damage then in these cases the minor child should make the compensation for the damage caused by himself/herself even that according to legal framework he/she shall not be liable for that damage but his/her parent shall be liable.

2) The minor from the age of seven (7), until the age of fourteen (14), shall not be liable for the damage caused, while parents shall be liable instead of him/her except if there is proved that during the case of the damage the minor has been able to judge (LORK, Article142.2 and 147.4)

In such cases there is presented a more various situation compared to the first one. Here, the children from the age of seven (7) to fourteen (14) in case of causing a damage shall not be liable, and regarding the compensation of the damage their parentsshall be liable except if there is proved that the children have been conscious for the act conducted. If the minors of this age have been conscious for the act conducted then they shall be liable and

obliged to make the compensation of the damage caused by themselves. In these situations, the legal framework has clearly determined that the parents should be liable for the damage caused by their children from the age of seven (7) to fourteen (14), except if they prove that their child has been conscious for the act conducted(LORK, 142.2 and 147.4).If parents manage to prove that their child has been capable to judge at the moment of the cause of damage, they will be exempted from the obligation on compensation of the damage caused by their child who is charged to make this compensation. Regarding this matter we should say that the legal framework of the abovementioned states is completely similar.Kosovo, Croatia and Serbia have, by their Laws, determined the obligation of the parents to be liable for the damage caused by their minor child that has reached the age of seven (7) except in case that they prove that the child has been able to judge at the moment of the cause of the damage, and if they manage to prove this they are exempted from the liability (LORK, 142.2 and 147.4, COARC, 1051.2 and 1056.4, LCTS 160.3 and 165.4).Hence, the essential condition in these circumstances is presented at the possibility of the parents to prove that the child has been capable to judge at the moment of the cause of the damage in order that they can be exempted from the liability of compensation of the damage caused, otherwise they shall be liable for the damage caused by their child who has reached the age of seven (7). Through such a legal determination there has been created the possibility for the parents to prove their innocence through which there is derived even the exemption from the liability when such a thing may be really proved. At the end we can say that the lawgiver has, in these cases, created security to the parents who in reality have been innocent regarding the damage caused by their child who has reached the age of seven (7). Talking otherwise, in such cases the parents shall be liable in principle for the damage caused by their child who has reached the age of seven (7) except in case they are able to prove their innocence regarding this liability.

3) The minor upon reaching the age of fourteen (14) shall be liable according to the general rules on liability for the damage(LORK, 142.3).

The minor, upon reaching the age of fourteen (14) acquires the delict ability and in this case he/she shall be liable for the damage caused(Dauti&Berisha&Vokshi&Aliu, 2013, 174). In other words, the minor who has reached this age according to the Law shall be liable for the damage caused and should respond for it according to the general rules on liability. However, this can be applicable if the minor of this age is capable to judge for his/her actions. In these cases parents shall not liable for the damage caused by their child who has reached the age of fourteen (14) except if he/she is not able to judge. If there happens that a minor of the age above fourteen (14) causes a damage to the other and in this case the minor is not

capable of judging his/her actions then parents or the person to whom the minor was entrusted shall be liable for that damage.Thus, the fundamental condition of this liability based on which the minor is liable for the damage caused shall be his/her consciousness for his/her actions. Various authors have given special attention to this matter and, by right, have ascertained that there should not be exempted from the liability the minor who has reached the age of fourteen (14) and who caused damage to the other due to temporary unconsciousness created through his/her actions such as use of drugs andalcohol from which there has been caused his/her temporary unconsciousness at the moment of the cause of damage (Tutulani-Semini.2006,257). In such cases there should be liable the minor who through his/her actions has caused the condition of temporary unconsciousness form which there is caused the damage.

The normative determinations of the abovementioned states are completely similar regarding the liability of the minor who has reached the age of fourteen (14). In these cases the minor shall be liable by himself/herself for the damage caused if he/she had been capable to understand his/her actions(LORK,142.3, COARC,1051.3, LCTS,160.3, CCA,614).This liability derives based on the general rules of liability for the damage caused.

Finally it is important to mention that all illegal actions from which there is caused a damage to the another person should have a liable person who shall respond for the damage caused, either the person who has caused the damage or the person who has been the supervisor or custodian of the person that caused the damage. This has been done with the purpose of compensation of the damaged person, since we should have into consideration one thing, that there should never remain uncompensated the person damaged by such cases of the cause of the damage and even by the cause of damage in general when the person responds himself/herself for the damage caused.

Conclusion

Based on the analysis and comparisons of the theoretical treatments and normative framework of various states we have ascertained that the parents' liability for the damage caused by their children is part of the liability for the others. Regarding this we should say that the terminology of the liability for the others differs at the points of view of various authors, and this variation in certain cases may bring uncertainty but when there is analyzed the content of each of the theoretical treatments there is noticed there they are completely the same but differ only in their terminological aspect.

Regarding the cases of parents' liability for the damage caused by their minor children we can ascertain that in order the parents to be considered liable for the damage caused by their child there should be met some conditions. Conditions that should be fulfilled, in this case, shall be the infancy of the child and his/her co-living with both or one parent. Hence, the child must be at minor age and must live with parents and under their care. This determination is identified through the research on all authors who have treated this kind of liability. However, besides these conditions we should say that in the theoretical treatments as well in legal determination of the countries that were into focus of this research there have been identified even some categorizations of minors upon which they are excluded from the liability for the damage caused by them as well as cases when they are liable themselves for the damage. In this aspect, the lawgivers of the abovementioned countries have determined that the children under the age of seven (7) shall not respond for the damage caused by them and the parents or responsible person shall be liable instead of the children regardless if the children are guilty or not. Regarding this we should say that the legal framework of Kosovo, Croatia and |Serbia have done this categorization completely similarly based on which the minors are excluded from the liability.Lawgivers and authors of these countries have considered that the minors of this age have not acquired the delict ability. Unlike the abovementioned countries, Albania has, by the Civil Code, determined differently this liability by including all minor under the age of fourteen (14) into persons that are not liable for the damage caused. This different determination makes Albania to be backward regarding the regulation of this matter since other countries have determined other circumstances for persons who have reached the age of seven (7).

Second categorization of the minor that are not liable for the damage caused includes the minors from the age of seven (7) until fourteen (14). Within this age,the minors are not liable if they cause any damage to anyone except if they have been capable to understand their actions at the moment of the cause of the damage. In these cases parents or responsible persons should be liable for the damage caused by the child except in case they can prove that the child had been capable to understand his/her actions at that moment. Even in this case there are identified legal determination completely similar between Kosovo, Croatia and Serbia.

The third categorization is related to the minors who have reached the age of fourteen (14). According to the abovementioned authors and legislations the minors of this age shall be liable for the damage upon the general rules of the liability for the damage caused which means they shall be liable themselves for the damage caused by them. However, in these cases we should have into account that this liability of the minors may come into

consideration only if he/she has been capable to understand his/her actions at the moment of the cause of the damage, otherwise the parents or person who has been taking care after the minor shall be liable. One thing should be taken into consideration, that there shall not be excluded from the liability the minor who at the moment of the cause of the damage has been unconscious temporarily due to his/her action as a consequence of use of drugs or alcohol that has caused the temporary unconsciousness of the minor due to which there has happened the cause of damage. Regarding this we should say that the legal framework on this categorization does not differ in the abovementioned states whereby we can ascertain that the third categorization of this kind of liability is determined completely similarly in Kosovo, Albania, Croatia and Serbia.

Finally we can ascertain that parents' liability for the damage caused by the children has not been treated enough and there is a need for a continuous attention to this kind of liability in order to be parallel to the social activity. Here, we are having into consideration the social developments which may bring new cases of this liability, so it is important that these cases to be treated in theory and to be determined in the legal framework in order that this field of the right to be regulated as much as better.

Abbreviations

UDHR - Universal Declaration of Human Rights
CRCH - Convention on the Rights of the Child
FLK– Family Law in Kosovo
LORK - Law on Obligational Relationships in Kosovo
COARC- Civil Obligations Act in the Republic of Croatia,
LCTS - Law of Contract and Torts in Serbia,
LOM – Law on Obligations in Montenegro,
CCA – Civil Code in Albania
CCF – Civil Code in France
RJSS - Regional Journal of Social Science
ICBLAS - International Conference on Business, Law, Administration, and Social Sciences

References:

Alishani. S. A (2002), Law of Obligations– General Part, Prishtina, Kosovo,
Alishani. S. A (2004), Studies from the Law of ObligationsII, Prishtina, Kosovo,
Alishani.S. A (2006), Studies from the Law of Obligations–Second part, Prishtina, Kosovo
Légier. G (2008), Civil Law - Obligations, Marseille, France,
Tahiri. B, (2015), Reform No 2/2015, Regional Journal of Social Science, Gjilan, Kosovo,

Tahiri.B, (2015), Conference Proceedings, 2-nd ICBLAS, Second International Conference on Business, Law, Administration, and Social Sciences, Tirana, Albania,
Dauti. N (2013), Law of Obligations, General Part, Prishtina, Kosovo,
Tutulani-Semini. M, (2006), Law of Obligations and Contracts, General Part, Tirana, Albania,
Vukovič.M, (1971), OdgovornostzaŠtetu, Zagreb, Croatia,
Millosheviq. L (1972), Law of Obligations, Beograd, Serbia,
Radišić. J, (1979), ObligacionoPravo, Beograd, Serbia,
Živković.S, (1972), NaknadaŠtete, Beograd, Serbia,
Dauti.N&Berisha.R&Vokshi.A&Aliu.A, (2013), Commentary on the Law on Obligational Relationships in Kosovo, Prishtina, Kosovo,
Sinani.M&Dhamo.M&Hysi.V&Kamani.P&Methasani.E&Harasani.Zh,(2008), Commentary on Universal Declaration of Human Rights
Podvorica. H, (2011), Family Right, Prishtina, Kosovo,
Podvorica.H, (2006), Family Right, Prishtina, Kosovo,
Aliu.A&Gashi.H, (2007), Family Right, Prishtina, Kosovo,
Mandro.A, (2009), Family Right, Tirana, Albania,
Begeja. S, Family Right in Albania, Tirana, Albania,
Convention on the Rights of the Child,
Law on Obligational Relationships in Kosovo, No. 04/L-077,
Civil Obligations Act in the Republic of Croatia, No. 01-081-05-768/2, (2005),
The Law of Contract and Torts in Serbia, (1997),
The Law on Obligations in Montenegro, No 01-1540/2 (2008),
Civil Code in Albania,
Civil Code in France,
Family Law of Kosovo. No 2004/32,
The Family Code of Albania, No 9062,
The Family Act of Serbia, 2006,
The Family Act of Croatia, No 01-081-03-2596/2,

Data Analytics In Preventive Health Care With Total Quality Management Approach

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Abstract

In this new era where people are more concerned about their health, they are trying to follow a healthy life style. The hospital and health care units is continually improving their value to their patients. This they accomplish through the provision of high quality services. Since there is a worldwide rise in the prevalence of chronic diseases, preventive healthcare should be one of the services that should be given to patients in the customer relationship management concept. This service could be integrated to the hospitals and local healthcare units with an understanding of total quality management and with a strong top management support. Being the customer's focus, understanding the customer is an important total quality management principle. Health care is the most crucial and delicate service that could be given. With preventive health care practices, effective patient data tracking, and data analytics, patients with potential diseases could be identified. Also, better life choice practices could be recommended which would prolong their life expectancy. Health promotional activities do not target a specific disease or condition, but rather promote the health and well-being on a general level. In this article, with the help of data mining tools, the patients' potential risks were identified. In addition, different health promotion and training services were recommended to be given to the patients. In training the patients, the effects of life choices from nutritious meals to daily exercising, increase the overall well besides preventing some of the potential threats. Data mining methods were seen as a useful supplementary method in analysing preventive health care data and its capability to illustrate a large dataset. Therefore, its relationships between variables are the reason it was selected in this study.

Keywords: TQM, Preventive Health Care, Customer Satisfaction, Data Mining, CRM

Introduction

Preventive healthcare consists of measures taken for disease prevention. Thus, this is as opposed to the treatement of disease. Just as health encompasses a variety of physical and mental states, so do disease and disability. They are affected by environmental factors, genetic predisposition, disease agents, and lifestyle choices. Health, disease, and disability are dynamic processes which begin before individuals realize that they are affected. Disease prevention relies on anticipatory actions that can be categorized as primary, secondary, and tertiary prevention.

Each year, millions of people die of preventable deaths. Consequently, there are several methods used for the prevention of disease. It is recommended that adults and children should visit their doctor for regular check-ups, even if they feel healthy. Furthermore, they were asked to perform disease screening, identify risk factors for disease, discuss tips for a healthy and balanced lifestyle, stay up to date with immunizations and boosters, and maintain a good relationship with a healthcare provider. Some common disease screenings include checking for high blood pressure, high blood sugar (a risk factor for diabetes), high blood cholesterol, screening for colon cancer, and depression. In addition, these diseases include HIV and other common types of sexually transmitted disease such as chlamydia, syphilis, gonorrhea, mammography (to screen for breast cancer), colorectal cancer screening, a pap test (to check for cervical cancer), and screening for osteoporosis (Preventive Health Care, 2016).

Health care as a service provider is a very delicate and crucial topic considering the importance of the human life. In all of the patient's services, zero defect must be considered. Zero defect concept is not an easy goal to succeed. Continuing improvement philosophy must be learned, adapted, and digested. Therefore, this philosophy is a very crucial part of the total quality management practices. If a health care service provider unit from a small clinic to a big hospital can be adapted to total quality management, then an understanding of continuous improvement comes along with it. Subsequently, this can only succeed with the top management's leadership and support. Like the concept of continuous improvement, being the customer's focus is part of TQM approach in the health care system. Therefore, it should be corrected to be more focused on patients.

According to the ASQ (2016), a core definition of total quality management (TQM) describes a management approach to long–term success through customer satisfaction. With the use of TQM, all members of an organization participate in improving processes, products, services, and the culture in which they work. Total quality management can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. Also, it uses strategy, data, and

effective communications to integrate the quality discipline into the culture and activities of the organization. The customer ultimately determines the level of quality. However, no matter what an organization does to foster quality improvement—training employees, integrating quality into the design process, upgrading computers or software, or buying new measuring tools—the customer determines whether the efforts is worthwhile.

Furthermore, while customer relationship management is a core approach in managing interactions between commercial organizations, typically, banks and retailers and their customers is not less important in a healthcare context. Customer interactions may occur through call centers, physicians' offices, billing departments, inpatient settings, and ambulatory care settings. As in the case of commercial organizations, data mining applications can be developed in the healthcare industry to determine the references, usage patterns, and the current and future needs of individuals. This is employed for the purpose of improving their level of satisfaction. Therefore, these applications can also be used to predict other products that a healthcare customer is likely to purchase. This involves whether a patient is likely to comply with prescribed treatment or whether preventive care is likely to produce a significant reduction in future utilization. To aid healthcare management, data mining applications can be developed to better identify and track chronic disease states and high-risk patients, design appropriate interventions, and reduce the number of hospital admissions and claims (Koh & Tan, 2005).

TQM practices plays a very important role in hospitals competitive strategy. Hospitals differentiate themselves from their competitors with their high quality and variety in their service products mix. Health care services does not just include diagnosis, surgery, treatment and medicines, but also preventive health care. Tracking the patient's data and applying a preventive health care strategy should be part of their strategy. In this article, data from the patients are analyzed in order to identify the potential risk carriers. Subsequently, before the diseases occurs, the patients tracked were supposed to be informed about a better health practices. However, this would decrease the diseases and increase customer's satisfaction.

Furthermore, data mining is used for finding previously unknown patterns and trends in databases. Also, it uses this information to build predictive models. In healthcare, data mining is becoming increasingly popular, if not increasingly essential. Also, several factors have motivated the use of data mining applications in healthcare services. The existence of medical insurance, fraud, and abuse, for example, has led many healthcare insurers to attempt to data mining which is considered as a relatively recently developed methodology and technology. Thus, this technology became prominent only in 1994 (Koh & Tan, 2005). In this article, data from both

male and female patients with their cholesterol and blood pressure measures were taken. The data also includes those that engages in sports, drink alcohol, and smokers. Also, one of the data mining tools, decision trees, was applied to the data.

Literature Review

In literatures in Total Quality Management and Continuous Improvement, understanding have been gotten from some researches conducted. Valmohammadi & Roshanzamir (2015) worked on the guidelines of improvement. Thus, they searched the relations among organizational culture. Steele & Schomer (2009) studied continuous quality improvement programs which provide new opportunities to drive value innovation initiatives in hospital based radiology practices. Jung & Wang (2006) have studied the relationship between TQM and continuous improvement. Katzman & Paushter (2016) tried to build a culture of continuous quality improvement in an academic radiology department. Hohan, Olaru & Pirnea (2015) studied the assessment and continuous improvement of information security based on TQM and business excellence principles. Consequently, Taylor & Wright (2004) studied the contribution of measurement and information infrastructure to the success of TQM. Furthermore, Taylor (1998) made a TQM implementation on organisation practices and information.The results underline the central role of data and information, and hence measurement, in successful TQM implementations. Lorente, Rodríguez, & Dewhurst (2004) worked on the effect of information technologies on TQM. Also, Daghfous & Barkhi (2009) studied the strategic management of information technology in UAE hotels. They did an exploratory study of TQM, SCM, and CRM implementations. Also, Taylor and Wright (2006) worked on the contribution of measurement and information infrastructure to TQM success.

However, there are studies on information gathering from preventive health care systems. In addition, Fields (1980) worked on client tracking. She developed a state-wide hypertension information system. Shih et al. (2011) worked on the health information systems. In small practices, they improved the delivery of clinical preventive services. Despite strong evidence that clinical preventive services (cps) reduce morbidity and mortality, cps performance has not improved in adult primary care. Redmond et al. (2010) investigated the sources of health information related to preventive health behaviors in a national study. Current literature suggests that certain sources of information are used in varying degrees among different socioeconomic and demographic groups. Therefore, it is important to determine if specific classes of health information sources are more effective than others in promoting health behaviors. Their study aims to

determine if interpersonal versus mass media sources of health information are associated with meeting recommendations for health behaviors (nonsmoking, fruit/vegetable intake, and exercise) and cancer screening.

More researches are done on data mining and preventive health care. Subsequently, Chang, Wang & Jiang (2011) used data mining techniques for multi-diseases prediction modeling of hypertension and hyperlipidemia by common risk factors. They mentioned that many previous studies have employed predictive models for a specific disease. Therefore, they failed to note that humans often suffer from not only one disease, but from associated diseases as well. Thus, these associated multiple diseases might have reciprocal effects. Also, abnormalities in physiological indicators can indicate multiple associated diseases. In addition,, common risk factors can be used to predict the multiple associated diseases. However, their approach provides a more effective and comprehensive forecasting mechanism for preventive medicine. Nenonen (2013) analysed various factors related to slipping, stumbling, and falling accidents at work. The utilisation of data mining methods has become common in many fields. In occupational accident analysis, however, these methods are still rarely exploited. Their study applies methods of data mining (decision tree and association rules) to the Finnish national occupational accidents and diseases statistics database. Cheng, Yao & Wu (2013) applied data mining techniques to analyze the causes of major occupational accidents in the petrochemical industry. Accidents that occur in the petrochemical industry frequently result in serious social issues. Behind every occupational accident, there are safety management problems requiring investigation. This study collected 349 cases of major occupational accidents in the petrochemical industry between 2000 and 2010 in Taiwan for analysis. Using descriptive statistics, they elucidated the factor distribution of these major occupational accidents. The Classification And Regression Tree (CART) was used to examine the distribution and rules governing the factors of the disasters. Mookiah et al. (2012) used data mining technique for automated diagnosis of glaucoma using higher order spectra and wavelet energy features. Eye images provide an insight into important parts of the visual system. Thus, it also indicate the health of the entire human body. Glaucoma is one of the most common causes of blindness. It is a disease in which fluid pressure in the eye increases gradually, damages the optic nerve, and result to the loss of vision. Robust mass screening may help to extend the symptom-free life for the affected patients. Shenas et al. (2014) identified high-cost patients using data mining techniques and a small set of non-trivial attributes. In their paper, they used data mining techniques, namely neural networks and decision trees, to build predictive models. This is used for the purpose of identifying very high-cost patients in the top 5 percentile among the general population.

They mentioned that the results of this study can be used by healthcare data analysts, policy makers, insurer, and healthcare planners to improve the delivery of health services.

Hajakbari & Minaei-Bidgoli (2014) found a new scoring system for assessing the risk of occupational accidents. However, they performed a case study using data mining techniques with Iran's Ministry of Labor data. Yeh, Cheng & Chen (2011) constructed a predictive model for cerebrovascular disease using data mining. Also, Cheng et al. (2012) applied data mining techniques to explore factors contributing to occupational injuries in Taiwan's construction industry they have worked on. They did accident analysis and prevention. Raju et al. (2015) explored factors associated with pressure ulcers: with a data mining approach.

Lee, Chen & Tseng (2011) worked on a novel data mining mechanism considering bio-signal and environmental data with applications on asthma monitoring. Silva & Jacinto (2012) tried to find occupational accident patterns in the extractive industry using a systematic data mining approach in the Portuguese Extractive Industry. Su et al. (2006) used data mining for the diagnosis of type II diabetes from three-dimensional body surface anthropometrical scanning data. Consequently, Yeh, Wu & Tsao (2011) used data mining techniques to predict hospitalization of hemodialysis patients. This study combines temporal abstraction with data mining techniques for analyzing dialysis patients' biochemical data in developing a decision support system. The mined temporal patterns are helpful for clinicians to predict hospitalization of hemodialysis patients and to suggest immediate treatments to avoid hospitalization. Vijayakrishnan et al. (2014) studied the prevalence of heart failure signs and symptoms in a large primary care population. Hence, this was identified through the use of text and data mining of the electronic health record. Chen, Chouq & Hwang (2003) made an application of a data-mining technique to analyze coprescription patterns for antacids in Taiwan. Therefore, the aim of this study is to estimate the scale of antacid prescription in Taiwan. This is done using the national insurance claims for outpatient services. It also aim to analyze coprescribing patterns of antacids using modern data-mining techniques. A data mining technique -association rule mining- was applied to identify the drugs prescribed in combination with antacids. Suzuki et al. (2015) worked on the comedications alter drug-induced liver injury reporting frequency with data mining. They examined the effect of these drug–drug interactions on liver safety reports of four drugs that is highly associated with hepatotoxicity. Co-reported medications were associated with changes in the liver event reporting frequency of drugs commonly associated with hepatotoxicity. Also, it suggest that comedications may modify drug hepatic safety. Chen et al. (2016) performed personal health indexing based on

medical examinations with a data mining approach. Kalaitzopoulos, Patel & Younesi (2016) worked on the advancements, in data management and data mining approaches, in translational medicine.

Data Mining

Data mining aims to identify valid, novel, potentially useful, and understandable correlations and patterns in data. This is done by combing it through copious data sets to sniff out patterns that are too subtle or complex for humans to detect. Cross-Industry Standard Process for Data Mining, or CRISP-DM (see www.crisp-dm.org) proposes the following methodology for data mining: business understanding, data understanding and preparation, modeling, evaluation, and deployment. Business understanding is critical because it identifies the business objectives and, thus, the success criteria of data mining projects. Furthermore, as the term "data mining" implies, data is a crucial component. Therefore, no data means no mining. Hence, CRISP-DM includes data understanding and data preparation. In other words, sampling and data transformation are essential antecedents for modeling. The modeling stage is the actual data analysis. Most data mining software include online analytical processing; traditional statistical methods, such as cluster analysis, discriminant analysis, and regression analysis; and non-traditional statistical analysis, such as neural networks, decision trees, link analysis, and association analysis. Consequently, this extensive range of techniques is not surprising in the light of the fact that data mining has been viewed as the offspring of three different disciplines. These discipline are database management, statistics, and computer science, including artificial intelligence and machine learning. The evaluation stage enables the comparison of models and results from any data mining model by using a common yardstick, such as lift charts, profit charts, or diagnostic classification charts. Finally, deployment relates to the actual implementation and operationalization of the data mining models. Data mining techniques can be broadly classified based on what they can do. They include description and visualization; association and clustering; and classification and estimation, which is predictive modeling. Description and visualization can contribute greatly towards understanding a data set, especially a large one. It can also be used in detecting hidden patterns in data, especially complicated data containing complex and non-linear interactions. They are usually performed before modeling is attempted. Thus, they represent data understanding in the CRISP-DM methodology. Based on association, the objective is to determine which variables go together; for example, market-basket analysis (Koh & Tan, 2005).

Nowadays, each individual and organization can access a large quantity of data and information about itself and its environment. This data

has the potential to predict the evolution of interesting variables or trends in the outside environment. Nevertheless, there are two main problems of data. Firstly, information is scattered within different archive systems that are not connected with one another, thereby producing an inefficient organization of the data. Secondly, there is a lack of awareness about new analysis tools. Two developments could help in overcoming these problems. First, software and hardware offer power at lower cost which allows organizations to collect and organize data in structures that give easier access and transfer. Second, methodological research, particularly in the field of computing and statistics, has recently led to the development of flexible and scalable procedures that can be used to analyze large data stores. Consequently, these two developments have shown that data mining is rapidly spreading through many businesses as an important intelligence tool for backing up decisions (Giudici, p.1). Data mining is used to refer to a very interdisciplinary field, which consists of using methods of several research areas to extract knowledge from real-world datasets (Freitas, p.1). The knowledge must be new, not obvious; and people or organizations must be able to use it (Adriaans & Zantinge, p.5). Data mining is the practice of automatically searching large stores of data to discover patterns and trends that go beyond simple analysis. Data mining uses sophisticated mathematical algorithms to segment the data and evaluate the probability of future events (Oracle). There are several data mining tasks like classification, clustering, dependence modeling, and association rules. Each task can be considered as a kind of problem to be solved by a data mining algorithm. Therefore, the first step in the development of a data mining algorithm is to define which data mining task the algorithm addresses (Freitas, p.13). In this paper, decision trees algorithm for classification was used.

Decision Trees

Databases are rich with hidden information that can be used for intelligent decision making. Classification and prediction are two forms of data analysis that can be used to extract models describing important data classes or to predict future data trends. Many classification and prediction methods have been proposed by researchers in machine learning, pattern recognition, and statistics. Most algorithms are memory resident, typically assuming a small data size. Recent data mining research has built on such work. They develop scalable classification and prediction techniques capable of handling large disk- resident data. Classification and prediction have numerous applications including fraud detection, target marketing, performance prediction, manufacturing, and medical diagnosis (Han & Kamber, p.285). Decision tree is one of the most widely used techniques for classification which has the task of assigning objects to one of several

predefined categories. In practice, one wants to have a small and accurate tree for many reasons. A smaller tree is more general and also tends to be more accurate. It is also easier to understand by human users. In many applications, the user's understanding of the classifier is important (Liu, p. 59-60). The Decision Tree procedure creates a tree-based classification model. It classifies cases into groups or predicts values of a dependent (target) variable based on values of independent (predictor) variables. The procedure provides validation tools for exploratory and confirmatory classification analysis. Therefore, the procedure can be used for:

Segmentation: Identify persons who are likely to be members of a particular group.

Stratification: Assign cases into one of several categories, such as high-, medium-, and low-risk groups.

Prediction: Create rules and use them to predict future events, such as the likelihood that someone will default on a loan or the potential resale value of a vehicle or home.

Data Reduction and Variable Screening: Select a useful subset of predictors from a large set of variables for use in building a formal parametric model.

Interaction Identification: Identify relationships that pertain only to specific subgroups and specify these in a formal parametric model.

Category Merging and Discretizing Continuous Variables: Recode group predictor categories and continuous variables with minimal loss of information.

Subsequently, there are exponentially many decision trees that can be constructed from a given set of attributes. While some of the trees are more accurate than others, finding the optimal tree is computationally infeasible because of the exponential size of the search space. Nevertheless, efficient algorithms have been developed to induce a reasonably accurate, albeit suboptimal, decision tree in a reasonable amount of time. Thus, these algorithms usually employ a greedy strategy that grows a decision tree by making a series of locally optimum decisions about which attribute to use for partitioning the data. ID3, C4.5, C&RT, QUEST are examples of the decision tree algorithms (Tan, Steinbach & Kumar, p.151-152).

The available growing methods is the Chi-squared Automatic Interaction Detection (CHAID). At each step, CHAID chooses the independent (predictor) variable that has the strongest interaction with the dependent variable. Categories of each predictor are merged if they are not significantly different with respect to the dependent variable.

Classification and Regression Trees (C&RT): C&RT splits the data into segments that are as homogeneous as possible with respect to the

dependent variable. A terminal node in which all cases have the same value for the dependent variable is known as an homogeneous "pure" node.

Quick, Unbiased, Efficient Statistical Tree (QUEST): A method that is fast and avoids other methods' bias in favor of predictors with many categories. Therefore, QUEST can be specified only if the dependent variable is nominal (IBM, p.1).

Application

Method: In this paper, data mining tools and C&RT was used. Analysis are done in SPSS Clementine. Decision trees are used for classification.

Data Set

A total of 1000 male and female patient's blood pressure and total cholesterol measurements were taken. Blood pressure and total cholesterol values are coded as low, normal, and high. Also, in the data set, there are records of the patients involved in sports, smoking, and who are drinking alcohol. Thus, this made it 7 fields and 1000 records in the dataset. Variables are "age, gender, blood pressure, cholesterol, sport, smoking, and alcohol". The built model is seen in Figure 1. Also, the summary of the variables can be seen in Figure 2.

Figure 1. Model

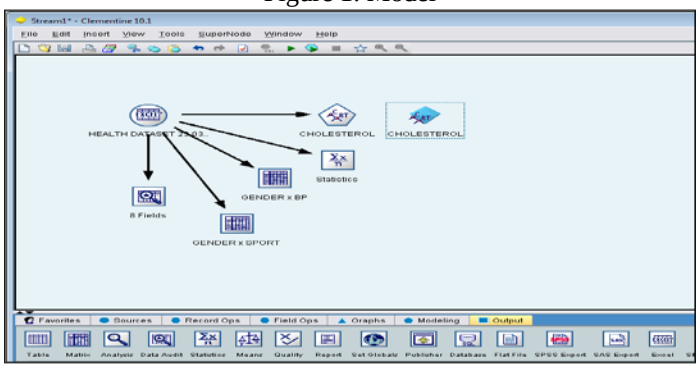


Figure 2. Data Audit

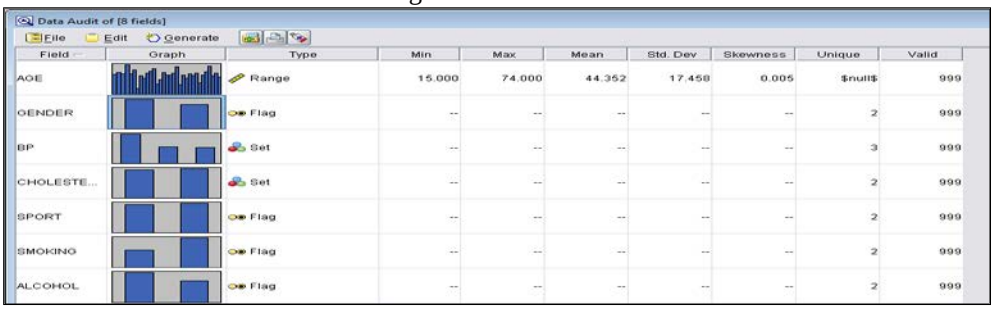


Figure 3. Histogram of Age

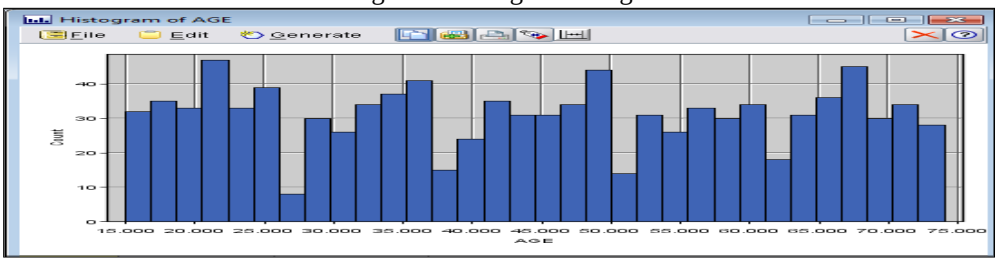
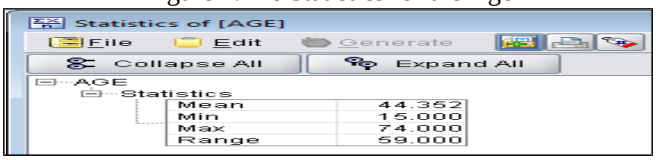
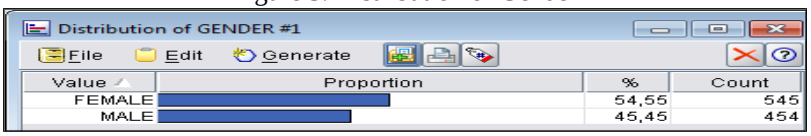


Figure 4.The Statistics for the Age



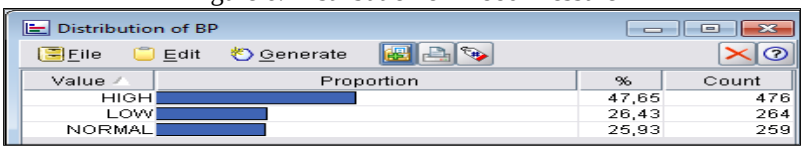
The mean of the age is 44,352.(Figure 3 and Figure 4). According to Figure 5, 54.55% of the patients are female and 45.45% are male.

Figure 5. Distribution of Gender



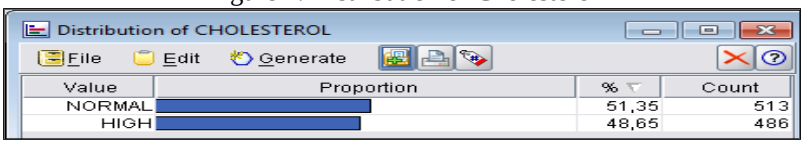
47.65% of the patients have high blood pressure, 26.43% of them have low BP, and 25.93% of the patients have normal BP (Figure 6).

Figure 6. Distribution of Blood Pressure



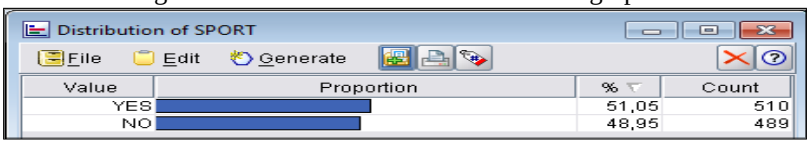
In Figure 7, the distribution of cholesterol can be seen. 51.35% of the patients have normal cholesterol and the rest have high cholesterol.

Figure 7. Distribution of Cholesterol



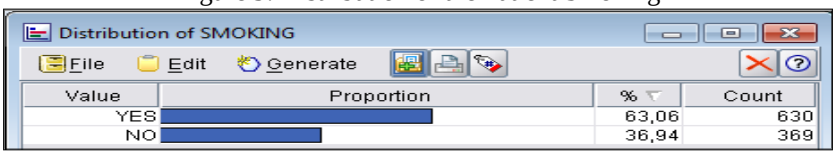
51.05% of the patients engaged in sports.

Figure 8. Distribution of the Patients Doing Sports



63.06% of the patients smoke (Figure 9).

Figure 9. Distribution of the Patient Smoking



According to Figure 10, 58.06% of the patients do not drink alcohol.

Figure 10. Distribution of the Patient Drinking Alcohol

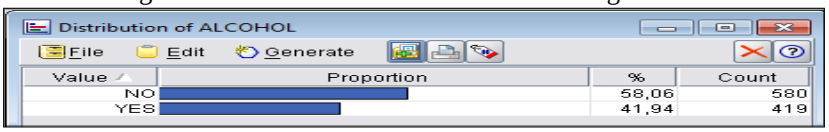
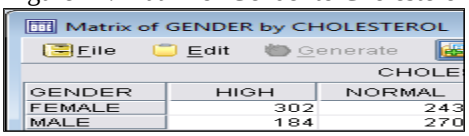
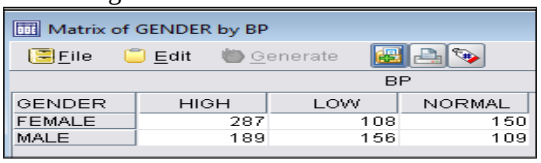


Figure 11. Matrix of Gender to Cholesterol



In Figure 11, the matrix of gender to cholesterol shows that 62% of the female have high cholestrerol (302 female), while 52% of the male have normal cholesterol (270 male).

Figure 12. Matrix of Gender to BP



In the Figure 12, it can be seen that 60% of the females' blood pressure is high (287 female). 59% of the male have low blood pressure (156 male) and 58% of the female have normal blood pressure (150 female). In Figure 13, one can see that 64% of the female do not engage in sport (314 female), while 45% of the male do engage in sport (279 male).

Figure 13. Matrix of Gender to Sports

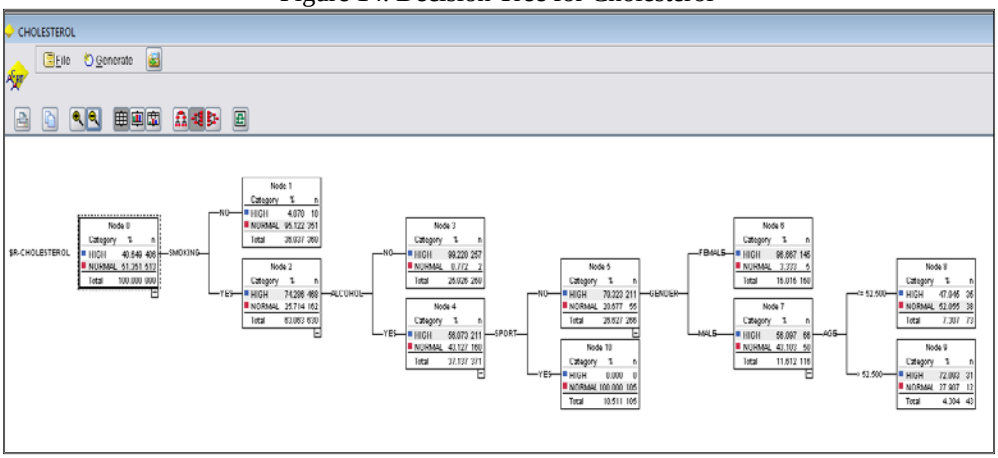
Matrix of GENDER by SPORT

File Edit Generate

SPORT

GENDER	NO	YES
FEMALE	314	231
MALE	175	279

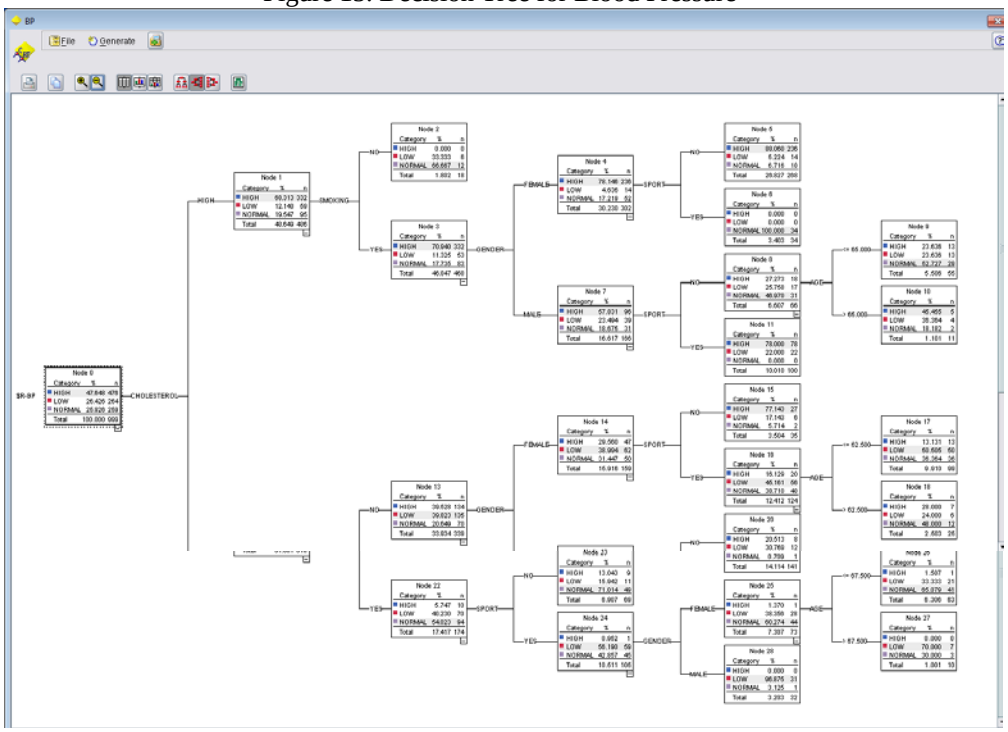
Figure 14. Decision Tree for Cholesterol



In Figure 14, the analysis done for decison trees shows that 48.649% of the patients have high cholesterol. 51.351% of the patients have low cholesterol. Smoking variable is effective here and it can be read from the tree that 95.122% of the non smokers have abnormal cholesterol. Furthermore, 51.351% ratio patients have high and low cholestreol, while 95.122% of them are non smokers.

74.286% of the smokers have high cholesterol if they are not drinking alcohol. 99.228% of them have high cholesterol. Thus, if they are drinking alcohol, 56.873% of them have high cholesterol. Engaging in sports on a regular basis is important. In our data, it was found that out of all the people who are smokers and are drinking alcohol, those engaged in sports have a normal cholesterol of 100%. On the other hand, the ones who are not engaged in sports have a high cholesterol with 79.33%. 96.667% of the females who are smokers, drinking alcohol, and not engaging in sports have high cholesterol, while the 56.897% of male have high cholesterol. In the same branch, age is also effective. The male who have an age under 52.5 with 52.055 % have normal cholesterol, while the ones who are above the 52.5 age with 72.093% have high cholesterol.

Figure 15. Decision Tree for Blood Pressure



In the blood pressure, cholesterol is effective. 68.313% of the patients who have high cholesterols also have high blood pressure. 88.060% of the patients who has high cholesterol, smokes, and who are not engaging in sports have high blood pressure. 100% of the female who has a high cholesterol, smoking, and engaging in sports have normal blood pressure. 27.273% of the male who has high cholesterol, smoking, and not engaging in sports have high blood pressure. In this branch, age is effective. However, 45.455% of them who have an age older than 65 have high cholesterol.

In the lower branch, 45.161% of the female who have a normal cholesterol and are drinking alcohol, but engaged in sports, have low blood pressure. Age is effective in this branch. Thus, 50% of them younger than 62,5 have low blood pressure.

43.62% of the male who has normal cholesterol, not using alcohol, and are engaging in sports have low blood pressure. 65.079% of the women who have normal cholesterol are drinking alcohol, and who are under the 67,5 age have a normal cholesterol. 96% of the male who have normal cholesterol, drinking alcohol, and are engaging in sports have low blood pressure.

Conclusion

This study attempts to present a data analytics in health care data. Preventive health care practices aim to implement customer value maximization manner. The results show that the proposed method could identify and evaluate critical points. A practical application of the method is also presented. Here, the groups which is at most risk are identified and the risk level for each category is determined. Health systems are facing a number of challenges in the cost-effective delivery of health care with aging populations and a number of diseases such as obesity, cancer, and diabetes increasing in prevalence. At the same time, the life sciences industry is also faced with historically low productivity. However, this has emerged as a science that can help tackle these challenges. The move toward electronic medical records in health systems has provided a rich source of new data for conducting research into the pathophysiology of disease (Kalaitzopoulos et al., 2016). Data analytics in health care will help the patients to be able to get treated at the right time. Also, this will help improve medical outcomes while also reducing the cost associated with mistreatment or overtreatment.

References:

Adriaans & Zantinge (1997). Data Mining, Addison-Wesley, p.5.

Andrew Taylor (1998). TQM implementation: organisation practices and information infrastructures, Omega, Volume 26, Issue 6, December 1998, Pages 715-727, ISSN 0305-0483, http://dx.doi.org/10.1016/S0305-0483(98)00022-X.

Andrei et al. (2015). Assessment and Continuous Improvement of Information Security Based on TQM and Business Excellence Principles, Procedia Economics and Finance, Volume 32, 2015, Pages 352-359, ISSN 2212-5671.

Ayako Suzuki et al. (2015). Comedications alter drug-induced liver injury reporting frequency: Data mining in the WHO VigiBase™, Regulatory Toxicology and Pharmacology, Volume 72, Issue 3, August 2015, Pages 481-490, ISSN 0273-2300.

Chad-Ton et al. (2006). Data mining for the diagnosis of type II diabetes from three-dimensional body surface anthropometrical scanning data, Computers & Mathematics with Applications, Volume 51, Issues 6–7, March–April 2006, Pages 1075-1092.

Chao-Hui, Jessie & Vincent (2011). A novel data mining mechanism considering bio-signal and environmental data with applications on asthma monitoring, Computer Methods and Programs in Biomedicine, Volume 101, Issue 1, January 2011, Pages 44-61, ISSN 0169-2607.

Cheng-Ding, Wang, & Jiang (2011). Using data mining techniques for multi-diseases prediction modeling of hypertension and hyperlipidemia by

common risk factors, Expert Systems with Applications, Volume 38, Issue 5, May 2011, Pages 5507-5513, ISSN 0957-4174.
Ching-Wu, Hong-Qing Yao & Wu (2013). Applying data mining techniques to analyze the causes of major occupational accidents in the petrochemical industry, Journal of Loss Prevention in the Process Industries, Volume 26, Issue 6, November 2013, Pages 1269-1278, ISSN 0950-4230.
Ching-Wu et al. (2012). Applying data mining techniques to explore factors contributing to occupational injuries in Taiwan's construction industry, Accident Analysis & Prevention, Volume 48, September 2012, Pages 214-222, ISSN 0001-4575.
Daghfous & Barkhi (2009). The strategic management of information technology in UAE hotels: An exploratory study of TQM, SCM, and CRM implementations, Technovation, Volume 29, Issue 9, September 2009, Pages 588-595, ISSN 0166-4972.
Dheeraj et al. (2015). Exploring factors associated with pressure ulcers: A data mining approach, International Journal of Nursing Studies, Volume 52, Issue 1, January 2015, Pages 102-111, ISSN 0020-7489.
Dimitris, Ketan & Erfan (2016). Chapter 2 - Advancements in Data Management and Data Mining Approaches, In Translational Medicine, edited by Aamir Shahzad, Academic Press, Boston, 2016, Pages 35-53, ISBN 9780128034606.
Duen-Yian, Ching-Hsue & Yen-Wen (2011). A predictive model for cerebrovascular disease using data mining, Expert Systems with Applications, Volume 38, Issue 7, July 2011, Pages 8970-8977, ISSN 0957-4174.
Fields (1980). Client tracking: The development of a state-wide hypertension information system:, Massachusetts Department of Public Health, Division of Preventive Medicine, Boston, Massachusetts 02111. Sharon Spaight, Preventive Medicine, Volume 9, Issue 3, May 1980, Pages 429-430, ISSN 0091-7435.
Freitas (2002). Data mining and Knowledge Discovery with Evolutionary Algorithms, Springer, p.1-13.
Giudici (2003). Applied Data Mining: Statistical Methods for Business and Industry, Wiley, p.1.
Hian & Gerald (2005). Data Mining Applications in Healthcare Journal of Healthcare Information Management, Vol. 19.
Han & Kamber (2006). Data Mining Concepts and Techniques, Morgan Kaufmann, 2006, p.285.
IBM SPPS Decision Trees 22, p.1.
Jinn-Yi, Tai-Hsi & Chuan-Wei (2011). Using data mining techniques to predict hospitalization of hemodialysis patients, Decision Support Systems, Volume 50, Issue 2, January 2011, Pages 439-448, ISSN 0167-9236.

Joaquim & Celeste (2012). Finding occupational accident patterns in the extractive industry using a systematic data mining approach, Reliability Engineering & System Safety, Volume 108, December 2012, Pages 108-122, ISSN 0951-8320.
Joo, & Wang (2006) Relationship between total quality management (TQM) and continuous improvement of international project management (CIIPM), Technovation, Volume 26, Issues 5–6, May–June 2006, Pages 716-722, ISSN 0166-4972.
Katzman & Paushter (2016). Building a culture of continuous quality improvement in an academic radiology department, Journal of the American College of Radiology, Available online 18 February 2016, ISSN 1546-144.
Ling Chen et al. (2016). Personal health indexing based on medical examinations: A data mining approach, Decision Support Systems, Volume 81, January 2016, Pages 54-65, ISSN 0167-9236.
Liu (2007). Web Data Mining, Springer, p.59-60.
Management Overview (2016). Retrieved from:https://docs.oracle.com/cd/B28359_01/datamine.111/b28129/process.htmhttp://asq.org/learn-about-quality/total-quality-management/overview/overview.html.
Martínez-Lorente, Sánchez-Rodríguez, & Dewhurst (2004). The effect of information technologies on TQM: An initial analysis, International Journal of Production Economics, Volume 89, Issue 1, 8 May 2004, Pages 77-93, ISSN 0925-5273.
Maryam & Behrouz (2014). A new scoring system for assessing the risk of occupational accidents: A case study using data mining techniques with Iran's Ministry of Labor data, Journal of Loss Prevention in the Process Industries, Volume 32, November 2014, Pages 443-453, ISSN 0950-4230.
Muthu et al. (2012). Data mining technique for automated diagnosis of glaucoma using higher order spectra and wavelet energy features, Knowledge-Based Systems, Volume 33, September 2012, Pages 73-82, ISSN 0950-705.
Nenonen (2013). Analysing factors related to slipping, stumbling, and falling accidents at work: Application of data mining methods to finnish occupational accidents and diseases statistics database, Applied Ergonomics, Volume 44, Issue 2, March 2013, Pages 215-224, ISSN 0003-6870.
Nicole et al. (2010). Sources of health information related to preventive health behaviors in a national study, American Journal of Preventive Medicine, Volume 38, Issue 6, June 2010, Pages 620-627.e2, ISSN 0749-3797.
Preventive Health Care (2016). Retrieved from:https://en.wikipedia.org/wiki/Preventive_healthcare.

Steele & Schomer (2009). Continuous quality improvement programs provide new opportunities to drive value innovation initiatives in hospital-based radiology practices, Journal of the American College of Radiology, Volume 6, Issue 7, July 2009, Pages 491-499, ISSN 1546-1440.
Seyed et al. (2014). Identifying high-cost patients using data mining techniques and a small set of non-trivial attributes, Computers in Biology and Medicine, Volume 53, 1 October 2014, Pages 9-18, ISSN 0010-4825.
Shih et al. (2011). Health information systems in small practices: improving the delivery of clinical preventive services, American Journal of Preventive Medicine, Volume 41, Issue 6, December 2011, Pages 603-609, ISSN 0749-3797.
Taylor & Wright (2006). The contribution of measurement and information infrastructure to TQM success, Omega, Volume 34, Issue 4, August 2006, Pages 372-384, ISSN 0305-0483, http://dx.doi.org/10.1016/j.omega.2004.12.003.
Tan, Steinbach & Kumar (2006). Introduction to Data Mining, p. 151-152.
Tzeng-Ji, Li-Fang & Shinn-Jang (2003). Application of a data-mining technique to analyze coprescription patterns for antacids in Taiwan, Clinical Therapeutics, Volume 25, Issue 9, September 2003, Pages 2453-2463, ISSN 0149-291.
Valmohammadi & Roshanzamir (2015). The guidelines of improvement: Relations among organizational culture, TQM and performance, International Journal of Production Economics, Volume 164, June 2015, Pages 167-178, ISSN 0925-5273.
Vijayakrishnan et al. (2014). Prevalence of heart failure signs and symptoms in a large primary care population identified through the use of text and data mining of the electronic health record, Journal of Cardiac Failure, Volume 20, Issue 7, July 2014, Pages 459-464, ISSN 1071-9164.
What is Data Mining? (2016). Retrieved from: 24.03.2016. https://docs.oracle.com/cd/B28359_01/datamine.111/b28129/process.

Are Fluctations In Energy Consumption Transitory Or Permanent? Evidence From A Fourier Adf Unit Root Test

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Abstract

This study analysis the stationarity of energy demand for 30 countries with annual data between 1960-2013 using the per capita energy consumption data acquired from kilogram petrol equivalent value. The per capita energy demand stationarity analysis is examined with the Fourier Augmented Dickey Fuller unit root test. The basic feature of the used econometric method is to include the unknown structural breaking features of the per capita energy demand to the analysis. The analysis results show that the energy demand are not stationary in Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, Iceland, India, Israel, Italy, Japan, South Korea, Mexico, Holland, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Turkey, England and USA, so that the energy demand management policies have lasting and long term effects in these countries. It has been determined that the per capita energy demand series of the Czech Republic and South Africa are stationary and the energy demand policies in these countries won't create long lasting effects but the energy demand predictions can be made by benefiting from the previous data of the energy demand.

Keywords: Energy Consumption, Order of Integration, Fourier Unit Root Test

Introduction

Testing the integrative features of the energy demand variables is showing up as a new part in the energy economy literature. The analysis of the energy demand stationarity and to understand it right is very important. This has many reasons. First, if the energy demand follows a stationary process, the energy demand policies used in order to manage energy demand will have temporary effects and after a certain while energy demand will return to its trend value. So if the energy demand has a non-stationary feature, any shock on the energy demand will have permanent effects. This

will lead to successful policies. The second reason explaining the importance of these analysis is, if the energy demand doesn't include unit root (if it is stationary) the previous data of the energy demand can be used for energy demand modeling.

The third fact lies in the relation of energy demand with other macroeconomic variables. Today the stationarity structure of the energy used in every field of economic life as raw material, intermediate input, final goods, can pass onto the other macroeconomic variables due to these close relations (Hsu et al., 2008, p.2318). As a result of this transfer mechanism the stationary situations of the key macroeconomic variables will also affect the alternative economic theories examining the efficiency of the guiding attempts to economy of governments via macroeconomic stability policies.

For example if a reel output is unit rooted, so as to say not being stationary, as a result of a negative shock on the output, it means that the value won't return to its normal trend value on its own. So Keynesian stabilization policy will be needed. If the reel output is stationary, Keynesian policies will cause temporary effects and will be ineffective.

Most of the literature examining the energy demand has made analysis without taking into account the structural breakdowns. But when the structural breakdowns are included into the analysis, the results of the stationarity analysis can change. So the unit root tests in which structural breakdowns are included increase the explanation power of the analysis.

In this study analysis will be realized for the 1960-2013 period by using Fourier Augmented Dickey Fuller (FADF) unit root test for 30 countries consisting of Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, Iceland, India, Israel, Italy, Japan, South Korea, Mexico, Holland, New Zealand, Norway, Poland, Portugal, Czech Republic, South Africa, Spain, Sweden, Turkey, England and USA.

The remaining part of the study is as follows. Part 2, selected literature review. Part 3, explanation of econometric methodology. Part 4, data and empirical findings. And at the conclusion part result and political suggestions will be presented.

Selected Literature Review

Literature examining the stability of energy demand starts with Narayan and Smyth (2007) study. After this study, many studies have been realized about the stability of energy demand. Some of the studies have been given in Table 1. An agreement couldn't be reached about the stability of energy demand in these studies. Data ranges of the studies, countries and the development levels of them, different econometric methods are the basic reason of this difference.

Table 1: Survey of selected literature for stationarity properties

Author(s)	Time Period	Unit Root Test	Conclusion
Narayan and Smyth	1979-2000	ADF	%31 of countries stationary
Chen and Lee	1971-2002	Carrion-i Sivestre	Stationarity
Hsu et al.	1971-2003	Panel unit root test	Mixed evidence
Apergis and Payne	1960-2007	Lee and Strazicich	Mixed evidence
Apergis et al.	1982-2007	Carrion-i Sivestre, Westerlund panel unit rrot test	Stationarity
Aslan	1960-2008	Lee and Strazicich	Non-stationarity
Barros et al.	1973:1-2008:10	Fractional integration with structural breaks	Non-stationarity
Kula et al.	1960-2005	Lee and Strazicich	Mixed evidence
Narayan and Popp	1980-2006	Pesaran panel unit root test	Non-stationarity
Shahbaz et al.	1971-2010	LM unit root test	Mixed evidence
Kum	1971-2007	LM unit root test with structural break	Stationarity
Yilanci and Tunali	1960-2011	Fourier LM unit root test	Mixed evidence
Ozturk and Aslan	1970-2006	LM unit root test with structural break	Mixed evidence
Mishra et al.	1980-2005	Carrion-i Sivestre	Mixed evidence

Econometric Methodology

In this study FADF unit root test will be used. The econometric method which will be used is a method which can include the unknown features of the structural breakdowns into the analysis. In the 54 year period which is included in the analysis, many events affecting the energy markets have occurred. Some of them are petrol crisis like in 1970s, excessive decrease in petrol prices in 1985, and invasion of Kuwait by Iraq in 1990. Using unit root test taking into account such structural breakdowns will increase the reliability of the results. So the basic benefit of this study to the literature is to create healthier and more reliable results by using a new econometric method taking into account unknown structural breakdowns of the energy demand series.

In the Christopoulos (2010) study, the application starts with the prediction of the model stated in equation 1 stated below;

$$y_t = \delta_0 + \delta_1 sin\left(\frac{2\pi kt}{T}\right) + \delta_2 cos\left(\frac{2\pi t}{T}\right) + \upsilon_t \quad (1)$$

In the equation π means pi; k means frequency number; t means trend value of the serial and T means the observation number.

At the second stage the model is determined from which minimum residual sum of squares (SSR) will be acquired by giving values between 1-5 to the k value in equation 2.

$$\widehat{\upsilon_t} = y_t - \widehat{\delta_0} + \widehat{\delta_1} sin\left(\frac{2\pi k^* t}{T}\right) + \widehat{\delta_2} cos\left(\frac{2\pi k^* t}{T}\right) \quad (2)$$

At the third stage the significance of the coefficient of the trigonometric terms of the model from which we acquired the minimum SSR

is tried. If the coefficients of the trigonometric terms are significant, residual series are acquired and ADF unit root test is applied to them and the acquired FADF test statistic values are compared with the critical values.

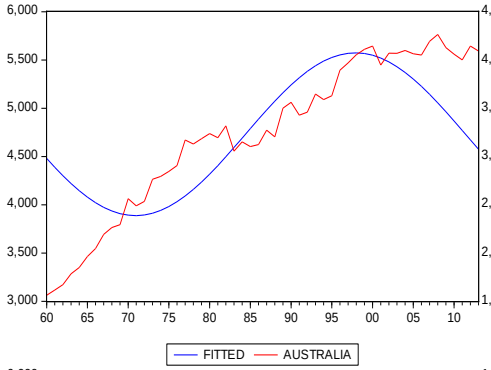
Data and Empirical Results

In the study per capita energy consumption data acquired as kilogram petrol equivalent annually between 1960-2013 for 30 countries from the World Bank database. Table 2 reports the FADF unit root test results. In column 2 the data ranges of the countries included in the analysis are stated. Different data range periods have been used due to lack of data. Column 3 states the frequency number selected according to the minimum SSR value; column 4 states the F statistic value calculated for the significance of the trigonometric terms; column 5 states the FADF test statistic value.

Table 2: FADF Unit Root Test Results

Country	Data Range	Frequency Value	F(k)	FADF
Australia	1960-2013	1	33.8759	-1.2488 (3)
Austria	1960-2013	1	26.7614	-0.4343 (13)
Belgium	1960-2013	1	27.6134	-3.3341 (7)
Brazil	1971-2012	1	13.3511	-0.6705 (2)
Canada	1960-2013	1	27.5293	-2.9006 (7)
China	1971-2012	1	15.8145	-0.9396 (1)
Czech Republic	1971-2013	1	15.4832	-4.6116 (11)
Denmark	1960-2013	1	12.9260	-2.6984 (9)
Finland	1960-2013	1	38.3209	-1.6387 (11)
France	1960-2013	1	41.2276	-2.4186 (6)
Germany	1960-2013	1	33.2074	-2.1593 (6)
Greece	1960-2013	1	46.6948	-2.4625 (3)
Iceland	1960-2013	1	22.7158	-1.4465 (14)
India	1971-2012	1	22.5861	-1.5116 (6)
Israel	1971-2013	1	60.1083	-1.1651 (7)
Italy	1960-2013	1	30.2837	-0.7629 (14)
Japan	1960-2013	1	36.6815	-0.9396 (16)
Korea	1971-2013	1	51.8623	-0.7602 (3)
Mexico	1971-2013	1	10.4238	-2.2518 (7)
Netherlands	1960-2013	2	12.9677	-2.5703 (0)
New Zeland	1960-2013	1	64.0336	0.4354 (14)
Norway	1960-2013	1	34.6079	-0.3162 (16)
Poland	1960-2013	1	50.6779	-2.5646 (9)
Portugal	1960-2013	1	85.9828	-1.4340 (3)
South Africa	1971-2012	2	20.3085	-3.0525 (0)
Spain	1960-2013	1	52.0165	-2.9372 (5)
Sweden	1960-2013	1	42.3096	-2.6092 (3)
Turkey	1960-2013	1	31.7650	-1.1827 (10)
United Kingdom	1690-2013	2	24.3897	-1.2118 (14)
USA	1960-2013	2	19.5652	-2.1315 (15)

Note: Numbers in the parentheses show the optimal lag length.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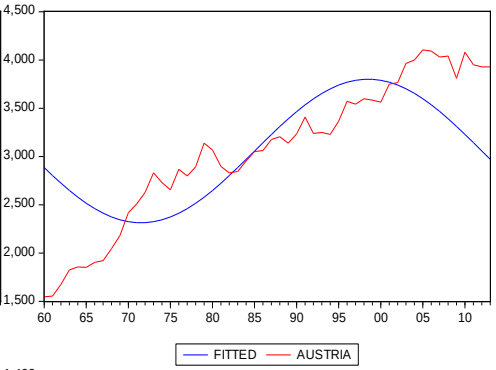
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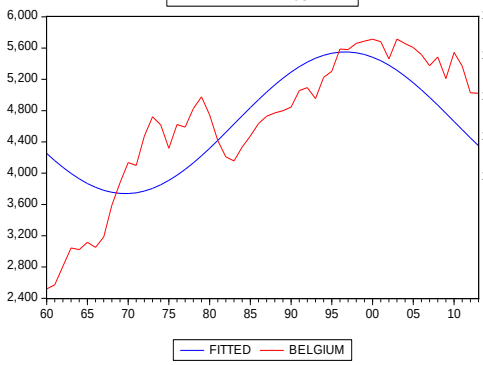
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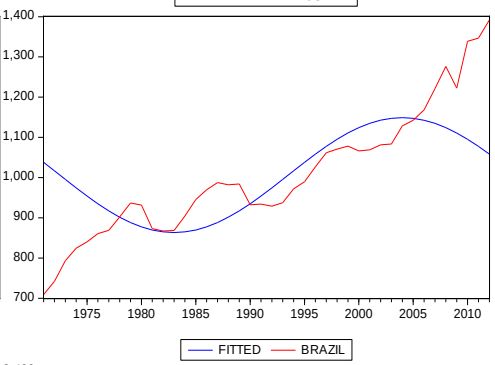
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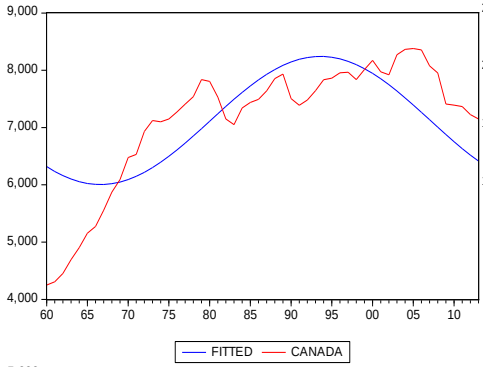
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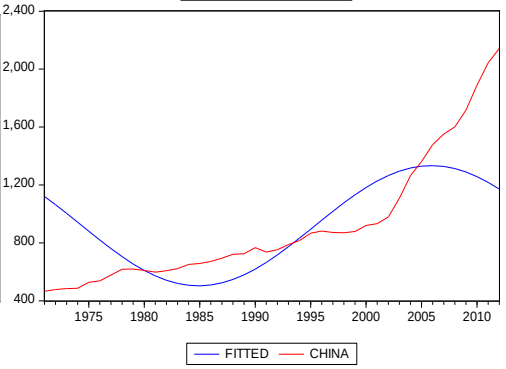
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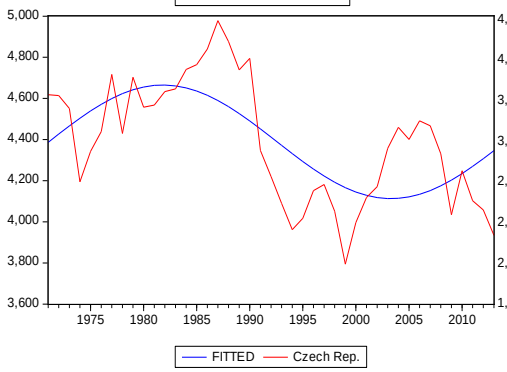
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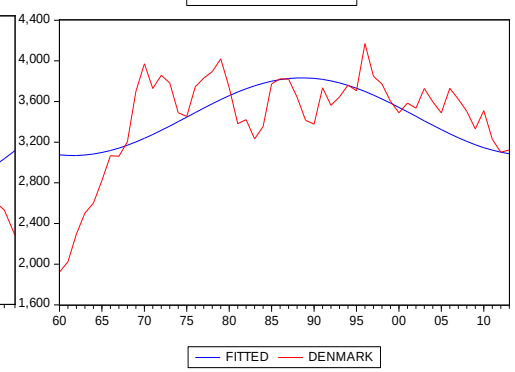
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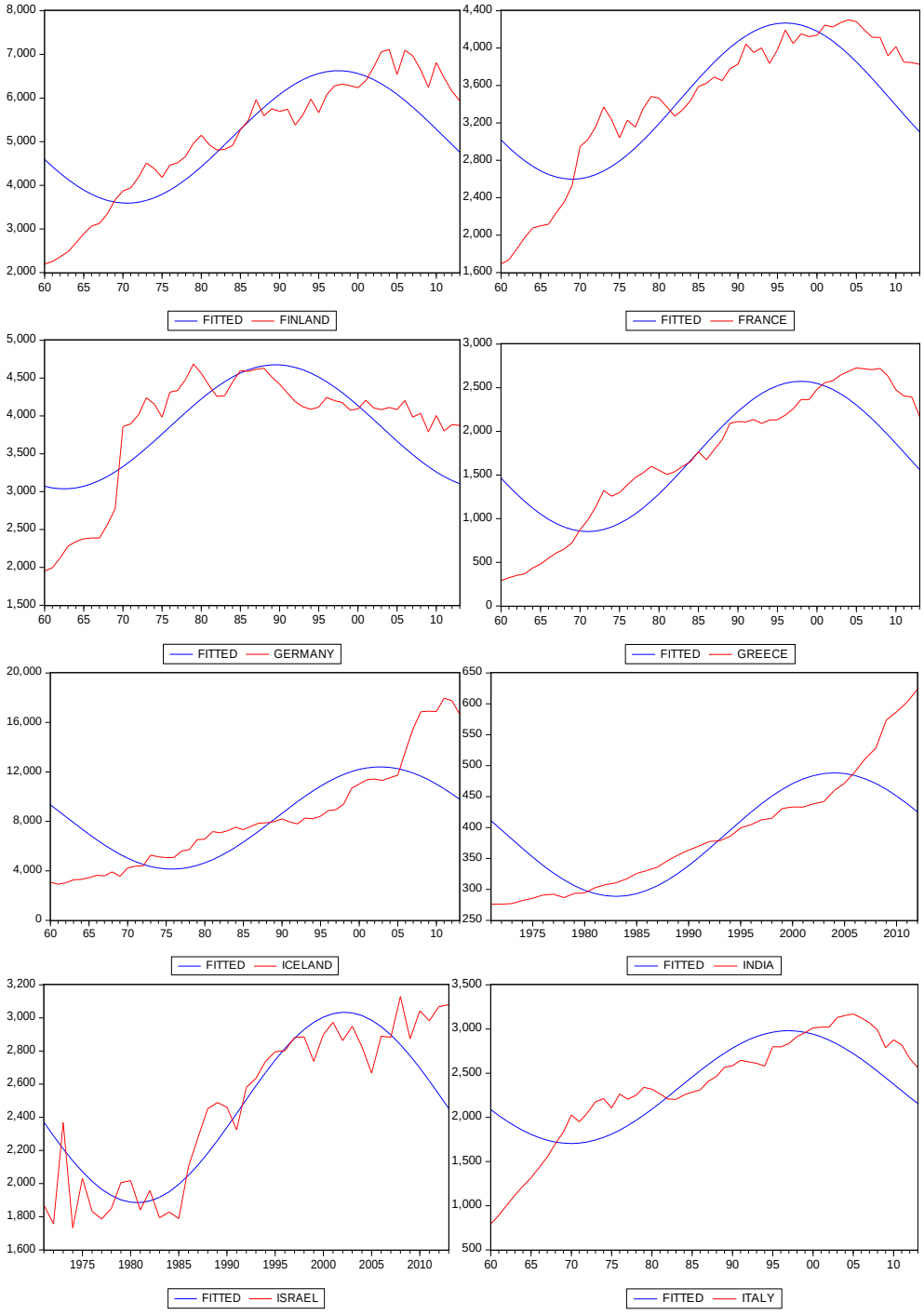
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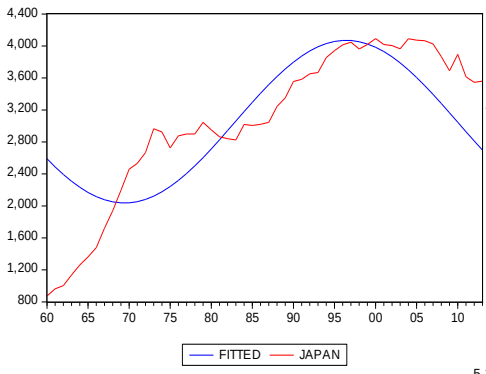
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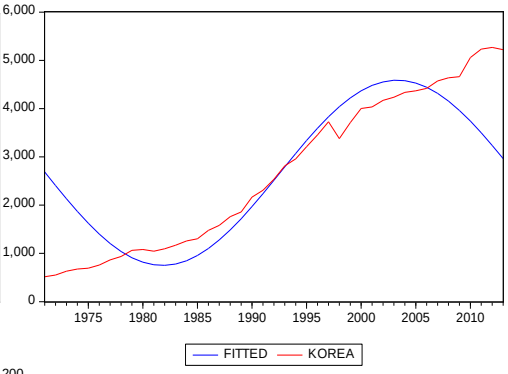
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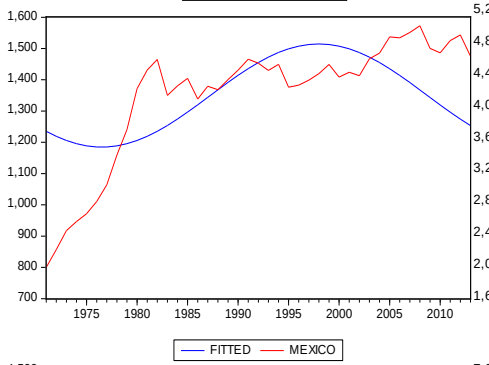
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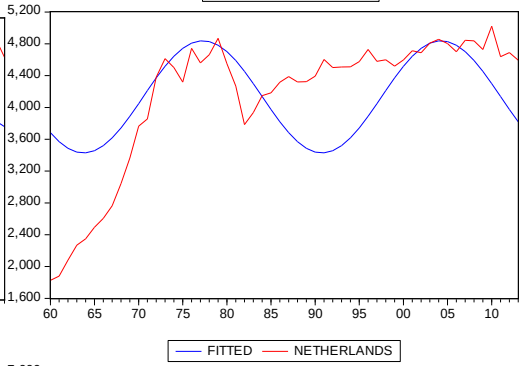
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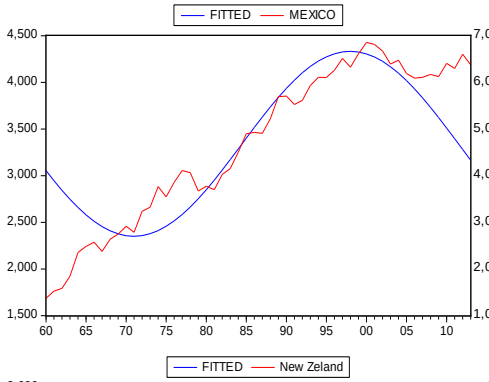
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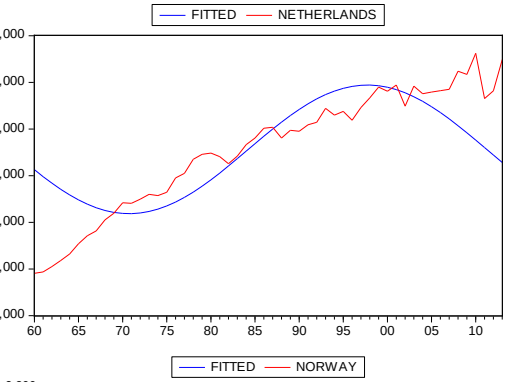
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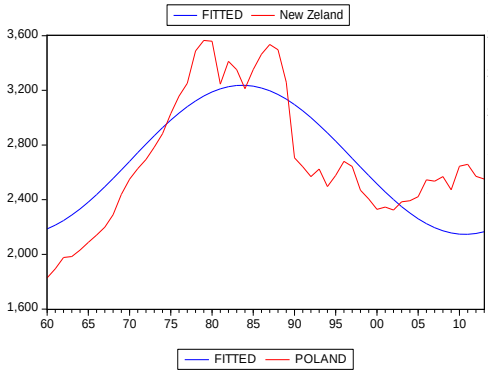
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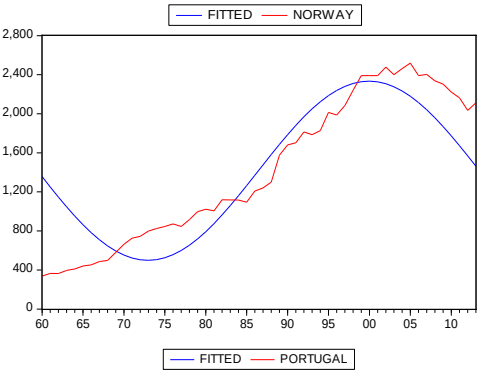
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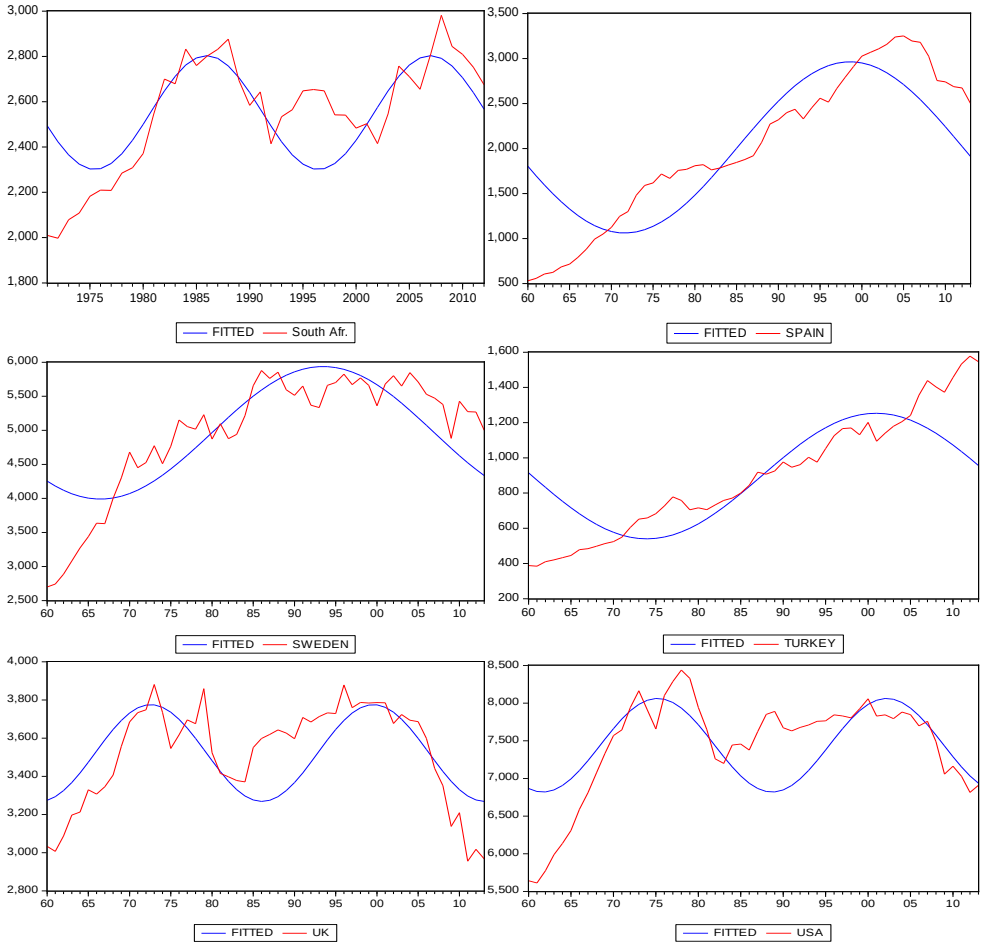

Figure 1: Per capita energy consumption and Fourier Function

In figure 1 per capita energy consumption and Fourier functions are shown. In all countries movements have been realized so as to catch the Fourier function breakdowns.

Results in column 3 shows that the frequency value from which minimum SSR has been acquired, except Holland, South Africa, England and USA, is 1; and that the minimum SSR value in these countries has been acquired with the model in which the SSR value frequency number is 2. The F(k) value in column 4 shows us the F statistic value of which we test the significance of trigonometric terms. According to this, since the trigonometric terms in 30 countries have been found statistically significant at the 10% level, FADF value could be calculated for all countries in the analysis.

According to the FADF value in column 5 the per capita energy consumption series of countries, except Czech Republic and South Africa,

have unit root. The energy consumption management policies in Czech Republic and South Africa, will have temporary effects. At the same time when making energy demand predictions in these countries, previous data from the energy demand can be used. There are various aspects explaining the stability of energy demand in the energy literature. According to Hsu et Al (2008) these are;

- Abundance of energy sources,
- Low energy consumption,
- New environmental laws stepping in,
- Middle income level

It has been determined that the energy demand series are unit rooted so as to say not stable for the countries except these countries. So the energy demand policies of Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, Iceland, India, Israel, Italy, Japan, South Korea, Mexico, Holland, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Turkey, England and USA can be used because they have permanent effects.

Conclusion

The analysis of stationarity of energy demand is gaining importance in energy literature. This has several reasons. The first reason is related to energy demand management policies. Most of the developed and developing countries are foreign dependent in energy and so they give great importance to energy demand policies. The energy demand shouldn't be stationary in order to create the demanded results so the energy demand policies shall provide lasting effects.

In this study the stability of the per capita energy consumption has been analyzed with Fourier ADF unit root test for 30 countries between 1960-2013 with annual data. So the basic benefit of this study to the literature is to create healthier and more reliable results by using a new econometric method taking into account unknown structural breakdowns of the energy demand series.

According to the analysis results, per capita energy consumption data of countries, except Czech Republic and South Africa, have unit root. So the energy demand management policies in these countries can create lasting effects. Since the per capita energy consumption data of Czech Republic and South Africa are stationary, policy applicators shall take into account that the energy demand estimations can be made based upon previous data but that energy demand management policies won't leave long lasting permanent effects.

References:

Apergis, N., & Payne, J. E. (2010). Structural breaks and petroleum consumption in US states: Are shocks transitory or permanent?. *Energy Policy*, *38*(10), 6375-6378.

Apergis, N., Loomis, D., & Payne, J. E. (2010). Are fluctuations in coal consumption transitory or permanent? Evidence from a panel of US states.*Applied Energy*, *87*(7), 2424-2426.

Aslan, A. (2011). Does natural gas consumption follow a nonlinear path over time? Evidence from 50 US States. *Renewable and Sustainable Energy Reviews*, *15*(9), 4466-4469.

Barros, C. P., Gil-Alana, L. A., & Payne, J. E. (2011). An analysis of oil production by OPEC countries: persistence, breaks, and outliers. *Energy Policy*, *39*(1), 442-453.

Chen, P. F., & Lee, C. C. (2007). Is energy consumption per capita broken stationary? New evidence from regional-based panels. *Energy Policy*, *35*(6), 3526-3540.

Christopoulos, D. K., & León-Ledesma, M. A. (2010). Smooth breaks and non-linear mean reversion: Post-Bretton Woods real exchange rates. *Journal of International Money and Finance*, *29*(6), 1076-1093.

Hsu, Y. C., Lee, C. C., & Lee, C. C. (2008). Revisited: are shocks to energy consumption permanent or temporary? New evidence from a panel SURADF approach. *Energy Economics*, *30*(5), 2314-2330.

Kula, F., Aslan, A., & Ozturk, I. (2012). Is per capita electricity consumption stationary? Time series evidence from OECD countries. *Renewable and Sustainable Energy Reviews*, *16*(1), 501-503.

Kum, H. (2012). Are Fluctuations in Energy Consumption Transitory or Permanent? Evidence From a Panel of East Asia & Pacific Countries.*International Journal of Energy Economics and Policy*, *2*(3), 92.

Mishra, V., Sharma, S., & Smyth, R. (2009). Are fluctuations in energy consumption per capita transitory? Evidence from a panel of Pacific Island countries. *Energy Policy*, *37*(6), 2318-2326.

Narayan, P. K., & Smyth, R. (2007). Are shocks to energy consumption permanent or temporary? Evidence from 182 countries. *Energy policy*, *35*(1), 333-341.

Narayan, P. K., & Popp, S. (2012). The energy consumption-real GDP nexus revisited: Empirical evidence from 93 countries. *Economic Modelling*, *29*(2), 303-308.

Ozturk, I., & Aslan, A. (2011). Are fluctuations in energy consumption per capita transitory? Evidence from Turkey. *Energy, Exploration & Exploitation*,*29*(2), 161-168.

Shahbaz, M., Tiwari, A. K., Ozturk, I., & Farooq, A. (2013). Are fluctuations in electricity consumption per capita transitory? Evidence from developed

and developing economies. *Renewable and Sustainable Energy Reviews*, *28*, 551-554.
Yilanci, V., & Tunali, Ç. B. (2014). Are fluctuations in energy consumption transitory or permanent? Evidence from a Fourier LM unit root test. *Renewable and Sustainable Energy Reviews*, *36*, 20-25.