World Trade Organization Regulation on Intellectual Property Rights of the “Bio-Technology”

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After establishing a series of agreements regarding Uruguay Round in 1995 and with the starting of activities of the World Trade Organization (WTO), the agreement on the intellectual property rights (TRIPS) comes into force modifying most of the current regulation on the protection of innovations, particularly of medicines and biotechnologies. The promoters of these modifications were confident that, in this way, it would be possible to hasten the innovative process, guaranteeing a fair compensation for the new products. These changes can have important consequences in the future of the agricultural sector since probably a reduced number of companies will totally control the seeds of different sectors. Also, the appearance of new entities in certain areas can have negative effects on their biodiversity and on the endemic species. Basically, this paper consists of two parts: first, a historical and judicial revision of the protection of intellectual property rights and second, a special technical and political-economic emphasis on the protection of this type of rights in relation to the World Trade Organization (WTO).

Keywords: Trade, Intellectual property rights, Bio-technology

JEL: F13, F14, F50, Q13, Q17
Controversy over the protection

During the 60s and the 70s, the investigations institutes form a series of countries developed an important work with an outlook on the obtention of high performance hybrids. At first, it was believed that the best thing to do would be to spread them as fast as possible to increase the offer of basic foods, trying in this way to settle the famine in the world. But nowadays, most of the investigations on biotechnology are in the hands of the private sector, increasingly concentrated in a few companies as a consequence of three factors: the first one is the nature of plants since many of them permit to capture the total benefit derived from the innovations (like the hybrid corn); the second one is the introduction of important changes in the intellectual property rights protection regime in the United States since 1980 and, finally, the fact that it is possible to introduce sterility characteristics in the transgenic seeds hindering the reseeding and forcing the farmer to acquire new seeds every year. To sum up, nowadays the products which were previously considered “public goods” are privatized and those who do not pay the technological quote for their use have a restricted access to them.

There is a strong controversy when it comes to evaluate if it is fair or not to grant property or patents rights to protect innovations in animal and vegetal species and also about the limits of their scope. In 1980, the Supreme Court of the United States authorized a patent on an artificially produced micro-organism which absorbed oil spillages. This pioneering decision will make the way for a series of changes in the intellectual property rights regime in the country. One of the most important ones is the authorization for universities and their scientific teams to patent their innovations even if they used public financing to obtain them. This change was a turning point in the innovative activity of the most important universities in the United States, causing a considerable increase in this type of activity. Many scientists from these universities created small biotechnological companies which later would be fusioned or bought by the big conglomerates of the country. We could see as an indicator of the acceleration of the innovation process of the time of the granting of around 60,000 patents in 1980 by the United States Patents and Trademarks Office (USPTO), which in 2001 granted 160,000 patents.
The intellectual property: industrial property and copyright

The laws of intellectual property form the set of exclusive proprietary rights granted by the State for a period of time to individuals and legal entities performing literary, artistic and scientific works or inventions or innovations and to those who adopt commercial indications, like products and creations with a commercial purpose. The ideas, mathematical formulas, non-original work and in general everything, which does not comply with what is provided in Law, is not protected.

The industrial property includes inventions, patents, trademarks, industrial models and drawing and origin geographical indications. It is the exclusive right granted by the State to use or exploit industrial inventions or innovations or commercial indications performed by individuals or companies to differentiate their products or services according to the clients of the market. The holders of this right are entitled to exclude others from the commercial use or exploitation of their property without their authorization.

The term “intellectual property” comprises two kinds of rights: The “copyright” and the “industrial property”. The copyrights establish the protection for persons who create works of intellect and the industrial property protects those who create works and contributions, which the legislators considered that had to be also protected.

Unlike other property forms, which are eternally maintained passing from hands to hands, the intellectual property rights have a temporary limit, which will depend on the type of rights (moral or patrimonial, copyright or industrial rights). However, as a general rule, the moral rights are perpetual and the patrimonial ones expire according to the Bern Agreement 50 years after the death of the author although most of the countries of the European Union, including Spain, have established a period of 70 years after the death of the author. Once this period is expired, the work is considered to be in the public domain and it can be freely used as long as the moral rights of the author are respected, particularly the authorship acknowledgement. According to the World Intellectual Property Organization (WIPO), the owner of the intellectual property can use it in any way, so that any other individual or legal entity can legally use it
without the consent of the holder of the right. Naturally, the exercise of this right is subject to limitations.

The copyrights are related to artistic creations, like poems, novels, paintings, films, etc. The expression “copyright” makes reference to the main act, as regards literary and artistic works, that can only be executed by the author or with his consent (patrimonial right). This act is the production of copies of the literary or artistic work, like a book, a painting, a sculpture, a photograph, a film and the recent digital formats. The expression “copyrights” makes reference to the rights of the person who created of the artistic work, the author, who has certain specific rights over the creation (moral rights). For example, the right to prohibit a distorted reproduction, which can only be done by the author, while other rights, like the right to produce copies, can be exercised by other persons (patrimonial rights granted to an owner), for example, an editor who has obtained a license from the author for this purpose.

**Intellectual property in living organisms**

**Methods of protection**
There are five kinds of intellectual property protection of living organisms: the technical protection, the industrial secrets, the patents, the utility models and obtentor rights.

- The technical protection is related to the nature of the process or product and applies when the copy of the innovation implies a high level of difficulty or high costs. The level of protection depends on the level of incorporation of the innovation to the product. There are two extreme cases: the first one takes place when it is not possible to recover the innovation based on the product or process (hybrids and sterile seeds) and the second one when the innovation is absolutely recoverable (autogamous plants). In this last case, the seed is what constitutes the innovation.
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- The industrial secrets are a type of protection associated to seeds of hybrids and to certain processes which allow giving certain characteristics to commercial plants. It is usually used as a step previous to the request of a license or to the acknowledgement of the obtentor of varieties. As opposed to other intellectual protection modalities, the industrial secret does not give exclusive rights and it is not conditional on inventive novelty or relevance test records.

- The patents can be granted for processes and products like hybrid plants varieties, transgenic plants, processes to give them certain characteristics, vaccines, etc. In order to obtain them it is necessary to prove that the invention is a novelty and that meets the requirements of inventive relevance and industrial applicability, a concept that covers agricultural uses. In biotechnology, there are differences between countries as regards the patentability of microorganisms, cellular lines, genes and genetic sequences and as regards the importance assigned to the product or process used.

- The utility models are a type of protection that can be applied to agricultural machinery and implementations, including their parts and covers the external disposition of the parts of a product. In this case, the requirements are less strict than those of the patents and the period of protection is also shorter.

- The obtentor rights cover the vegetable varieties obtained form the plant breeding as long as they are distinguishable, stable and uniform.

International agreements on the protection of intellectual property and the granting of patents: protection of vegetable material
At an international level, we can mention a series of agreements and arrangements on the protection of the individual property and the granting of patents of the World Intellectual Property Organization (WIPO) already existing before the creation of the WTO. These are the agreements and arrangements:

- The Paris Convention for the Protection of Industrial Property (since 1883) which is applied to patents, trademarks, geographical indications and industrial designs and models and unfair competition.
- The Patent Cooperation Treaty which facilitates the request and registration of patents at an international level.
- The International Agreement for the Protection of Vegetable Obtentions establishes, since 1961, the criteria for the granting of protection of the vegetable obtentions which are materialized in the “obtentor rights”. The subscribing parties of this agreement become part of the International Union for the Protection of Vegetable Obtentions (UPOV as per the initials in Spanish).
- The Madrid Agreement which deals with the international registration of trademarks and tries to control the indications of false or fraudulent indications.
- The Trade Related Intellectual Property Agreement (TRIPS or ADPIC in Spanish) which was treated at the Uruguay Round (1986-1994) incorporated for the first time standards about the intellectual property in the trade multilateral system, establishing a series of basic principles about the industrial property and the intellectual property (patents, copyrights, trademarks, industrial designs, geographical indications, integrated circuits and commercial secrets) in order to reduce the differences as regards the methods to protect these rights in the signing countries and with the ultimate purpose of creating common international standards.

In the TRIPS agreement certain minimum protection levels are fixed by each government regarding the intellectual property of the other members of the WTO. In so doing, there is a balance between the long term benefits and the possible short term costs for the society.

The Agreement covers three matters: how to apply the basic principles of the trading system and other international agreements about
the intellectual property, how to provide the adequate protection for the intellectual property rights, how the countries must properly respect these rights in their territories and how to solve the differences regarding intellectual property among the WTO members, and also the establishment of a series of special temporary provisions during the period of insertion of the new system. However, in spite of the signature if this agreement, we still find many differences, both inside the WTO and between the developed countries when it comes to the establishment of the regulation of patents on plants and genetically modified animals and on the processes needed to produce them.

Besides, we must also mention that the TRIPS agreement is not binding on its members to adopt a system identical to the UPOV or to join it but many countries are enforcing the protection of vegetable varieties according to the obtentor rights and the adhesion to the UPOV. Nowadays, the possibility to apply sui generis systems different from the UPOV in developing countries is studied.

In summary, the intellectual property of innovations related to plants, their parts or new varieties is protected, basically, through two systems: the system of obtentor rights (applicable to new vegetable varieties) and the system of invention patents (applicable to plants or cells, genes, seeds, processes for the transformation of plants and transformation vectors). In some countries, this last system is also applicable to vegetable varieties and hybrids.

**UPOV agreement for the protection of vegetable obtentions**

Nowadays, we have two legal frameworks which protect the innovations as regards plant material. On the one hand, there is the legal framework prevailing in the United States, which includes the conventional patents apart form having a system of vegetable varieties similar to the European one and having a special law of vegetable patents (1930), only applicable to vegetable material asexually propagated. On the other hand, there is Europe which deems as inappropriate those mechanisms of protection of new varieties obtained through traditional enhancement methods (hybridization and selection). There, the Vegetable Varieties Rights were created.
In 1961, sponsored by the International Union for the Protection of Vegetable Obtentions, the UPOV Agreement is created which “provides for a sui generis way of protection of intellectual property, specifically adapted to the plant breeding method and elaborated to encourage the obtentors to create new vegetable varieties”. The agreement establishes three criteria: the distinctiveness, that is, that they are clearly distinguishable from other varieties previously protected by the expression of at least one important feature; the homogeneity (the plants of the variety must be homogeneous between one another) and the stability since the features must remain unaltered after repeating the reproduction or propagation (this last criteria implied difficulties for the hybrids which have been solved in the UPOV agreements).

In 1991, the UPOV Agreement was reviewed and the introduced changes became part of the European Community Vegetable Varieties Right (1995). Mainly, the rights of the vegetable obtentors were strengthened regarding the material of the protected variety to be propagated, the multiplication, sale, trading, export, import etc. Also, some improvements were included regarding the potential protection of all the plants genres and species.

The concept “essentially derived varieties” was introduced to allow the breeder to control the use of the variety in case it suffers random mutations. Are understood to be such the varieties "mainly derived from an initial variety or from a variety that in turn derives from the initial one and which keeps the expression of the essential characteristics derived from the genotype or combination of genotypes of the initial variety”. In this way, the rights of the obtentors are protected. Otherwise, these rights would soon loose the value of their intellectual property as it had been happening when a breeder made "cosmetic" changes on a previous variety without paying for it.

Among many measures of the UPOV, we must highlight the fact that the farmers can save the seed for the following seeding season with no need to ask for permission, that the small farmers are exempt from the payment of royalties and that the farmers can continue keeping established varieties for seven years.

European regulations on biological patents (98/44/CE)
Article 2 of the European regulations on biological patents defines two basic concepts: On the one hand, the concept of "biological matter" describes that matter which is isolated from its natural environment or produced through a technical procedure even when it previously exists in natural state. On the other hand, the concepts of "microbiological procedure" and "essentially biological procedure" are defined.

As regards the transgenics, the article 4.2 of the Directive states that “those inventions with animal or vegetable objects shall be patentable if the technical viability is not limited to certain vegetable variety or animal type”. This means that the patents with high scope on the variety or type are accepted and this implies the intellectual protection of innovations on transgenic plants and animals which due to the type of technology can be performed on different varieties and breeds.

As regards human beings, article 5 deals with the human material patents. In article 5.1 it is stated that neither the body as such nor its different parts in their natural state are patentable. Article 5.2 states the possibility to patent an element isolated from the human body obtained through a technical procedure, including the total or partial sequence of a gene even when the structure of that element is identical to that of a natural element.

According to article 5.3, the granting of the patent shall depend on the fact that the isolated element has or has not an explicit application in the request since it is not possible to patent sequences with an unknown function which do not solve a technical problem. Based on this, it is possible to grant patents for genes with known functions that can be used in the design of drugs or for sequences with unknown function that can be used in diagnosis or other industrial purposes. In article 26 it is stated that it is mandatory to obtain the approval from the person out of whom the material or biological structure is isolated.

**The patenting process in numbers**

The empirical evidence shows, first, an explosion of the patenting process. The applications requesting patents experienced an enormous increase worldwide since it went from 2.3 millions in 1994 to more than 8 millions in
2001 and to more than 12 millions in 2004. In the United States, the total number of patents obtained between 1980 and 200 was more than the double and between 2000 and 2004 increased by 60%.

The countries that grant more patents are, in the following order, the United States (especially individuals, companies and government as national agencies although during the last years the highest growing belongs to the foreign ones), Japan, Germany, United Kingdom, France and Canada. We must mention that there is also a high concentration of patenting in a few countries like Japan (452,737 patents) which is four times the ones in the United Kingdom (101,330 patents) and is twenty times those in Taiwan (24,646 patents). In Latin America and the Caribbean countries, Mexico is first with the position number 24 (1,907 patents). Then follows Brazil (position 28 with 1,263 patents), Argentina (position 32 with 904 patents) and Venezuela (position 36 with 557 patents).

As regards the ranking of companies with the highest number of patents, IBM is first, followed by Canon, Hewlett-Packard and Matsushita. If we concentrate on the most dynamic branches of patenting in the United States, first we find the biology and the molecular microbiology, followed by the drugs and compounds, electronics and optical systems. Inside the biotechnology, the highest number of patents belongs to the transgenics and the processes associated to them, genes and sequences of genes.

The main companies that patent in the area of the biotechnology are, in this order, Dow Chemical, Basf, Ciba Geigy and Monsanto, followed by the United States government, universities, foundations and researchers. More precisely, inside the agricultural Technologies, the order according to the number of patents is as follows: the universities (56.0%), Aventis (15.7%), Singenta (13.8%), Grupo Monsanto (5.9%) and Grupo Dupont Pioneer (0.2%). Finally, As regards genes and genes sequences, the highest number of patents belongs to the United States Government in first place, followed by the University of California, Smith Kline Beecham and Incyte Pharmaceuticals Inc.

The intellectual property and the protection of biotechnology in the WTO framework
The GATT, antecedent of the WTO, comes into effect in 1948, appearing in this way the International Commerce Organization (ICO). The WTO appears after the Uruguay Round of the GATT (1986-1993) and due to substantial commercial and political changes that took place in the world until it was created, has many differences with the ICO. For example, the constitution treaty of the WTO regulated matters which did not appear in the ICO, like agriculture, service and intellectual property.

The WTO regulates the intellectual property rights through the Agreement on the TRIPS, which constitute the minimum protection on intellectual property and the countries which are members of the WTO must adapt their legislations to their respective national legislations. Although the deadlines for this adjustment vary according to the level of development of the country, the double principle of the most favored nation and national treatment was applied for all the members one year after the WTO became effective. Also, since 1995 a special system of protection has been imposed on pharmaceutical and chemical products for agriculture.

**The protection of biotechnology in the WTO**

The protection of the intellectual property rights in the WTO was achieved thanks to the position of the representatives of the developed countries in the Uruguay Round. Apart for incorporating the traditional property rights (trademarks, patents and copyrights) they were able to introduce new elements like the biotechnology.

**The patents: granting on live matter, plants and computer programmes**

There are differences in opinion as regards the protection through patents between developed and developing countries. While the developed countries try to reform the protection, the developing ones are afraid that the future technological process of the nation is limited. In the agreement on the TRIPS, the prevailing position was that of the developed countries, prolonging to 20 years the protection period granted by the patents and investing the cause of the test in the case of patents on procedures. But
this reinforcement was attenuated by some dispositions which limited the final TRIPS agreement. The article 27.1 of the Agreement established as patentable the inventions of all the fields of technology, products or processes, enlarging the patentability to new live matter.

As regards the granting of patents on live matter, plants and computer programmes, first, regarding live matter, the developments in genetic engineering coincided in time with the Uruguay Round of the WTO and therefore became an unavoidable matter during the Round when including the intellectual property in that forum. Therefore, following the criteria of the European Agreement on Patents, it was agreed to grant patents on the micro-organisms and non-biological and microbiological processes.

As regards plants, the members can decide if they want to exclude them from the protection through patents and they are also free to decide the kind of protection that must be given to the vegetable obtentions, be it patents, sui generis systems or a combination of both. Although the TRIPS Agreement is not binding to confirm the International Union for the Protection of Vegetable Obtentions of 1978, several Latin American governments has joined it.

Finally, as regards the computer programmes, they were not considered as patentable before the TRIPS agreement but due to the growing importance of this industry in the developed countries, more and more patents are granted on the technical aspects related to software. Therefore, the agreement protects them through the copyrights although in the developed countries the patent modality would be preferred. The resistance of the developing countries against the enlargement as regards patents was partly attenuated by concessions referred to grace periods and derogations.

Possible exclusions

When defining the patentable matter, the article 27 of the TRIPS Agreement establishes a series of exclusions except which everything is patentable. In general, everything which traditionally has not been protected can be excluded, like the diagnosis methods and the therapeutic and surgical methods to treat persons and animals apart form the inventions whose
commercial exploitation affects the public order and the moral, the health or the life of persons or animals. The procedures potentially harmful to the flora or to the environment are also excluded.

Also, as we have already mentioned, it is possible to exclude the plants, animals and procedures essentially biological, allowing the country members to decide. The protection of the new vegetable varieties is left in the hands of a specific system, different from the patents system. However, the specific system is not applicable for the new animal species. Therefore, up to the present moment the only mechanism to protect them are the patents as a consequence of the non-restrictive interpretation of that prohibition.

a. Patentability requirements
The TRIPS Agreement establishes the granting of patents for the novelty, the invention and the industrial application, but does not specify some minimum levels of novelty or invention. In this sense, the member Status must choose the standards they want to apply. As regards the inventions, there could be difficult requirements to restrict the patentability or easier requirements to encourage the local developments.

b. Limitations on the patent rights
The TRIPS Agreement in articles 30 ("exceptions to the granted rights") and 31 ("other uses without authorization of the holder of the rights", which includes the mandatory licenses and the enhancements on protected inventions) establishes a series of regulations which limit the exclusivity right granted by the patents. As regards the obligatory licenses, these are the minimum restrictive conditions:

• When the holder of a patent refuses to authorize an agent to use the protected property, in a prudential period of time, under reasonable circumstances, the State can make public use of that property fore non profit purposes in case of national emergency or extreme urgency.
• The authorization given through this mechanism is not exclusive.
• The usage granted in this way cannot be transferred unless it is transferred together with the company or intangible to which it is applied.
• This usage is onerous; the holder shall always be entitled to be paid.
• The main purpose of the usages with no authorization from the holder is to supply the internal market of the country member in which this usage is established.

Besides, the Agreement limits most of the regulation of the Paris Agreement which allows the granting of mandatory licenses in case of abuse in the practice of law, like for example the non exploitation of the protected matter. According to the Agreement, the patent right can be enjoyed no matter the origin of the products (them may come from abroad or they may be produced in the country). Therefore, it is not possible to impose a mandatory license for the non exploitation in the country where the right has been granted unless the conditions established in article 31 are met and the country where the mandatory use is to be authorized has problems of internal supply of certain essential products, like medicines and others.

c. Enhancements and dependent patents

The article 31 also establishes a series of regulations to solve the problem of granting a second license infringing the exploitation of a patent previously granted. This regulation could be applied to the enhancements introduced in an innovation already protected by patents. The minimum conditions to grant another license are:

• The enhancement must generate an economically important technical advance.
• The holder of the first patent shall be entitled to obtain a cross-license under reasonable conditions.
• It is not possible to grant the authorized use of the first one without the granting of the second one.

When posing a great obstacle for the local development of technology through the import of technology, the observation of this regulation could
impede the transference, promotion and development of technology in countries without the technological capacity or the means needed to carry out I+D since it imposes conditions which are very difficult to meet by the technologies of inferior levels of the non developed countries. Occasionally, this demand could make impossible or ineffective the exploitation of a second patent referred to an enhancement or to a local technological development of inferior level. One way to attenuate this demand would be to interpret it in a restrictive way, following the objectives established in article 7 of the TRIPS Agreement.

d. Limited exceptions to the rights

On account of article 30 of the Agreement, the member States can establish a series of limited exceptions to the exclusive rights granted by a patent as long as the following requirements are met:

- The exceptions must not threaten in an unjustified way the exploitation of the patent.
- The legitimate interests of the holder must not be threatened.
- The legitimate interest of third parties must be taken into account.

The WTO case law deals with the scope and sense of this last regulation. The European Commission filed a claim against Canada’s government requesting a revision of the national legislation of this country as regards patents. To defend their interest and to be able to apply the limited exceptions, the Canadian authorities invoked the articles 7 and 8 of the TRIPS Agreement on the protection of intellectual property. On that basis, they maintained that the governments should have the necessary flexibility to adjust the patent rights in order to achieve a balance between such demands and the top priority national policies. The special group formed in the WTO to settle this conflict finally declared that the existence of article 30 implied the acknowledgement of the fact that the definition of article 28 about the patent rights needed an adjustment and added that, in spite of this, no renegotiation of the basic balance achieved in the Agreement applied. As regards the compatibility of Canadian legislation with article 30, the special group declared that the conditions established in this article
were accumulative and that for the exception to be authorized all them had to be present.

4.1.3. Retroactivity of the Agreement as regards the protection of pharmaceutical and chemical products for agriculture

In article 65.4 of the TRIPS Agreement it is established that, when a developing country is required to protect with the help of patents for products certain technological sectors which did not enjoy this benefit when the agreement was applied, that State shall be granted, apart from the 5 grace years already granted for other concepts, 5 additional years to adjust the national legislation. However, according to articles 70.8 and 70.9, when pharmaceutical and chemical products for agriculture are protected, the grace period is only apparent and besides, the regulations acquire a retroactive character. In fact, the member Status could submit requests for patents from the date the Agreement became effective (January 1st 1995). On the other hand, the States are required to grant exclusive trading rights for five years which will start as of the date in which the trading was authorized, under a series of conditions, of a product for which a patent request was submitted no matter it is approved or not.

The holders of patents enjoy a maximum level of protection since they have been guaranteed the possibility to preserve the novelty until 2005 if the respective request was submitted and the member States are required to grant exclusive trading rights under certain conditions even if by 2005 the invention is not considered as applicable to be protected by a patent. Therefore, by establishing the exclusive trading rights, a period of exclusiveness has been obtained, with no need to obtain a patent and consequently, with no need to comply with the patentability criteria required in the country where the exclusive rights are granted.

a. Protection of undisclosed information

The TRIPS Agreement also deals with the unfair competence, determined in article 10 bis of the Paris Agreement as the basis for the protection of the undisclosed information. Although the article does not define the concept
“undisclosed information”, it does establish a series of requirements for its protections, which are:

- The information must be secret, that is, difficult to access.
- It must have commercial value due to its confidential character.
- All the reasonable measures must have been taken to safeguard it.

Any kind of restriction as regards the nature of the matter to be protected is established. Therefore, any information that meets the mentioned requirements shall be protected. As long as the information is not disclosed, the protection shall have an indefinite duration in favour of its holder.

The entry into force of these regulations could be very important for the developing countries if they were applied to the traditional knowledge or to the goods they have, whose benefits are obtained almost exclusively by big transnational companies dedicated to exploit them. Among the mentioned knowledge and goods, which are usually based on the genetic resources of these countries, we find the natural medicine, the medicinal plants and the medicine of indigenous communities. In any case, it is difficult to place them within the framework of the modalities of intellectual properties in effect, like the patents and the copyrights, not only because they do not meet the requirements but also because the lack of resources to access this system. Therefore, the regulations we have mentioned could be, due to their flexibility, a valuable instrument to protect and preserve the traditional knowledge.

b. Geographical indications

The geographical indications were included in the GATT thanks to the initiative of several European States, where the geographical origin of a series of agricultural products was very important. The Paris Agreement already regulated the protection of the origin indications or origin denominations, establishing penalties for false indications about the origin of the product. In spite of the economic potential, the mechanism has been applied in a very isolated way in Latin America and the Caribbean countries.

According to the definition provided by article 22.1 of the TRIPS Agreement, the origin denominations identify a product as original from a specific territory or from a region or locality of that territory when the
quality, reputation or other characteristic can be attributed to its geographical origin. Although we usually distinguish between the origin denominations and origin indications, the Agreement prefers a wide concept, without making reference to the different modalities which are present both at a broad level and in the different national legislations. Also, the Agreement establishes measures which guarantee the conservation of the geographical indication, but limits its usage as mark only to the cases in which it avoids the fact that the abuse of the geographical indication introduces a mistake on the true origin of the product.

The geographical indications can be especially important for the developing countries, particularly for those in Latin America and the Caribbean, since in many of them there is a vast variety of natural or craftsmanship products that could be revaluated using this mechanism. In effect, the geographical indication is usually related to the small scale production of articles with especial characteristics, basically attributable to their place of origin. Besides, its application helps to preserve the biodiversity, as opposed to the transgenic agricultural varieties, which tend to promote the single crop farming.

c. Trade/Service Marks

The concern about the marks and copyrights was one of the main reasons to include the concept of intellectual property in the GATT. This inclusion was mainly promoted by the claims of the representatives of the industrialized nations about the trading of forged products and the lack of protection of the mark.

The marks are the distinctive and more visible signs of goods and services. The products of biotechnological origin also use them since they help to show the origin and the supposed virtues of their products and services. The TRIPS agreement enlarges to a great extent the signs that could constitute a mark, with the main purpose of differentiating the object. Besides, it is established that if certain signs are not distinctive by themselves, they can be registered as mark anyway, if the usage has given that virtue. It will be necessary to impose limitations on this regulation so that the exclusive rights on the generic names do not hinder their use by other agents.
Moreover, the member States cannot impose mandatory licenses regarding the marks. The article 6 bis of the Paris Agreement (version 1967) is also applicable since it establishes the protection of the “notorious mark”. Although the TRIPS Agreement does not require the use of a registered trademark, it imposes certain minimal regulations in case some day that requirement is mandatory. For example, it establishes a period of three years for the prohibition to use an already registered trademark. After this period, it is possible to request the annulment of that trademark due to the lack of use, although it also provides for the fact that the owner can present reasons to justify that lack of use, avoiding the annulment. This regulation is similar to the one contained in the Paris Agreement, except in that this latter did not establish a fixed period of time but a fair period for the annulment which would be effective only if the owner does not inform the causes of the lack of use.

The importance of marks and their advantages for competitiveness has come to a point that nowadays the trading of a product without mark is not conceived. This is reflected in the chapter of the Agreement which deals with the observance of the intellectual property rights, where criminal penalties are imposed for the cases of criminal forgery of marks or piracy of copyrights as well as the obligation of the member States to take measures to impose the respect for these rights.

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Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran

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With the entrepreneurship mission incorporated into the education and research missions of universities, their role in the economic and social development in societies has increased. Thus, subjects revolving around academic entrepreneurship and knowledge commercialization have drawn the attention of many researchers and politicians in different countries in the world. In Iran, too, the knowledge commercialization phenomenon is in its prime and is in its early stages of taking shape and development. Therefore, this paper aims to identify obstacles and solutions in the commercialization of university research in Iran. The qualitative research method has been used in the form of a case study. The research data collection tools consist of semi-structured interviews. As a compliment of data collection tools, some evidence and documents were also studies. The research statistical population includes all the individuals engaged in knowledge commercialization in the University of Tehran. Twenty six interviews were conducted before data saturation reached. The results of the qualitative research indicate that the

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organizational, environmental/institutional and internal university research commercialization impeding factors are critical obstacles in the Small Business Development Center (SBDC) of the University of Tehran and policy makers should devise proper strategies in light of these factors.

**Keywords:** Commercialization, Small Business Development Center, Commercialization obstacles

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**Introduction**

Given the widespread view that increase in university research boosts society’s capacities, one should also note that as long as the outcomes of university research are not transferred to public and private sector companies and implemented by them, it would be practically of no avail to the society. Therefore, the policies governing university researches should focus on rapid transfer of knowledge to the companies in the public and private sectors aided by other organizations to ensure the common good (Zieminski and Warda, 1999).

Commercialization is so important that currently many research and academic institutes have formalized commercializing technologies through offering consulting services and conducting research projects and the number of such consulting services centers is increasing by day in developed countries such that since 1980’s until now the number of technology transfer offices in America has increased from 25 to 200 offices (Dilcher, 2002, p.92).

Certainly, one of the reasons that account for the speed of technology development in developed and industrial countries is focus on the commercialization process of the research outcomes in those countries (Tijssen, 2006). In light of the condition of commercialization of university research in the Small Business Development Center of the University of Tehran, from 49 finished projects, all of which were highly potential for commercialization, neither one entered the commercialization process. Therefore, identification of obstacles and challenges in way of commercialization of university research could have a significant and
considerable effect on the development of academic enterprises and the entrepreneurial businesses of university researchers. Recognizing this notion is critical for national officials, R&D managers and technology managers. As a result, the main research question of this paper would be: what are the obstacles and solutions in commercializing university research in the Small Business Development Center of the University of Tehran?

**Literature Review**

**Theoretical Framework**

In this section, the theoretical framework of the research is presented to show the relationship between the research components. Given that starting an investigative case study research without having a theoretical framework is futile, in all stages of the research the theoretical framework was employed to enrich the results of the report, organize the interviews, and collect and manage data and not to exercise some kind of research design bias (Eisenhardt, 1989). Therefore, in this paper to avail of a proper theoretical framework, Siegel et al (2003) categorization was used which involve three main subjects of institutional, organizational and internal and it is proved it largely covers the effective factors in this respect. The reason for choosing this framework is its comprehensiveness in employing all the expected variables in previous studies. In fact, it is presumed that all the issues related to the obstacles in way of commercialization of university research could be summarized in these three subjects. The mentioned subjects provided the basis for designing open questions for individuals in this research and collecting the needed data. Although, the framework’s components were modified after the interviews, to avoid the risk of describing the phenomenon under study before thoroughly understanding it, we implemented the theoretical framework. The model’s indices were examined in figure 1 as the theoretical framework of the present paper.
**Figure 1:** The theoretical framework of the obstacles in the way of commercialization

**Internal impeding factors:** According to the definition, they denote the impeding factors that are recognized as the inputs of the technology transfer process from the university to the industry, examples of which are disclosing inventions, skilled staff employed in the technology transfer offices and imposed legal costs (external) for protecting intellectual properties of the university.

**Environmental/Institutional impeding factors:** Siegel sums up these factors in one topic and argues that they are related to the economic and political conditions of a society and its sub structures and availability of services.

**Organizational impending factors:** understanding the potential importance of organizational factors could be started with some considerations about activities, motivations and organizational culture that bear the interest of the stakeholders in the technology transfer process from the university to the industry.
Research Background

Evidence and examples about the growth of technology based ventures in the valid universities in the world such as Cambridge (Siegel, 1995), Stanford and MIT (Roberts and Malone, 1996) indicate that starting new university ventures and spin-offs and commercializing of university research are easily viable. The only requirement of its success is creating and implementing supportive values and cultures in such risky business ventures. On one hand, many researchers believe that in essence, universities are not entrepreneurial organizations. Perhaps, one reason for it could be the dimensions and largeness of these organizations. Nevertheless, there are many reasons to account for it such as the nature of relationships, the hierarchal structures and organizational levels, intense monitoring of rules and processes, time constraints and the tendency to achieve results quickly, lack of entrepreneurial skills, inappropriate incentive methods and systems, etc. Besides these barriers and constraints, many university professors and staff believe that being an entrepreneur practically prevents them from their main mission as researchers, which is to continue learning and teaching (Zahra and Garvis, 2000).

Various domestic and international researches have been done in the field of identifying barriers of commercializing university research using different methods. For example, stressing the knowledge spill-over theory of entrepreneurship, Acs et al. (2004) investigated the causes of failure among academic entrepreneurs who engaged in commercialization. In 2004, Zhao et al identified the major obstacles of innovation in academic entrepreneurs in the four stages of entrepreneurship (sensing the opportunity, seizing the opportunity, capture the value, reconfiguration). Plewa (2005) used a different approach to identify the barriers of commercializing research which is discovering conflicts of interests between universities and organizations. He was looking to find the answers for two questions which were 1) what interests stimulate universities and organizations to engage in commercialization 2) Do universities and organizations have different interests to stimulate them to enter into the industry-university relationship. In his studies, Kirihata (2007) divided commercialization into three stages of fundamental research, product development, and commercialization and then examined its barriers in each stage. Given the
various international researches in this respect, a summary of the mentioned obstacles are provided in the theoretical background section in table 1.

**Table 1: A summary of international researches about the obstacles in commercialization of research**

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Barrier</th>
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<tbody>
<tr>
<td>The need for technical supports (Decter et al., 2007, Lockett and Wright, 2005). The inadequate resources allocated to technology transfer in universities (O’Shea et al., 2005). Inefficiency of processes and procedures used (Siegel et al., 2003). Inefficiency of the processes of patent transferring agreements (Debackere and Veugelers, 2005, Decter et al., 2007). The monotonous nature of academic researches (Ndonzua et al., 2002, O’Shea et al., 2005), Incentive structure (cash and non-cash rewards) including credits to improve employees and the payment and incentive systems of technology transfer offices (Siegel et al., 2003a, Siegel et al., 2003b, Siegel et al., 2003, O’Shea et al., 2005). Different research questions and the current difficulties in the revelation trends of “General knowledge,” unawareness of graduates to the recent industrial advancements (Fontana et al., 2006). The lack of a practical perspective (Kirihata, 2007).</td>
<td>Structural</td>
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<td>The lack of long-term strategies (Elmuti et al., 2005, Chiesa and Piccaluga, 1998, Mahboudi and Ananthan, 2010). Bureaucracy and the inflexibility of administrative systems in universities (Siegel et al., 2003; Sooreh et al., 2011). The inefficient management of intellectual properties (Siegel et al., 2003).</td>
<td>Management</td>
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<tr>
<td>Clarification and sharing market demands (Kirihata, 2007, Vohora et al., 2004, Rothaermel and Thursby, 2005, Hansen, 2004, Acs et al., 2004). Cooperating with experts outside the organization (e.g. accountants, venture capitalists and lawyers) (Kirihata, 2007), The lack of communication and networks among investors, industry actors and academics (Decter et al., 2007, Abutalib, 2007). Slow speed of knowledge transfer negotiations, detecting and locating the technologies (Decter et al., 2007, O’Shea et al., 2005), Public environment (Chiesa and Piccaluga, 1998; Salamzadeh et al., 2011; Sooreh et al., 2011). Demand conceptualization (Kirihata, 2007).</td>
<td>Environment</td>
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<td>Researcher</td>
<td>Barrier</td>
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<td>products in competition (Abutalib, 2007).</td>
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<td>Not being familiar with companies willing to acquire technology (Decter et al., 2007, O’Shea et al., 2005). Cultural differences of industrial actors and academics (Debackere and Veugelers, 2005, Barnes et al., 2002, Samson and Gurdon, 1993, Siegel et al., 2003a, Siegel et al., 2003b, Siegel et al., 2003, Fontana et al., 2006, Elmuti et al., 2005, Decter et al., 2007).</td>
<td>Industrial</td>
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<tr>
<td>Contrasting revenues of industrial and academic actors (Samson and Gurdon, 1993, Decter et al., 2007, Plewa, 2005). differing motivations of industrial and academic actors (Decter et al., 2007). the lack of knowledge of industrial actors about technologies produced in universities (Acs et al., 2004). Not trusting the industry regarding the protection of intellectual property right (Siegel et al., 2003, Abutalib, 2007), the contrasting objectives of industrial and academic actors (Debackere and Veugelers, 2005, Fontana et al., 2006, Elmuti et al., 2005). Long academic researches, differing priorities and preferences (Fontana et al., 2006, Barnes et al., 2002, Elmuti et al., 2005).</td>
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<tr>
<td>Poor regulations regarding the protection of intellectual properties on the national level (Abutalib, 2007). Academic agendas and regulations in all cases and related to commercialization of research (Shane, 2004). regulations and policies applied by governments (Goldfarb and Henrekson, 2003; Salamzadeh et al., 2011; Sooreh et al., 2011).</td>
<td>Legal</td>
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</table>
Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran

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<th>Researcher</th>
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Research Methodology

With respect to the purpose, the present paper falls under the category of applied research. In this paper, the qualitative research method has been used with the aim of investigative research and with the field research strategy of interviewing in person. The in-person interviews involved three groups of individuals bearing interest in commercialization namely, professors experienced in commercialization of university research in the Engineering faculty of the University of Tehran, scholarly professors in university entrepreneurship and commercialization of research, and managers and policy makers in SBDC. The selection criteria were ten years of experience at the minimum for the experienced professors, scientific publications related to commercialization of university research and entrepreneurship for the scholarly professors, and two years of experience at the minimum for the managers and policy makers in SBDC. The selection criteria were ten years of experience at the minimum for the experienced professors, scientific publications related to commercialization of university research and entrepreneurship for the scholarly professors, and two years of experience at the minimum for the managers and policy makers in SBDC. For sampling purposes, the objective judgments method was used which is considered as one of the non-probability sampling methods. The sampling and interviews...
continued until the analysis and investigation process reached theoretical saturation, therefore, 26 semi-structured and open interviews were conducted.

The data collecting method involved examining of the relevant theoretical principles and literature including the pertinent domestic and international scholarly papers, archival data, and interviews with experts. Open ended and semi-structured interviews were conducted according to the guidelines which in fact contained a list of topics, subjects, and areas that needed to be attended to along with other directions for 1) the sequence of topics 2) range and domain of activities 3) nature of visual and audio tools and how to use them. All the interviewees had to answer the same questions such as their definitions of commercialization, barriers and impediments to commercialization and solutions for improving commercialization of research in the SBDC.

Furthermore, based on the research by Eisenhardt et al (1998), three techniques were used for the purpose of increasing the validity and reliability of the qualitative data. First, the answer guessing technique was used to avoid the respondent’s (deviation from the topic of discussion) when answering open-ended questions. Afterwards, the interviewees were ensured about their anonymity and confidentiality of the answers so as to increase the accuracy of answers and statements. Finally, each interviewee was informed in advance about the purpose of the research. On the one hand, since the main theme of the case study research involved detailed collection of data from multiple sources, in order to ensure the validity of results and benefit from the advantages of plurality of sources, we did not only suffice to the interviews and investigated the documents and evidence from the SBDC archival data to enhance the results. For the analysis of data, open coding was first used and then the axial coding.

Data Analysis (Research Findings)

For the purpose of analyzing the data, first the responses and opinions of the interviewees were recorded with their permission and provided they did not allow recording, notes were taken during the interviews and they were transcribed later. The main produced data are the result of in-person interviews and which in fact consist of the verbal responses, comments,
ideas, discussions and interactions of the participants. In the next step, the
data were categorized and when the area of study was fully determined we
decided about the initial interpretation of the results and creating a set of
general topics. This set of general topics was later used for categorizing and
analyzing the recorded transcripts. The categorization was done according
to the topics in the interview guidelines and also the research purposes i.e.
the internal and external impeding factors in the SBDC. In the third step,
the categorized data were analyzed and this was done in three stages viz.
reduction of data (i.e. selecting, simplifying, and transferring raw data to an
analyzable format), displaying data and conclusion and testing. The matrix
structure of the data and information analysis about barriers of university
research commercialization in SBDC which were extracted from the
transcripts of the interviews are shown in table 2.

Table 2: A summary of international researches about the obstacles in
commercialization of research

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Aspects</th>
<th>Components</th>
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<tbody>
<tr>
<td>Organizational barriers</td>
<td>Inefficiency of university research commercialization structures</td>
<td>Lack of physical substructures in the SBDC</td>
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<td>Lack of technical supports in the SBDC</td>
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<td>Lack of allocated resourced to the SBDC</td>
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<td>Lack of coordination and effective communication between the university structures in the SBDC</td>
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<td>Inefficiency of university research commercialization processes</td>
<td>Lack of transparency of processes in the SBDC</td>
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<td>Incomplete processes in the SBDC</td>
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<td>Inefficiency of the employed procedures and processes</td>
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<td>Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran</td>
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<td><strong>Issue 7 December 2011</strong></td>
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<tr>
<td><strong>Inefficiency of patent transferring agreement processes</strong></td>
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<td><strong>Differences in the expected research questions for each party and existing difficulties in the processes of disclosing the required knowledge</strong></td>
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<td><strong>Lack of a thorough research to market cycle</strong></td>
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<td><strong>Lack of proper backgrounds</strong></td>
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<td><strong>Lack of entrepreneurship programs</strong></td>
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<td><strong>Lack of knowledge and skill in the area of business activities and launching and managing ventures</strong></td>
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<td><strong>Management incompetency</strong></td>
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<td><strong>Lack of long-term strategies and a practical vision in the SBDC</strong></td>
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<td><strong>Bureaucracy and inflexibility of the university administrative system toward the SBDC</strong></td>
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<td><strong>Ineffective management of intellectual properties in the SBDC</strong></td>
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<td><strong>Lack of support for commercialization from the senior management</strong></td>
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<td><strong>Incompetent expert systems</strong></td>
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<td><strong>Low level of education and expertise with evaluators</strong></td>
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<td><strong>Professors' objections to the results from the evaluation of plans</strong></td>
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<td><strong>Incapability of evaluators in most cases</strong></td>
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<td><strong>Lack of an incentive structure</strong></td>
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<td><strong>Lack of motivation and inclination</strong></td>
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<td><strong>Lack of incentive structures (cash prizes) such as the promotion of the staff and faculty members</strong></td>
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<td>Environmental barriers</td>
<td>Lack of marketing in SBDC</td>
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<td></td>
<td>Lack of incentive structures (non-cash prizes), reward systems and bonuses for the faculty members and the staff</td>
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<td></td>
<td>Have the faculty share the profits</td>
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<td></td>
<td>No mass producing products</td>
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<td></td>
<td>Lack of understanding of the needs and priorities of the business sector</td>
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<td></td>
<td>Poor quality of knowledge and technology produced in universities</td>
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<td></td>
<td>Transparency and not sharing of market needs</td>
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<td>Lack of demand conceptualization</td>
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<td>Lack of products’ competitiveness</td>
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<td>Lack of market knowledge</td>
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<td>Lack of communication networks with the market</td>
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<td>Industry barriers</td>
<td>Political constraints and sanctions</td>
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<td></td>
<td>slow speed of negotiations on knowledge transfer</td>
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<td></td>
<td>Identification and location of favorite technologies</td>
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<td>Apolitical planning</td>
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<td></td>
<td>Managerial instability and constant change</td>
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<td></td>
<td>Failure to identify companies that are willing to acquire technologies</td>
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<td></td>
<td>Different cultures, interests, motivations of industry participants and academics</td>
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<td>Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran</td>
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<tr>
<td><strong>Administrative bureaucracy</strong> (complexity of the process in the Development Department, slow and bureaucratic process of getting permits, and a lot of meetings and correspondence)</td>
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<td>Motivation for publishing research</td>
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<td>Failure of the Industry to ensure full protection of intellectual property rights</td>
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<td>University project take a long time</td>
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<td>The public sector's reluctance</td>
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<td>Different aims and priorities</td>
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<td>Shared vision of the university and industry</td>
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<td>Inconsistency between university projects and industry needs</td>
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<td>Lack of awareness of industry actors of technologies produced in the universities</td>
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<td><strong>Internal barriers</strong></td>
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<td><strong>Financial barriers</strong></td>
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<tr>
<td>The university’s disinclination to provide financial support for researchers and hence to exploit the knowledge generated by them</td>
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<td>The SBDC’s reliance on the government budgets</td>
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<td>Different financial expectations of the SBDC and the Development Department from the supported projects</td>
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<td>The government’s lack of networking with venture capitalists</td>
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<td>Skilled labor barriers</td>
<td>Inadequate budgets allocated for applied research in the university</td>
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<td></td>
<td>Lack of role models</td>
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<td>Professors’ lack of freedom to participate in business activities</td>
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<td>Lack of access to appropriate human resources</td>
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<td>Researchers’ lack of awareness of intellectual property rights in universities</td>
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<td>The unrealistic expectations of the universities’ administrators and professors about the value of their technology</td>
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<td></td>
<td>Researchers’ vague and uncertain relationship with money</td>
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<td></td>
<td>Scientists’ characteristics</td>
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<tr>
<td>Incompetent intellectual property law</td>
<td>Lack of clear intellectual property legislation</td>
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<tr>
<td>Communications and networks barriers</td>
<td>Failure to cooperate with experts outside the organization (such as accountants, lawyers and venture capitalists)</td>
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<td></td>
<td>Lack of communication and networks among investors, industry activists and academics</td>
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<tr>
<td>Institutional barriers</td>
<td>Legal barriers</td>
<td>Poor intellectual property protection laws at the university and national level</td>
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<td></td>
<td>No implementation or incorrect implementation of the laws</td>
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### Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran

#### Discussion and Conclusion

In this section, in order to provide a ground for comparison with previous efforts of other researchers mentioned above, it can be argued that in this study, by complementing the previous research efforts (Mahbodi and

<table>
<thead>
<tr>
<th><strong>Normative barriers</strong></th>
<th>Poor policies, laws and government policies in all matters related to the commercialization of research</th>
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<tbody>
<tr>
<td></td>
<td>Rents and relations-oriented in the public sector</td>
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<td></td>
<td>No motivation or sensing of the need to commercialize knowledge</td>
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<td>Different value systems</td>
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<td></td>
<td>Lack of entrepreneurial spirit in universities</td>
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<td></td>
<td>The general belief about the universities being non-profitable and the need to publish research results instead of preserving them for commercialization</td>
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<td></td>
<td>The unattractive nature of academic research</td>
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<td>Inappropriate attitude toward entrepreneurship in the academic society</td>
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<td></td>
<td>Mental image of the business environment</td>
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<td><strong>Cultural-cognitive barriers</strong></td>
<td>Lack of participatory culture</td>
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<td></td>
<td>Negative attitudes among academics about engaging in business activities</td>
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<td>Creating and promoting a supportive and entrepreneurial culture</td>
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</table>
Anatan, 2010; plewa, 2004) and particularly, the theoretical model of the research (Siegel, 2003), the default theoretical framework of the research was modified after the classification and management of data and ultimately, 3 topics were added to the previous 4 ones. So, the environmental/institutional barrier – which is generally defined as factors that need to be studied in the environment (Kirihata, 2007; Vohora et al, 2004; Rothaermel and Thursby, 2006; Hansen, 2004; Acs et al, 2004) – are divided into environmental barriers and institutional barriers in this paper. This division and stress on institutional barriers as important barriers are because according to the interviews, institutional barriers such as laws, regulations and legislations are recognized as significant barriers in commercialization in the SBDC and therefore, they should be regarded as a very important dimension. Moreover, cognitive and normative barriers are less investigated in earlier works (Elmuti et al., 2005) whereas they are stressed as one of the dimensions of institutional barriers here in this research. Finally, cultural-cognitive barriers are recognized as institutional barriers. While in earlier works, just cultural barriers were identified as one of the type of barriers and impediments, such that they were viewed in a general manner or from the perspective of cultural differences of the industry and the university (Debackere and Veugelers , 2005; Barnes et al., 2002; Samson and Gurdon, 1993; Fontana et al., 2006; Siegel et al., 2003a; Siegel et al., 2003b; Siegel et al., 2003; Elmuti et al., 2005; Decter et al., 2007) or from the perspective of the cultural differences of the university (O’Shea et al., 2005; Henrekson and Rosenberg, 2001; Mahboudi and Ananthan, 2010; Ndonzuau et al., 2002; Spilling, 2004). This is while in the present paper, the cultural barriers are examined from perspective of cultural differences in the industry and the university context and are also recognized as a very important dimension of the university as an institution. On the subject of organizational barriers, the present paper supports the findings from earlier works in the area (Debackere and Veugelers, 2005; Fontana et al., 2006; Siegel et al., 2003a; Siegel et al., 2003b; Siegel et al., 2003; Decter et al., 2007; Ndonzuau et al., 2002; O’Shea et al., 2005). And with regard to the internal barriers, it should be noted that commercialization of university research is only possible when the necessary inputs of this activity exists viz. transparent laws on intellectual properties (Abutalib, 2007), sufficient and appropriate financial background
(Abutalib, 2007; Moray and Clarysse, 2005; Hansen, 2004; O’Shea et al., 2005; Lockett and Wright, 2005), skilled labor (Lockett and Wright, 2005; Kirihata, 2007; Abutalib, 2007) and finally, the communication networks inside and outside the university (Decter et al., 2007; Abutalib, 2007). Overlooking these aspects have always ensued adverse consequences. In earlier works, researchers have not thoroughly examined all the aspects and they have sufficed to one or some aspects while in this research all the aspects were examined in the context of the SBDC.

Therefore, based on content in the research methodology section and owing to the qualitative research, the research question was appropriately answered. Using interviews and multiple sources, the components of the commercialization of university research barriers in the SBDC were extracted and then illustrated in figure 2 in the form of a three-level pattern with the first level representing the subjects, the second level the dimensions, and the third level the components. It is to be noted that the concepts arising from each of the aspects project in the form of a consistent system in the above-mentioned components. In other words, removing one barrier is not enough for overcoming the all barriers and reducing all the barriers at the same time could become synergically effective. However, due to the constraints in illustrating the 75 components, we sufficed to provide only an outline of them. Solutions for the commercialization of university research in the SBDC were derived from the interviews.

**Figure 2:** Components of university research barriers (subjects, aspects, and components) (researcher made)
Obstacles and Solutions of Commercialization of University Research: Case Study of Small Businesses Development Center of University of Tehran

Components

Aspects

Subjects

organizational

institutional

environmental

internal

7% components

Inefficiency of university research commercialization structures
Lack of proper backgrounds
Management incompetency
Incompetent expert systems
Lack of an incentive structure
Lack of marketing in SBDC
Environmental barriers
Industry barriers
Financial barriers
Skilled labor barriers
Incompetent intellectual property laws
Communications and networks barriers
Legal barriers
Normative barriers
Cultural cognitive barriers
Recommendations

Based on the results from the present research, some recommendations are offered here for the aim of developing and deepening this area of knowledge commercialization:

1) Conducting quantitative studies for ranking the barriers and acquired solutions
2) Offering a model for evaluating the barriers of university research commercialization
3) Examining the results from the present paper in other commercializing centers and universities and conducting comparative study between them.

In addition to the above-noted recommendations, some practical recommendations are offered below for the managers and policy makers in the field of university research commercialization, as well. A point to note is that the recommendations are given here with an emphasis on the solutions.

1) Revising the structure and processes associated with commercialization of university research with respect to the internal and external context of the university research commercialization centers.
2) Adopting policies and pass laws that support commercialization on the national, regional and local level.
3) Determining the research budget and creating a process for the budget to be put to use without any limitations regardless of the type of research.
4) Developing a professional proficiency system for evaluating university research projects and appraising the potentiality of these projects for the purpose of commercialization.
5) Improving the capacities of the faculty with regard to commercialization and focusing on education and learning.
6) Defining common goals for the university and the industry in line with the Development Vision of the country.
7) Holding specialized common meetings and sessions between the university and the industry to exchange views and identify common issues
8) Defining university projects based on the real needs of the industry.

References


Analyze of Green Market Certificate, Case Study Romania

**Authors:** Adrian Georgian ARDELEANU, Academy of Economic Studies, Bucharest, Romania, geo_agr@yahoo.com

According with the assessment of numerous international bodies energy needs of industrialized countries will increase by approximately 60% by 2030, the same estimates show that oil demand will be more than 115 million barrels in 2020. On the other hand oil and gas reserves are unevenly distributed around the globe, and the largest reserves are situated in politically or economically insecure regions, therefore due to increasing consumption of energy is necessary orientation to use non-conventional forms of energy, beside to ensure a share of renewable in the energy consumption by at least 20% by 2020, European Union setting national targets for each Member State. Despite of advantages offer by green energy for environment, the cost of operating are still high, leading to the increasing of electricity price to the final consumptions. Therefore in order to stimulate the green energy the governments support the production of green energy thought a range of incentives, the paper aim is to analyze the market of green certificate as well as the actual context that offer real premises for development of this.

**Keywords:** energy, certificate, market, renewable resources

Fulfilling the immediate and medium-term energy demand, at a cost as low, represent the overall strategic objective of the energy sector. Due to increasing consumption of energy is necessary orientation to use non-conventional forms of energy. It is estimated that demand for energy
worldwide to grow by around 60% by 2030. World consumption of oil has already increased by 20% in 1994, while worldwide demand for oil is expected to grow by 1.6% per year, while the known oil reserves can sustain the current level of consumption only until 2040, and the natural gas until 2070. Another major problem is increasing of oil and gas prices; they have nearly doubled in the EU over the past two years, with electricity prices following.

Intensification of energy use from renewable sources constitutes an important component of the package of measures needed to reduce emissions of greenhouse gases and to comply with the Kyoto Protocol as well as other commitments made at European level in order to reduce the greenhouse emissions in the perspective of 2012. At present only a small proportion of the world’s energy needs come from alternative and renewable energy sources.

Table 1: The Renewable Energy Resource Base (exajoules per year)

<table>
<thead>
<tr>
<th>Type of resources</th>
<th>Current use</th>
<th>Theoretical potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydropower</td>
<td>9</td>
<td>147</td>
</tr>
<tr>
<td>Biomass energy</td>
<td>50</td>
<td>2,900</td>
</tr>
<tr>
<td>Wind energy</td>
<td>0.12</td>
<td>6,000</td>
</tr>
<tr>
<td>Solar energy</td>
<td>0.1</td>
<td>3,900,000</td>
</tr>
<tr>
<td>Geothermal energy</td>
<td>0.6</td>
<td>--</td>
</tr>
<tr>
<td>Ocean energy</td>
<td>not estimated</td>
<td>7,400</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>&gt;4,000,000</td>
</tr>
</tbody>
</table>

About 13 percent of primary energy comes from renewable, with most of this coming from traditional biomass like wood-burning. Hydropower is the next largest source, providing 2-3%, and modern

technologies like geothermal, wind, solar, and marine energy together produce less than 1% of total world energy demand.2

Figure 1: Renewable as a % of final energy consumption by Member State

The percentage of renewable in the final energy consumption varied between countries: from almost 40% in the case of Sweden — to almost zero at the bottom end of the scale. However, this overview masks the notable progress made across the Member States from 1991 onwards. For instance, over this period, Latvia, Lithuania, Romania and Estonia — all of them increased their absolute share by over 10%. Ten Member States doubled their share in the final energy consumption, with Bulgaria, Czech Republic, Slovakia, Cyprus and Lithuania increasing their share by over a factor of four, albeit starting from a relatively low base. However, from 1991 to 2005, the shares in a small number of Member States actually declined — due, primarily, to a combination of the rapidly rising final energy consumption and fluctuations in the production of hydropower due to lower rainfall.3

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2 Guvernul Romaniei "Foaia de parcurs a Romaniei in domeniul energiei"
Large hydropower (> 10 MW) continues to dominate renewable electricity production in most Member States, accounting, in 2005, for approximately two thirds across the EU-27. This compares to 17 % from biomass and waste, 15 % from wind and the rest from geothermal (1.2 %), and solar (0.3 %). There are significant differences in the share of renewable between the EU-27 Member States. Amongst the EU-27 in 2005, Austria, Sweden and Latvia had the greatest shares of renewable electricity in their gross electricity consumption, including large hydropower. Denmark shows the largest share of renewable electricity when large hydropower is excluded.

Figure 2: Renewable electricity as % of gross electricity consumption

Sustainable development requires that among with exhaustible resources consumption is necessary to have an increasing amount of renewable resources. In this context, the development of renewable energy sources as a significant energy resource is one of the main objectives of energy policy, renewable sources would be the only way to supply electricity
to more than 800 million people in developing countries, but all potential beneficiaries of renewable amounted is about of 2 billion inhabitants of the planet.

Mainly as a local resource, developing of renewable energy sources contribute to the creation of new business, decreasing unemployment and encouraging economic and social cohesion in poor areas. Besides the advantages of renewable energy, according to specialists in the field, maintenance costs make energy more expensive, eg without operating at a nominal wind speed is reducing significantly the power installed. Wind plants produce only 20 % of power that could produce an annual report on installed capacity, while 6 percent of energy is produced at over 75% of installed power.4 Also, there are costs that the investor does not take into account when implementing such a project, for example, need to provide a reserve capacity.

Thus, in order to support green energy each Member State has established a subsidy system composed of preferential prices, competitive offers or obligations associated with a range of subsidies and mechanisms.

| Table 2: Subsidy for renewable energy well established in the EU |
|---------------------|--------|--------|--------|--------|--------|
| Country             | Fixed  | Subsidezi | Certificat | Competiti | Fiscal |
| Austria             | x      | x        | H            |          | x      |
| Belgium             | x      | x        | x            |          | x      |
| Danmark             | H      | x        |              |          | x      |
| Finland             | x      |          |              | x        | x      |
| France              | x      | x        | x            | x        | x      |
| Germany             | x      | x        |              |          | x      |
| Greece              | x      | x        |              |          | x      |
| Ireland             | x      |          |              | x        | x      |
| Italy               | x      | H        | x            |          | x      |
| Luxembou            | x      | x        |              |          |        |
| Nederland           | x      | x        | x            |          | x      |

One method of subsidy to green energy is green certificates, which represents documents received by producers from the operator of energy transport when the supplied the network. In turn, electricity suppliers are obliged to acquire the state green certificates depending on the amount of energy that it sold, to encourage production of energy "clean".

Green certificates benefit producers of renewable electricity and are issued according to the amount of renewable electricity produced or sold into the grid. Demand for green certificates can come from several sources. There may be voluntary demand from consumers who wish to purchase 'green electricity'. The government can also stimulate demand by stipulating that suppliers should provide their consumers with an increasing proportion of their power from renewable sources. The value of the certificates can assume a separate market value through trading between electricity suppliers. Trading in green certificates is being developed in a number of Member States and at a European-wide level.

According to legal regulations the producers of electricity from renewable resources get one green certificate for each 1 MWh delivered in electrical network, the producers of electricity in hydroelectric plants with an installed power below 10 MW receive a green certificate for each MWh delivered network and producers of electricity resulting from the use of solar energy received three green certificates for 1 MWh delivered to the network you will be able to export in 2010, to be traded in the European market. Also, in 2010, energy suppliers will be able to achieve rates and

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5 EEA Briefing, No 2/2004 Agenția Europeană de Mediu Subvenționări ale energiei electrice și energia regenerabilă
compulsory licenses by purchasing green on both domestic as well as imports from the European market for green certificates.

The promotion system of energy produced from renewable sources is applied for a period of 12 years for electricity produced in new central power and for 6 years for the wind energy produced in imported second-hand central, in hydro power modernized after 1 January 2004, in the central put in function before 1 January 2004 and olds groups.

The Green Certificates Value is determined by means of the market mechanisms:

- Bilateral contracts negotiated between producers and suppliers
- On a Centralized Market organized and administrated by OPCOM

The price of Green Certificates varies in a range established by Government Decision, $[P_{min} \div P_{max}]$. The minimum price is imposed in order to protect the producers and the maximum price to protect the consumers.

For the period 2008-2014 the trading value of Green Certificates ranges between a minimum value of 27 euro/certificate and a maximum value of 55 euro/certificate. The value in Romanian Currency (Lei) will be calculated at the exchange rate determined by Romanian National Bank as the average exchange rate for the month of December of the previous year.

Energy suppliers are obliged to purchase an annual number of green certificates equal to the value of fixed rate and required quantity of electricity supplied annually to customers. The value of mandatory annual is 2.47% in 2007, 5.26% in 2008, 6.28% in 2009, 8.3% during 2010-2012. For the period 2008-2014, the trading of green certificates market in ranked within 27 euro and 55 euro/certificate.

Table 3: The value of annually mandatory quota

<table>
<thead>
<tr>
<th>An</th>
<th>The value of annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2,47%</td>
</tr>
<tr>
<td>2008</td>
<td>5,26%</td>
</tr>
<tr>
<td>2009</td>
<td>6,28%</td>
</tr>
<tr>
<td>2010-2012</td>
<td>8,3%</td>
</tr>
<tr>
<td>2013</td>
<td>9%</td>
</tr>
<tr>
<td>2014</td>
<td>10%</td>
</tr>
<tr>
<td>2015</td>
<td>10,8%</td>
</tr>
</tbody>
</table>
Suppliers which don’t realize the annual quota imposed pay the value of non bought green certificate to an amount double the maximum amount of trading certificates.

Price of green certificates varies in a interval determined by the Government. Minimum price required to protect the producers and the maximum price for the consumer for the period 2008-2012, the price of green certificates trading is limited between a minimum of 27 Euro / certificate and a maximum of 47 Euro / certificate, calculated in lei at the average rate exchange established by the National Bank of Romania for October from the previous year.

In Romania, the proportion of renewable recourses in total consumption of primary resources, will have a level of about 11%, and in 2015 of 11.2%. At present electricity from renewable sources occurs only in micro hydro power, this production represents less than 0.5% of the total.

![Figure 4: Energy production on resources](image-url)
In order to promote renewable energy the European Commission has proposed to Member States to ensure a share of renewable in the energy consumption of European Union by at least 20% by 2020 global setting national targets for each Member State. 6

Three sectors are covered by renewable energy: electricity, heating and cooling and transport. The method applied globally gave to Member States individual option regarding the contribution of these sectors to achieve their national goal. However, it is proposed that each Member State to reach a weight of at least 10% renewable energy in the transport sector until 2020. The proposal is based on the following grounds: 7

- the transport sector register the fastest growing emissions of greenhouse gases from all sectors of the economy;
- bio fuels stopped the oil dependency of the transport sector, which represents one of the most serious problems of insecurity of energy supply in EU;
- the production of bio fuels is currently more expensive than producing other forms of renewable energy, which could mean they cannot be developed without a specific request.

Final consumption of energy from renewable sources in each member state shall be calculated as the following:

- final consumption of electricity from renewable energy sources;
- final energy consumption from renewable sources for heating and cooling;
- the renewable energy consumed in transports.

Taking in consideration the European Union target of 20% of the total electricity consumed as electricity produced from renewable resources, Romania needs to intensify its actions to exploit renewable resources.

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7 Guvernul Romanian "Strategia pentru resurse regenerabile"
Implementation of Cohesion and Structural Funds in Romania

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The paper is aimed to analyze the structures involve in implementation of structural and cohesion fund and identifies main issues related on financial management. The proper function of management and control system of structures in charge with the management of structural instruments is one of the main conditions for a good absorption capacity. Financial crisis has an main impact on implementation, therefore in order to speed up the implementation of cohesion policy programmes to ensure that resources are mobilized to support recovery efforts new measures have been proposed to simplify the financial management of the cohesion policy programmes and reduce the administrative burden.

Keywords: structural instruments, implementation, management, structures

Introduction

Structural and Cohesion Funds represent an important complement to national policies, both directly and through leverage effect, are the main instruments of the European Union to promote economic and social cohesion and solidarity. Through them, the European Commission aimes reduction of levels of development between different regions and the least developed countries.

These funds are structures as follows:
• European Regional Development Fund (ERDF) support less developed regions, by financing investment in productive sectors, infrastructure, education, health, local development, SME;
• European Social Fund (ESF) is the structural fund for EU social policy, employment measures to support employment and human resources development.

Cohesion Fund (CF) is a financial instrument to support investment in transport infrastructure and environment.

European funds complementary to structural and cohesion fund:
• European Agricultural Fund for Rural Development (EAFRD) financing investments to increase competitiveness in agriculture and forestry, environmental protection, improving quality of life and diversification of economic activities in rural areas;
• European Fund for Fisheries (EFP), support sustainable development of fisheries sector and coastal areas where the sector is predominantly

For 2007-2013, it aims to achieve three objectives which the EU intends to contribute to reducing disparities between Member States and between different parts of it. [3] (Figure 1).

Figure 1: Objectives of cohesion policy
• Convergence. Aims to Member States and less developed regions, Treaty, in Article 158, proposes reduction of levels of development between different regions, the most favored regions, including rural areas. This objective concerns, first of all, those regions whose GDP is less than 75% of the community. Commission also can provide temporary support to those regions that have a GDP per capita less than 75% of EU 15 member states.

• Regional competitiveness and employment objective, aims to regions not eligible under the Convergence objective. For cohesion policy outside the Member States and less developed regions, the Commission proposes an approach on two levels: First, through programs funded by the European Regional Development Fund, Cohesion Policy supports the regional to anticipate and promote economic change in industrial and rural areas by strengthening their competitiveness and attractiveness. Under the program financed by the European Regional Development Commission proposes strict intervention and focus on 3 priorities: innovation and knowledge based economy, environment and risk prevention, accessibility and services of public interest.

• European territorial cooperation objective refers to: transnational cooperation; Cross-border cooperation; Interregional cooperation.

![Figure 2: Geographical eligibility (Source: EC, 2010)](image-url)
For the programming period 2007-2013, all the regions in Romania are eligible for non reimbursable financial assistance within the Convergence and Territorial Cooperation Objective.

Accessing EU funds was conditioned by the preparation of programming documents, which indicate areas to be targeted for EU financial assistance. The main programming documents are: National Development Plan 2007-2013, National Strategic Reference Framework, Operational Programs / Regional Operational Programmers. [1]

In order to implement regional priorities of National Development Plan have been developed Operational Programs, based on documents is made operational planning and effective implementation of structural and cohesion funds. Operational programs are structured functions of objectives (table 1).

Financial allocation is one third of the EU budget, a total of EUR 336.1 billion, the allocation for Romania is 19.668 billion

![Figure 3: Financial allocation for Operational Programms](Image)

Source: Ministry of Public Finance, 2010
Table 1: Operational Programs and related funds

<table>
<thead>
<tr>
<th>Operational Program</th>
<th>Structural instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOP Increase of Economic Competitiveness</td>
<td>European Regional Development Fund</td>
</tr>
<tr>
<td>Regional OP</td>
<td>European Regional Development Fund</td>
</tr>
<tr>
<td>SOP Transport</td>
<td>Cohesion Fund and European Regional Development Fund</td>
</tr>
<tr>
<td>SOP Environment</td>
<td>Cohesion Fund and European Regional Development Fund</td>
</tr>
<tr>
<td>SOP Human Resources Development</td>
<td>European Social Fund</td>
</tr>
<tr>
<td>OP Administrative Capacity Development</td>
<td>European Social Fund</td>
</tr>
<tr>
<td>OP Technical Assistance</td>
<td>European Regional Development Fund</td>
</tr>
<tr>
<td>OPs Territorial Cooperation</td>
<td>European Regional Development Fund</td>
</tr>
</tbody>
</table>

*Source: Ministry of Public Finance*

For each operational programs at the level of ministries have been created Management Authority responsible for management and implementation of programs. Depending on specific operational program, in the relationship between the managing authority and beneficiary are involved central or regional intermediary bodies.

Managing authority is responsible that adequate controls are performed at lower level; risk analysis-submits certified payment application to based on the spot checks, submits certified payment application, confirmation on regular content of expenditures of claims. On the other hand intermediate body submits of certified payment applications to Managing Authority and carry out on the spot checks at lower levels.[4] Managing Authority must also ensure that beneficiaries are informed of the
specific conditions concerning their projects, the financing plan, the time limit for execution and the financial and other information to be kept and communicated.

Authority for Coordination of Structural Instruments coordinates the preparation and development of legal, institutional, procedural framework for management of structural instruments; also monitor the use of financial assistance. [7]

Certification and Payment Authority receives funds from the European Commission make interim payments, final payment, certifies statements of expenditure and payment requests to transfer funds from the Commission, made transfers of amounts unduly paid and also payments for eligible expenditures.

According to the provision of law institutions involved to verify the legality of the procurement process are National Authority for the Regulation and Monitoring of Public Procurement and Unit for Coordination and Verification of Public Procurement. [7] Unit for Coordination and Verification of Public Procurement verify ex-ante procedural terms for all contracts financed from European funds according to the Order of Ministry of Public Finances no 175/2007.

National Authority for the Regulation and Monitoring of Public Procurement made ex-post control of public procurement according to the Order of the President of the National Authority for Regulating and Monitoring of Public Procurement no. 11/2007.

Monitoring Committee is the body that ensures coordination of structural instruments and monitoring effectiveness and quality implementation of Community assistance, use and impact, in compliance with Community provisions. [8]

Romania has established an Audit Authority that represent an associated body to the Court of Accounts, without legal capacity, operationally independent from the Court of Accounts and at the same time independent from all the Managing Authorities and Certifying and Paying Authority. [9] The Audit Authority has the following responsibilities:

- system audit, sample checks and final audit;
- checks and external audit for the structural funds;
- annual checks of the management and control systems;
• checks of the statements of expenditure, on the basis of an appropriate sample;
• carries out appropriate checks in order to issue winding-up declarations at the closure of measures and programs;
• checks the existence and correctness of the national co-financing.

Figure 4: Implementation scheme of Structural Instruments

In order to ensure effectiveness, efficiency and efficacy of the operations concerning these funds, each state member has to establish a sound financial management system, that shall provide: the definition of the
functions of the bodies concerned in management and control and the allocation of functions within each body; compliance with the principle of separation of functions between and within such bodies; procedures for ensuring the correctness and regularity of expenditure declared under the operational programs; reliable accounting, monitoring and financial reporting systems in computerized form; a system of reporting and monitoring where the responsible body entrusts the execution of tasks to another body; arrangements for auditing the functioning of the systems; systems and procedures to ensure an adequate audit trail; reporting and monitoring procedures for irregularities and for the recovery of amounts unduly paid.[2]

One of the most important requests is detecting and reporting irregularities defined as “any infringement of a provision of community law resulting from an act or omission by an economic operator, which has, or would have, the effect of prejudicing the general budget of the European Union by charging an unjustified item of expenditure to the general budget”.

Irregularities include:

- Unintentional irregularity
- Intentional irregularity
- Irregularity without financial impact
- Irregularity with financial impact
- Once-off irregularity
- Systemic irregularity

Intentional irregularity means any action of an operator of involved institutions in order to enrich himself or any other person.

Intentional irregularity can be:

- Invoices made out for undelivered services, goods and works
- Invoices made up by a fictitious firm - falsifications
- Invoices made up in duplicate
- Invoices made up for excessive, incorrect amounts – inflation of invoices
- Non-charging quantity, price and other discount in the invoices
- Fraudulent transfer of funds to a wrong account
- Manipulating findings of documentary checks
• Manipulating findings arising from checks on the spot
• Falsifying and modifying accounting and/or other records and justifying documents

Unintentional irregularity means any action of an operator of involved institutions caused by negligence and resulting, in most cases, from infringement of approved procedures.

Unintentional irregularity can be such as:

• Faults and errors caused by negligence
• Unintentional infringement of operating procedures
• Insufficiently defined control environment and financial management system

An irregularity with financial impact is an irregularity in which a payment of funds has been made and this payment represents unjustified expenditure within a project. An irregularity without financial impact is an irregularity that has been identified before payment has been made to the Beneficiary. Systemic irregularity refers to faults in Operation Program management systems which can call into question the accuracy and correctness of expenditure declarations.[2]

On 2008, the Commission has proposed a series of measures to speed up the implementation of cohesion policy programs for the 2007-2013 periods to ensure that all cohesion policy resources are fully mobilized to support state and regional recovery efforts.

These measures are based on recommendations and specific legislative a non-legislative measures designed to accelerate investment and simplify the implementation of European cohesion policy programs. [1] The idea is to introduce greater flexibility, give regions a head start and target cohesion policy programs on smart investment.

Moreover was proposed several measures to simplify the financial management of the cohesion policy programs to reduce the administrative burden. These measures include:

• Introduce lump sum or flat-rate payments for reimbursement
• to further facilitate contracting with the European Investment Bank (EIB) and the European Investment Fund (EIF), direct contracts can be awarded to the EIB or EIF
• to simplify the management of certain projects generating revenue: those co-financed by the ESF or co-financed by the ERDF or Cohesion Fund where the total cost is less than €1,000,000 [5]

Conclusions

A definite role in making projects is held by the financing sources which include the main Structural Instruments (Cohesion Fund, European Social Fund, European Fund for Reconstruction and Development) for which there have been drawn up operational programmes according to the specific of each sector and based on which funds can be accessed. Financing through the Structural Instruments implies that proper mechanisms of financial control are put in place. In this respect, the proper function of this mechanism is a prerequisite for increasing the capacity absorption of European funds.

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[7] Ordonanta Guvernului nr. 29/2007 privind modul de alocare a instrumentelor structurale, a prefinantarii si a cofinantarii alocate de
la bugetul de stat, inclusiv din Fondul national de dezvoltare, in bugetul institutiilor implicate in gestionarea instrumentelor structurale si utilizarea acestora pentru obiectivul convergenta

The Organizations and the Challenges of the New Century

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The changes from the present times influence more and more in general the national economies and in particular the companies thought the impact on their business environment. We can see how the events from one county have sometimes a global impact and other times have an impact on specific national economies or companies from a specific country. In this way the business environment it is in a continuous change that influences the company’s activities. If with decades behind, the organization of the company could remain unchanged for a long period of time, even in conditions of economic crisis or economic growth, in present the situation is totally different because of the dynamic rhythm of economic and social life. In order to face and to adapt to all these changes, the companies have to modify their management and organizational structures. The ease with which firms adapt to environmental changes depends on their organizational structures and flexibility.

But why some organizations yield more profit than other ones? Why some companies „survive” to competition and others „die” after a short period of success? These are standard questions of researches on business management. The answer to these questions is their capacity to adapt to changes and to choose the best alternative based on a proper match to the firm’s economic environment.
Keywords: globalization, organizational structure, strategy, change management, managerial instruments

Introduction

The changes govern more and more the world affecting in general the economies and in particular affecting the companies through the impact upon the business environment. If with decades ago the company's organization could remain unchanged for a long period of time, in present the situation is totally different. This means that the companies have to change their organizational structures and management more frequently in order to act to the changes. This phenomenon is determined in general by the society dynamic rhythm of changes that determine the companies to modify their strategies to the new market conditions and in this way to modify much more frequent their organizational structures. The importance of the organizational structure and its reorganization derives from the necessity to obtain a high profitability in conditions of challenges and incertitude's, in which the traditional functional organizational structure is not very efficient in the actual dynamic environment.

Tendencies in the economic and social environment

The specialists in the field [1], [2], [3] identify 3 major tendencies in the economic and social environment that determine the companies to adopt more flexible and efficient structures. These tendencies create a dynamic economic environment, unpredictable and competitive in which the companies have to find a way to act rapidly and efficiently in order to face the competition. The tendencies identified are:

Globalization. This tendency determines the intensification of the competition on the world markets that impose to companies to be flexible and to adopt adequate structures for every market. Because of this phenomenon companies will act not only in the national economy and so the competition between the companies will become global. In these
conditions the advantage for the companies is the increasing of the action space, but on the other hand the threat is the global competition.

In the case of the companies which act globally, like multinational companies for example, the exact configuration of their organizational structure, realized in accordance with the company strategy, can be realized only if will be taken into consideration the existing specific situation and analyzing the influence factors like: environment dynamics, diversification degree of the company’s activities in other countries, number of branches from abroad etc.

**Technical and technological progress.** This phenomenon imposes the creation of flexible structures that should assure the adaptation to the rapid technological changes. In this way technical and technological changes can determine differentiated organizational structures in which the exchange of information and materials within the units is very high. Also this tendency will have an impact upon the human resources of the company because through the introduction of new production technologies some jobs will disappear or others will be reorganized. For this reason the companies should pay a special attention to the consequences upon the human resources derived from the technical and technological progress, considering that they should be prepared for it.

Demographical changes are especially reflected upon the personnel through the modification of the personnel categories structure. Thus we can observe the increase of the number of “untraditional” workers who strengthen the concept of “virtual organization” in which the employees never meet directly and work through the technology or in which the members of a team can be the employees of different companies or can work in different geographical spaces. These changes influence the organizational structure becoming more flexible and also influence the ways in which are implemented the activities of the human resources management. The companies will pay attention to the recruitment and selection processes because they will need human resources adapted to the requirements and specifications of the jobs.

Functional structures are adequate to the companies which act in stable and easy to predict environments, whose products are not very diversified;
Divisional structures are adequate to the big companies which act in a dynamic environment, whose products, beneficiaries and markets are diversified and where the flexibility of the structure it is a necessity.

Matrix structures are adequate to the big companies with a high grade of diversification that act in complex and unpredictable environments that impose to the company a high capacity of analyzing of information and rapid adaptation to the changes.

But even the some organizational structures are suitable to some specific business environment conditions and activities, in their design it should be taken in consideration the future developments in the business environment. This is why the knowledge of the possible tendencies in the evolution of the company is needed.

**Tendencies in the evolution of the company**

The specialists in the field predict big changes at the beginning of this century, changes which will influence not only the world, but also will influence the role and activity of the companies, which at their turn will influence the evolution of the global economy.

The present and the future tendencies of global economic integration, the increasing of the importance of the ecology in the global economic environment, the closeness between the effort dedicated to the economic growth and to the wellness of people are few arguments which strengthen the belief that the free market economy system is in full progress process, that the private companies have an important role and that the two processes are interconnected and interrelated.

From a global point of view, the future evolution of the company and of its environment is determined by real changes on economic, social-economic, socio-demographic, technological plans or as reactions of these companies that act in this environment and try to adapt to its evolution.

In the specialized literature these future evolutions are synthesized in a set of characteristics of the future environment and of the companies. The content of these evolutions reveals one more time the interdependence between the environment and the activity of the company.
The knowledge society/the information society - is the result of the important changes in the environment as a result of increasing of the role of information in the society, having the following forms:

- the increasing of the companies which offer intellectual, informational services- generating the informational sector from the national economy- research-development, consultancy, design etc.;
- the increasing of the informational work represented by the increasing of the informational workers number and of the number of persons with specialized education and training;
- the extension of the “informational goods” which incorporate especially human intelligence investments and creativity through the conception process.

The strengthening of the internationalization of the business environment through the amplification and diversification of the activities of the transnational and multinational companies, through the strengthening of the interdependences between national economies and the cooperation of the states in the economic problems is another tendency. As a result it appears the phenomenon of markets internationalization and the increasing of the markets dimension. In these conditions the companies have to elaborate organizational structures in accordance with these evolutions and with its own estimations regarding the evolution of the supply and demand, the evolution of the global and national economy in the future.

Intensification of the competition will influence the company’s activities and management. The companies will have to focus more frequently on enlarged market researches and concentrated marketing actions with a view of gaining the buyers interest and gaining of the supremacy in front of the competition.

The intensification of the cooperation between companies will be an alternative in the competition fight for the entering in a new market. The cooperation could take the form of mixed companies and the establishment of the collaboration agreements in the research-development, production, selling activities. As predictable directions we can mention the settlement of strategic alliances and mergers which will change the rapport of forces on the international markets and will reconfigure the new markets.
Under the impact of these future environment changes the company will have to adapt its management, taking into consideration the following future characteristics:

1. The increasing of the dimensional, structural and functional flexibility will determine high performances and the efficient utilization of the resources.
2. Tendency of geographical disperses of the company activities consisting in the localization of some functional activities (R&D, strategically planning etc.) different of the production activity and other auxiliary activities due to the “distances reduction” at the global scale and due to the progresses in the field of telecommunications and transports.
3. The increasing of the importance of the small and medium companies in the majority of the countries.
4. The strengthening of the role of intellectual technologies in the management and functioning of the company will determine modifications in the work characteristics and content, the increasing of the level of culture and knowledge of the problems at the company and market level.
5. The increasing of the creativity potential will be determined by the scientific progress, by the intense circulation of the information. In this way the company will have a strong innovative character in the production and management plan, with a capital importance for the strategic management.
6. Reorientations in human resources management materialized in:
   a. working program reduction;
   b. new forms of personnel motivation and payment that can contribute to stimulate the employees participation in the achieving of the company’s objectives;
   c. the extension of the training and development programs effectuated within the company or through specialized companies
   d. working time flexibility and efficient usage
   e. the appearance of the global teams
7. The increasing of the communications processes within the company and between the abroad “units” of the company due to the INTERNET.
8. The increasing role of the change management.
9. The increasing role of the environment protection in the company’s activities. The companies act and will act taking in consideration the environment protection because the sustainable development is an objective for every country.

Change Management

Under the influence of these discontinuous changes the companies will have to refocus their strategies [4], [5], [6]. In general when are faced with the necessity of change, the managers focus their actions on small components of the whole problem. They often take into consideration only tactical aspects as:

- Do we have to adopt a functional or a matrix organizational structure?
- Do we have to centralize or decentralize our activities?
- Do we have to harmonize better the business strategy with the organizational design?

These questions and other questions are only simple tactics when are not integrated in a global plan of change. A change that is made under these conditions has a profound impact upon the general transformation of the whole organization. Often the change is based on a personal opinion not upon a realistic and systematic analysis of the company and its management conditions.

The specialists [7], [8] consider that for the management of change in a strategic way it must be taking into consideration the following change levers:

- The external environment. It is difficult to create a global “image” of the environment pressures and so it will be needed new tools for the surveillance of the environment and for the treating of information.
- The mission. Because of the increasing of the economic, social, political pressures it will be needed a clear formula of the
organization mission that will be used as a guide in taking the strategic decisions of the company.

- The strategy. It will be vital the creation of a strategy with operational objectives at multiple levels of the organization and also using of new management techniques.

- The management of the organizational mission and strategic processes. When the organization formulates the mission, it must take in consideration all interest groups (employees, stakeholders, managers etc.).

- The tasks. A change in the strategy can determine the introduction of new tasks and new organization techniques within the company. This situation can request hiring of new specialists in the company or the development of the existing personnel.

- Precise organizational structure. The introduction of the new tasks and/ or new techniques will require the clear definition of each task, the authority of the superior person and of the person in charge.

- The human resources. Every organizational change determines a modification in the personnel actions. Thus the change management should pay a great attention to the personnel and to its motivation process. Motivated people are essential in the implementation of the change.

- The groups. The informal groups within the organization can facilitate or otherwise can stop the efforts of change and, because of this; it will be need a special attention.

When a change in organization is planned, the organization must be viewed as a global entity upon which different forces from the exterior act, like in the following figure.
**Figure 1:** The organization and the external influences

The **technical system** contains all the elements requested for the solving of the production problems.

The **political system** contains the practices, activities and other elements that belong to the reparation of the power in organization.

**Cultural system** includes values, symbols and other elements related to the organizational culture.

These organizational systems can be managed through 3 managerial instruments:

- Mission and strategy;
- Organizational structure
- Human resources management.

The change in organizations can be realized using the managerial instruments for the harmonizing of the organization systems (technical, political and structural). Change management implies technical, political and cultural decisions that can determine a new “face” of the organization. Among their qualities, knowledge and abilities, the XXI managers must possess a visionary thinking, in accordance with their company’s adaptation.
to the environment evolution, an ability to inspire strength and perseverance to the work team, in achieving the set objectives and in implementing the designed projects. [9]

The companies are always under the pressure of fluctuations and changes and because of this the three component systems (technical, political and cultural) will be also under the influence of change, needing some adjustments. But when we will action upon one system, for example the technical system (for example one company intends to introduce a new production system more performing and which will use techniques very advanced), it can happen to appear changes in the other two systems (for example the employees will be against the changing of technology and will begin a spontaneous strike- political system or some interest groups will request the modification of the organizational culture- cultural system). In this way one the change in the technical system could influence the political and cultural system. For this reason, the change management requires the combination of the modifications which will be realized in the organizational systems and the maintaining of the equilibrium between the organizational systems in the process of adapting to the environment changes In order to realize an efficient change management, the managers have to action using the 3 managerial instruments (Mission and strategy; Organizational structure, Human resources management).

Conclusions

Some organizations yield more profits that other ones. Some companies “survive” to competition and others “die” after a short period of success. Which is the difference between these organizations? Which factors differentiate these organizations? The answer to these questions is their capacity to adapt to changes and to choose the best alternative of management and organizational structures based on a proper match to the firm’s economic environment. The relationships between the company’s market environments its internal organization holds an economic interest because they affect economic efficiency. Their internal organization depends on the market structures in which the firm operates and they influence firm’s market behavior; therefore it is needed a knowledge of the
challenges of the new century and their impact upon their organizational structures and management.

References

Commercialization of University Research and Innovations in Iran: Obstacles and Solutions

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Commercialization of the university researches and innovations becomes more and more important in this era of volatile changes. Every day we could feel the challenges associated with this process in any knowledge based institute, such as universities, research centers, R&D centers, etc. Commercialization challenges are an integral part of these entities, and their managers are looking for some ways to handle them. In the present study, we used the Delphi method to find the main challenges and main solutions for commercialization of the university researches and innovations in Iran. After reviewing the literature, the challenges are considered and then the solutions are proposed. Finally, the paper concludes with a discussion of the research findings.

Keywords: Commercialization, Obstacles, Solutions, Research, Innovation
Introduction

Commercialization of university researches and innovations is an integral part of a knowledge based institution. This process has its own risks and uncertainties, and CEOs are always interested in development of new innovations to compete with their competitors (Li et al., 2005; Lumpkin and Dess, 1996). Moreover, commercialization of university researches and innovations depends on direct investment of the companies (Hitt et al., 1996; Zahra and Nielsen, 2002).

Although governments attempt to eliminate the obstacles to commercialization of innovations, through Incubators, Science Parks, etc., still there are a variety of obstacles before the commercialization process. Incubators are joint offices which help newly established firms and start-ups to handle their problems (Hackett and Dilts, 2008). Also, Science Parks and University Research Parks lay the grounds for development of those firms and facilitate the commercialization of their researches and achievements (Lofsten and Lindelof, 2005; Link and Scott, 2007; Sooreh et al., 2011).

The present study concentrates on the main obstacles to the commercialization of researches and innovations in Iran, and tries to answer to these two main questions? First, “what are the main obstacles to commercialization of university researches and innovations in Iran?” And second, “what are the main solutions to eliminate the main obstacles to commercialization of university researches and Innovations in Iran?” To answer these two main questions, we firstly reviewed the paper and then the Delphi method is used to collect expert views in this respect. Finally, the paper concludes with the main research achievements.

Literature Review

Today, universities act as important agents of knowledge-based economies and the innovation cycle (Etzkowitz, 2003), agents that are considered as the driving engine of human knowledge and which aim at the development of societies. This is more evident in entrepreneurial societies in which in view of Audretsch (2007) the knowledge-based entrepreneurship is considered as the driving force behind economic development, employment, competitiveness in global markets, etc. In this regard, the
entrepreneurial university plays an important role as both a manufacturer and a disseminating institution (Guerrero et al., 2010). Private and public sectors seek the produced knowledge in universities in order to address their problems and difficulties. Clearly, this is the result of the second revolution in the missions of universities and involves commercial engagement and goes beyond the educational and research purposes of these entities (Salamzadeh et al., 2011).

Notwithstanding that universities and members of faculties do not traditionally view research as capacities for exploiting market opportunities, they have come to the realization that they need to seize the emerging opportunities of financial support from the private sector and adapt to them due to the decline in the general support of most governments, particularly, in some research areas. A sign of this turn of approach is the establishment of technology transfer offices in universities.

Technology transfer from universities and other government research institutes have been the specific purpose of policy makers and the public, in the past decade. The motivations arisen from two factors of the need for improvement of private sector’s access to the government’s research results and budget constraints have induced politicians to provide reasons in support of commercialization of university technologies. One of the most important of these reasons is the Morrill act which came into force in the U.S back in 1980 and according to it, universities were granted intellectual property rights for new technologies. Afterwards, policy makers in other countries followed the U.S example. At that time, the general opinion was that research activities should have had tangible commercial advantages and that universities and other government research organizations should have met these new demands through increasing technology transfer activities (Buenstorf, 2006).

Commercialization of knowledge and technology has a long history. Although, the knowledge and technologies gained from scientific research were rarely commercialized or introduced to the market, in the past. However, it seems that commercialization of knowledge and technologies first began with the arguments about cooperation of universities and industries and it was with the Morrill act in 1862 wherewith the university system was given the right to give land grants. This cooperation has a long history. For instance, the defense department of the U.S regarded research
and development cooperation with the universities as the main agent of progress during the world war two when competing with the Soviet Union. It may not be evident enough but the interaction of the university and the industry truly shapes the processes and outputs of commercialization of research and technology (Markman et al., 2008).

Reviewing the past research in the literature, Chang et al (2009) found two main streams of research for the commercialization of university research. First, the “technology transfer” stream (Debackere and Veugelers, 2005; Etzkowitz and Leydesdorff, 2000; Siegel et al., 2003). Drawing from the 1980’s literature, it is argued in this stream of research that commercialization of university research should be viewed as a technology transfer process from the university to the industry. In order to improve the commercialization of university research, the university should focus on the barriers to the technology transfer process and on the conflicting interests among stakeholders by creating a motivational gap.

The second stream of research is related to “institutional and organizational resources” (e.g. Di Gregorio and Shane, 2003; Wright et al., 2006). Having emerged in the early twenty first century, it avers that having desirable institutional and organizational resources such as supportive commercial sub-structures, organizational incentives, strong research basis and access to venture capital has a major role in improving the commercial performance of the university research.

Most of the definitions on university entrepreneurship have a special focus on commercialization of knowledge produced in universities and some researchers (Toole and Czarnitzki, 2007) regard both terms as interchangeable. There have been different definitions proposed by researchers with each focusing on particular aspects of this phenomenon. In defining university entrepreneurship, some researchers argue that it involves all the commercialization activities beyond the education and research conventional obligations (Klofsten and Jones-Evans, 2000), while other researchers pay more attention to newly emerged activities, particularly spin-offs. For example, Etzkowitz (2003) argues that the entrepreneurial university is a natural development center with commercial and intellectual supportive structures and a combination of them for the students and the faculty when launching new ventures. Wright et al (2007), too, view university entrepreneurship as the development of
commercialization and argue that there is more to it than the traditional focus on giving out intellectual property grants including activities to create spin-offs from the knowledge and technologies produced in the universities.

Sometimes, university entrepreneurship is defined as an effort to increase revenues and to achieve personal or institutional influence and prestige through developing and marketing research ideas or products based on research (Louis et al., 1989) or to integrate roles and new resources in the present context of the organization and to create new models to help researchers with what they need to do (Colyvas and Powell, 2003). In some other researches on university entrepreneurship, a field of entrepreneurship has been devised that seeks to understand and describe new business ventures and products that have originated from the universities’ intellectual properties (Llano, 2006).

There are also other researchers that view university entrepreneurship as encompassing all the university’s entrepreneurial activities which are not limited only to licensing, creating new firms in the university, technology transfer, development centers, science and technology parks, patent assignment and regional development (Rothaermel et al., 2006).

The entrepreneurial university links economic development as a new university function with education and training. This is called “knowledge capitalization” which harbors the new core mission of the university and solidifies the link between the university and knowledge users and leads the university to economic practicality (Etzkowitz, 1998). In the literature, commercialization of university research and technology transfer are used synonymously for the most part (Chang et al., 2009).

Generally, technology transfer involves the transferring of idea, method or research results in an environment that results in products, services or processes using any method. Technology transfer is the official transfer of new discoveries and innovations produced from scientific research that non-profit research institutes and universities run in cooperation with commercial sectors to gain general advantages.

Many other researchers have also provided definitions for commercialization: Urabe (1988) defines commercialization as producing a new idea and implementing it on a new product, process or service which results in dynamic growth of the national economy and increase in
employment rate and the net profit for innovative firms (Urabe, 1988). Reviewing different definitions including Jolly (1977) who considers commercialization a process which begins with an insight into the technology-market and ends with sustainable functions of the product proportionate to the market, Spilling offers a comprehensive definition arguing that commercialization is a process of transferring and converting existing theoretical knowledge in academic institutions to some types of economic activities (Spilling, 2004). Similar to Siegel et al. (2003), Bandarian (2007) defines commercialization as the conversion or transferring of technology to a profitable setting. And technology here entails skills, techniques, processes of receiving patents or other private ownerships, material, equipment, systems, etc. (Bandarian, 2007).

Referring to the definition of Utterback (1979) who suggested that commercialization begins with inventions and creativity, Robert (2007) argues some researchers include exploiting inventions in the commercialization of research and posit that unless the commercialization is successful the invention will not make it as an innovation and therefore, will not be introduced to the market (Roberts, 2007). Chang et al (2009) offered a practical definition for commercialization of university research as encompassing the faculty members who seek to exploit their research results via receiving patents, franchising and participating in the ownership of spin-offs.

Examining different existing views toward commercialization of research findings, three main approaches were revealed depending on at what stage the research process begins and at what stage it ends (Ghazinouri, 2005):

**The responsive/reactive commercialization approach:**
In this method, after running a research project and obtaining the results, the considerations about the commercialization stage will begin. This method is more applicable to technologies that are the lateral results of large research projects.

**The guaranteed commercialization approach (contractual research):**
In this method, the commercialization activities (e.g. making contract with business partners) are carried out before starting the research project. This
method is more applicable to technologies that their nature and state of performance are determined or the product of the technology could be clearly defined or when the researcher is highly positive he will obtain the desired results.

The parallel commercialization approach:
In this method, the commercialization activities begin before the inception of the research project and the commercialization considerations are completed, stage by stage and in parallel with the research project.

Creating the contexts for commercialization of research findings and introducing knowledge to the market and society leads to technical and economic development and improvement of welfare in the society, and moreover, it significantly promotes the economic values in research organizations. Being so important, many studies and much research have been done about commercialization and introduction to the market in different institutes.

In a nutshell, commercialization is the act of converting new findings and research ideas to products and services and marketable technologies. In other words, commercialization refers to a set of efforts that are undertaken with the purpose of selling research works and with the aim of making profit and placing education and research even more in line with economic and social objectives. Given the above definitions, commercialization could be defined as introducing an idea or an innovation to the market. Commercialization of research results is one of the important steps of the innovation process, which ensures the stability and continuity of researching and accelerates knowledge-based economy development and fosters significant economic values for organizations, as well. Commercialization is a process by which profits are made when implemented into the market place while it has no value profit-wise in the development stage. If shelved, technology will not yield any revenue.

Methodology

The present study has a qualitative approach and takes advantage of the benefits associated with Delphi method. The Delphi method, which was developed by Norman Dalkey (Dalkey & Helmer, 1963), is an iterative
process through which judgments of experts are collected and distilled, using a series of questionnaires. The researchers concentrate on problems, opportunities, solutions, forecasts, or feedbacks and are usually promoting a list of judgments as the research results. Each questionnaire is revised based upon the information gained through the previous questionnaire(s). The process ends when the research questions are sufficiently answered (Dalkey and Helmer, 1963; Juri, 1971).

Delphi method has been used in a variety of studies and in different fields (Adler & Ziglio, 1996; Delbeq et al., 1975; Rowe & Wright, 1999; Skulmoski & Hartman, 2002). This method is used for structuring a series of judgments in order to facilitate group problem solving (Linstone & Turloff, 1975).

There are a series of advantages associated with Delphi method, which are (Rowe and Wright, 1999): Anonymity of Delphi participants; Ability to revise their ideas (Iteration); controlled feedbacks and informing participants of other's judgments, and statistical aggregation of group responses. While some authors believe in the quantitative approach of the Delphi method (e.g. Tapio, 2011), others adhere to this belief that it could be used with qualitative techniques (e.g. Mason, 1996). This study is structured as follows:

1. Defining and elaborating the research problem. Considering the nature of the problem and its logistical considerations which arose from the topic and problem in question.
2. Preparing the preliminary questionnaire, based on the literature review. Also, we asked about the participants' view about new questions to be asked in the next steps.
3. Acquiring qualitative feedback through preliminary questionnaires answered by the participants. A list of obstacles and solutions is achieved in this step, and participants commented on the accepted and relevant questions.
4. Preparing the final questionnaire based on analyzing the preliminary questionnaire. We considered the privacy of the participants, anonymously reviewing their views.
5. Gathering and analyzing the data, and concluding the study with research findings.
It should be noted that the participants were individuals aware of the topic being investigated, as a panel which McKenna (1994) defines as “panel of informed individuals”. Nineteen experts participated in the study and shared their knowledge through the Delphi study. The authors used purposive sampling based on the assumption that a researcher's knowledge about the population could be considered in order to choose the cases (Polit & Hungler, 1997). The experts were informed of the topic and agreed to participate in the study.

Data collection and analysis were done through three steps: the discovery of views and opinions, determining the most important issues, and data analysis. Although the literature shows that two or three rounds are preferred (Proctor & Hunt 1994, Beech 1997, Green et al., 1999) and four rounds suffice (Young & Hogben 1978), we determined to iterate the questionnaires for five rounds. To analyze the qualitative data, content analysis technique was used. Data gathered in the initial stages were analyzed by grouping the similar issues. The respondents were coded to become traceable. Finally, the results were finalized and the outcomes appeared.

Discussion

Nowadays commercialization of university research and R&D innovations is considered as a significant factor in economic stability of the countries (Nevens et al., 1990; Arora et al., 2001). Although the process of commercialization seems to be simple and conventional, it has its own obstacles and solutions. Evidently, it could be noted that turning an idea into an innovation and subsequently into a commercial product/service, is a complex effort.

In the present study, we conducted a series of interviews with experts who were familiar with these kinds of effort, and have dealt with commercialization affairs in their academic or professional career. The obstacles and solutions are identified and offered in an Iranian context. The main obstacles are as follows:

1. Researches and technologies are not completely based on customer needs
According to the literature, one of the most important issues about researches and technological innovations is their potential to be commercialized. In this respect, their consistency with market needs is of paramount importance. The interviewed experts believe that the current researches and innovations are not completely in line with customer needs, which could result in useless researches and wasting the knowledge potential.

2. Lack of solid rules and regulations for protecting Intellectual Property (IP) rights

Intellectual Property rights are of paramount importance in research commercialization. That is to say that commercialization of research and innovations, without considering IP is something strange. According to the interviewees’ view, existing rules and regulations are not sufficient and even comprehensive. Thus, it could be a challenging issue for commercialization of research and technological innovations.

3. Lack of appropriate evaluation of ideas and innovations in a national entity

Ideas and innovations are registered in different organizations in the country, but there is not any integrated organization or entity to evaluate the ideas with a unified system. The evaluation criteria are different according to the selected organization, and do not follow a national standard. Moreover, the evaluation process is somewhat traditional. Since there is not a realtime system for registering the innovations and achievements, there is the possibility to register some ideas and innovations for several times, and just after objection to illegal registration, the court will consider the issue. This could lead to several problems for beneficiaries of the research or innovation.

4. Inadequate relationship with regional and global market

According to the limitations posed to the researchers and innovators in the country and obstacles in registering and protecting their achievements, the relationships with global markets would encounter some problems. In this regard, it could be considered as a critical obstacle to research commercialization.

5. Lack of adequate venture capital for investment in new technologies
Although there are some institutions which are established, especially after 2009, to provide venture capital and entrepreneurial funds for researchers and innovators, still there is a gap to be filled. Interviewees were stressing on the importance of this issue for several times and mentioned that venture capital providers could significantly change the existing status.

**Table 1:** Obstacles to commercialization of researches and innovations

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<th>Obstacles to Commercialization</th>
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<td>Researches and technologies are not completely based on customer needs</td>
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<td>Inadequate relationship with regional and global market</td>
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<td>Lack of appropriate evaluation of ideas and innovations in a national entity</td>
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<td>Lack of adequate venture capital for investment in new technologies</td>
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<td>Lack of solid rules and regulations for protecting Intellectual Property (IP) rights</td>
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Participants in this research mentioned a variety of solutions to deal with highlighted obstacles, which were classified in a coding process. Main solutions are:

1. Proposing a roadmap for research and technology commercialization in which the research priorities are highlighted. A roadmap for commercialization of research and innovation is a mandatory need for development of the process. In addition, determining the research priorities based on market needs and social problems could direct the resources in a more effective way and make resource allocation more efficient.

2. Providing an appropriate environment for research and technological interactions in regional, national, and international levels

Experts believed that business environment and commercialization of the research and innovation have a close relationship. Therefore, providing an appropriate environment could pave the way for commercialization and
capitalization of the knowledge. This solution considers the contextual aspects of the process and tries to answer to the challenges in different levels.

3. Institutionalizing the documentation and evaluation systems in order to better protect IP rights
An intellectual Property right constitutes a significant part of the commercialization process and plays a critical role in this respect. Documentation and evaluation of the products and services which are going to be commercialized, helps the existing systems to protect the rights of the researchers and innovators in a better way. Also, this could lead to promote the motivation of the beneficiaries.

4. Proposing an appropriate regulatory structure and revising the existing rules and regulations
Rules and regulations could protect or destroy an innovation on its way to commercialization. A comprehensive and comprehensible regulatory structure is a necessity to overcome a significant number of commercialization problems. The interviewees offered that government should revise the regulations and facilitate the process.

5. Financing researches and innovations with both governmental and non-governmental budgets and funds
Like any other activity, commercialization needs financial support. Lack of enough financial facilities and institutions might result in an unsuccessful commercialization. It should be noted that both governmental and non-governmental funds are needed to turn an idea into a marketable service or product. All the interviewees mentioned the same point.

6. Offering tax exemptions in order to motivate investors
Tax exemption is a critical point to investors, especially in the countries in which tax rates are quite high. In the present study, experts believe that considering tax limitations of the interested investors could turn the investment potentials into reality, and increase the rate of propensity to investment.

7. Developing sales and marketing sectors in commercialization entities
Marketing and sales departments play a significant role in commercialization of researches and innovations. Thus, empowering those
departments will eliminate a variety of obstacles in the commercialization process.

8. Sharing the benefits associated with commercialized researches and innovations with researchers and innovators

One of the most important solutions to juice up the performance of commercialization is to consider a method to share the outcomes in a fair way. Therefore, the interviewees were emphasizing upon this fact and argued that a fair and motivating system would result in improvements in the commercialization process.
Proposing a roadmap for research and technology commercialization in which the research priorities are highlighted

Providing an appropriate environment for research and technological interactions in regional, national, and international levels

Institutionalizing the documentation and evaluation systems in order to better protect IP rights

Proposing an appropriate regulatory structure and revising the existing rules and regulations

Financing researches and innovations with both governmental and non-governmental budgets and funds

Offering tax exemptions in order to motivate investors

Developing sales and marketing sectors in commercialization entities

Sharing the benefits associated with commercialized researches and innovations with researchers and innovators

**Table 2:** Solutions to eliminate the obstacles of commercialization of researches and innovations

**Conclusions**

As mentioned earlier, commercialization of university researches and innovation is of paramount importance, both practically and theoretically. Of course, there could be a variety of obstacles and problems to reach this goal, which we have to identify and decide how to handle those issues. This research seeks to identify those obstacles and find appropriate solutions to
face them. In order to answer the research questions, the Delphi method is used and expert views are collected, coded and finalized.

The main identified obstacles are as follows: Researches and technologies are not completely based on customer needs, Inadequate relationship with regional and global market, Lack of appropriate evaluation of ideas and innovations in a national entity, Lack of adequate venture capital for investment in new technologies, and Lack of solid rules and regulations for protecting Intellectual Property (IP) rights.

In order to face these obstacles, the following solutions are proposed: Proposing a roadmap for research and technology commercialization in which the research priorities are highlighted, Providing an appropriate environment for research and technological interactions in regional, national, and international levels, Institutionalizing the documentation and evaluation systems in order to better protect IP rights, Proposing an appropriate regulatory structure and revising the existing rules and regulations, Financing researches and innovations with both governmental and non-governmental budgets and funds, Offering tax exemptions in order to motivate investors, Developing sales and marketing sectors in commercialization entities, and Sharing the benefits associated with commercialized researches and innovations with researchers and innovators.

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Knowledge Management – The Importance of Learning Theory

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„Knowledge is power”. Sir Francis Bacon, Religious Meditations, Of Heresies, 1597 - English author, courtier, & philosopher (1561 - 1626)

Knowledge Management is a current topic in the market, which have been treated during the last years from different consideration perspectives. This ongoing subject has fascinated me ever since I had the opportunity to read a paragraph of Hendry Minzberg, in respect of this topic.

Knowledge management is a main part of the today’s economy. It reflects the expressive representation to the demand of the knowledge society, within the scope of the globalization and the continuous learning.

Organizational learning and learning organization are two concepts often confused. If knowledge processes, knowledge contained change occurs through the process of learning. By learning we understand, in this context, an increase of possibilities of action of various sources of personal knowledge.

Keywords: management, knowledge, learning factors, human capital, learning capacity, cognitive dissonance, situational influences, Data Mining, learning processes
Factors of influence over the learning result

The learning result of human knowledge bearers, beside the learning situation, is influenced by other factors as well. If they increase learning, one speaks about successful learning factors; on the contrary, if these factors represent an obstacle for learning, one speaks about learning barriers. Considering this point of view, further on are presented the following: learning technique of human bearer of such knowledge, their learning capacity, their approach, their predisposition as well as such circumstances. Compare with figure 1.

![Figure 1: Factors of influence over the learning result of human knowledge bearers](source.png)

Source: Jenny Amelingmeyer(2004); Wissenmanagement-analyse und Gestaltung des Wissensbasisvon Unternehmen; in: Deutscher Universtitaets-Verlag, Wiesbaden

**Learning technique**

The learning capacity of persons is influenced to a great extent by their didactical-methodical competence. Among these, it is stated firstly the knowledge about the individual study methods, about the didactical structuring of teaching and learning processes, about selecting different forms of study, internal and common, as well as about different communication media.
Considering that almost any individual has his/her own learning style, each individual also displays an individual effective and efficient learning technique. It is generally deemed that exclusively acoustic information is maintained less that the audiovisual one or even than personally experienced knowledge, however, this varies significantly from person to person.

**Learning capacity**

New knowledge may be assimilated whereas existent knowledge may be refined only when the person has a proper *learning capacity*.

In this context, one pays a special attention to performance characteristics, relevant for learning, such as intelligence, intellectual curiosity, comprehension, joy to experience, creativity, intellectual opening, etc. These individual characteristics of performance may also be used more or less efficiently, depending on the learning technique acquired.

On the other hand, the learning capacity is also determined by the already existent knowledge. The more comprehensive, voluminous and various it is, the more new knowledge can be integrated and applied. The condition that this thing has the intended effect of the knowledge transmitted is that, on the one hand, the information is not too less innovative (and therefore boring) and, on the other hand, it is not so new that the person cannot integrate it in their personal context. If the information volume exceeds the assimilation capacity (we talk about "Information Overload"), it is no longer possible to properly process knowledge. In this context, one must consider the fact that a person may have available very different levels of starting knowledge, in different fields.

**Approach**

The learning processes may be influenced both positively and negatively by the existent means of approach. The causes of these approaches, positive or negative, may be on different levels.

As a prevention of learning, the following things have an impact: aversion to certain fields of knowledge (for instance, mathematics) or
aversion to the source of knowledge. In companies, this is noticed under the form of so-called “Not-Invented-Here-Effects”.

In this context, we must refer to the cognitive dissonance phenomenon which can lead to the fact that some knowledge contents are not perceived as such or are underestimated or overrated. On the other hand, the extrinsic learning incentives can increase the learning motivation.

Predisposition

The individual learning capacity of human knowledge bearers can be thenceforth influenced by the respective concrete predisposition. Thus, individual performance depends, at a certain time, among others, on the health condition, biorhythm and humor of the respective day. Thus, individual performance is subject, during a learning period, to typical fluctuations. Virtually it takes a starting phase which then becomes the main working and concentrating stage and in the end becomes the final stage.

Situational influences

Finally, the learning success is also affected by situational influences. Thus, in many cases, a basic attitude is settled as of the beginning, concerning work and learning. Also, teaching is positively influenced by aspects given to exterior conditions (illumination, temperature etc.) and by the concrete working environment (type of chairs, positioning in space of work equipment etc.). Special conditions must be taken into account as far as learning with a monitor is concerned.

Change of knowledge of the material knowledge bearers

As material knowledge bearers are mainly passive knowledge bearers, changes in knowledge of their memory are induced, mainly through human knowledge bearers. Thus, we must take into consideration certain special characteristics, according to the type of material knowledge bearers, as described below.
Changes in the content of knowledge of the publication-based and audiovisual knowledge bearers

The audiovisual knowledge bearers and publication-based knowledge bearers do not usually acquire new knowledge. Even so, different processes may result in the development of memorized knowledge.

Thus the further *completions* (for example handwritten observations) on the existent publication-based knowledge bearers, lead to the extension of the acquired knowledge and/or to the change of its interpretation. Both the new *compilations* of the publication-based knowledge bearers (possibly gathering articles on a certain theme), and the creation of *references*, lead to the extension of knowledge of these bearers. The same thing is valid for the audiovisual knowledge bearers.

As for the publication-based knowledge bearers and the audiovisual knowledge bearers, it was found that for acquiring new knowledge contents, new knowledge bearers were often created. In the case of publication-based knowledge bearers, this thing appeared in the creation of new documents (notes in conversations, protocols, new editions, etc.). As for the audiovisual knowledge bearers, new contents are often developed by the existent
communication environment. In both cases, there are no changes in the knowledge content of the existent bearers, but they should be treated as such due to the resemblance of processes in this sense.

The change in the content of knowledge of the computer-based knowledge bearers

By using the computer-based knowledge bearers, knowledge is generated, which, before the existence of these bearers, could not be produced or could only be produced by great effort. The reason in this sense is represented mainly by the possibility of applying some comprehensive calculations, as well as simulations, based on the computer.

In the past years, together with the development of Data Mining, this aspect gained a lot of value, because such new knowledge becomes very accessible databases, by recognizing information, based on computers.

In certain cases of the computer-based knowledge bearers, processes still take place, similar to the learning processes of the human knowledge bearers. The independent extension of the basic knowledge of the expert systems is included herein. The same is valid for the apparition of new connections in the neuronal networks. The apparition of new knowledge to the computer-based knowledge bearers is tightly connected to the creation of new files and/or to the reopening of the existent communication media.

Changes in the content of knowledge of the product-based knowledge bearers

As long as the audiovisual, publication-based, and/or computer-based knowledge bearers are integrated in the computer-based knowledge bearers, there are possibilities to change the knowledge contents of this components analogously to the ones mentioned above. Thus, a change usually takes place in the knowledge contents, when a new component is added (for example control programs).

In certain situations, the knowledge memorized within the product-based knowledge bearers, is modified from a point of view of the human knowledge bearers, but also when new methods give the possibility to
decrypt the implicit knowledge contents up to that moment. This is valid for example for new possibilities to analyze chemical substances.

**Collective development and learning processes**

The collective knowledge bearers are also characterized, just like human knowledge bearers, by development and learning processes, as well as oblivion processes. Thus, there are different types of knowledge changes, as well as different learning processes. As a whole, we must retain that collective learning has visibly benefited from less focus in the field of research, than individual learning.

**Conclusions**

The purpose of knowledge management, as an initiative for potential existing knowledge, stretches to a corporate and integrated system. This knowledge is an efficient processing of knowledge to achieve the main goals of the company. One of its aims is developing organizational intelligence.

All knowledge starts with learning, but the benefits are limited unless new knowledge is shared – ideally with everyone else in an organization who might find it useful. Sharing, incidentally, depends equally on everyone both making their knowledge available to others and on using the knowledge made available to them, on both push and pull; it is not a one-way process.

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High-Tech Products and the Double Adverse Selection: Does Commercial Distribution Worsen Efficiency?

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We all know that information about products drives consumption choices. But knowledge comes first. Without the correct consciousness about products, even with complete information inefficient outcomes may result. The adverse selection problem is revisited in this paper, successfully interpreting what happens any time when, even if a contract is complete and the information about the good being sold known, consumers either do not know enough about the existence of some relevant characteristic of products, or do not fully understand their specifications. One can argue that intermediaries (e.g., shop-assistants) can solve the issue. But, unfortunately, this is not true. Intermediaries affect market mechanism, alter consumption experiences and can even create incentives for firms to cheat. This implies that high quality firms should quit commercial distribution to create self-owned mono brand dedicated shops, where assistants are educated (since they work directly for the producer), any asymmetry is equilibrated and the incentive to cheat for firms is ceased. The total social welfare will be increased and, in qualitative terms, consumers buy something that fits better their preferences.

Keywords: Asymmetric Information; Adverse Selection, Consumer Behaviour; Product Quality
Introduction

When a consumer goes to buy high tech products, very often she does not exactly know the basket of characteristics of the product she is going to buy. Usually, she does not know how many qualities are available, as well. She knows her own needs, which functions the good being purchased should have, maybe some aesthetic idea, but nothing more. Only informed consumers, -i.e. individuals who can perfectly distinguish among products, have complete information. Remaining consumers (uninformed) buy products that are somehow unknown to them: to some extent their purchase builds upon trust in intermediaries, such as advisors or shop assistants. Resulting outcomes are predictably inefficient, since these intermediaries can be either ignorant (maybe less than consumers, but still ignorant enough to alter market mechanism) or not interested as they should be in consumer satisfaction. Thus, some products seem to fit consumer needs, just because those needs are defined in an incomplete way, and because those products are presented vaguely, without the correct amount of details. Resulting outcome is that differentiation strategies fail to obtain desired results, in case they are based on details that will be neglected.

Let us imagine what happens when a consumer decides to buy a CD player. Maybe she will be careful to check that it can program a track list, that it has a friendly remote, but it is hard to expect that she knows how important is the jitter error of the laser beam, or how much either the signal-to-noise ratio or the dynamic range or the total harmonic distortion can influence the listening experience. If, e.g., an audio equipment exhibits a total harmonic distortion index (THD) less than 1%, it is defined HIGH FIDELITY (HIFI henceforth). Therefore, a famous brand, can correctly say to sell HIFI audio equipment even if its product rates THD = 0.9%. Are consumers able to understand the difference between that product and another one that rates, say, THD = 0.65% ? Since this difference is basically observable just after listening the equipment, and since this
difference emerges clearly only if the listening experience is conduced comparatively with both equipments available at the same time, and since the correct understanding of the meaning of the THD index is rare, the reply to the question is no. If two qualities of the same good were provided, two perfectly identical players, except for the THD index, with a little difference in price, the greater part of consumers will buy the lower priced one.

Alternatively, one can argue that a consumer could decide to buy a player that possibly satisfies less important needs, on the basis of a secondary function (let us say, shuffle play) compared to another that, instead, is technologically better (say, a lower THD index) but without that secondary function. This happens because the consumer does not know (and does not give the correct weight to) fundamental specifications. After one hour of continue listening with headphones at medium volume, with a player that rates \( \text{THD} = 0.9\% \), consumer’s ears will be tired and, also after the listening is terminated, will hear light rumours, as a pavement below any other sound, that will take several minutes to vanish. This problem is completely absent (in same conditions of use) if the player rates \( \text{THD} = 0.01\% \).

This kind of effects are very difficult to be predicted by consumers: no one can have doubts that if a consumer had known these consequences before the purchase, she surely would have bought another CD player, with a lower THD index, even without the shuffle play! Thus, the reader must be aware that the point here is not a matter of preference! No one would buy a distortive sound player, if the idea of the added distortion is known in acoustic terms it should be. This is just an example, but many other characteristics can be considered or thousands of examples in the high tech sector can be done, such as: cache memory level in CPUs for personal computers, vertex/shader calculation capacity and memory amounts for video cards, plasma/LCD/LED technological details for TV sets, and many more.

The rationale is unique: consequences of ignorance in market actions. This ignorance cannot be solved because sources of information about this kind of topics are difficult to reach and to understand. The focus is on the ignorance about important details. These details are not blinded by
the seller, in the attempt to complete the transaction at a “wrong” price: these specifications are just difficult to understand, barely known. Therefore, even if the seller applies an honest price segmentation of her products, unavoidably an asymmetric bargaining occurs: if consumers knew real characteristics of products they would choose to pay the difference. This problem is so true that in many situations, producers’ pricing strategies are not based on what they should refer to (-i.e. fundamental specifications) but, instead, on secondary options, referring solely to particulars that consumers are aware of!

From another point of view, this builds a strong incentive for mimicking strategies of producers and correspondingly reduce the authentic differentiation: some of producers take advantage of the ignorance of consumers and sell low-profile products at high prices thanks to their brand appeal. Thus, in the market, three firms type will exists: high prices firms with authentic high quality, high prices firms with mimicking strategy with low quality, and low prices firms with low quality. The first and the third types are perfectly and easily recognizable: in fact, very well known brand producers decide to sell very high quality products at high prices, whereas unknown brand producers place their products in a low-price segment and therefore they are perfectly recognizable as well. The mimicking firms (the second group) obtain positive extra profits, thanks to ignorant consumers, who trust the “brand-high price” signal and incur in the bad purchase.

This paper aims to show therefore that the traditional meaning of adverse selection is not sufficient to describe the truly existing asymmetry in the market. This asymmetry is constituted by two parts: the first comes from a lack of information (this is the well known adverse selection that every microeconomic textbook describes recalling Akerlof, 1970); the second comes from a lack of knowledge. This is not responsibility of any seller. But this creates inefficiencies and bad purchases. This, further, creates the incentive for firms to cheat, relying on the ignorance of consumers. Only intermediaries can operate as “knowledge-providers-on-demand”.

However, intermediaries, such as shop-assistants, are not always able to accomplish their function, either because of their ignorance or due to other interests. Consider the case when a distributor store is relevantly interested in selling a particular brand, or a particular model, for any reason: what will the shop assistant do if that brand, or that model, is not better
than another? Maybe, apart from moral hazard issues between worker and principal, if the assistant has to give a suggestion, probably she will try to pursue his principal’s profit. Consequent distortions can affect distributive channels chosen by producers to sell their products and their profits.

The model here considers these issues because tries to cope with a broader definition of asymmetric information. The adverse selection occurring when buyers and sellers do not share the same informative set is usually described as the situation where one of the two contract parts is endowed with more information than the other, before the transaction happens. This incompleteness generates sub-optimal results, widely known in literature. But this kind of asymmetry is not the only one: consumer’s choices are driven by what she knows. Thus, from this perspective, it does not really matter how informed is the seller: the buyer chooses adversely because she ignores the existence (or does not understand characteristics) of something else that could fit better his preferences. In a very simple textbook model of rational consumer choice, we could depict the situation in which an individual allocates all his income between a TV set and good-x (say, clothes), according to his preferences, subject to his budget constraint. But, let us ask a question: which TV set? The sole type he knows.

The problem, then, is a lack of knowledge, not just of information. This, in turn, requires a new approach to describe how agents decide and how their incentives are structured. This broader definition of adverse selection, which tries to enlarge the idea of limited-rationality invoked by the mainstream literature, will allow a deeper understanding of many actual circumstances, when consumers choose rationally in a limited-knowledge context.

This links the model more to the literature about selling strategies than to the one about adverse selection. Eventually, the lack of information in incomplete contracts and the signalling strategies to solve it have widely been treated in lots of previous contributions, since the famous papers by Akerlof (1970), Spence (1974) and Rothschild and Stiglitz (1976), Wolinsky (1983), Engers an Fernandez (1987), and many more. Literature about selling strategies accounts for the relation between influence on buyers and ignorance. Examples of this kind of contributions are Wagner et al. (2001), Schmitz (2007), Fay and Xie (2010).
The correct consciousness about the goods that are being consumed is the very core of the work by Bui et al. (2008), where the asked question is exactly how to know what is inside a drink. The reason behind this contribution is that if consumers knew exactly how harmful the alcohol consumption is, they would certainly moderate it. The same insight comes from Kopp and Kemp (2007), about funeral services and related laws: capability to choose in a limited rationality and knowledge context. The theoretical definition of merit goods lies underneath our argument: what Musgrave (1957) told us in a way is in fact that there are goods that are not fully evaluated and the policy maker can intervene to solve the inefficiency arising from the lack of consciousness.

Furthermore, the self-confidence that consumers feel about their decisions leads to a deeper research for their satisfaction, as documented by Loibl et al. (2009). This can imply that less aware consumers are exactly those who do not search enough and who rely on salespersons. From another perspective, the difference between ignorance and information is the leading perspective in Rotfeld’s words (2008), who underlined how consumers are not just pawns to be moved. They can have (and of course they should have) the correct consciousness to maximize their utility. Otherwise, most of the economic theory addressed to define and analyse drivers of preferences’ satisfaction should be reconsidered as a delegation problem that acknowledges solely a fundamental role in intermediaries who influence consumers’ purchase decisions.

Our model obtains two results. First of all, it shows that two sources of asymmetry exist: incomplete information and ignorance. Secondly, it demonstrates that if intermediaries act honestly to defend consumers’ interests, the issue is solved, with net gain in terms of social welfare: general quality of products will be improved, low-quality products will disappear, mimicking firms have no more incentives to cheat. Third, it gives the evidence of a possibly misleading role of commercial distribution: as long as producers are not involved is the final sale, they have the incentive to mimic, with lower satisfaction for consumers and lower well-being for the entire society. On the contrary, if producers quit the commercial distribution and create self-owned mono brand dedicated shops, their shop-assistants will be responsibly educated to support buyers, without any other incentive to sell wrong products. This happens because if the owner of the
store is not simply a distributor (with his own profit objectives) but is exactly the producer of the products, the result of the sale will impact on the reputation of the brand and so does the actual quality of the sold goods (both in absolute and in relative-comparative terms).

Then, the idea of adverse selection is being redesigned: what literature already knows is an “absolute” definition of adverse selection: e.g., the buyer does not know that a second-hand car has an almost broken engine. Here, a “relative-comparative” adverse selection problem appears: e.g., the buyer chooses a product because she does not know (or fully understand) its and other product’s specifications; therefore the comparative analysis and the choice mechanism both fail to lead to the best outcome and preferences are not fully satisfied (sometimes unconsciously, i.e. the consumer is not fully satisfied and she does not think she could have had more). Responsibility is assigned: this is a matter of knowledge, not just of information.

Section two presents the model, and section three will conclude.

A model of double adverse selection

In this model, I hypothesize that consumers do not know exactly quality of goods: they know just the final appearance, they can judge the correspondence to advertised technology, and maybe they can be endorsed by a sufficient level of knowledge to judge their consumption experience. Only a very little part of them know actual characteristics of technological goods. It often occurs that “a friend”, “a colleague” or, more generally, “someone” who is supposed to be an expert, suggests the final choice. Finally, the shop-assistant works to address the purchase to some good in particular. In what follows, we will never consider the principal-agent problem between a shop assistant and the owner of the shop. We will suppose they have the same incentive profile. The reason for this highly simplifying assumption is that the model here is not addressed to study how far can be a worker’s behaviour from hers principal’s profit maximization. This topic is widely known and already analysed in literature. The point here is, instead, to study consumers’ side to find how exogenous factors can alter their satisfaction, very often unconsciously.
A continuum of consumer and firms exists. Products are of two types: high tech high profile goods (high quality) and standard tech low profile goods (low quality). Their prices are different because of factors of production, technology embedded, and production processes; in particular standard tech goods costs less than high tech food. Firms are of two types: famous brand and no brand. The first type produces the high tech high profile good (HQ henceforth), and sells it at the correct high price HP. The second type produces the standard tech low profile good (LQ henceforth), and sells it at the correct low price LP. The setting must be amended because, in the first group of firms, some producers use their famous brand to hide an LQ good behind an HQ branded appearance.

So we have three groups of firms, and the difference between firms in the second and the third type is that they sell the same product differently: branded (high price) and unbranded (low price). Their quality level is the same, the price is different. However, consumers do not know that quality of goods produced by the second and third type is the same, unless they buy it. Technological products are not experience goods, since the correct knowledge can make every consumer able to choose without hesitation among all different opportunities for his consumption.

The lack of information transforms the setting of the problem, which assumes characteristics of experience consumption. This complicates further the issue, since the consumption cannot be a complete source of information: e.g., if a consumer buys an integrated stereo amplifier of a given channel power, he will simply observe that it sounds (as it is absolutely obvious to happen), but nobody will buy two, three, or four amplifiers to compare them in his own living room! Moreover, since in some store every consumer may ask to listen the audio components, their experience will give information just about those elements that are used in the trial. Theoretically speaking, a perfectly informed consumer, endowed with complete knowledge on technological standards, may ask to listen precisely some models, instead of those already present in the shop.

**Summing up:**

- the first type of firms is made of $N_1$ producers, split in two groups:
  - the first is populated by $N_1^A$ producers who sell their high quality
products (HQ) at high prices (HP); the second counts $N_1^B$ producers who sell their standard quality products (LQ) at high price (HP) to mimic high quality and obtain higher profits;

- the second type of firms is made of $N_2$ producers selling their standard quality products at the correct low price (LP).

For simplicity, in the model the number of firms has been normalized to one, so that $N_1^A + N_1^B + N_2 = N = 1$.

Since consumers cannot observe quality, but they can rely solely on prices, their choice is affected by a lack of information. Moreover they suffer also by a lack of knowledge. Because of the lack of information, part of consumers will not be able to distinguish among high prices products: they are all interested in high quality products, but they can’t properly distinguish between them, and therefore, some of them incurs in the bad purchase (buying LQ at HP). Because of the lack of knowledge, part of consumers who ignore characteristics of HQ products will decide to buy LQ at low prices.

Summing up, we consider three groups of consumers:

- the first group is populated by $M_1^A$ consumers, who buy HQ products at correct HP prices, because they do not suffer either from the lack of knowledge or from the lack of information;

- the second group is populated by $M_1^B$ consumers, who want to buy HQ products, and are willing to pay HP prices, but, unfortunately for them, they suffer from lack of information; thus, a part of them $(\beta M_1^B)$ will incur in the bad purchase, even if the remaining part $((1-\beta)M_1^B)$ will fortunately reach their goal;

- the third group is populated by $M_2$ consumers, who buy LQ products at LP prices and reach their goal. It must be noted that these consumers either decide to buy LQ products because they suffer from lack of knowledge and therefore do not understand the difference. Alternatively, it could be said also that they understand to be ignorant and, since do not find how to learn what they need, decide to avoid the risk to incur in the bad purchase.
For simplicity, in the model the number of consumers has been normalized to one, so that \( M_1^A + M_1^B + M_2 = M = 1 \).

Each consumer buys one good and, of course, he maximizes his own utility. The net utility for consumers is defined as the difference between the quality value \( jQ \), net of paid price \( jP \), \( (j = H, L) \)

\[
U = jQ - jP
\]

The eq. (1) is founded on the same idea that is used in literature about quality and differentiation; e.g., Cooper and Ross (1984), Perloff and Salop (1985), and Albrecht et al. (2002). An important assumption is that aware consumers do prefer HQ goods, since it is assumed

\[
HQ - HP > LQ - LP
\]

(2)

Who mistakenly buys the low-quality good at high price, (the bad purchase) obtains

\[
LQ - HP < 0
\]

(3)

Who does not suffer from none of the adverse selection sources buys high quality equipment at the correct high price, since difference in quality is worth the difference in prices, as shown in eq. (2). Then, it is

\[
HQ - HP > LQ - LP > LQ - HP
\]

(4)

Further details are needed in order to explain consumers’ decisions. Consumers can decide to buy the HQ good because know exactly how good it is, how satisfactory it is, and definitely because they know rationally that the increase in quality is greater than the increase in price. This is the same
position that is assumed by those who suffer from lack of information (first source of adverse selection): their problem is that they cannot recognize HQ as well as they should and look exclusively to the price signal in order to make their choice for a quality purchase. Finally, those who ignore the difference between technological qualities, choose to buy the LQ good (second source of adverse selection).

Possible outcomes for consumers in $M_1^A$ and in $M_2$ groups are easily predicted

$$(HQ - HP) \text{ for } M_1^A \text{ consumers, and}$$

$$(LQ - LP) \text{ for } M_2 \text{ consumers.}$$

The problem is different for $M_1^B$ consumers, since their possible outcome is given by the following expected value:

$$EU(M_1^B) = \frac{N_1^A}{N_1^A + N_1^B}(HQ - HP) + \frac{N_1^B}{N_1^A + N_1^B}(LQ - HP)$$

The first addend is the probability to find an HQ producer anyway, while the second addend is the probability to suffer the negative outcome deriving from a bad purchase.

A first result of the model comes out from the eq. (6): an increase in knowledge about technology, information about product characteristics, and, broadly speaking, increasing the average awareness level of buyers actively operate to reduce the second addend: it is evident that eq. (6) is decreasing in $N_1^B$ and vanishes if consumers do not suffer from lack of information. Here the role of shop assistant would be central.

Let us rethink the problem, following a completely different approach and accounting for social welfare distribution, to obtain again and definitely the desired result.
Firms know differences between HQ and LQ. Firms are supposed to be identical, with same technology and for simplicity I will assume no fixed costs. Total costs of each firm depend on chosen quantity \( q \) and quality \( jQ \), as widely assumed in literature (see for example for similar cost functions, Shapiro, 1982, Cooper and Ross, 1984, and Albrecht et al., 2002):

\[
TC = c(q, jQ)q
\]

(7)

therefore, two different cost specifications can emerge, according to two different qualities:

\[
TC^{HQ} = c(q, HQ)q
\]

(8)

\[
TC^{LQ} = c(q, LQ)q
\]

(9)

and, of course, \( TC^{HQ} > TC^{LQ} \). Profits of HQ producers are defined by (remember that we are hypothesizing for simplicity that each consumer buys only one unit):

\[
\pi^{HQ} = [HP - c(q, HQ)][M_1^A + (1 - \beta)M_1^B]
\]

(10)

In similar way, profits of sincere LQ producers can be written as:

\[
\pi^{LQ} = [LP - c(q, LQ)]M_2
\]

(11)

Mimicking firms have a different profit profile, which can be written as

\[
\pi^{MIM} = [HP - c(q, LQ)]\beta M_1^B
\]

(12)
where, $\beta \in (0,1)$ is the share of $M^B_i$ consumers who buy from a mimicking firm.

Correspondingly, in eq. (10), we find the $(1-\beta)$ share of “lucky” $M^B_i$ consumers who buy from HQ firms. The incentive to cheat for firms arises because $\pi^\text{MIM} > \pi^\text{HQ} = \pi^\text{LQ}$. Two assumptions have been imposed here: the first is that profits for cheaters are greater than other possible profits; the second is that HQ and LQ producers earn equal profits. The latter does not constitute an incentive to cheat, it is a simplifying assumption that is added to focus exclusively on the asymmetric information problem. Relaxing this assumption, however, does not revert necessarily results of the model. Consider, as a reinforcing example, that Albrecht et al. (2002), assume null profits for firms in equilibrium, as they impose free entry/free exit market conditions. I apply the same hypothesis, and therefore this implies that

$$jP = c(q, jQ)$$

(13)

for each HQ and LQ producers. Then, the profit differential that cheating firms will benefit (against each consumer) is equal to the damage of wrong purchases. In particular, recalling eq. (13), one can write that $\pi^\text{HQ} = 0$, $\pi^\text{LQ} = 0$, and consequently that:

$$\Delta\pi = \pi^\text{MIM} - \pi^\text{HQ/LQ} = HP - LP$$

(14)

Looking at our problem in welfare terms, I now analyse both side of the market to check what happens whether information and knowledge are available.

The source of consumers’ welfare loss is twofold: the first part derives directly form the first kind of asymmetry, -i.e. consumers who want the high quality product but do not distinguish it and buy the standard
quality product paying the high price, \((HP - LQ)\), which is exactly the profit differential going to cheating firms; and the second part derives indirectly from the second kind of asymmetry, -i.e. consumers who ignore some characteristics and buy standard goods (or, possibly, risk-averse consumers who prefer to buy the standard good to avoid the probability of the loss caused by the adverse selection). Thus, such sources of consumers’ loss can be written as the sum of the loss suffered by \(\beta M_1^B\) consumers who buy from the \(\frac{N_1^B}{N_1^A + N_1^B}\) cheaters, plus the loss suffered by \(M_2\) consumers who consciously buy the LQ good (due to either ignorance or risk-aversion). That is:

\[
\text{consumer loss} = \beta M_1^B (HP - LQ) + M_2 \left[ (HQ - HP) - (LQ - LP) \right] > 0
\]

(15)

If shop-assistant play the correct role, and help consumers as they are supposed to do, giving required information and awareness, they can solve the issue, improving total welfare because consequent consumer gains are greater than the restriction mimicking firms’ profits. Then, competent shop-assistants increase social welfare if the value expressed by eq. (15) is greater than the value in eq. (12), -i.e. if

\[
\beta M_1^B (HP - LQ) + M_2 \left[ (HQ - HP) - (LQ - LP) \right] > [HP - c(q, LQ)] \beta M_1^B
\]

(16)

Recalling that the bad purchase has the same value of the positive profit differential for each unit sold, -i.e.

\[
(HP - LQ) = [HP - c(y, LQ)]
\]

(17)

since it is
The conclusion demonstrates that if shop-assistant act in order to inform about actual characteristics of HQ goods, allowing consumers to choose with perfect information, social welfare will be overall increased, since the loss for consumers that is consequent to the asymmetric information is greater than the reduction of profits suffered by mimicking firms by knowledge and information diffusion. Of course, from our point of view, the case with perfectly competent shop assistants gives the same outcome obtained in mono-brand shops, referring exclusively to the problem of consumers’ awareness about goods’ specifications.

When consumers are not ignorant and perfectly informed, cheating firms disappear, since no one will buy from them: mimicking profit in eq. (12) is zero. Also LQ producers will migrate to HQ productions, since we assumed \( HQ - HP > LQ - LP \), therefore aware consumers will buy only HQ products. Be the reader aware that from model’s perspective, the difference between HQ and LQ is not a matter of differentiation among valuable characteristics: this is the reason why, if high quality specification is perfectly revealed, only HQ products will be sold in the market.

If producers sell their products by distributive channels with imperfectly informed intermediaries in stores, they can obtain mimicking profits since ignorance of consumers meets the imperfect action played by shop-assistants. On the contrary, as aforementioned, equivalently in both the case of mono brand self-owned shops and the case of commercial distribution with perfectly informed intermediaries, they obtain \( \pi^{HQ} \).

So, in a static-one-period setting, the model demonstrates that commercial distribution negatively affects welfare maximization and creates advantages just to cheater firms. Then, the implication could be that the correct signal to let consumer distinguish between authentic HQ producers and cheaters is the creation of mono brand shops, where only HQ products are sold. In those shops, assistants are educated directly by HQ producers and thus both sources of asymmetry are solved. This leaves the mass
distribution channel as the low price distribution. No asymmetries, and no welfare loss.

Concluding Remarks

The adverse selection problem has been re-defined to analyse the asymmetric information that characterize consumers’ choices under incomplete information and ignorance. By means of a welfare analysis it has been demonstrated that shop-assistants play a key role in divulging information about characteristics of goods. If they fail, no matter why, commercial distribution negatively affects welfare maximization. This suggests the adoption of a more credible signal: the creation of mono brand store, where only HQ product are sold by educated shop-assistant. The model demonstrates that in these conditions, welfare increases and cheating firms will disappear. Only high tech products will be sold. Differentiation and competition strategies among producers, as we all know them by literature about these topics, are different topics that have been neglected. The model will be extended for future research in order to cope with dynamic multi-periodical reputational issues, and account for dynamic mimicking price signalling. The relation between reputation of firms and market equilibrium, e.g. Kreps and Wilson (1982), will be investigated to show how this broader definition of adverse selection affect the incentive to cheat.

References


Development of Distance and E-Learning Based Higher Education in Uzbekistan in Framework of International Collaboration

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Today international collaboration and cooperation are being considered as one of the main trends of higher education development all over the world. Knowledge has become increasingly international. For example, the total number of foreign students worldwide was approximately 200,000 in the 1950-1960 years. This figure changed in 1987 up to 1.2 million partially thanks to establishing international mobility programs such as European Comission funded ERASMUS MUNDUS. In 2004 this number reached 2.5 million (UNESCO Institute for Statistics, 2006).

Keywords: E-learning, Higher education, Uzbekistan

J. Knight defines internationalism as the activities of higher education institutions in response to the economical, political and social forces pushing higher education towards greater international involvement [1]. More broad definition of the internationalism in higher education is given in the U. Teichler’s monographs where this term has been employed regarding seven themes: (i) physical mobility of academic staff and students; (ii) recognition of study achievements across borders; (iii) different modes of transfer of knowledge across borders; (iv) internationality in the substance of higher education; (v) international orientation and attitudes, (vi) the similarity of heterogeneity of national systems of higher education;
(vii) internationalization as an argument for almost any higher education reform. [2].

In Uzbekistan the processes of internationalization of higher education started in 1991, when this former Soviet republic became politically and economically independent. In 1997, when the new Act on Education and the National program on Personnel Training was approved by the government the international collaboration got its legitimate bases. Even the formal structure of higher education, consisted of 4-year of Bachelor studies and 2-year Master courses which was launched that time underlined the country’s endeavors to be implemented in international education.

The government decree on development of measures to strengthen material-technical base of higher education institutions and radically improving training highly qualified specialists announced this year is also aims to improve the quality of training specialists with higher education, demanded by industries and sectors of the economy through the strengthening and modernization of the logistics of higher education institutions, equipping them with modern educational and scientific and laboratory equipment, optimization of areas and specialties training of qualified personnel, further develop international collaboration, especially in the areas of academic staffs mobility.

Many Uzbek universities are strongly engaged in international educational and scientific collaboration. For instance, Urgench State University has managed the several cooperative projects: ZEF/UNESCO project entitled “Restructuring the use of land and water recourses in the Khorezm region”, International MA courses in collaboration with Weihenstephan University of Applied sciences, 145171 TEMPUS-1-2008-1-ES-SM HES PERSEUS project, 158918-TEMPUS-12009-1-At-TEMPUS-JPCR CANDI E-Learning project, 511172-TEMPUS-1-2010-1-DE-TEMPUS-JPCR CIBELES project, UNESCO funded project on utility for production of biogas for supplemental supplies, UNESCO funded project on development of the efficient use of water recourses, another UNESCO funded project on growth of "Indigofera" and acquisition of color by using water saving technologies, the US Embassy sponsored English language teaching courses for academic lyceum and college students, ICARDA project for improving the quality of regional wheat production, CRDF aided canal lining and
afforestation project to prevent raised groundwater tables and field salinization in the Khorezm region of Uzbekistan.

Among different international components of higher education distance and e-learning based courses stand for one of the major means of broadening the horizons of the global world. Distance learning is confidently asserting itself, especially in higher education. This is a more flexible and liberal form of education, as any people paying relatively low costs could get a new profession or improve necessary skills and knowledge. First of all, it is important to understand what is meant by distance learning because now you can meet a variety of interpretations of the concept. This includes any form of self-learning and distance education and external studies.

Compared with traditional forms of education, distance learning offers more freedom in choosing the learning mode, and is easily adaptable to suit the learner's individual needs and circumstances. One is not limited in distance and learning in higher education regardless of the place of residence. One is also not limited in time and learn when it is convenient and optimal for own pace, instead of attending classes at certain times, as in traditional full-time education. However, one has a wellstructured curriculum, implementation of which is strictly controlled by the teacher.

Distance learning provides an opportunity of individual personal approach to the teacher for each student. The courses are held in continuous online contact between the teacher and students by: recording the attendance, checking the assignments, testing and discussion of the test results and difficulties and problems of the students during the e-seminars, forums and chats, answering the questions individually and explaining the most difficult topics by an individual approach. Currently, the TEMPUS project entitled “158918-TEMPUS-1-2009-1-A T-TEMPUS-JPCR CANDI” began to develop an international distance learning course in Informational Technology and Chemistry. The aims of this project are: (i) creating a sustainable infrastructure of e-Learning in Uzbekistan and Kazakhstan together with European partners; (ii) examining the needs and developing a simple platform of e-Learning; (iii) training local young professionals for further development of the platform; (iv) involving the representatives of varies sectors of the economy such as manufacturing and industry and
universities to determine a road map of cooperation for innovation research, including characteristics of the platform and content of training courses.

The CANDI project will develop both the infrastructure for e-Learning/retraining, and the skills necessary to transfer existing courses and curricula to an e-Learning environment. The project is set up in a way to address the following multiple problems simultaneously:

- assisting to educate large numbers of students;
- assisting to narrow the gap between the education level in central universities and the provinces;
- training the local university staff in systematic and effective use of e-Learning, presentation technology, and related didactic skills;
- using e-Learning not only to teach students, but also to teach university staff, in particular at institutions in provincial cities;
- supporting the retraining of the staff of the manufacturing and industry sectors. On the other hand, CANDI will also open opportunities for industry to deliver applied courses and lectures to a university audience;
- employing cheap open source solutions for e-Learning;
- providing a pilot phase where existing courses from European partners will be transferred into the e-Learning framework. Since these courses will reflect the state of the art in their respective areas (mostly Computer Science, Chemistry, Computational Science, Chemistry, Chemical Technology, Software Skills), they will by their nature improve the quality of the curricula inside and outside of e-Learning;
- improving the English and software skill knowledge of all participants, thereby improving the ability of Central Asian staff to achieve sustainability through international grants [3].

CANDI project is planned as a three-year project in which the competence of local actors in the field of e-Learning will be developed in several stages. The first year will focus on learning needs and development of the first simple e-Learning platform together with the first e-learning. CANDI provides training to local young professionals on the use and development platform. Using the demo and experience available at the beginning of the second year of the project, the consortium will involve representatives of the manufacturing sector and universities to determine
the road map, including characteristics of the platform and content of training courses to be developed at the pilot stage of the second and third years. Throughout the duration of the project from first to third year CANDI will deal with the introduction of prototypes of e-Learning (with respect to both course content and e-Learning platform development), taking into account the contribution of European researchers. Technically, CANDI will primarily use the free, open educational platform, such as MOODLE or TUD’s Digital Classroom for e-learning. CANDI platform will support multiple languages: English, Uzbek, Kazakh and Russian and will ensure the flow of knowledge and information between the partner universities. Due to large differences in quality networks in different countries CANDI will support a variety of paradigms of e-Learning, from online courses with streaming video and video conferencing throughout the day to stand-alone devices such as DVD.

Urgench State University, together with the National University of Uzbekistan and the Tashkent Institute of Chemical Technology are the regional partners of the project. In collaboration with Vienna University of Technology, Open University of England, Technical University of Munich, University of Vienna, Kazakh National University and International Kazakh-Turkish University distance and e-learning based courses on Informational Technologies and Chemistry are being developed and proposed to implement in current teaching curriculums For instance, the aim of the course "Simulation of molecules and processes" is to teach students the principles of mathematical representations of chemical problems associated with studying the structure and properties of chemical compounds, and development of practical methods for solving the given tasks by using computer systems.

This course is based on the latest achievements of computer technology and its implementation in applied research. Mathematical modeling of even a very simple chemical system necessarily require a high level of computer tools and software. Students should be familiar with the general course of chemistry, mathematics, and have the necessary skills to work on personal computers. From the students of chemical disciplines knowledge on stereochemistry, quantum chemistry and physical methods of researching are necessary for the mathematical modeling.
Thus, development of distance learning courses will lead to a reduction of tuition fees, due to the phasing-out of hardcopies of publications and possibility of introducing a new course or improving the existing course at no additional cost. The further development and deep implementation of distance and e-learning courses will involve more deeply Uzbekistan universities through international educational collaboration and cooperation. Hence, the higher education institutions in Uzbekistan are well-prepared for implementing distance and e-learning in broad scales, which is demonstrated here in the example of Urgench State University.

References


Money Laundering – an Economic Offence

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Preventing and combating money laundering, the product of the transnational organized crime, in general, is one of the most efficient means of stopping this activity, which is a threat for the national or international economic operations.

The penal incrimination and sanction of money laundering is a useful instrument for the accountability of all categories of offenders, but also with the purpose of imposing more severe sanctions for those who commit offences generating dirty money, behind so called legal commercial activities. Eventually, we shall review the internal regulations on money laundering, and also of the international judicial instruments incriminating this offence, analysing the offence by its constitutive elements.

Keywords: economic offence; money laundering, international legal instruments, the internal regulation

The internal regulation of money laundering

In the Romanian legislation, money laundering was regulated for the first time by Law No 21/1999, part of the large harmonization of the national
legislation with the communitarian acquis\(^1\). Law 21/1999 was abolished on 7 December 2002, when the Romanian Parliament adopted Law 656/2002 on the prevention and repressions of money laundering, as well as for setting up some measures for prevention and combating of terrorism financing acts\(^2\). The national legislative framework is completed by the Decision No 1559/4 December 2008 on the approval of the Regulations for the Organization and Functioning of the National Office for Prevention and Control of Money Laundering\(^3\).

**International legal instruments regarding money laundering**


Internationally, the general framework is formed by the UN Convention against transnational organized crime of 2000\(^5\) and the Recommendations of the Financial Action Task Force\(^6\), adopted at the moment of its formation.

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\(^2\) Official Gazette No 904/12 December 2002, with subsequent modifications and amendments, including those stated by Government Urgent Injunction No 26/2010 (Official Gazette No 208/1 April 2010).

\(^3\) Published in the Official Gazette No 841/15 December 2009


\(^6\) FATF was established in 1989 by the G-7 Summit held in Paris. Today it is formed by representatives of 31 states, to which is added the European Commission. Regarding the
Incrimination of money laundering by the actual legislation

Before starting to analyze this offence, a few statements on its name must be made. The term “money laundering” is said to originate from Mafia ownership of Laundromats in the United States in 1920s-1930s. Gangsters were earning huge sums in cash from extortion, prostitution, gambling and alcohol smuggling, earnings which needed legal justification. One of the ways in which they were able to do this was by purchasing outwardly legitimate businesses and to mix both illicit and licit earnings received from these businesses. Laundromats were chosen by gangsters because they were cash businesses, an undoubted advantage to people like Al Capone.

As it was previously shown, money laundering is stated by Law No 656/2002 on the prevention and repression of money laundering, as well as for setting up some measures for prevention and combating of terrorism financing acts. Art 23 of the law states three ways for incriminating money laundering:

First way, provided for by Art 23 Para 1 Let a) states that “the conversion or transfer of property, knowing that such property is derived from criminal activity, for the purpose of concealing or disguising the illicit origin of property or of assisting any person who is involved in the committing of such activity to evade the prosecution, trial and punishment execution”.

The second way provided for by Art 23 Para 1 Let b) states that “the concealment or disguise of the true nature, source, location, disposition, movement, rights with respect to, or ownership of property, knowing that such property is derived from criminal activity”.

The third way provided for by Art 23 Para 1 Let c) states that “the acquisition, possession or use of property, knowing that such property is derived from any criminal activity”.

The judicial object of money laundering is represented by the social patrimonial relationships, born and developed in relation to the goods and recommendations on money laundering of this group, we note that in 1990 were published 40 Recommendations, revised in 1996, to which other 8 special recommendations on financing terrorism were added in 2001, and the Nine Special Recommendation on “cash couriers” adopted on 22 October 2004.

values in financial, banking, economic, commercial or civil circuits, achieved by the institutions stated by Law 656/2002. Art 23 Let b) has as judicial object the social relationships on the right of property or other real rights. The special judicial object of this offence also comprises social relationships born and developed in relation to justice, the incriminated offences preventing the truth and the achievement of justice.

The material object of money laundering is represented by goods resulted from the main offence (for instance, fraud in banking) and subjected to laundering. In the category of goods named above are also included payment documents and instruments recognized on the financial, banking, investments and insurances market, attesting property or other rights regarding property. Goods or values must be the result or the “product” of an offence, and not instruments used for that offence. According to the UN Convention of 2000 against transnational organized crime, the offence must have a certain degree of gravity, namely the

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8 Art 8 of the Law No 656/2002 states that the provisions of this law shall be applied to the following natural or legal persons:
- a) credit institution and branches in Romania of the foreign credit institutions;
- b) financial institutions, as well as branches in Romania of the foreign financial institutions;
- c) private pension funds administrators, in their own behalf and for the private pension funds they manage, marketing agents authorized for the system of private pensions;
- d) casinos;
- e) auditors, natural and legal persons providing tax and accounting consultancy;
- f) public notaries, lawyers and other persons exercising independent legal profession, when they assist in planning or executing transactions for their customers concerning the purchase or sale of immovable assets, shares or interests or good will elements, managing of financial instruments or other assets of customers, opening or management of bank, savings, accounts or of financial instruments, organization of contributions necessary for the creation, operation, or management of a company, creation, operation, or management of companies, undertakings for collective investments in transferable securities, other trust activities or when they act on behalf of and their clients in any financial or real estate transactions;
- g) persons, other than those mentioned in Let (e) or (f), providing services for companies or other entities;
- h) persons with attributions in the privatization process;
- i) real estate agents;
- j) associations and foundations;
- k) other natural or legal persons that trade goods and/or services, provided that the operations are based on cash transactions, in RON or foreign currency, whose minimum value represents the equivalent in RON of 15000EUR, indifferent if the transaction is performed through one or several linked operations.


10 See V. Dabu, S. Ctitinean, Noua lege pentru prevenirea și sancționarea spălării banilor (Law No 656/2002), UN Convention against organized transnational crime, Dreptul Magazine No 6/2003, p.35
maximum penalty stated by the law for that particular offence must exceed 4 years”. If the goods are the result of another illicit act, such as the civilian contract with illicit cause (for instance, selling with frivolous price) or contravention (for instance, illegal exchange of currency) the offender is not liable for money laundering.

The active subject is represented by any natural person, without stating any other special quality of the subject. The active subject of money laundering can also be the author of the main offence, or a person specialized in money laundering, without any connection to the main offence.

The passive subject is represented, firstly, by the state, as owner of the obligation to ensure and guarantee normal economic-financial and business activities. The passive subject can be any natural or legal person prejudiced by this offence.

The objective side

The material element of money laundering in the first way of incrimination is represented by the action of “exchanging” or “transferring property”, knowing that this is derived from criminal activity, for the purpose of concealing or disguising the illicit origin of property or of assisting any person who is involved in the committing of such activity to evade the prosecution, trial and punishment execution.

“Changing” property means the transformation of an asset or a value in another one. For instance, Lei amounts resulted from illegal smuggling of assets, are exchanged in foreign currency through exchange offices. The change can also be physical by subjecting the assets to modifications susceptible of altering their material appearance, without affecting their inner value (for instance, changing the color, series and registration number of a stolen vehicle with the elements from a damaged legally purchased vehicle, which can no longer be used, and is bought by offender for a small price). Another meaning of changing assets refers to the replacement of an asset by another one, or the yielding up an asset to take

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13 According to Art 2 Let b) of the Law 39/2003 on the prevention and combat against organized crime, published in the Official Gazette No 50/29 January 2003, serious offence is that offence for which the law stated the penalty of imprisonment, with a special minimum of at least 5 years.
in return another asset of equivalent value, or of different value\(^{12}\) (for instance, exchanging anonymous stocks, bonds, payment references or stolen or illegally acquired stock certificates issued to bearer to other legal ones).

The \textit{transfer of assets} – the second way of the material element of money laundering, refers only to the physical movement of the asset from a place to another one and the transfer of money from a bank account to another one at the same bank or from a bank to another.

The transfer of values, in judicial literature\(^{13}\) and according to Law No 656/2002, should consider the following activities:

- the operation of moving capital under different forms from a country to another, with or without legal appearance;
- moving currency or apparent payment orders for different merchandise or even payments (deductions), buying bonds, script notes, opening commercial credits, bank deposits, credits etc.
- moving currency by speculative buying, re-sales of stock in stock exchanges
- fictive payments, issued by cards
- inter-banking transfers of funds using the Western Union system
- different forms of internal or international deductions: cheques, letters of credit, payment or collection orders.

To invoke money laundering, the purpose of changing and transferring goods must be the concealment or disguise of their illicit origin, as well as for assisting the offender to evade prosecution, trial or punishment execution.

Regarding the “\textit{disguise}”, the doctrine\(^{14}\) showed that it must be considered the fact that the change or transfer of goods was made with the purpose of concealing their illicit origin, the replacement of the illegal features with “fake” ones or true, but have a legal appearance. The change or transfer of assets must be performed with the purpose of disguising the illicit origin, namely to create a valid and verisimilar “legality”.

The immediate consequence of the analyzed version is the state of danger on the values protected by the law.

Causality – money laundering subsists when there is a causality link between the changing or transfer of goods resulted from offences and the immediate consequence of this action.

The material element of money laundering in the second way of incrimination is represented by the concealment or disguise of the true nature, source, location, disposition, movement, rights with respect to, or ownership of property, knowing that such property is derived from criminal activity. The action does not refer to a good in its materiality, but to the right of property or to other rights with respect to that good.

The concealment or disguise, as defined by the law, represents the set of actions performed by the active subject with the purpose to “legalize” a good resulted from an offence, namely that the good or value resulted from legal businesses or operations.

The concealment or disguise regard the origin (source, origin, genesis), location (the physical place of the good), property (who has the right to use that good) and circulation of the good (circuits, routes followed by the good).

The concealment or disguise can have the shape of preparation or obtainment by the active subject of false documents regarding the origin, location, property of, circulation or use of the goods. Thus, are forged bills, fictitious transportation documents, companies, buying-selling contracts, donations or credits.

The material element of money laundering in the third way of incrimination is represented by the acquisition, possession or use of property, that such property is derived from any criminal activity.

The acquisition represents the action of a person to obtain, by any means, an asset stated by the law, knowing that is the derived from an offence.

The possession and use represents the action of a person to enjoy an asset, to use it and to exploit it for a determined or undetermined period of time, temporary or continuous, according to its destination, if the person knows that the good is derived from any criminal activity.

\[15^\text{The so called incorporable goods}\]
When the object of “laundering” is represented by illicit amounts of money, the offender, namely “the launderer” performs the following activities:

- First of all, the offender receives cash amounts derived from offences (receipt of money)
- Second of all, the launderer establishes a scheme of money laundering (the proper laundering), which, in most cases, is structured on three phases:
  1. Placement – the amounts of money derived from any criminal activities are placed in circulation, are actually placed in institutions like those stated by Art 8 of the Law No 656/2002, namely: banks, investment funds, insurance companies etc. Thus, on this phase the illicit funds are crumbled, namely the total amount is divided in amounts smaller than 10,000 EUR (in Lei equivalent), then the small amounts are placed.
  2. Sedimentation and stratification represents the separation of the illegal funds from their source. This is achieved by the performance of total or partially fictitious financial or commercial transaction, by the creation of cover-up companies. The launderer prepares fictitious import-export documents, as base for the transfer of money from their initial location to placement (bank) in other bank as payment for the fictitious services or operations.
  3. Integration supposes the legalization of funds derived from any criminal actions by reinserting them in the legal financial, banking or commercial circuit.

As one can notice, money laundering is a set of complex and very refined activities, procedures, techniques and methods. Money laundering closes the criminal circuit, which starts with one or more offences, continues with the financial result (dirty money) and is ended by the laundering of this product, using procedures, techniques or schemes, simpler (for instance, placement of money abroad) or more complex (for instance, the use of financial-banking circuits).

The subjective side The guilt by which the offence is committed in all its three deeds stated by Art 23 of the Law No 656/2002, is the direct intention, because the active subjects commits specific actions (changing, transfer etc.), knowing that the goods are derived from any criminal actions.
Preparation actions, though possible, are left by the legislator outside incrimination. According to Art 23 of the Law No 656/2002, the attempt is punished.

Regardless of its means, money laundering is punished with prison from 3 to 12 years.

Procedural aspects

In order to apply the Law No 656/2002, the legal persons stated by Art 8 shall assign one or more persons with such responsibilities. For money laundering, the banking secrecy – professional secrecy for the employees of a bank – shall not be opposable to the prosecution bodies or to the courts of law. Thus the data and information required by the prosecutor or court are communicated by the persons stated by Art 8, upon written request of the prosecution bodies, with the authorization of the prosecutor or the court.

Regarding the situations where there are solid grounds of committing an offence involving money laundering or terrorism financing, for the purposes of gathering evidence or of identifying the perpetrator, the following measures may be disposed: monitoring of bank account and similar accounts; monitoring, interception or recording of communications; access to information systems; supervised delivery of money amounts. Also, the prosecutor may dispose that text, banking, financial, or accounting documents to be communicated to him.

For the situations where there are solid and concrete indications that money laundering has been or is to be committed and where other means could not help uncover the offence or identify the authors, undercover investigators may be employed in order to gather evidence concerning the existence of the offence and identification of authors, under the terms of the Criminal Procedure Code.16

Conclusions

Very serious, national and international phenomena, money laundering manifests with an increasing speed and under more and more dangerous

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forms, often organized or transnational. This is why the international bodies have recommended to Governments to intensify the combat against money laundering by intensifying and diversifying the means of prevention and combat, including the judicial ones.

Law No 656/2002, as amended and completed by subsequent laws\(^\text{17}\), is an efficient mean of combat against money laundering, elaborated according to the European and UN conventions on this matter.

Post Evaluation: Training of Livestock Officers in Bangladesh

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The survey reported the level of usage of short term training program on ‘computer basics and database application’ for Upazila Livestock Officer (ULO) in Bangladesh. A number of 40 individuals were selected randomly out of 175 trained officers. Data were collected during December 2010 – April 2011 through questionnaire and personal interview. Specifically information on usage of computer, personal skill ratings, and constraint faced by respondents in the usage of ICT equipment were gathered. The training was found beneficial and applicable irrespective of job-level of the participants. Findings revealed that a majority of the respondents (95%) perceived themselves as in using personal computer for their official works. The study concludes that the overall impact of the training was very high for all trainees, irrespective of their age and service experience. It should be posited that government at various levels should assist in training of officers on digital compatibility.

Keywords: Upazila Livestock Officer (ULO), Training impact, Computer basics and database application
Introduction

The world at present is undergoing a ‘knowledge revolution’ as a result of the ‘information boom’ that is being spearheaded by the rapid advancement in information technology through internet technology, directly using the personal computer. Expectedly, this has significantly changed the way people communicate, live, and conduct their daily business. More importantly, the revolution in communication has provided efficient ways for developing countries to grow economically and socially, as well as increase their agricultural productivity through information exchange between extension agents and farmers. According to Oladele (2010), knowledge and information are important factors in accelerating agricultural development by increasing agricultural production and improving marketing and distribution. Information communication technology (ICT) can enhance new communication pathways and reduce transaction costs, giving greater accessibility to information on fair prices, transportation, and production technologies.

The Department of Livestock Services (DLS) is one of the larger Government organizations in Bangladesh and provides challenging livestock services to farmers throughout the country. The DLS encourages and supports planning and implementation of all livestock related extension activities at the grass-root level and works in partnership with Government organizations, non-government organizations, and private sectors. The role of livestock sub-sector is vital for the economic development of agro-based Bangladesh. The contribution of livestock to National Gross Domestic Product (GDP) is 2.79 percent and which is 17.15 percent in Agricultural share (DLS, 2011). To provide high quality extension services, the DLS employs about 500 livestock officers at the field level (DLS, 2011). Due to lack of ICT skills and database application livestock officers were not able to provide satisfactory services to field level and communication properly and timely to the higher authority (Personal communication: Dr. MD. Shahidul Islam, Project Director, NATP, DLS, Bangladesh). Average knowledge on computer basics and database of all the livestock officers is not satisfactory.

Any programs provide high-quality employment and training services that address the needs of individuals in need of training, retraining,
and skill upgrades. Graduate Training Institute (GTI) of Bangladesh Agricultural University (BAU) began a training course on ‘Computer Basic and Database Application’ from November 2010 to February 2011. The training aims to change trainee’s performance through improved knowledge, computer skills, and attitude. National Agricultural Technology Project (NATP), phase I conducted such training program at GTI for DLS officers of 120 Upazilas under the 25 districts of the country (DLS, 2010). To develop their computer basic and database application skill levels. For this objective, the NATP of DLS has invested huge resources for livestock officers for increasing the efficiency of the concerned fields. This study appraised the extent of use of ICT tools by ULO. Arokoyo et al. (2005) reported that agricultural extension depends, to a large extent, on information exchange between and among farmers on the one hand and a broad range of others on the other, the latter being identified as one area in which ICT could have a particularly significant effect.

The author argued that wider use of computer and database has the potential to open up communication and sharing of information across traditional and social boundaries and to assist previously excluded groups in participating fully, ensuring an increase in agricultural production. Exploiting the information provided by the internet will bridge the information gap between developed and underdeveloped economics. It was confirmed that use of ICT plays an important role not only the agricultural activities but also the related officers worked on this site. However, the big question is, ‘Does this training program able to appraise the level of usage of computer and database application in the trainee’s job’? To answer this question, this study sought to appraise the level of usage of computer basics and selected ICT tools by ULOs for dissemination of information to farmers and information sharing among them.

The main objective for investing resources in training is to eliminate performance deficiencies (Charles, 1990). To achieve this objective, the training organization must be concerned about the effectiveness of the training program (Ajayi, 2001; Davies, 1973; Salas et al., 2006). To achieve the aim of the study, two major objectives were set: a) to examine ULOs personal skill ratings on the usage of computer basics and ICT tools and b) to evaluate their level of access and usage of the selected ICT tools.
ICT tools. However, in spite of having immense importance of trainees’ perceptions of trainings there are no published study on examining the changes in between the pre- and post-training activities. Thus, such an effort to identify the contributing perceptions of ULOs regarding ICT would facilitate in decision making for training program as well as policy makers to revise such kind of training program for officers to develop their skills. Therefore, the main aim of the study was to identify the contributing perceptions of ULOs regarding ICT for their skill levels.

Materials and Methods

The study was carried out in forty (40) randomly selected Upazilas in Bangladesh. The study population consisted of all government livestock officer in different 40 Upazilas. This representative sample of trained population was selected from 175 trained ULOs. This survey was conducted just after complete the training program. An exploratory survey was done to achieve a common understanding of computer, usage of computer after training program and overall ICT-related tools. A structured questionnaire was employed to elicit information from the randomly selected ULOs. The final part of the questionnaire consisted of seven statements as perceptions measured by a five-point Likert scale; for each statement there were 5 response categories, namely ‘extremely agree’, ‘almost agree’, ‘moderately agree’, ‘disagree’, and ‘extremely disagree’ and the scoring was done by assessing 5,4,3,2, and 1 points respectively. A pilot-test with 10 ULOs was conducted in the study area before the complete study and accordingly minor changes were made in questionnaire. Questionnaire reliability was measured (based on the pilot-test) by calculating Cronbach’s Alpha. Reliability coefficient of 0.89 for the questionnaire was achieved.

Primary data were analyzed with the usage of both descriptive and inferential statistics; specifically, simple frequency, percentage, mean score, and Pearson correlation co-efficient were utilized. Independent variables were the ULOs’ personal demographic and socio-economic characteristics, while the independent variables were the personal skill ratings on the extent of their usage of computer and ICT tools for livestock information dissemination. Variables for the analysis were Computer Proficiency (CP = 1
if respondent can use; otherwise = 0), Computer Training (CT = 1 if respondent owns a computer; otherwise = 0), and Access to Computer (AC = 1 if respondent has access; otherwise = 0). Skill ratings (competency levels) were determined by the ability of the trainees to search the information and make a database based on specific topic and to disseminate it using computer packages such as PowerPoint, Microsoft Word, and the Internet: possessed ability to use = 1; inability to use = 0.

Results and Discussions

The study revealed that ULOs possessed a very low technical competency on computer basic and database application. They are also showed very extremely low technical knowledge on ICT tools and their usages for livestock information dissemination. However, the findings of the study were enlisted systematically:

• Characteristics of Upazila Livestock Officers (ULOs)
A higher proportion of the trainees were between 48 and 57 years of age (69%) with an average 51.75 years. There was no respondent whose service tenure was less than 15 years. Only eight percent studied population had PhD degree and rest ninety two percent of the trainees had Bachelor of Science degree and Masters Degree with relevant field.

• ULOs’ perceptions of computer training and their skill levels
The data in table 1 represents the comparison of perceptions of ULOs’ regarding their computer skill and skill levels in between the pre- and post-training activities. It was also represented the demand based perceptions of training program, where considering all of the four condition skill level did not differ in terms of awareness of the perceptions related to objectives, merits and demerits of training. Thus it could be concluded that the absence of statistically significant differences in the perceptions of computer skills and database application among the trainees indicate that perceptions of the program have not been a contributing factor to ULOs’ skill levels. The similar findings suggested for farmer’s training on their skill levels for livestock management (Yilmaz and Akbas, 2010).

• Competency levels of ULOs with ICT tools
Table 2 reveals that a majority of trainees (95%) showed their ability to use of personal computer and no one respondent showed their inability to use of computer. But rest 5% trainees had less confident on their ability just after the completion of training program. Training for use of personal computer and multimedia projector suggested almost the entire trainee group. During using ICT tools less frighten occurred regarding computer using among the target group.

This would be more helpful for the trainee as well as working speed/spirit among the DLS staff. This kind of survey was reported by Eneh (2010) where training recommended for entrepreneurs to enable them keep afloat in the ailing Nigerian economy. The training program was effective to increase the competency levels of ULOs with use of computer and other ICT tools. Although effective training can prevent the lack of skill from impeding potential effectiveness gains from decision technologies (Yi and Davis, 2001).

Table 1: Perceptions mean score of training by computer skills and skill levels

<table>
<thead>
<tr>
<th>Perceptions</th>
<th>Computer skills</th>
<th>Organizational</th>
<th>Personal</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training enables ULOs to use</td>
<td>4.05</td>
<td>3.84</td>
<td>3.74</td>
<td>3.61</td>
</tr>
<tr>
<td>Training provides ULOs with</td>
<td>2.64</td>
<td>4.21</td>
<td>3.93</td>
<td>2.50</td>
</tr>
<tr>
<td>Satisfaction on training</td>
<td>2.30</td>
<td>1.30</td>
<td>1.12</td>
<td>0.56</td>
</tr>
<tr>
<td>Training programs facilitate</td>
<td>3.84</td>
<td>2.58</td>
<td>4.92</td>
<td>2.64</td>
</tr>
<tr>
<td>Training enables ULOs on</td>
<td>3.48</td>
<td>3.72</td>
<td>3.68</td>
<td>1.62</td>
</tr>
<tr>
<td>Participation opportunities</td>
<td>3.64</td>
<td>1.52</td>
<td>1.34</td>
<td>2.98</td>
</tr>
<tr>
<td>Trainee’s need-based practices</td>
<td>4.86</td>
<td>3.20</td>
<td>2.94</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Table 2: The competency levels of trained ULOs with ICT tools

<table>
<thead>
<tr>
<th>Item</th>
<th>Usefulness frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Personal</td>
</tr>
<tr>
<td>Easy to use</td>
<td>38 (95.0)</td>
</tr>
<tr>
<td>Trained to use</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Can manipulate</td>
<td>25 (62.5)</td>
</tr>
<tr>
<td>Not able to use</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
Not able to | 7 (17.5) | 25 (62.5) | 24 (60.0)
Technical and Sourcing | 14 (35.0) | 14 (35.0) | 10 (25.0) | 30 (75.0) | 6 (15.0) | 21 (52.5)

- Access to ICT tools
About 77.5% of the trainees, in one way or another, perceived themselves as frequent users of the internet facilities and 52.5% users of multimedia projectors; although, in most cases, not for livestock information dissemination. Interestingly, all the trained ULOs reported having a personal computer and using it (table 3)

<table>
<thead>
<tr>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

When probed further about constraints on use of ICT tools, they reported challenges such as power outages, cost and inadequate training on the usage of the computer, especially between and ULOs and their clientele. Such kind of critical reviews reported by Hati and Das (2011). In addition, findings revealed that mobile phones and computer systems are the most used and widely owned by ULOs and their organizations. Further statistical analysis shows a strong correlation between ownership (access to use) and usage of computer systems; internet and phones (table 4).

From the obtained results, the duration of training courses were discussed during interviewing with few trainees. They also suggested prolonging the duration of the course and also request to enhance the practice time during training. The topics and schedule programs of a training fully depends on the target groups and their preferences. Rong-Chang et al. (2009) and Salas et al. (2006) found the similar comments from their investigation among the trained employees. About 50% of the total population reported that no skills on internet use and database application during their oral interviewing. This report identifies the training
requirement for ULOs to work properly with more satisfaction. Such kind of report investigated for Doctors training conducted by Devitt and Murphy (2004). This kind of training also play role in the development of office personnel in a complete form, addressed similar findings by Swezey and Pearlstein (2007).

Table 4: Pearson correlation between availability (access and ownership) and use of ICT tools by ULOs

<table>
<thead>
<tr>
<th>Variables (No. of responses)</th>
<th>df</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>39</td>
<td>0.092</td>
</tr>
</tbody>
</table>

Conclusions

The impact of computer basic and database application training program is expected to bridge the gap between the computer illiteracy of officers and in the acquisition and dissemination of livestock information from bottom to top levels. Overall, there were large differences among the ULOs in their skill levels before and after the training program. ULOs’ perception of ‘using of computer’ is helpful to form new skills mostly important contributed to the skill levels on working with group, organization works, personal and field works. This clearly indicates that developing skill levels on computer basics and database application training able to level up their skill levels.

Both medium-aged and senior livestock officers have basic computer literacy after the training program, but nearly half of the studied population identifies the use of database application as necessary tools for their job duties. In addition, there are several topics of which a large proportion of ULOs, particularly the medium aged, have little knowledge, but which have not been identified as training needs. Some recommendations are made for provision of such program for all DLS officers.

Based on the findings of this study, it could be concluded that, differences of ULOs’ computer skill levels are mostly depends on their perceptions of training program and post practices. Besides, practice of
post-training at different service places with an opportunity to work at the real workplace could be helpful to develop most of the computer skills of ULOs. Thus, NATP should review the existing trainings along with developing a better training system in accordance to the readiness of all DLS officer in future. The author suggests training and retraining of ULOs on ICT tools to bridge the digital gap, thereby enhancing the capability of the ULOs to utilize computer in this 21st century as a helpful tool for food security.

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The author gratefully acknowledges the ULOs in the study area for providing all support in data collection activities. Author also is grateful to Project Director (Dr. Md. Shahidul Islam) of NATP (National Agricultural Technology Project) for funding supports to conduct training program and choosing GTI as a venue.

References


Management in the Innovation Project

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The object of this research is to identify the sources of risk in innovation projects and to determine whether they could be managed better. Due to the diversity of opinions and theories over the nature of risk, reaching an agreement about risk management is difficult. This will be a major problem if any effort is made to proactively manage ‘risk’ in naturally ‘risky’ areas such as innovation. Some risk management could be valuable, but perhaps too much, or inappropriate risk management might stifle innovation. It is necessary and valuable to consider the process of innovation from conceptualization to commercialization, how uncertainties are formed, how they are managed in that context, and how the techniques of risk management can be further deployed to enhance the success rate of innovation projects. Various approaches have been proposed to risk management in general, however the extent to which they are relevant for managing innovation is uncertain. Thus, during this paper, the general model of innovation and the process of risk management for managing the parameters which create the risk in these projects are explained.

Keywords: Innovation, management, risk

JEL Classification: M1, M15
Introduction

Establishing something new is the essence of product innovation. Since this process necessarily involves risk, an early risk identification and management is required in innovative firms. So the purpose of this paper is to explore methods for managing risk in the innovation projects. In the meantime, the proposal method for managing the risk in specific kind of innovation will be explained more.

In the next section, definition of innovation and different types of innovations are described. Continuously, different stages of innovation are presented. Section three illustrates the definition of risk, sources of risk and risk management systems. Section four states the methodology of this research. Section five explains the proposal method for managing the risk in the innovation projects and includes the example of that and section six concludes this paper.

Innovation

Innovation is the main source of economic growth (Mokyr, 2002) and a key source of new employment opportunities as well as providing potential for realising environmental benefits (Foxona et al., 2005). One of the most important arguments is that, in the global economy, where economic actions can be more cheaply carried out in the low-wage economies such as China, the main way in which the other economies can compete and survive, is to find new and better products and processes, In other words, to innovate (Storey and Salaman, 2005).

Definition

According to the Oxford Dictionary of Economics ‘innovation refers to the economic application of a new idea. Product innovation involves a new or modified product; process innovation involves a new or modified way of making a product’ (Black, 1997). According to Afuah (2003) innovation is the employing of new knowledge to provide a new product or service that the customers want. In another words, it is invention + commercialization. Van de Ven (1986) describes innovation in terms of a new idea, which may be a
recombination of old ideas, a plan that challenges the present order, a formula, or an exclusive method which is perceived as new by the involved individuals.

**Different Types of Innovation**

Literature provides different categories of innovation classified by type, degree, competence, impact, and ownership (Narvekar and Jain, 2006). Innovation can be considered in both manufacturing and service sectors of different sizes (small, medium and large). Although there is a difference between these two sectors, the general definition and process of innovation are the same. Services have their own characteristics different from manufacturing. For instance, services are intangible, perishable and heterogeneous (Johe and Storey, 1997; Song et al., 1999).

Tidd et al. (2005) says innovation is not just about opening up new markets; it can also present new ways of serving older and established ones. He classifies the innovation into 4 groups (Product, Process, Position and Paradigm) each of which can happen along an axis, running from incremental through radical change. Incremental product innovation entails the introduction of an improved product, which, compared with its predecessor, has at least one additional desirable characteristic or is efficient with the same characteristics. In contrast, radical or fundamental product innovation takes place when a new market has opened up and the innovator begins to satisfy a hidden demand (Ferguson and Ferguson, 1994).

By considering the different kinds of innovation which is mentioned above, as Figure 1 shows, for this study, three dimensions were selected to classify the innovation types. First one is based on kind of company (manufacturing or service). The other one considers the innovation based on product or service. Among different kinds of innovation which are mentioned in the literature like marketing, organization, position, and paradigm and so on, the product and process were selected. Since it seems in general point of view all of these different kinds of innovation can be categorized based on these two dimensions (product and process). Also these two kinds of innovation are more common in comparison with other ones. The last dimension assesses the innovation according to incremental or radical. The degree of novelty has an effect on this dimension. It means if
the degree of novelty increases (based on the national or international consideration), the dimension is moving from incremental to radical situation.

Figure 1: Classification of innovation

As figure 1 show, in general, the kind of risk management is more related to incremental or radical dimension. Radical innovation has high risk in comparison with incremental which has a low risk. So for managing the risk in the radical one (which sometimes this innovation is new in the world or country) the more complex risk management methods (e.g.: Risk Standard Model) are needed. In incremental situation that are like the improvement, the simple risk methods (e.g.: risk log) can be used. It should be paid attention that the size of company can affect on amount and kind of risk management.

For example one small company may spend a lot of time and uses the different and precise method for managing the risk in one incremental innovation project, since it has a limited resources but a big company just
uses the one and simple method for the same project. In this paper the proposal method -Risk Standard Model- for managing the risk in radical innovation will be explained.

**Different Stages of Innovation**

It is suggested by several studies that there is usually a formal process for developing new products and services in firms with high performance in innovation (Griffin, 1997; Tatikonda and Rosenthal, 2000 and Shaw et al., 2001). In service firms, however, it does not appear to be common to use the formal process (Mitchell Madison Group, 1995). This formal process includes ‘creativity and ideas management, selection and portfolio management and implementation management’ (Oke, 2007). Tidd et al. (2005) argue that innovation is a general activity associated with growth and survival and a common fundamental process can be seen in all firms, which involve: Searching, Selecting, Implementing and Learning.

A stage-gate approach for managing the process of innovation (which has been adopted by many firms) is recommended by Cooper (1999); it allows the firms to manage, direct and control their innovation efforts. However, there is a major critique of Cooper’s stage-gate approach, which focuses mainly on process factors. Other organizational factors which have an impact on innovation performance need to be considered.

The Pentathlon framework (Goffin and Pfeiffer, 1999; Oke and Goffin, 2001) is a general one for managing innovation which addresses several soft organizational and process issues (figure 2). Goffin and Pfeiffer (1999) declare that in order to achieve successful innovation management, companies should perform well in five areas (which are demonstrated in figure 2) and make sure that efforts in these areas are integrated. Narvekar and Jain (2006) point out another framework for considering innovation. This framework demonstrates an interactive innovation process which has three stages: ideation, incubation and demonstration.
The inputs to the process are the triggers through in-house R&D (human and structural capital), feedback from customer (relational capital) or through a serendipitous incident. The intuitive nature of those who involved in the innovation and the absorptive capacity of the organization, intervene here to have an influence on the production of the innovation process. Usually, the output of the process is a patent or a new process or a new product.

In spite of having many models of the technological innovation process in literature, the process is not vivid (Narvekar and Jain, 2006). Innovations vary widely in terms of nature, scale, degree of novelty etc. However it can be seen that the same basic process is operating in each case (Tidd et al., 2005). In summary, each innovation projects (in all manufacturing or service industry) may have five following stages:

**Creativity**
Searching the external and internal environment and processing relevant signals about threats, opportunities and also ideation.
Selection

Preliminary assessment and deciding by considering a strategic view of how the organization can be best developed; to know which of these signals to respond to.

Incubation

Transacting to the actual product development and producing the prototype production.

Implementation

Translating the potential idea into something new and launching it in an external or internal market.

Learning

Learning from progressing and building their knowledge base and improving the ways in which the process is managed.

Risk

For companies in order to launch new products speedily and successfully, taking risk is essential. The ability to identify and manage risk is considered to be vitally important in risky innovation.

Definition

There is no single, universally employed definition of the word risk (Green and Serbein, 1983). Its definition is changing as it becomes interwoven with innovation and a rapidly globalizing world. Companies in order to survive must innovate at a previously unparalleled rate and within the framework of greater uncertainty. This means the risks they take are deepening (Taplin, 2005). In the more technical and specialized literature, as Ansell and Wharton (1992) say, the word risk is used to imply a measurement of the chance of an outcome, the size of the outcome or a combination of both. According to the standard definition of risk, it is “the combination of the
frequency or probability of occurrence and the consequence of a specified hazardous event” (Edwards and Bowen, 2005). Some former writers in the field drew a distinction between uncertainty and risk. A risk situation is defined as one in which a probability distribution for consequences is made on a meaningful basis, agreed upon by the set of relevant experts, and therefore it is ‘known’. Uncertain situations arise when an agreement among the group of experts cannot be gained, so there will be an undefined probability distribution on the set of outcomes (Hertz & Thomas, 1919).

Sources of Risk
Any factor affecting project performance can be a source of risk, and when this effect is both uncertain and significant in its impact on project performance, the risk arises (Chapman and Ward, 1997). Ackermann et al. (2007) argue that the categorization of risk in a simple way can be extremely unhelpful since the categories may be viewed as independent of each other. In addition to considering a wider range of risk categories, it is significant to consider more than just the risks themselves but also their impact on one another. In order to represent the different aspects of risk in an accurate way, it is important to consider risk as systemic. According to them the categorization of risk is: Political, Customer, Partner and Supplier, People, Reputation, Market and Financial.

In other categorization of sources of risk based on Green and Serbein (1983), risk aspects of the enterprise may be considered under the following major headings: Property and personnel, Marketing, Finance, Personnel and production, Environment. So with paying attention to the different sources of risk and purpose of this paper, the best categorization of them, which suits for this study, could be found as follow:

• **Environment** (government policy, exchange rates, availability of skilled labour, weather, culture)
• **Technical** (new methods, technologies, materials)
• **Resources** (staff, materials, finance)
• **Integration** (software modules, new & old systems)
• **Management** (multiple parties’ experience, use of project management techniques, HRM, set the tight goals, product
transition management, organization structure, organization behaviour)
  • Marketing (customer, competitors)
  • Strategy

Risk Management System
Risk management means ‘the process of understanding the nature of uncertain future events and making positive plans to mitigate them where they present threat or to take advantage of them where they present opportunities’ (Taplin, 2005). By considering that one of the main features of innovation will always be ‘risk’, risk management needs to facilitate innovation rather than stifle it (Taplin, 2005). A methodical approach to risk management enhances the ability of an organization to manage risks at all stages. The important purpose of risk management is to improve project performance by means of systematic identification, appraisal and management of project-related risk (Chapman and Ward, 1997). A systematic approach to risk management has to encourage decision-making inside an organization which is more controlled, more consistent and yet at the same time more flexible (Edwards and Bowen, 2005). According to Edwards and Bowen (2005) (figure 3) it is safe to say that a good risk management system for a project should encompass these processes:

• Establishing the appropriate context(s)
• Recognizing the risk of the project which the stakeholder organization will face
• Analyzing the identified risk
• Developing responses to those risks
• Controlling and Monitoring the risks during the project
• Allowing post-project capture of risk knowledge
Chapman and Ward (1997) say that most specific risk management processes are explained in terms of phases (stages) which are decomposed in a variety of ways, some are related to tasks (activities), and some are related to deliverables (outputs/products). They present the nine-phase RMP that is more detailed than most specific process. This structure depicts an alternative approach to managing risk. Smith and Merritt (2002) provide the other process for managing the risk. This process consists of 5 steps for managing the risk.

In summary, it can be said that all risk management systems have the four following phases:

- **Identifying parameters** (defining and focusing)
- **Analysing** (probabilities and prioritizing)
- **Solving** (e.g.: Defer action for more information, Accept risk, Buy out risk (transfer to a third party), Parallel contingency development)
- **Monitoring and learning** (New risk identification, Creating action plan for risks now above threshold, Concluding successful action plan and redeploying resources, Documenting the experience for use in future projects)

**Methodology**

By considering the different kinds of purpose of research and research strategy, also some criteria for selecting the kind of research strategy (especially research questions), this research uses the case study as a strategy for research. As research project may have more than one purpose; this research is also placed between explanatory and exploratory research.

This research concentrates more on the qualitative approach than quantitative, because finding the quantitative data during the innovation project is very difficult and at some points impossible (There are not any quantitative documents in different companies about innovation projects which they had done).

Because of the importance of theoretical model in any kind of case study, this study started the research with a hypothesis model (figure 4).
Figure 4: Snapshot of innovation process and risk management system

As figure 4 shows there are five decision points in this process. Each of these points need some information/criteria for approving the last stage and going to next stage (or back or abandon) and also should consider the parameters which create the risk in the next step.

This is a dynamic diagram and there is an interconnection and overlap between different decision points.

Based on hypothesis model, this structure is a method for better fitting the innovation process and risk management system together. These different stages of risk and innovation and elementary model for matching these two issues were considered in some cases from Iran and UK. Based on the purpose, strategy of research and method of gathering the data, also
with considering the different definitions of analyzing method, the explanation building is the method for analyzing the data in this thesis. In this paper, the second step of risk management system (analyzing) will be explained more.

**Method for Managing Risk in the Innovation Projects**

Keizer et al. (1991) have been developing a novel method to diagnose and control risks in innovation projects: the Risk Diagnosing Methodology (RDM). This method lets a firm identify comprehensively and systematically the technological, organizational and business risks that a project might faces, and to formulate and implement appropriate risk management strategies. This method includes nine steps which are: ‘initial briefing, kick-off meeting, individual interviewing of participants, processing the interviews (design of a risk questionnaire), answering the risk questionnaire, constructing the risk profile, preparing a risk management session, risk management session, drawing up and execution of a risk management plan’ (Keizer et al., 2001).

In risk analysis, typically we are trying to understand, how risks are generated, assessing their probabilities and impact, ranking them and screening out minor risk (Emblemsvag and Kjolstad, 2006). Proper risk analysis lets an organization to achieve an understanding of the relative severity of its risks on a project (Edwards and Bowen, 2005). Different methods for analyzing risk from quantitative to qualitative, include: Monte Carlo simulation, Hazard identification methods, Failure modes and effect analysis, Fault tree analysis, Event tree analysis, What if’ scenarios, Risk Mapping, Influence diagram etc.

Method which will be used in this research consists of four phases. In following, the summary of different stages of this method (how they work) will be described and in next section the case application will be explained for analyzing the risk. It should be emphasized that various parameters like kind of innovation, industry and company have an affect on method, so therefore different methods may be appropriate for different
conditions. Consequently this general method should be calibrated with different situations.

For the first phase of risk management -Identifying Parameters- some of the parameters as mentioned at section 3.2 can be selected as parameters that create risks based on the kind of industry, size of companies, the countries which the companies are located in and situation of company.

In the second phase -Analyzing- the company should estimate probabilities of events and the impact of their consequence and also prioritize these different risk factors in order to solve them, because, the company cannot solve all the risks (limited recourses, time etc.) and also the innovation is inherently risky, and if the company wants to manage all risks, it may cause to stifle the innovation. With considering the conditions of radical innovation, standard risk model (figure 5) would be a good method for this purpose. Based on this method, expected loss for each of the risks could be calculated, and the risks could be prioritized based on the expected loss.

![Risk Management Diagram](image)

**Figure 5**: Standard risk model (Smith and Merritt, 2002)

\[
(Expected \ loss \ (L_e) = L_t \times P_e \times P_i)
\]

Risk events are the parameters which are recognized as risk. But for calculating the probability of risk event and probability of impact, the following method can be used. For instance, it can be assumed that the Technical (refer to section 3.2) is the risk event. Based on different
parameters which are mentioned as a risk, technical risk includes three risk event drivers which create this risk. These risk events are: new methods, technologies and new materials. For each of these risk events, different scenarios could be written with different probabilities of success (Table 1) (In different situations these scenarios and their probabilities could be changed). So after calculating the probabilities of success, $P_e$ can be calculated as: $P_e = 1 - P_{success} = 1 - (P_1 \times P_2 \times ...)$

**Table 1:** Risk event probability

<table>
<thead>
<tr>
<th>Risk event: Technical</th>
<th>Probability of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>new methods ($P_1$)</td>
<td>0.9</td>
</tr>
<tr>
<td>technologies ($P_2$)</td>
<td>0.7</td>
</tr>
<tr>
<td>new materials ($P_3$)</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
</tr>
</tbody>
</table>

To find the reasons for each of the risk events drivers, the scenario method could be used. Same method could be applied for impact. Each of these parameters which create the risk is more effective in one or some of the stages of innovation project, and cause the problem(s) in these stages. Although in general, they affect the whole stages; separating them is also possible. According to Table 2, if each of the risk events affects different stages of innovation, they would have different probability of success. If they affect more than one stage, the probability of success is equal to multiplying them. So the probability of failure for impact ($P_{ij}$) equals one minus the probability of success.
For calculating the expected loss, total loss should also be found. But it could be assumed that the total loss for all risk is equal, because all of these risks will cause the reduction of success in the market and losing the profit. So if the total loss were the same for all risk events and impact, it does not have an effect on prioritizing the risk. Thus all risk could be prioritized based on result of multiply $P_e$ and $Pi$, because the $L_e$ in all is equal.

In phase three, the company should find different methods for solving these risks in different stages of innovation and in phase four, the company should monitor the process and also learn for future risk management system.

**Case Application**

In this section the proposed method for analyzing the risk in risk management system will be applied for one case. January 2003, lightweight Medical directors Neil Tierney and Neil Farish were considering the options open to their Edinburgh-based industrial design company. The commercialization fund upon which the development of their Lightweight Incubator for Neonatal Transport (LINT) product depended on to secure patenting had failed to materialize.

According to parameters which create the risk during the innovation project and also information based on case, it can be said that

---

1 Case from: Scottish Institute for Enterprise (www.sie.ac.uk/cases)
environment, marketing and resources are three parameters which are creating the risk during this case. So in second phase these parameters should be considered and prioritized. Tables 3, 4 and 5 suggest these three risk event (marketing, resources and environment) with their risk drivers. In the Lightweight case, for Resources risk, just finance plays a role as a risk event driver. In Marketing risk all three drivers (customer, competitor and market) exist and in Environment risk event, intellectual property is as a risk event driver. For each risk event the $P_e * Pi$ for prioritizing them are calculated as shown bellow.

**Marketing (Table 3)**

\[
P_1 = 0.7 \\
P_2 = 0.5 \\
P_3 = 0.5
\]

\[
\text{P}_{\text{success}} = 0.7 \times 0.5 \times 0.5 = 0.175 \\
\Rightarrow P_e = 1 - \text{P}_{\text{success}} = 0.825
\]

Marketing has an effect on implementation stage of innovation $\Rightarrow P_i = 1 - 0.1 = 0.9$ 

\[
P_e * P_i = 0.7425
\]

**Table 3: Risk event drivers for marketing**

<table>
<thead>
<tr>
<th>Risk event: Marketing</th>
<th>Risk event drivers</th>
<th>Probability of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P₁) Customer†</td>
<td>(P₂) Competitor ‡</td>
<td>(P₃) Market</td>
</tr>
<tr>
<td>Product is different and best in all attributes and satisfy all of the new demands of customers</td>
<td>There is not any competitor product and entrance to this market is difficult</td>
<td>The company is in this market and has a relation with customer and also supplier and</td>
</tr>
<tr>
<td>Product Type</td>
<td>Characteristics</td>
<td>Company Position</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Product is different and best in some attributes and satisfy some new demands of customers</td>
<td>There is not any competitor product and entrance to this market is easy</td>
<td>The company is in the similar market but has a relation with customer and also supplier and buyer are in coordination with the new idea</td>
</tr>
<tr>
<td>Product is different and has advantages in one or two attributes but it can’t satisfy the new demands of customers</td>
<td>Products with low capabilities of competing and difficulty for entrance to this market</td>
<td>The company is not in this market but has a relation with customer and also supplier and buyer are in coordination with the new idea</td>
</tr>
<tr>
<td>Product just has advantage in comparison with present products</td>
<td>There are competitors product and entrance to this market is difficult</td>
<td>The company is in this market just as a “niche” and does not have a direct relation with customer and also supplier and buyer are not in</td>
</tr>
</tbody>
</table>
Product is different and has advantages in one or two attributes but it is worse in other attributes and can’t satisfy new demands of customers

There are powerful competitor products and entrance to this market is easy

The company is not in this market or the similar and does not have a relation with customer and also supplier and buyer are not in coordination with the new idea

† *Intervener Parameter*: introducing the future innovation before the maturity in life cycle of the previous innovation in the market, would have a negative effect on the probability of success.

‡ *Intervener Parameter*: if the competitors advertise about their future products which is not yet in the market, but with good attributes of competitions, this would have a negative effect on the probability of success.

*Resources (Table 4)*

\[
P_i = 0.5 \quad \Rightarrow \quad P_{\text{success}} = 0.5 \quad \Rightarrow \quad P_e = 1 - P_{\text{success}} = 0.5
\]

Resources has an effect on implementation and incubation stages of innovation

\[
\Rightarrow P_i = 1 - (0.1 \times 0.3) = 0.97
\]
\( P_e \times P_i = 0.485 \)

**Table 4**: Risk event drivers for resources

<table>
<thead>
<tr>
<th>Risk event: Resources</th>
<th>Probability of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>(( P_i )) Finance†</td>
<td></td>
</tr>
<tr>
<td>Financial resources for innovation is enough within the company</td>
<td>0.9</td>
</tr>
<tr>
<td>Financial resources for innovation should be supplied with external and some available external resources and good proposal is accessible</td>
<td>0.7</td>
</tr>
<tr>
<td>Financial resources for innovation are not in the company and they should be supplied from available external resources and a good proposal is accessible</td>
<td>0.5</td>
</tr>
<tr>
<td>Financial resources for innovation are not in the company but the familiarity with external sources is available and a relatively good proposal is accessible</td>
<td>0.3</td>
</tr>
<tr>
<td>Financial resources for innovation are not in the company and for consuming the external resources, researches should be done as there is no familiarity with them and a relatively good proposal is accessible</td>
<td>0.1</td>
</tr>
</tbody>
</table>

† *Intervener Parameter*: broad range of innovation would have a negative effect on the probability of success.

**,Environment** (Table 5)

\[
P_i = 0.7 \quad P_{\text{success}} = 0.7 \quad P_e = 1 - (0.1 \times 0.3 \times 0.5 \times 0.7) = 0.9895
\]

Environment has an affect on implementation, incubation, selection and creativity stages of innovation \( \Rightarrow \) \( P_i = 1 - (0.1 \times 0.3 \times 0.5 \times 0.7) = 0.9895 \)
\[ P_e \times P_i = 0.297 \]

**Table 5:** Risk event drivers for environment

<table>
<thead>
<tr>
<th>Risk event drivers</th>
<th>Probability of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>((P_1)) Intellectual property</td>
<td></td>
</tr>
<tr>
<td>intellectual property rules are done completely and within the short time</td>
<td>0.9</td>
</tr>
<tr>
<td>intellectual property rules are done completely but within the relatively long time</td>
<td>0.7</td>
</tr>
<tr>
<td>intellectual property rules are done partially complete and within the short time</td>
<td>0.5</td>
</tr>
<tr>
<td>intellectual property rules are done partially complete and within the relatively long time</td>
<td>0.3</td>
</tr>
<tr>
<td>intellectual property rules are done incomplete and within the long time</td>
<td>0.1</td>
</tr>
</tbody>
</table>

So with pay attention to these results the company at first should consider the marketing risk after that, resources and in the last one environment. Also company based on their abilities should find the methods for solving some or all of these risks.

**Conclusions**

On the one hand companies need innovation to endure in the market competition but on the other hand one of the most important aspects of innovation is risk. If the companies do not consider the risk, the project will be failed and if they apply a lot of risk management systems,
these methods could stifle the innovation. This research attempts to provide the system for managing the risk in the innovation projects and also to create a method for prioritizing different risks factors and to manage the most important ones in second stage of this risk management system for some kind of innovation.

References


Growth Diagnostics: Strengths and Weaknesses of a Creative Analytical Framework to Identify Economic Growth Constraints in Developing Countries

Authors: Harald HABERMANN and Pablo PADRUTT, MAS students in Development and Cooperation, Swiss Federal Institute of Technology, Zurich, Switzerland, harald.habermann@giz.org.np,

This paper discusses the Growth Diagnostics approach developed by Hausmann, Rodrik and Velasco. The approach suggests an analytical framework to identify the most binding constraints that hamper economic growth in a specific country at a specific point in time. Aiming at higher-order principles of neoclassical economics, Growth Diagnostics allows policymakers to creatively develop policy designs which address the most binding constraint while taking into account relevant factors of their country’s economic, political and social context. Most importantly, it considers both orthodox and heterodox policies as possible solutions to ignite growth. Against the backdrop of changing economic policy advice from the big push idea to the augmented Washington Consensus, the authors analyze the reasoning behind the Growth Diagnostics approach. Criticisms by academics and practitioners serve as a basis for a discussion on the approach’s possible shortcomings. The authors conclude that Growth Diagnostics is a useful tool to inform growth strategies in developing countries, whereas the new framework’s flexibility is discerned as both its essential strength and its main weakness. Among the approach’s most important contributions are its explicit renunciation of economic rules of thumb in favor of fact-based diagnosis and context-specific policy design, its ability to identify reform
priorities based on expected impact as well as its caution with respect to potentially adverse second-best interactions between different policy reforms.

**Keywords:** Growth Diagnostics, developing countries, economic growth, economic policy reform, Washington Consensus

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**Introduction**

Economists have been debating what policies best serve a country’s economic growth for almost as long as the discipline has existed. Easterly (2001: xi) sarcastically compares their ongoing search for the drivers of growth in developing countries to the “quest [...] for a precious object with magical properties: the Golden Fleece, the Holy Grail, the Elixir of Life.”

A novel approach now promises to set aside the changing recipes and blueprints that have informed growth strategies in the past and instead be more context-specific. Growth Diagnostics suggests an analytical framework to identify the most binding constraints that hamper economic growth. Policy reform would then be carried out in a prioritized manner and taking into account the country’s contextual realities.

The Growth Diagnostics approach promises to apply neoclassical economics in all its flexibility. While the economic policies and institutions that lead to growth differ from one successful case to another, Rodrik (2007: 21) asserts that there are first-order economic principles which are present in all success stories, such as “a semblance of property rights, sound money, fiscal solvency [and] market-oriented incentives”. Most importantly, there is an infinite number of orthodox and/or heterodox policy designs and institutional frameworks that can potentially implement these principles: the principles themselves “come institution-free” (Rodrik 2007: 29).

A Growth Diagnostic of a given country’s economy can be based on national data, cross-country comparisons, comparisons with similar neighboring countries, international rankings or enterprise surveys. The data is scrutinized with the aim to find the most binding constraint to economic growth, following the forks of a decision tree (figure 1). For each
level of this multilemma, the diagnostician has to ask herself what kind of signal the economy would be likely to emit if the element in question were the most binding constraint.

![Growth Diagnostics decision tree](image)

**Figure 1:** Growth Diagnostics decision tree (Hausmann, Klinger & Wagner 2008: 22)

The initial Growth Diagnostics paper by Hausmann, Rodrik and Velasco¹ and its practical applications have enjoyed much attention from academics and practitioners alike. Hausmann, Klinger and Wagner (2008) and Rodrik (2010) adapted and complemented their original work based on feedback from peers and practitioners. Some of the debates and criticisms with respect to the Growth Diagnostics approach will be discussed in this paper. The authors’ critical appraisal is divided into two chapters: a first one

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¹ Hausmann, Rodrik and Velasco submitted their original draft to discussion in 2005 and later published it in Stiglitz & Serra (eds) 2008. In this paper, we refer to it as Rodrik 2007.
that reflects criticisms with regard to the approach’s theoretical and methodological basis and a second one that considers challenges in terms of its practical application.

**Theoretical and methodological criticisms to Growth Diagnostics**

Several criticisms have been raised with regard to the assumptions and methodological fundamentals of the Growth Diagnostics framework: Have reform blueprints really failed to deliver? Is Growth Diagnostics an unscientific approach or disciplined art? Is it realistic to search for and focus reform on only one binding constraint to growth? Is the Growth Diagnostics decision tree biased towards private investment?

*Have reform blueprints really failed to deliver?*

Rodrik (2007: 85) states that the crucial “economic paradox of our time is that “development” is working while ‘development policy is not. By and large, decades of policy reforms and aid interventions that followed the logic of a big push of public investments did not deliver on their promise of triggering a positive upward spiral of growth (Easterly 2001: 37). Similarly, structural reforms based on the so-called Washington Consensus set of economic policy reforms across the board (Williamson 1990) mostly failed to yield sustained growth (Rodrik 2007: 86).

There are a number of counterarguments to this assertion, all suggesting that the policy blueprints did not actually fail to deliver.

The first type of counterargument is that Latin America and Africa have not undertaken enough economic reforms from the Washington Consensus cookbook in order to trigger sustainable growth. Given that many leaders on these two continents spent “considerable political capital in pursuit of Washington Consensus-style reforms”, Rodrik (2007: 86) dismisses this argument as not doing justice to the great efforts undertaken. Moreover, he points out that, in blatant contrast, the adepts of the Washington Consensus were indeed very quick to attribute temporary successes of such incomplete reform efforts to the workings of their recommendations, e.g. in 1990s Argentina until the crisis. Rodrik also
challenges that reforms were not deep enough: “[t]he countries that performed well, for the most part, are not those that undertook ambitious reform agendas—quite to the contrary” (Rodrik 2007: 87). Real-world politics usually lead to second-best solutions that can rightfully be criticized for being insufficient or even counterproductive. Washington Consensus reforms in Latin America were successful in stabilizing the crisis-ridden economies of the region, but ultimately failed to automatically trigger economic growth, as their proponents had expected them to do. Given how many of the most successful Asian economies kick-started growth with small but decisive policy innovations, the argument of insufficient reform is indeed unsatisfactory. It appears more likely that the Washington Consensus-style reforms in Latin America and Africa were simply not enough focused on context-specific priorities.

A second counterargument is that the reforms had been effective, but their results in terms of growth have not manifested themselves yet. This would mean that the reforms undertaken need to be maintained; their payoff simply exhibits a time lag. The argument that the growth effects of Washington Consensus reforms in the 1990s have yet to be awaited seems rather weak as it is not consistent with empirical research about reform and economic growth (see for example Tokarick 2008): growth responds relatively quickly to reforms that address critical obstacles and bottlenecks in an economy. However, it can be argued that the difference between post-reform growth and the calamitous GDP contractions of Latin America’s lost decade in the 1980s was indeed considerable.

A third counterargument identifies external circumstances, such as a slowdown in the overall growth of industrial countries, as the main culprit, rather than an alleged ineffectiveness of the reforms. However, many developing countries achieved impressive growth rates in the very same economic environment. For instance, notwithstanding the industrial world’s recessions, China’s export-led economy consistently grew at rates from 6 to 14 percent per annum between 1990 and 2008 (World Bank 2010).

Finally, a fourth counterargument states that the countries which successfully achieved sustained growth over the last two decades were those that had followed conventional economic policy advice in line with the Washington Consensus recommendations. According to Rodrik (2007: 87),
this view ignores that the success stories were almost all characterized by heavy government intervention, such as the industrial policies in South Korea and Taiwan, and/or heterodox reforms, such as China’s dual-track strategy: “China did not simply liberalize and open up; it did so by grafting a market track on top of a plan track, by relying on TVEs [township and village enterprises] rather than private enterprise, and through special economic zones rather than across-the-board trade liberalization. [The counterargument in question is often based on the idea] that partial, heterodox reform efforts in these countries would have yielded even more fruit had they been more by the book. One commonly hears that India, for example, would have grown faster had its government been able to reform more comprehensively and rapidly. The trouble is that one looks in vain for countries that did in fact reform more comprehensively and rapidly than India did and ended up with higher growth.” (Rodrik 2007: 87). It would in fact be hard to argue that the impressive growth of China, as the most prominent example, was due to rudimentary and incomplete Washington Consensus-style reforms. Rather, the country’s growth strategies have been heterodox to the core since Deng Xiaoping’s first reforms. They have, however, been creating ever more orthodox incentives for expanding economic activity and increasing productivity.

All above-mentioned arguments in defense of a narrow interpretation of the Washington Consensus can rightfully be questioned. We have to bear in mind, however, that the Washington Consensus, as it was identified by Williamson (1990), aimed at crisis-ridden Latin America. It can be argued that the Washington Consensus was never actually a general blueprint for growth, but rather a set of recommendations for Latin American countries that had all suffered roughly the same external shocks and were haunted by the same types of government failures, which led to low appropriability of returns to economic activity. Applied to a specific Latin American country, the Washington Consensus reforms were then adjusted, sequenced and prioritized in accordance with the national context. For instance, a 1998 World Bank Country Economic Memorandum for Mexico recommends the following priorities for policy reform: “[R]eforming the legal underpinnings of the financial sector, especially in the areas of strengthening creditor and shareholder rights [...] and in terms
of better legal enforcement; [i]mproving the incentive structure in the labor market by reducing non-wage labor costs or, alternatively, by creating a more transparent link between contributions and benefits, [...] [s]trengthening the deregulation effort and domestic competition policies [and] [c]ontinuing the expansion of education attainment levels.” (World Bank 1998: vi)

The criticism of the Washington Consensus as a dogmatic blueprint may be exaggerated against this backdrop. Orthodox adjustment programs based on the Washington Consensus recommendations should certainly be credited for the stabilization of many Latin American economies in the 1980s and 1990s. It is however justified to dismiss the Washington Consensus as a recipe for growth on the grounds that it is prone to oversimplifications and, most importantly, that it categorically excludes creative, unorthodox policy mixes. Its failure to deliver sustained growth in Latin America is likely to be connected to this fact. To overcome the most binding constraints to economic growth, decision-makers probably need a more targeted approach that identifies priorities for reform and defines a higher-order goal without anticipating (let alone prescribing) the exact policy design to achieve it.

**Is Growth Diagnostics an unscientific approach or disciplined art?**

On a methodological level, one of the main criticisms towards the Growth Diagnostics approach is the absence of a scientific formula in its procedural application (Sartor 2007: 12). Unlike growth regression analysis, for instance, it only provides a framework to formulate hypotheses on binding constraints to growth rather than hypothesis on empirical tools to test them. Thus, the identification of the most binding constraint can be perceived as an arbitrary choice by the respective practitioner. Leipziger and Zagha (2006: 2) criticize that “these tasks rely on the creativity of the analyst and his or her ability to formulate hypotheses and create plausible ‘stories’ that can then be verified empirically”. Along those lines, Nobel Prize laureate Mike Spence reportedly appraised the framework as a “disciplined art” rather than science (Leipziger & Zagha 2006: 2), allowing for a more open-ended analysis.
In response, Sartor (2007) proposes a formulaic procedure to make Growth Diagnostics more scientific. He suggests building on the International Monetary Fund’s currency crisis early warning system. These models have been able to produce statistically and economically significant results on the probabilities of currency crises by means of regressions on a number of relevant variables, such as overvaluation, reserve losses or export growth (Sartor 2007: 13). Adopting this model for Growth Diagnostics could serve as “an additional tool to help the analyst make a correct diagnosis” (Sartor 2007: 19).

These suggestions miss the point that, from a practitioner’s perspective, the absence of a formulaic procedure to diagnose the binding constraints, is an important disciplining factor. The methodological openness of the approach obliges the analyst to tailor her diagnosis to the specific context, without being able to rely on confined hypotheses and standard regressions to test them. Naturally, this does not mean that it is undesirable to introduce a more systematic guideline for the application of the Growth Diagnostics approach. In fact, Hausmann, Klinger and Wagner (2008) undertake a first such attempt by presenting a “mindbook” to assist practitioners in the implementation of the approach.

Is it sensible to search for and focus reform on only one most binding constraint to growth?

Another important general criticism of the Growth Diagnostics approach contests the idea that an economy has a single most binding constraint that hampers its growth or, if it does, that it is necessarily optimal to address it first. Rodriguez (2005: 2) argues that under certain conditions it appears more favorable to reduce two binding constraints by half rather than focusing reform entirely on relaxing one constraint as far as possible. He asserts that Growth Diagnostics is a non-linear programming problem that may require more than one solution to solve: “[…] we are trying to maximize a function with constraints, but where both the function and the constraints are so highly non-linear that we have no idea where the maximum lies” (Rodriguez 2005: 3). The analogy to a non-linear programming problem leads him to conclude that addressing one constraint at a time is usually an inefficient way to maximize that function. Hausmann, Klinger and Wagner
counter that “not all provided inputs are important constraints, as they do not all bind at the same time. If agents find expected returns to be dismal, changing the availability of finance may do little to investment. [We] suggested focusing on the constraints that have the highest direct effect in order to increase the chances that the impact would overwhelm potentially negative second-best interactions. There may be more than one [constraint] that either fits these conditions or that one cannot discard as potentially fitting them”.

Similarly, Jeffrey Sachs reportedly said that Growth Diagnostics might be a useful tool in a functional economy, where it would be legitimate to fiddle on certain binding constraints in order to improve growth at the margin. In contrast, he argues that the economies of many developing countries are so dysfunctional that marginally improving growth by concentrating on the most binding constraint will only produce modest returns at best and fail to deliver the big push that these countries purportedly need. In such cases, it would therefore be preferable to aggressively tackle several constraints at a time instead of focusing on only one binding constraint (Jeffrey Sachs, as conveyed by Sartor 2007: 19). This argumentation misses a crucial point about the Growth Diagnostic approach. Instead of assuming ex ante that any developing country with a dysfunctional economy is necessarily constrained by a supply-side lack of physical capital (the big push idea), the approach suggests diagnosing the context-specific obstacles in order to target and prioritize reforms, the political capital for reforms being a scarce resource like any other. Focusing on the most binding constraint first in no way means that the reforms cannot or should never be radical. Furthermore, once the first constraint is reduced to a reasonable level, reforms are meant to go about the second one and so on. As Rodrik (2010: 37) puts it, the successful countries in terms of growth are those that “[…] identify sequentially the most binding constraints and remove them with locally suited remedies.”

When an economy faces more than one very critical obstacle to growth, it may indeed be sensible to focus reform on more than just one constraint that appears to be a bit more problematic and urgent than the others. The main idea behind the Growth Diagnostic approach is that policy-makers should avoid addressing different constraints simultaneously
if there are adverse interactions between them or if they do not have sufficient political capital for several parallel reform processes.

*Is the Growth Diagnostics decision tree biased towards private investment?*

Starting from an endogenous growth model, the authors of Growth Diagnostics understand private investment and entrepreneurship as the main driver of economic growth. Hence, they defined low levels of private investment and entrepreneurship as the central challenge that sits on top of the initial decision tree in figure 1. This choice suggests that the approach is based on findings about the long-term growth achievements of successful developing countries by Rodrik in 1999 (64): “the key is to induce the private sector to invest by enhancing the perceived returns to private investments and to generate a virtuous cycle of profits, investments, and capacity expansion.” Fernandez-Arias (2008) argues that in some cases, aggregate investment may seem an adequate choice, but it may also be hiding important misallocations. Hausmann, Klinger and Wagner (2008: 23) respond that “[...] asset accumulation is seen as an interesting area to search for symptoms of a problem because problems get reflected in investment behavior, independent of the relative importance of such behavior on growth [...].”

Felipe and Usui (2008) directly challenge the choice to put private investment on top of the decision tree, arguing that there is no established statistical association between investment shares and growth rates. They admit the relevance of private investment to kick-start growth. However, they caution that “once a country is growing, a high and increasing investment share may not be a necessary requirement in order to continue growing or even to accelerate growth. Indeed, historically, there are many countries that have achieved high growth without a high investment share” (Felipe & Usui 2008: 8). The scatter plot in figure 2 (Felipe & Usui 2008: 9) shows the annual GDP growth over five periods (1960s, 1970s, 1980s, 1990s and 2000-2004) and the corresponding investment share of GDP for 146 countries. The vertical line represents the overall mean investment share of 21.6 percent; the horizontal line stands for the overall mean growth rate of 3.8 percent. These two lines divide all 514 data points into four quadrants. Quadrant I in the top-right corner shows countries with above-average
growth rates and investment shares. Quadrant II in the top-left corner shows above-average growth rates but investment share below the world average. Quadrant III to the bottom-left shows below-average growth rates and below-average investment shares. Finally, Quadrant IV to the bottom-right shows below-average growth rates but above-average investment shares. Note that the regression lines depict the relationship between the countries in each quadrant and not the relationship between all countries in a specific period.

![Growth rates and investment to GDP ratios](image)

**Figure 2:** Growth rates and investment to GDP ratios
(Felipe and Usui, 2008: 9)

Felipe and Usui (2008: 10-12) draw several conclusions from this graph:

(a) Overall, the correlation between investment share and growth is positive and statistically significant. Nevertheless, it is not significant in all quadrants: it is only significant for quadrants I and III. Hence, the empirical evidence of a positive relationship between investment share and growth rate found in various studies is driven
by an analysis of countries that either have low investment ratios and a low growth rate (quadrant III) or high investment ratios and high growth rates (quadrant I).

(b) Countries situated in quadrant IV exhibit a similar above-average investment share as the well-off countries in quadrant I. Consequently, their growth performance is unlikely to be hampered by low private investments. In other words, the Growth Diagnostics decision tree in figure 1 is not suitable for these countries. The binding constraints to growth have to be sought elsewhere.

(c) Countries in quadrant II have achieved similar growth rates as countries in quadrant I, but associated with a below-average investment share.

(d) The authors argue that the Growth Diagnostics methodology should apply only to the countries in quadrant III, i.e. countries with both below-average growth and investment share. The main objective of the approach should thus be to identify the reasons why these countries find themselves in quadrant III and, ultimately, suggest context-specific policies to help them achieve higher investment shares and growth rates and thereby move to quadrant I.

Felipe and Usui (2008) also examine the transition path of 44 countries that were in quadrant III in the 1990s to study where they ended up in the period 2000-2004. 20 of these countries remained in quadrant III. 24 countries shifted to the other three quadrants: out of these 24, 11 countries shifted to quadrant II. These efficient countries achieved an above-average growth rate with investment shares that still lay below average. 4 countries shifted from quadrant III to quadrant IV, meaning that, even though they achieved a higher investment share of GDP, their growth rate did not improve considerably. And finally, 9 out of the 44 countries shifted to quadrant I following the path suggested by the Growth Diagnostics decision tree in figure 1, that is, achieving higher economic growth by increasing private investment. They conclude that economic growth is also possible without increasing private investment; the binding constraint may well lie outside of the decision tree in figure 1.
Furthermore, it could be criticized that the decision tree in figure 1 does not actually consider a possible lack of entrepreneurship separately, as the stated problem at the top of the tree would suggest (“Problem: low levels of private investment and entrepreneurship”). Most importantly, the problem may not actually lie with low levels of investments, but with their inefficient allocation or their quality. Rodrik (2010: 36) implicitly integrates the criticism that low private investment and entrepreneurship are not necessarily the main challenge that hampers growth. Five years after the publication of the first draft of Growth Diagnostics, he supplements the initial decision tree with a higher-ranking decision tree (figure 3) that includes potential obstacles in the supply and demand of not only physical capital, but also human capital, employment and productivity.

Figure 3: Higher-ranking Growth Diagnostics decision tree (Rodrik 2010: 36)
Growth Diagnostics in practice: a useful tool to inform economic policy in developing countries?

The Growth Diagnostics approach is tailored to make economic policy reform in developing countries more effective in terms of growth impact. Practitioners have raised a number of concerns with regard to the framework’s practical applicability: Is an exclusive focus on growth itself appropriate in high-poverty contexts? Can shadow prices be adequately factored into the analysis? How should potential future constraints be dealt with? Is there a clear-cut transition from igniting growth to sustaining it? How can practitioners derive a cure to the malady they identified by means of Growth Diagnostics? Finally, when comparing a country case study by the World Bank (2002), which essentially follows the Washington Consensus approach of wholesale reform, to Growth Diagnostic case studies of the same country, are the results any different?

Is an exclusive focus on growth itself appropriate in high-poverty contexts?

The Growth Diagnostics approach places an exclusive focus on economic growth. Thereby, it declines to explicitly consider policy reform objectives that are interconnected or even potentially conflicting with growth, such as poverty reduction, satisfaction of basic human needs, income distribution or environmental protection (Felipe & Usui 2008: 7). From this perspective, one could ask whether the approach is appropriate to inform the growth strategies of countries which face great challenges in these fields, in particular in terms of widespread multi-dimensional poverty. We argue that, indeed, it is: growth increases incomes and provides the government with fiscal resources to achieve other policy objectives.

While development should be a broad approach that aims to improve human capabilities (Sen 1999), economic growth is the main challenge for developing countries. Growth is the engine of poverty reduction, as it translates into higher incomes. However, some associate economic growth with outcomes that are not favorable to the poor, particularly in political discourse. Empirical evidence clearly suggests otherwise. Dollar and Kraay (2001) sampled 137 countries to examine how increasing average income relates to the income of the poorest quintile.
They find that the income of these poorest 20 percent of society increases proportionately with average income. This strong linear relationship between growth and poverty reduction has been demonstrated most impressively in China. Deng Xiaoping’s economic reforms had reduced a number of constraints to economic growth around the early 1980s. Thereafter, China’s economy started growing at a sustained and rapid pace and thereby lifted over 600 million people out of extreme poverty (i.e. less than 1.25 USD PPP a day) in the first 25 years after Deng’s reforms (Chen & Ravallion 2008). Even in cases where a growth episode mostly benefits the wealthier segments of a population, increasing average incomes still translate into higher tax revenues, which the government can use to alleviate the sort of the poorest segments of their population. Moreover, economic growth does not only improve the income of poor people, it also brings positive change in other dimensions of poverty, such as health. Examining cross-national differences, Filmer and Pritchett (1997: 6) find that GDP per capita has the most significant impact on mortality of children under the age of 5, whereas differences in public spending on health account for almost none of the cross-national disparities.

The considerations above do not imply that economic growth is necessarily and automatically pro-poor. In the short run, there can be tensions and time lags between optimizing growth variables and poverty reduction variables. Furthermore, there is a range of considerations on the quality of growth (Thomas 2000) that need to be taken into account to achieve economic, social and environmental sustainability over the long term. In addition, more potent economic growth may not always be the prime objective of a society. Arguably, for some countries in Latin America that have enjoyed reasonably high economic growth over the last few years, such as Argentina and Brazil, social equity and income distribution may deserve greater attention from policy-makers than an additional increase in their respective country’s growth rate. At the end of the day, economic growth remains one of the key factors, if not a precondition, to reducing absolute poverty in the developing world.

*Can shadow prices be adequately factored into the analysis?*
One of the most important criticisms from practitioners with regard to the practical application of the Growth Diagnostics approach is that it is difficult to measure shadow prices of resources. Wherever the societal opportunity cost of an economic activity is not equal to the activity’s market price, the shadow price designates the objective value of the activity’s unit cost in a theoretically optimal solution. If the shadow price of a resource is high, it is assumed that this resource is constraining growth. While this is quite straightforward in theory, it is hard to identify price and non-price signals in practice (Felipe & Usui 2008: 7). In the presence of several distortions, price signals are likely to be insufficient indicators for reflecting relative scarcities. Aghion and Durlauf (2009: 12) argue that even if the equilibrium price of a resource could be measured, it would not necessarily reflect a constraint to growth. The authors underpin their argument by discussing low interest rates under a high degree of credit rationing. “Indeed, the more restricted the access to credit (that is, the more individuals are barred from undertaking their own projects), the more supply of loanable funds there will be in the economy, as all credit-rationed individuals will end up lending to a few entrepreneurs” (Aghion & Durlauf 2007: 20). This results in a lower domestic interest rate even though the local credit market is severely constrained.

Hausmann, Klinger and Wagner (2008) recommend searching for non-price signals as well. They argue that a binding constraint will generally lead to activities and arrangements designed to bypass the specific constraint. For example, strict government control can lead to the formation of informal activities. In such a case, the diagnostician needs considerable in-depth knowledge of the analyzed economy. The measurement of shadow prices through non-price signals amplifies the “disciplined art” problem described above: different researchers applying the Growth Diagnostics methodology can reach very different conclusions.

**How should potential future binding constraints be dealt with?**
Another challenge of a Growth Diagnostics analysis is its static nature, whereas development is a dynamic process. This inconsistency over time is decisive for the application of the approach. Growth Diagnostics focuses on constraints that are binding at the time of analysis, but not necessarily in
the future. Felipe and Usui (2008) argue that Growth Diagnostics was designed to identify binding constraints in stagnant economies, but it is not suitable to identify institutional adjustments that can sustain growth in the medium and long run. Hence, Felipe and Usui (2008: 15) conclude that “growing economies are outside the scope of growth diagnostics”. This argumentation is countered by Leipziger and Zagha (2006: 4), who, based on the example of Bangladesh, assert that the diagnostics to increase the growth rate are in principle no different in a stagnant and in a growing economy.

The World Bank (2006) emphasizes the importance of considering potentially binding constraints that already require intervention today. In contrast, it can be argued that the Growth Diagnostic approach is flexible enough to consider possible future constraints and target them depending on their urgency. As argued above, it is not easy to find clear-cut empirical evidence even on today’s binding constraints. It is all the more difficult to find evidence for tomorrow’s binding constraints, which may, therefore, lead to more politicized or even arbitrary recommendations. The Growth Diagnostics approach’s emphasis on targeted, evidence-based strategies would be at odds with such subjective projections. Whenever future binding constraints can be identified on a relatively robust basis of assumptions, however, it appears to be expedient to integrate them into the analysis.

Is there a clear-cut transition from igniting growth to sustaining it?
Rodrik (2007) puts a strong emphasis on the need for robust institutions to sustain growth in the long term. However, the Growth Diagnostic approach only provides a framework to identify and tackle the most binding constraint in order to kick-start growth. Sustaining economic growth over the medium and long term is usually a more tricky enterprise, however. Thus, Rodrik (2007) emphasizes that growth ultimately requires robust institutions. These can be both formal and informal organizations or sets of rules, practices and customs. Ideally, such institutions “induce socially desirable behavior on the part of economic agents” (Rodrik 2007: 51) and sustain a productive dynamic in the economy (Rodrik 2007: 43). Rodrik (2007) remains rather vague when it comes to applying these considerations in practice, however. It is telling that, in their exemplary case studies on
Brazil, neither Hausmann (2008) nor Rodrik (2007) suggest possible institutional adjustments in order to sustain Brazilian growth after the most binding constraint, the high cost of finance, is removed. Several questions remain unanswered: Are the two phases of kick-starting growth and sustaining it really distinguishable? After the most binding constraint has been tackled and the economy starts to grow soundly, by what standards should practitioners decide whether they should identify the next binding constraint (kick-start) or instead focus on reforming the country’s institutions (sustain)?

*How can practitioners derive a cure to the malady they identified by means of Growth Diagnostics?*

Diagnosing a patient with an illness and treating him are obviously two different challenges. How can practitioners translate the results of a Growth Diagnostic into viable options for policy-makers? Pritchett (2008: 39) calls this critical phase “Growth Therapeutics”, which is ultimately “a diagnostic of the [country’s] capability for [reform] implementation”, that is, the policy-makers political capital. Rodrik (2007) does not elaborate precisely on the transition from the identification of the most binding constraints to the identification of adequate policies. By means of real-world examples, he simply points out that it is important to consider both orthodox and heterodox reforms, depending on the context and capacity of the country in question. Hausmann, Klinger and Wagner (2008: 90) provide a general guideline for diagnosticians to close this gap. Growth Diagnostics focuses on the effects of constraints to growth and ideally identifies the most binding:

\[
\frac{\partial \text{Growth}}{\partial \text{Constraint}_i} \max_{i \in l} \left\{ \frac{\partial \text{Growth}}{\partial \text{Constraint}_i} \right\}
\]

Growth is understood as the following function:

\[
\text{Growth} \left( \text{Constraint}_1, \ldots, \text{Constraint}_i, \ldots, \text{Constraint}_L \right)
\]
Consequently, policy $P_j$ affects growth through its impact on these constraints. In particular, its marginal effect would be:

$$\frac{\partial \text{Growth}}{\partial \text{Policy}_j} = \sum_{i=1}^{l} \frac{\partial \text{Growth}}{\partial \text{Constraint}_i} \frac{\partial \text{Constraint}_i}{\partial \text{Policy}_j}$$

Given that constraints usually cannot be removed directly, policies have to be found to do so indirectly, but in a politically viable and cost-effective way. In principle, there are innumerable policies that can effectively address a given syndrome. Thus, policies should be designed creatively and against the backdrop of relevant context-specific factors. Local knowledge and ownership are crucial. The question remains whether the technical identification of binding constraints should be scrutinized under the lens of political feasibility. For instance, if a government’s political capital is insufficient to tackle the most binding constraint, should it instead address the second most binding constraint, provided that there are no adverse second-best interactions? Or should it rather try to minimally change the first most binding constraint?

**Brazil case studies: Does a Growth Diagnostic lead to different recommendations for reform?**

Does the application of the Growth Diagnostics approach in practice lead to different recommendations for reform than, for instance, the wholesale reform recommended by the Washington Consensus? Brazil lends itself to such a comparison, as both Hausmann (2008) and Rodrik (2007)\(^2\) apply Growth Diagnostics to different time intervals of Brazil’s economic indicators. A World Bank (2002) study that scrutinizes the same time period as Rodrik (2007) can be compared with the two Growth Diagnostic analyses as an applied example of the Washington Consensus reform blueprint. Whereas all three studies identify the high cost of finance in Brazil as a priority area for reform, there are fundamental differences between the analysis by the World Bank (2002) and the case studies of Hausmann (2008)

\(^2\) Note that the work referred to here as Rodrik 2007 is a republished version of the original draft that was submitted to discussion by Hausmann, Rodrik and Velasco in 2005 (see above).
and Rodrik (2007) as regards the question whether an improvement of the investment climate could help spark growth.

Based on the three studies’ analyses of possible constraints to growth, a first best solution would be to implement a wholesale reform. In light of the growth obstacles in Brazil around the turn of the century, wholesale reform could have implied simultaneously (a) lowering the level of public consumption and transfers in order to reduce the overall deficit, which would create space for the high investment demand; (b) increasing investment in infrastructure and human capital; and finally (c) simplifying the tax regime and reducing regulatory obstacles and uncertainties for the private sector. However, this wholesale solution would not only require more political capital than the government may possess. It also implies conflicts of aims, such as simultaneously reducing taxes and the overall deficit. As a consequence of such contradictions between different reform aims, Hausmann (2008: 24) argues that a second-best approach becomes unavoidable. Moreover, Hausmann (2008) and Rodrik (2007) assert that wholesale reform would cause serious adverse interactions that could even harm growth. While the World Bank (2002: 25) recommends improvements to the business climate in Brazil as a safe bet to trigger growth, Hausmann (2008: 16) and Rodrik (2007: 80) caution that such reforms could even harm growth due to second-best interactions: reforms that ease the regulatory and fiscal burden of the private sector would make investment even more attractive. This new incentive structure would result in a further increase of private investment demand, which is already considerably higher than the supply of finance in Brazil over the observed periods. The two authors fear that such an additional boost in the demand for investment would force up Brazil’s interest rate. This unintended side effect would clearly conflict with any reform effort that tries to address the country’s most serious constraint on growth, namely the high cost of finance.

**Conclusions**

This paper aimed to provide a critical appraisal of the Growth Diagnostics approach by discussing criticism from academics and practitioners. As discussed above, there have been many critical questions on the approach’s
theoretical set-up and its practical application. Some of the most important criticisms have already been addressed by the authors of the Growth Diagnostic approach. For instance, Rodrik (2010) went beyond the initial exclusive focus on the lack of private investment and took the decision tree to a more general level.

A number of other questions still remain, however. Critically, Rodrik’s (2007) extensive disquisition on the importance of resilient institutions to sustain growth in the long term does not translate easily into the practical application of the approach. It is unclear whether (and at what intervals) a country should regularly carry out a diagnostic of its most binding constraint or whether there is some sort of threshold of transition, starting from which the country needs to focus exclusively on strengthening its institutions in order to maintain a productive dynamic and successfully absorb external shocks. It is also unclear whether all branches of the decision tree need to be considered in a diagnostic. For instance, Rodrik (2007) and Hausmann (2008) do not discuss possible market failures in their Brazil case studies: neither of them gives an indication as to why information externalities or coordination failures are unlikely to constrain growth in Brazil. Further questions concern problems with the practical measurement of shadow prices, which should be addressed to the extent of the possible in order to make diagnostics more robust. Finally, it should be studied how current trends in the development of the most binding constraint as well as considerations on possible future binding constraints can be integrated into the diagnostic.

Growth Diagnostics provides a very flexible approach to economic policy reform in developing countries. Firstly, the framework’s great flexibility is its strength: it focuses on the higher-order principles of neoclassical economics instead of handing out standard recipes. The latter run the risk of being unsuitable in the national context.

Secondly, in contrast to the list of reforms suggested by the Washington Consensus, which largely focused on government failures, Growth Diagnostics considers a more extensive range of possible binding constraints.
Thirdly, Growth Diagnostics allows countries to systematically and transparently prioritize their reforms, which can be crucial given the limited political capital and fiscal resources of developing country governments. Fourthly, singling out the most binding constraint also helps prevent adverse second-best interactions between different reforms. In its Brazilian case study, the World Bank (2002) fails to consider such interactions when recommending tax and regulatory reforms to improve the investment climate, in parallel to reforms to ease the high cost of finance. Such tax and regulatory reforms would induce more private investment, which was already higher in Brazil during the observed period than the supply in financing for such investment. The resulting second-best interaction would force up the interest rate and thereby worsen the main problem of high cost of finance. As opposed to this, a Growth Diagnostic of Brazil during that period would recommend priority focus on the most binding constraint, the high cost of finance, and thereby avoid the second-best interactions of wholesale reform efforts.

Fifthly, when it comes to designing solutions to reduce binding constraints, the Growth Diagnostics approach explicitly allows for policies that mix orthodox and heterodox solutions to remove the most binding constraints. Thereby, it does justice to the great diversity of recent success stories with regard to policies that effectively triggered economic growth in different settings.

Sixthly, the approach allows for creative and context-specific policy design, which has the potential of more successfully taking into account local economic, political and social specificities. Thereby, it increases ownership of the reform, which helps avoid political anti-reform backlashes, as witnessed in post-Washington Consensus Latin America. Finally, the approach’s flexibility is also its most important weakness. It remains willingly unclear about what policy design is adequate. It thus requires the diagnostician to possess in-depth knowledge of the country’s stakeholder dynamics. Moreover, the results of diagnostics by different diagnosticians are likely to be relatively heterogeneous due to the great flexibility in its application. This can ultimately lead to negative perceptions of the framework’s usefulness.
Overall, Growth Diagnostics is an appropriate approach to inform growth strategies in developing countries. It provides a useful framework to identify strategic policy choices that successfully kick-start economic growth and thereby alleviate poverty.

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Globalization Measurement: Notes on Common Globalization Indexes

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Globalization is a broad concept casually used to describe a variety of phenomena that reflect increased economic, social and political interdependence of countries. Despite the increasing awareness on globalization, it is interesting to note that there is no any universally accepted definition and there is no standard measurement for globalization. Along with the growing number of countries participating in globalized world, there have been increasing concerns related to the globalization and its impacts on different aspect of life. Looking at the way globalization affects us, there is a need to measure globalization not only to know the effects of it, but also to manage it. A number of globalization measurements have been proposed. In this paper, we provide a taxonomy which categorized recent globalization measurement based on its definition to single and synthetic indexes. We then describe the indicators, method and availability of data, and analyses some of their shortcomings. In addition, we compare the indexes with respect to some criteria. Our survey concludes that selection of a good globalization indexes for the study depends on the objectives and the sample of the study. The findings of this study can help researchers as a guide line to select best index for their studies or develop new and better measurement.
Introduction

Globalization is not a new phenomenon. Rather, our world has experienced it since many years ago [1-4]. Globalization is a complicated process, which affects different aspects of our lives such as economic, social, environmental and political sphere (Figure 1). Globalization includes flows of goods and services across borders, international capital flows, reduction in tariffs and trade barriers, immigration, cultural transformation, and the spread of technology and knowledge beyond borders.

Figure 1: Various effects of globalization

The current wave of globalization is unmatched due to the involvement of a large geographical area, the complexity and different level of communication and relation and the participation of many nations among the developing countries. In fact, over the course of time, many
nations have experienced progressive development processes and profound changes, from simple lifestyle to the lifestyle that is governed by technology gadgets. Through literatures, globalization has become a more shared knowledge and thus, awareness on it and its implications on us have become more eminent.

While increased integration of countries in economic, social, political and environment sphere are often referred to globalization, there is no universally accepted and indisputable definition of globalization. Researchers define globalization from different points of view such as increase in integration of markets and diffusion of technology and idea (Friedman 1999); reducing the role of geographical constraints on social and cultural arrangements [5]; Eliminating the ability of the nation to establish and implement their own policies [6]; increase in the importance of transnational corporations [7]; changing in the political, social, economic and political foundations of countries [8]. Thus, arriving at a universally acceptable definition of globalization is not a difficult task due to the absent of the clear-cut theory.

The broad effects of globalization on different aspects of life grab a great deal of attention over the past three decades. In the new wave of globalization (1980-present), the large numbers of countries, especially developing nations, are speeding up their openness. It is obvious that the concern about the impact of globalization on issues such as economic growth, poverty, inequality, cultural dominance, and environment have been increasing. These debates emphasize on the importance of measuring globalization. In fact, to know these effects, constructing an index that captures all aspects of it is necessary. Without doing so, it is impossible to know the benefits or cost of globalization and how to manage it. To measure globalization, the broad and precise definition is needed. Based on the different definition of globalization, researchers have tried to construct an index.

There is variety of globalization measurement and no standard rule for measuring it. This is because of two reasons; the first reason is that globalization is a highly complex and multifaceted process. Finding an index, that capture all aspects of it, is very difficult [9-10]. The second one is that globalization is a wide concept, with no single definition. In fact, what
is globalization actually is, mention as an open question. As a result, finding a standard measure is a hard task [10]. Even though, researchers have constructed various indexes to measure globalization, there is not any standard index to measure this broad concept.

This paper is aimed to provide an updated overview of the recent developments in globalization measurement and to underline the main issues that remain to be solved. This is fundamental for the econometric researcher who wants to investigate effects of globalization or to develop new and better measurement. The remainder of this paper is structured as follows. Taxonomy of globalization measurement according to globalization definition is introduced in Section 2. Then, we present some criteria for synthetic indexes to compare indexes in section 3. We describe critical point about indexes in Section 4. Finally, Section 5 concludes our paper.

**Globalization measurement**

The measurement of globalization is not an easy task, given that there is lacks of uniform and generally acceptable definition of globalization. There is variety of globalization measurement and no standard rule for measuring it. Many attempts have been done to measure globalization. In this part, common measurements of globalization are reviewed. Based on definition of globalization, these measurements divided in to single index and synthetic index (Figure 2):

**Single index**

For some studies, the effect of economic globalization through trade or/and finance is more important than other dimensions of it. The empirical analysis use two groups of proxies; De facto and De jure measurement.

**De jure globalization index**

Trade and financial globalization capture by the level of restrictions placed on the movement of goods, services and capital. The common
indexes that have been used for measuring restriction on trade and capital of a country are mentioned below:

- Average tariff rate:
The restriction on trade is commonly measured by mean of tariff rate on import of goods and services. This index calculated by:

$$ T = \sum_i \frac{M_i t_i}{M} $$

Where $M_i$ and $t_i$ are import and tariff rate on good $i$, respectively, and $M$ represents total of import. This index has been used in Agénor, (2004) and Jaumotte, (2008).

- **The IMF’s restrictions measurement**

  Since 1967, the IMF has published an Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) that provides the basis information on the presence of restrictions in the countries. In this report (up to 1997), the controls on international financial transactions are categorized as follow: the existence of multiple exchange rates, regulatory requirements of the surrender of export proceeds, restrictions on capital account transactions, the presence of restrictions on current accounts transactions [13-15]. Despite the fact that the AREAER is widely used as measurement of capital controls, but the basic variables are too aggregated to capture actual capital controls [16].

- **Chinn - Ito index**

  Chinn and Ito (2005) introduced an index to measure degree of capital openness that called KAOPEN. This index is the first standardized principal component of the four variables that measured in AREAER. The Chinn-Ito index is normalized between zero and one. A more open country capture higher value. The KEOPEN is calculated for 182 countries for the period of 1970-2006.

**De facto globalization measurement**

Trade and financial openness are measured by the level of export, import and capital that called de facto measurement. In this part, three common measurements of them are explained.
• **Openness**

The simplest and usual index for measuring trade openness is ratio of trade (sum of export and import) to the Gross Domestic Product (GDP) of country. Easy way to calculate and availability of essentials data are mentioned as benefits of this index [11-12, 17-18].

The trade openness of countries depends on trade policy (restriction on trade) as well as the geographical and economic characteristics of a country. Therefore, countries with small population will trade (as a proportion of GNP) more than large countries. The main problem of this index is that these elements are not considered in trade openness measurement (sum of export and import to GDP) [19]. An optional approach for measuring trade openness is “structure-adjusted trade intensity” introduced by Pritchett (1996) to correct the outcome measure of trade openness for relevant country characteristics. The trade openness is regressed on some country characteristics that are thought to be relevant in determining trade as a percentage of GNP as well as being exogenous to trade. The resulting residual is an adjusted or corrected measure of trade openness.

• **Gross capital flows**

The sum of gross inflows and outflows as a ratio to national GDP is known as a good ratio that can capture two-way flows. It also provides sensible and logical picture of globalization.

• **Foreign assets and liabilities**

The sum of gross stocks of foreign assets and liabilities as a ratio to GDP is corrected for valuation effects. This ratio omits the problems of flow data.

• **Foreign direct investment**
From production standpoint, FDI is an important vehicle of globalization. FDI is the best kind of foreign investment that is non-debt flows. This type of foreign investment is less volatile than other types of foreign investment. It also plays a significant role to transfers of technology and new management knowledge to the host country [17]. Many researchers use FDI as indicator for capture financial openness of a country. FDI shows the ability of countries to attract foreign investment. It would capture only the side of financial integration of a country [20].

**Synthetic index**

Recently, researchers have tried to capture all dimensions of globalization in one index. They have selected the variables and indicators according to what they believe globalization is. In the following, these indexes are illustrated:

- **A.T. Kearney/Foreign Policy Globalization (KFP)**

  Kearney (2002, 2003) is the first attempt to introduce a multiple measurement for globalization. This index measures not only economic integration but also technological connectivity, personal contact, political engagement. This globalization Index is calculated only for 62 countries (see more in Caselli and Gemelli 2008).

  To build the index, four stages have been done like Human Development Index of UNDP:
  1. The relevant variables have been selected by careful assessment.
  2. By consideration of data availability, a proper measurement for each variable has chosen.
  3. These variables are measured in different units that should be normalized. KFP use panel normalization to normalize the individual variables.
  4. A weighted sum of the normalized variables is calculated which gives a numerical score for each country in each year to determine country rankings.
Weights are assigned based on construction belief. Variables are weighted double or single relative to others. The reason for a priori weights is that they have some normative significance. Some researchers believed that this approach is not reasonable [19, 21]. This index does not adjust the variables for geographical dimension. Therefore, the ranking of countries depends not only on their geographical characteristics but also on their policy stance towards globalization.

- **KOF1**

This index was introduced in Dreher (2002) and updated in Dreher, Gaston et al. (2008). Based on this index, globalization defines as a process that erodes national borders, integrates of economies, politics, technologies, and cultural and facilities flows of people, goods, capitals and ideas. KOF index covers the economic, social and political dimensions of globalization [22-25]. The principle components analysis is used to calculate the weight for variables. This index does not adjust for geographic characteristics of countries.

- **The CSGR2 Globalization Index**

The Index measures the economic, social and political dimensions of globalization for the period of 1982 to 2004 for 62 countries. The index is claimed to be complementary to KFP, as it use optimal statistical weighting known as principal component weighting and controlling for fixed country geographical characteristics. The procedure of constructing index is same as KFP [10, 26-28].

- **Maastricht Globalization Index (MGI)**

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1 German acronym for ‘Konjunkturforschungsstelle’ (Economic Research Center)
2 Center for the study of globalization and regionalization
The MGI index uses seven group of variables include global politics, organized violence, global trade and finance, social and cultural, technology and environment to cover all dimensions of globalization. This index is calculated only for 2000 and 2008 [24, 29]. This index is the only one that capture environmental dimension of globalization. MGI also includes geographical characteristics of countries in adjustment of countries.

- **New globalization index (NGI)**

  Vujakovic in 2009 has developed an index with five new variables to measure globalization. These variables are trade-mark applications by non-residents, portfolio investment stock, patent applications by non-residents, and environmental agreements [30]. Based on this index, globalization defines as a process that increases interaction and interdependence between economies, societies and nations beyond large distances. He has used a parameter to control geographical distances between countries. For constructing the globalization dimensions and variable weights, the principal component analysis is used. Dimensions and weights constructed in such manner reflect the statistical characteristics of the dataset.

- **Globalization index (G-index)**

  G-index has been introduced by Randolph, 2001 to measure the depth, breadth and richness of the interdependence between the national and the global economy. The major weigh of variables belongs to economic dimension of globalization. The main shortcoming of this index is partially publishing of the data [31].

**Evaluation of synthetic indexes**

In this section, a comprehensive set of criteria are proposed, to facilitate comparison between different synthetic indexes. Table 1 is based on these criteria that are important in the construction of an index. Such criteria could help in evaluating the existing globalization indexes, serve as the abilities to be considered in implementing new indexes, or facilitate
selection of best index for studying globalization. In the following, each group of these criteria is described and discussed in detail.

**Structural criteria**

- **Number of indicators**

  The synthetic indexes use various numbers of indicators and variables to capture dimensions of globalization. Although, a large number of indicators measure globalization completely, it also causes some problems. For instance, the larger amounts of information are needed to construct an index that decreases the number of countries with complete set of required data. In addition, the exclusive number of indicators reduces the timeliness of such information from different sources [10].

- **Negligible weights to indicators**

  The researchers use different methods to weight the indicators. Based on their method, some indicators get negligible weight, for example, in CSGR index, phone calls get one-thousandth of the overall value. Considering insignificant weight for the indicators is a weakness of the index.

- **Geographical adjustment**

  This criterion indicates that whether the index have adjusted the variables for the geographical characteristics or not. On one side, the adjustment for geographical characteristics of countries is important, as it should be accounted beside other spheres of globalization. Based on their definition, globalization includes interaction of actors across large distances to run the risk of confusing regionalization with globalization [32]. In addition, controlling for these factors might improve the understanding of the other, more subtle determinants of globalization such as past and present policy choices that might be interesting [24]. On the other side, some believed that the reason for the openness of countries is not matter in
globalization ranking of countries. It is preferable to control for these factors when analyzing the causes and consequences of globalization.

- Environment

This criterion show ecological footprint of countries, whether include in index or not.

**Dimensions of globalization as criteria**

In the following, the dimensions of globalization that measured by synthetic indexes are mentioned as criteria. This is important to know which sphere of globalization is covered by index.

- **Economic globalization:**

  One of the most important and broad dimensions of globalization index is economic one. Therefore, it is important that the index cover this aspect of globalization comprehensively. The economic indicators of indexes are categorized in two groups:
  1. Actual flow of trade and foreign capital: These indicators show the level of trade (export + import) and all kinds of foreign capital such as FDI, FPI and cross border bank-lending.
  2. Restriction on trade and capital flow: These indicators show the tariff and non-tariff barriers, taxes on trade and other kinds of restriction on export, import and capital.

- **Social globalization**

  1. Culture: It shows whether the index cover the culture proximity of the country to the rest of the world.
  2. Information and contact: This criteria show whether the index measure easy access of people to the information and people in other countries.
• **Political globalization**

This criterion indicates the political dimension of globalization is measured by index or not.

**Coverage criteria**

- **Years**: It indicates the period that the index is calculated.
- **Numbers of countries**: It shows the number of countries that the index covers them.

**Discussion**

As illustrated in this table, we are able to compare synthetic index with respect to some criteria. If an index supports each of these criteria (except negligible weight to indicators), it is more accurate than the approach which does not. This table can help researchers to choose the best index for their studies based on their globalization definition and objective of studies. In addition, it leads those researchers that have aimed to improve the current globalization indexes, by determining its weaknesses and strengths. In addition, it can be concluded from the table that KOF is the best index for measuring globalization based on some feature of it. The first one is that it measures the level of trade and all types of foreign capital as well as restriction on them. The second one is that it measures social and political dimension of globalization more comprehensive than other indexes (to see detail of indicators Dreher 2005). The last one is that it calculated for a large number of countries and longer period. However, it is worth mentioning here that KOF is not suitable for all globalization studies. The objective of a study is an important factor that should be accounted when selecting globalization indexes.
**Table 1**: Existing globalization indexes and criteria for good composite indexes

<table>
<thead>
<tr>
<th>Index</th>
<th>Years</th>
<th>Number of Countries</th>
<th>Number of Indicators</th>
<th>Economic globalization</th>
<th>Social Globalization</th>
<th>Geographical adjustment</th>
<th>Environment</th>
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<tr>
<td></td>
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<td></td>
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<td>Actual Flow</td>
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<td>Foreign Capital</td>
<td>FDI</td>
<td>Restriction on Trade and Capital</td>
<td></td>
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<tr>
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<td>Actual Flow of Trade</td>
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<tr>
<td>KFP</td>
<td>1971-2005</td>
<td>62</td>
<td>12</td>
<td>×</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>KOF</td>
<td>1970-2008</td>
<td>158</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
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<tr>
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<td>1982-2004</td>
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<td>16</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
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<tr>
<td>MGI</td>
<td>2000-2008</td>
<td>117</td>
<td>11</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
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<tr>
<td>NGI</td>
<td>1995-2005</td>
<td>70</td>
<td>22</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>G-index</td>
<td>2001</td>
<td>185</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

Criteria:
- ✓: Yes
- ×: No
- Same weight

210
Critical view on globalization indexes

In this section, the main shortcoming of the single and synthetic indexes will be discussed.

Problem of single index

There are also some problems in the single indexes, which only consider globalization as an economic one, as follow:

De jure measurements are not comprehensive and do not accurately reflect the actual degree of trade or financial openness of an economy into international markets. For example, some of them measured restriction on foreign exchange transactions that do not necessarily restrict the capital flows. Furthermore, these measurements do not able to catch the degree of enforcement of restriction on of goods, services and capital [15-16, 33]. The main problem of de facto indexes is measuring globalization indirectly. For example, trade openness - that measured by trade volume as share of GDP - measured indirectly through trade volumes [12, 34-35].

However, it is recommended that, in the case of using de jure and de facto indexes, to capture the degree of economic globalization more precisely, it is better to use them as complements rather than substitutes. For instance, in the countries with low level of trade and foreign capital, it is not obvious that these low rates are because of restriction on the flow of them or the structural shortcoming in these countries.

Problem of synthetic Index

In this type of index, researchers have tried to consider all dimensions of globalization. Despite of the extensiveness of these indexes, some problems still exist and they need to be addressed. The first on is using extremely large number of variables and indicators in constructing them. The excessive use of variables and indicators gives rise to many and different problems, as follow: [10]

- The larger number of variables and indicators need greater amount of data to calculate index. Therefore, the number of countries that
have this amount of data decreases. These countries comprise of the developing countries and some developed ones.

- The need to acquire a large amount of disparate information from diverse sources reduces the timeliness of such information.
- The excessive use of variables restricts the instrument’s comprehensibility and thus limits its chances of gaining broad international recognition.

The second one is the weights that imputed to some variables are negligible. For example, the scant value of Phone calls in CSGR index that account for 0.004 in the Ideas sub-dimension, two-thirds of the overall value of the Social globalization sub-index and one-thousandth of the index’s overall value of index [19]. The third shortcoming is that these indexes do not consider any measurement of restriction on trade and capital except KOF index. To measure the economic globalization of a country both actual flow and restriction should be consider. The forth is related to the adjustment for geographical structure of countries in some of these indexes like KOF and KFP. This adjustment improve the precisely of indexes that the level of their globalized do not affected by countries characteristics. Finally, some of these indexes do not publish the methodological notes clearly, and an access to the data of these indexes is difficult to gain. This kind of disadvantage is eminent in the index such as the G-index.

Overall

Further shortcomings of each group of index, globalization measurement, in overall, suffer from some problems. The most robust obstacle is lack of data. Data on FDI, trade barriers or outsourcing is not easily accessible. This problem is highlighted in studies that need disaggregate data, or longer periods. To illustrate, data on trade policy barriers that is published by UNCTAD is available only from 1989 onwards. The lack of data is more obvious in the developing countries [36]. The usual limitation of indices is lack of theoretical foundation or relevance and their low robustness [19, 37-38].
Conclusions

Measuring globalization is a difficult task. This is due to the fact that it does not have any universally accepted definition. Furthermore, globalization has different aspects that make it difficult to consider all in just one index [29]. However, by considering the new wave of globalization and the participating developing countries in this process, awareness on its effects on economic, social and political sphere, is critical. In order to explore these effects, it is necessary to construct a new tool. Finding an instrument to measure a phenomenon of such complexity and such significance for humanity is a challenge both fascinating and demanding.

Nevertheless, many researchers try to tackle these difficulties and create various ways to measure it. As mentioned, to construct one index, the variables and indicators have been selected based on how the constructers define globalization. There are some differences in the measurement, weighting, and normalization rules used to construct these indexes.

In this paper, after considering the importance of measuring globalization, we presented the classification of globalization indexes. The current and common indexes are categorized in ‘single indexes’ that only measured economic dimension of globalization, and ‘synthetic indexes’ which measured economic, social, political and environmental dimension of globalization. We also proposed a set of criteria which are mainly used in evaluating synthetic globalization indexes. Such criteria could help in evaluating the existing globalization indexes, serve as the abilities to be considered in implementing new indexes, or facilitate selection of best index for studying globalization. Finally, the problems of current measurement of globalization are discussed.

The aim of this paper is to provide an insight on globalization index, by providing a classification of available indexes. This is done so that it can help researchers to select the best index for their studies or develop new and better measurement.

In a nutshell, we cannot conclude that which index is better than the other. In fact, the findings of our study have indicated that there is no single superior index that is suitable for all cases. The proposed list of criteria serves as a guide line for researchers to select the best index for their
studies. Based on these criteria, this paper recommended KOF as the best index that measures more comprehensively all dimensions of globalization than other indexes. Nevertheless, the selection of the globalization index for a study depends very much on the objective of that study, data availability and characteristics of countries under consideration. For instance, if a study aims to show the level of social globalization of a country, NGI and KOF are the best to be chosen. It seems that it is necessary for both qualitative and quantitative researchers to study globalization and hence, develop an accurate index for it. This index is useful in comparing and contrasting the existing indexes so that a more precise measurement of globalization can be attained. This index should be simple, precise and easy to understand.

Acknowledgment

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References


The Subtotal Button for Summarizing Data in an Excel Database

Authors: John O. MASON, Culverhouse School of Accountancy, The University of Alabama, Alabama, U.S.A.

The subtotal feature in Excel allows you to generate summary information, such as subtotals, averages, record counts, and maximum and minimum values for groups of records in a database. When you generate the summary information, Excel adds summary and grand total rows to the worksheet, labels each row, and outlines the records in each group. By clicking on the outline minus and plus symbols, you can quickly hide and show the details for each summarized group of data. The subtotal feature also allows you to remove and replace summary information.

Keywords: Filter a database, Inserting summary information, Multiple sets of summary information, Replace current subtotals, Remove and replace summary information, Sort a database, Subtotal button, Subtotal feature, Subtotaling a subset of the database, Summary information

Excel’s Subtotal feature provides a quick and easy way to summarize data in an Excel list or database and to outline a database. You do not need to enter formulas to summarize the data in the worksheet. Instead, the Subtotal button in the Outline group of the Data tab’s Ribbon enables you to automatically calculate summary information, such as subtotals and grand totals, for groups of data that you previously sorted and, optionally, filtered.
However, before you access the Subtotal button, your data must be organized in the form of a list or a database with named fields and must be grouped according to the values in one of those fields. For example, the database in the Employee.xlsx workbook file includes named fields, such as LAST NAME, FIRST NAME, and DEPARTMENT, as shown in Figure 1. Moreover, you can sort the records (i.e., group records) in ascending or descending order according to the values in a field, such as DEPARTMENT.

The Subtotal feature provides a great deal of flexibility in how you can summarize data in a list or database. When you click on the Subtotal button, you choose:

- The groups of records for which you want subtotals, such as those grouped by department name in the DEPARTMENT field.
- The summary function, such as Sum, Count, Average, Max, Min, etc., to use in generating the summary information.
- The field or fields to be summarized for each group of records, such as the values in the SALARIES field. Excel inserts the summary information in a summary row for each group and a grand total row and places the information in the same field or fields (i.e., columns) it summarizes.

For the Subtotal button to work, you first must sort, and optionally filter, your database. If you sort the database on multiple keys, the first sort key must be the field on which you intend to group the records (i.e., the groups for which you want Excel to calculate summary information). For example, sort the records in the in the employee database in ascending order according to values in the DEPARTMENT field. After sorting the database, the records ought to be in ascending order by department.

Once you have sorted the database, you can generate summary information for each group (i.e., Accounting, Executive, etc.) and grand totals for all records in the database. If the database is filtered, then the summary information will be generated only for those records that are not hidden. To generate the summary information, complete the steps below:

1. Select any cell in the database (if necessary).
2. Click on the Subtotal button in the Outline group of the Data tab’s Ribbon. Excel displays the Subtotal dialog box (see Figure 2).
When you first click on the Subtotal button, the “At each change in” box automatically displays the name of the left-most field name in the database, as shown in Figure 2. To select a different field on which to group the records, click on the arrow at the right-end of the At each change in: drop-down list box and then select another field name. The field name you select should represent the groups for which you want to generate summary information. Moreover, this field name should be the same as the first sort key on which you sorted the database. Since you sorted the database with the
field DEPARTMENT as the first sort key, select the DEPARTMENT field name by clicking on it in the list box.

![Subtotal Dialog Box](image)

**Figure 2:** Subtotal Dialog Box

4. In the Use function: drop-down list box, select the function you want to use in summarizing the records in the database. A number of functions are available, including Sum, Count, Average, Max (maximum value), Min (minimum value), Var (variance), StdDev (standard deviation), etc. You select a function by clicking on the arrow at the end of the box to display the drop-down list of functions and then clicking on the function. For the department groups, select the Sum function (if necessary).

5. In the Add subtotal to: list box, check the boxes of the field or fields that contain the values or items you want to summarize and clear all other check boxes. When you first click on the Subtotal button in the Outline group of the Data tab’s Ribbon, Excel displays up to six names in the list box and automatically checks the box of the
last numeric or date field. Because SALARY is the only field for which you want to generate subtotals, check its box and then clear all other check boxes in the list box.

6. When the Replace current subtotals box is checked, Excel replaces any previous summary and grand total rows with the summary and grand total rows it inserts when you choose OK. When the box is clear, Excel inserts the summary rows between the last record in each group and any summary rows that may have been previously inserted. Excel also inserts the most recent grand total row above any previous grand total rows. By placing the next set of summary and grand total rows above the previous set(s), you can develop a great deal of summary information for the records in the database. For example, you might develop summary information that includes subtotals, averages, maximum values, minimum values, record counts, etc. Because you will generate several different kinds of summary information in this section, clear the check in the Replace current subtotals box.

7. The Summary below data check box allows you to decide whether to place each summary row below (if checked) or above (if clear) the group of records to which it applies. In this example, the box should be checked.

8. If the Subtotal dialog box on your screen matches that shown in Figure 3, click on OK. Otherwise, make the necessary changes before clicking on OK.
As soon as you clicked on OK in the Subtotal dialog box, Excel automatically inserted the subtotals in the form of summary rows beneath the departmental groups, as shown in Figure 4. Excel also inserted a grand total row after the last group of records. In addition, Excel labeled each summary row with a row title, consisting of the group’s value in the “group by” field and a word describing the type of summary information. For example, Excel created the row title Accounting Total for the accounting group of records. Similarly, Excel created the row title Grand Total for the grand total row.
Figure 4: Summary Information in the Form of Salary Subtotals for the Department Groups

Also, as you can see in Figure 4, Excel outlined the data to the left of the worksheet. The inner brackets outline each group of records; the outer bracket outlines all records in the database so that you can show or hide as much detail as you need. At the bottom of each bracket is a minus sign.

Clicking on the minus sign for a group of records hides the records in the group, but not the summary information, and replaces the bracket and minus sign with a plus sign. Clicking on the plus sign redisplayed the records in the group and replaces the plus sign with the bracket and minus sign. Alternatively, you can click on the Plus and Minus buttons that are located to the immediate right of the Subtotal button. Thus, the plus and minus symbols in the outline and the Plus and Minus buttons in the Outline group of the Data tab’s Ribbon allow you to quickly hide and show the details for each
The Subtotal Button for Summarizing Data in an Excel Database

For example, if you want to display and print only the summary information, then click on each minus sign to hide all records and leave only the summary information displayed in the worksheet. Optionally, click on the minus sign at the left of the first grand total row to hide all but the grand total summary information.

Creating Multiple Sets of Summary Information

If you want to develop additional summary information for the department groups, you again click on the Subtotal button in the Data tab’s Ribbon and follow the steps outlined above. However, you must be sure that the Replace current subtotals check box is clear before you click on the OK button. Otherwise, Excel will replace the previous summary and grand total rows with the new summary information it inserts. For example, insert summary information using the Average, Max, Min, and Count functions, respectively. After you have inserted the summary information with the Count function, your worksheet should match that shown in Figure 5.

Note: When you click on the Subtotal button to create more than one set of summary information, Excel inserts the most recent summary rows between the last record in each group and any previous summary rows. Excel also inserts the most recent grand total row immediately above any previous grand total rows. If you want to develop additional summary information for the department groups, you again click on the Subtotal button in the Data tab’s Ribbon and follow the steps outlined above. However, you must be sure that the Replace current subtotals check box is clear before you click on the OK button. Otherwise, Excel will replace the previous summary and grand total rows with the new summary information it inserts. For example, insert summary information using the Average, Max, Min, and Count functions, respectively. After you have inserted the summary information with the Count function, your worksheet should match that shown in Figure 5.

Note: When you click on the Subtotal button to create more than one set of summary information, Excel inserts the most recent summary rows between the last record in each group and any previous summary rows. Excel also inserts the most recent grand total row immediately above any previous grand total rows.
Subtotaling a Subset of a Database

To subtotal only a subset of records, you should filter your database first. Filtering hides all records except those that meet criteria you choose. When you insert subtotals in a filtered database, Excel summarizes only the visible records. As with an unfiltered database, group (i.e., sort) the records before you click on the Subtotal button.

Removing and Replacing Summary Information

The following ways enable you to remove subtotal summary information that you inserted with the Subtotal button:
• To remove summary rows and the grand total row immediately after inserting them, click on the Undo button on the Quick Access Toolbar.

• To remove all summary and grand total rows from the database, click on the Subtotal button in the Outline group of the Data tab’s Ribbon to display the Subtotal dialog box and then click on the Remove All button.

If you want to replace existing summary and grand total rows with updated summary information, click on the Subtotal button in the Outline group of the Data tab’s Ribbon, check the Replace current subtotals box in the Subtotal dialog box, select the appropriate field names and other options, and then click on the OK button.

Summary

The subtotal feature in Excel allows you to generate summary information, such as subtotals, averages, record counts, and maximum and minimum values for groups of records in a database. However, before you generate summary information, you must sort the database according to the field on which you want to summarize. When you generate the summary information, Excel adds summary and grand total rows to the worksheet, labels each row, and outlines the records in each group. By clicking on the outline minus and plus symbols, you can quickly hide and show the details for each summarized group of data. The subtotal feature also allows you to remove and replace summary information for the summarized group of data.
Forecasting Sales in a Sugar Factory

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Beets’ cultivation and sugar production represent one of the most important parts of Greek agricultural economy. A careful and well-organized planning of the production as well as the determination of an accurate safety stock is important for sugar industry, as for many other companies and organizations, in order to define the production quantity which leads to maximum revenues and profits. Forecasting, and especially widely used statistical forecasting techniques, is the best way for policymakers to organize their activities and company’s production and make the appropriate adjustments. Apparently, management information systems and forecasting support packages play a leading role in this area, since the amount of data under process is usually quite large and demands an automated procedure to effectively produce and evaluate forecasts. In this case study, “Pythia”, an expert forecasting platform developed by the Forecasting and Strategy Unit of the National Technical University of Athens, was implemented on a monthly data series regarding sugar sales of a Greek sugar factory for the years 2000-2005, bringing theory and practice together. Additionally, the methods or combinations of methods which are well suited for this time series are highlighted based on three error indices. Finally, the results of the study and

¹ Corresponding Author
conclusions are considered and perspectives of progress and development in the field of forecasting are contemplated.

**Keywords:** Sales forecasting; Time series; Forecasting support systems; Statistical forecasting methods; Agricultural forecasting

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**Introduction**

Sugar Industry is an active and ever growing field of Greek agriculture. In many countries it is a matter of major importance to ensure a sufficient and satisfactory production of sugar, since thousands of tones are consumed and traded every day all over the world. According to Higgins and Muchow (2003) the cultivation, harvest, transfer, processing and marketing of sugar have to be treated as a single problem. This attempt may be too complicated, especially in countries, where harvesting units and farms belong to private companies and are separated from factories, where the processing takes place. Forecasting is without doubt essential for companies and industries in order to achieve their goals and maximize their profits (Armstrong, 1985). Since models implemented in other countries cannot be utilized in Greece due to the different environmental conditions and soil fertility, the development of algorithms in order to predict annual sugar production and demand in Greece has become a necessity. For this reason the present study applies the most commonly used and up-to-date statistical forecasting methods as well as combinations of multiple methods on one time series: sugar sales of a Greek factory for the period 2000-2005.

New technologies play a crucial role in the simplification of the forecasting process, so an efficient and expert software package, “Pythia”, was implemented in this case. All forecasting methods chosen and tested for the specific type of data are described below. Furthermore, “Pythia” along with the results of the study and the smoothing method applied in this case study are presented. Finally, the most appropriate methods are indicated, based on various error indices.
Statistical tools and methods

 Statistical forecasts refer to the application of statistical time series’ models or deterministic models on data series with a view to a systematic and automated forecast production. Statistical forecasting methods can be directly used by business managers lacking any technical or statistical knowledge via expert forecasting information systems like “Pythia”. In the present study the following widely known statistical methods are taken into consideration and are briefly reviewed below: Linear Trend, Simple Exponential Smoothing, Holt Exponential Smoothing, Damped Exponential Smoothing, Holt-Winters Model and the Theta Model. The formulae of the aforementioned methods can be found in any forecasting textbook (e.g. Makridakis, Wheelwright & Hyndman, 1998; Brockwell & Davis, 1987).

In statistics, regression analysis examines the relation of a dependent variable (response variable) to specified independent variables (explanatory variables). In case of time series’ analysis the index of each period is used as the independent variable.

Exponential Smoothing methods were developed in the early 1950s. Since then they’ve become very popular among operators, primarily due to the fact that they are easily implemented, require minimal computing time and a relatively small number of observations in order to extract a forecast. Smoothing methods are mainly suited for short and intermediate-term batch forecasting. Optimal performance is observed when these techniques are applied on stationary data series.

Simple Exponential Smoothing (SES) assumes that time series have an almost constant average and the forecast results from the extension of a constant-level line.

Holt Exponential Smoothing can additionally handle the trend component, which is usually present in business data.

Despite its popularity, empirical evidence has shown that the Holt linear forecast function tends to overestimate. Taking this into account, Gardner and McKenzie (1985) described how a dampening parameter, \( \phi \), can be used within Holt’s method to provide more control over trend
extrapolation. Gardner and McKenzie explain that if $0 < \phi < 1$, the trend is damped.

The most commonly used procedure to calculate the optimal values of the smoothing factors is the minimization of the in-sample Mean Squared Error (MSE).

The Holt-Winters model, which is a multiplicative seasonal model, is appropriate for time series in which the amplitude of the seasonal pattern is proportional to the average level of the series. The model introduces a seasonal factor $I$ and a ratio and like in all smoothing methods mentioned above, every constant ranges from 0 to 1.

The Theta model (Assimakopoulos & Nikolopoulos, 2000) is based on the concept of modifying the local curvatures of the time series. This change is obtained from a coefficient, called Theta-coefficient ($\theta$), which is applied directly to the second differences of the time series. The smaller the value of the theta coefficient, the larger is the degree of deflation. In the extreme case where $\theta=0$ the time series is transformed to a linear regression line. The progressive decrease of the fluctuations diminishes the absolute differences between successive terms in the derived series and is related, in qualitative terms, to the emergence of long-term trends in the data (Assimakopoulos, 1995). Conversely, if the local curvature is increased ($\theta>1$), then the time series is dilated, magnifying the short-term behavior.

Following this procedure, a set of new time series, the so-called Theta-lines, is constructed. Generally, the initial time series is decomposed into two or more Theta-lines. Each of the Theta-lines is extrapolated separately and the forecasts are then combined. Any forecasting method can be used for the extrapolation of a Theta-line according to existing experience (Fildes et al., 1998). A different combination of Theta-lines can be employed for each forecast horizon.

**Organizing the forecasting process**

It is a matter of fact that in many organizations successful fulfillment of the forecasting process is often obstructed by a gap between theoreticians and practical users (Mahmud et al., 1992). Especially, De Roeck (1991) states that a gap between forecasting theory and practice actually
exists. Wheelwright & Clarke (1976) have come to the conclusion that, although practitioners support theoreticians in terms of technical competence and skills, theoreticians still think little of practical users who, according to them, lack judgmental ability to choose optimal techniques and produce cost effective forecasts. This case study is an attempt to bridge this gap between theory and practice in the field of forecasting, through the examination of data provided by Greek sugar industry and the implementation of the forecasting methods mentioned in the previous section. The original data concerning monthly sales of sugar in kilograms for the years 2000-2005 are studied in this case. We should note that sales take place every month of the year, whereas production occurs only five months of each year (campaign period). Thus, 72 monthly observations about sales for 6 consecutive years are available.

“Pythia” software (Makridakis et al., 2008), utilized to produce forecasts for the above data series, has been developed by the Forecasting and Strategy Unit of the National Technical University of Athens and designed in a way that it can also serve managers without any statistical/technical background. Furthermore, Pythia gives users the opportunity to incorporate human judgment in the forecast aiming to increase its accuracy and provides them with comparative statistical information, in order to point out systematic biases and rule them out in the future. “Pythia” has been applied in various areas, such as real estate (Pagourtzi et al., 2008a) and mortgage loans (Pagourtzi et al., 2008b) and its main features include: data analysis, data processing, statistical forecast, import of special events and actions, bottom-up and top-down forecasts, monitoring and reporting, graphical and numerical data presentation.

After mining the data, we observed that outliers were present in the time series and decided to follow the smoothing method proposed by Fildes et al. (1998):

- First, the differences $Z_t = X_t - X_{t-1}$ are calculated, where $X_1, X_2, \ldots, X_N$ is the raw data series.
- The observations of the resulting time series $Z_t$ are placed in ascending order.
- The upper and lower smoothing limit are defined as follows:
where $B$ is the number of observations for the $Z_t$ series and 75, 25 are the selected smoothing parameters. In the present study two more sets of values for the smoothing parameters (65, 35 and 70, 30) are put under the microscope.

An observation is defined as an outlier if:

$$Z_t < L_z - 1,5 \cdot (U_z - L_z) \text{ or } Z_t > U_z + 1,5 \cdot (U_z - L_z)$$

A random outlier $X_K$ is replaced by:

$$X_K' = X_K - [L_z - 1,5 \cdot (U_z - L_z)], \text{ if } Z_t < L_z - 1,5 \cdot (U_z - L_z)$$

$$X_K' = X_K + [U_z + 1,5 \cdot (U_z - L_z)], \text{ if } Z_t > U_z + 1,5 \cdot (U_z - L_z)$$

### Results

Three accuracy measures (Mean Absolute Error, Mean Squared Error and Root Mean Squared Error) were used to analyze the performance of the aforementioned methods. In this section we summarize the results, after the implementation of these statistical techniques on the sugar sales series via the forecasting software “Pythia”. In addition, five combinations of multiple methods with various weights are tested here, since it has been observed that in some cases, combinations of methods tend to outperform the individual methods being combined (Makridakis & Hibon, 2000).

As far as the Mean Absolute Error is concerned, it is obvious that the Damped method produces the most accurate forecasts, followed by the combination SES-Holt-Damped with weights 70-15-15 respectively. It is also worth to notice that this combination actually outperforms SES, Holt and Damped methods, since the weighted mean of their errors is larger than the MAE of their combination. On the other hand, Winters method has the worst performance which is depicted in all three errors used in this analysis.

Taking into account the MSE and RMSE, Holt, Linear Trend and their combination perform better than any other method or combination of methods.

For this set of smoothing factors the relative ranking of the methods is analogous to the previous ranking, although the calculated in-sample
errors are generally smaller than those for the previous set of parameters. Based on the MAE, Damped method and SES-Holt-Damped are best suited for this data series, whereas Holt, Linear Trend and Holt-Linear Trend are the most appropriate based on the MSE and RMSE measures.

Time series with smoothing factors 25-75:

**Table 1**: MAE, MSE and RMSE of statistical methods for smoothing factors 25-75

<table>
<thead>
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<th>Method</th>
<th>MAE</th>
<th>MSE</th>
<th>RMSE</th>
</tr>
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<tbody>
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<td>SES</td>
<td>974534</td>
<td>$2.13 \times 10^{12}$</td>
<td>1458092</td>
</tr>
<tr>
<td>Holt</td>
<td>977860</td>
<td>$2.12 \times 10^{12}$</td>
<td>1457198</td>
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<tr>
<td>Winters</td>
<td>2086027</td>
<td>$8.10 \times 10^{12}$</td>
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<tr>
<td>Damped</td>
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<td>Theta</td>
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<tr>
<td>Holt (50%) – Trend (50%)</td>
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<tr>
<td>Holt (50%) – Theta (50%)</td>
<td>1041801</td>
<td>$2.39 \times 10^{12}$</td>
<td>1544863</td>
</tr>
<tr>
<td>SES (60%) – Holt (20%) – Trend (20%)</td>
<td>975863</td>
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<td>1457551</td>
</tr>
<tr>
<td>Theta (50%) – Damped (20%) – Trend (30%)</td>
<td>1046685</td>
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</tr>
<tr>
<td>SES (70%) – Holt (15%) – Damped (15%)</td>
<td>974320</td>
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<td>1458182</td>
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</tbody>
</table>
Time series with smoothing factors 30-70

**Table 2:** MAE, MSE and RMSE of statistical methods for smoothing factors 30-70

<table>
<thead>
<tr>
<th>Method</th>
<th>MAE</th>
<th>MSE</th>
<th>RMSE</th>
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<tbody>
<tr>
<td>SES</td>
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<td>1441599</td>
</tr>
<tr>
<td>Holt</td>
<td>948276</td>
<td>2.07 × 10^12</td>
<td>1438774</td>
</tr>
<tr>
<td>Winters</td>
<td>2024279</td>
<td>7.61 × 10^12</td>
<td>2757785</td>
</tr>
<tr>
<td>Damped</td>
<td>924869</td>
<td>2.10 × 10^12</td>
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<td>Linear Trend</td>
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<td>1438774</td>
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<tr>
<td>Theta</td>
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<td>Theta (50%) – Damped (20%) – Trend (30%)</td>
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<td>SES (70%) – Holt (15%) – Damped (15%)</td>
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</table>
Time series with smoothing factors 35-65

Table 3: MAE, MSE and RMSE of statistical methods for smoothing factors 35-65

<table>
<thead>
<tr>
<th>Method</th>
<th>MAE</th>
<th>MSE</th>
<th>RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SES</td>
<td>994952</td>
<td>$2.33 \times 10^{12}$</td>
<td>1527468</td>
</tr>
<tr>
<td>Holt</td>
<td>1013216</td>
<td>$2.31 \times 10^{12}$</td>
<td>1521166</td>
</tr>
<tr>
<td>Winters</td>
<td>2024208</td>
<td>$7.66 \times 10^{12}$</td>
<td>2767465</td>
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<tr>
<td>Damped</td>
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<td>$2.39 \times 10^{12}$</td>
<td>1546641</td>
</tr>
<tr>
<td>Linear Trend</td>
<td>1013216</td>
<td>$2.31 \times 10^{12}$</td>
<td>1521166</td>
</tr>
<tr>
<td>Theta</td>
<td>1253867</td>
<td>$3.20 \times 10^{12}$</td>
<td>1790235</td>
</tr>
<tr>
<td>Holt (50%) – Trend (50%)</td>
<td>1013216</td>
<td>$2.31 \times 10^{12}$</td>
<td>1521166</td>
</tr>
<tr>
<td>Holt (50%) – Theta (50%)</td>
<td>1044235</td>
<td>$2.55 \times 10^{12}$</td>
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<td>$2.59 \times 10^{12}$</td>
<td>1611697</td>
</tr>
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<td>SES (70%) – Holt (15%) – Damped (15%)</td>
<td>1388197</td>
<td>$3.67 \times 10^{12}$</td>
<td>1916617</td>
</tr>
</tbody>
</table>

As we can see in table 3, Holt and Linear Trend as well as the combination Holt-Linear Trend are the most suitable methods to predict sugar sales, taking into account the Mean Squared Error, which is the most commonly used index to evaluate the accuracy of the forecasts.

Apparently, for all three sets of smoothing factors, Holt, Linear Trend and their combination provide the most accurate forecasts and the lowest values of the MSE. We evaluate the results considering this specific error, because the MSE is an accuracy measure of the forecast, which, due to
squaring each term, weights large errors more heavily than small ones. However, every statistical technique utilized in this study presents relatively lower error values in the case of smoothing factors 30-70 than in the other two cases. Winters’ significant deviation of error values from those of the other methods shows that the model is not suitable for this kind of data.

**Conclusions**

This study addressed a specific gap in the field of Greek agriculture by implementing commonly used forecasting techniques on the demand-side rather than the supply-side of the sugar industry, in order to facilitate the design of the production policy, which is a complicated problem to many countries. This is particularly important for the Greek sugar industry, since production doesn’t take place every month of the year, but only during the campaign period which lasts five months, so the amount of production has to be meticulously predicted and organized taking into account annual demand for sugar and its side products.

The results indicate that Holt, Linear Trend and the combination Holt-Linear trend (with weights 50-50) offer the most accurate forecasts, while the Holt-Winters model is inappropriate for the specific time series. Apart from that, the best choice of smoothing factors has been identified to be 30-70, whereas the worst set of parameters is 35-65, for which the largest errors emerge. It is, however, worth to notice that the values of the error measures appearing throughout this study are relatively large due to unpredictable factors, such as weather conditions of the current year or the value of sugar in Greece compared to those of other countries, and the small number of available observations, and prove that there is a long way of improvement in the area of sugar demand forecasting.

Future research will involve examining other statistical methods for better performance or modifying already existing methods to fit this type of data series and investigating whether the incorporation of expert judgmental estimates could significantly improve the accuracy of the forecast. The methods which are proven to perform well in this case study can be also tested on other agricultural data series. Forecasting support systems can be very helpful in these procedures, minimizing the processing
time, handling a great amount of data simultaneously and opening up new horizons. It is also essential to overcome the difficulties mentioned above which hinder accurate forecasts. This could be achieved by the expansion of the current time series and the integration of special events, such as intense competition or possible natural disasters, in the forecasting process.

References


Analysis of Consumers Profile as an Important Tool for Tourism Development

Authors: Eleina QIRICI, Korca’s University, Marketing-Tourism Department, Korca, Albania, qirici.elena@yahoo.com

Tourism plays an important role in contributing to cultural exchange and sustainable development. On the one hand, it involves a short-term consumer experience of other locales. Tourist can play and leave, remaining isolated from negative impacts at the local level. On the other hand, tourism may increase recognition of the importance of respecting cultural diversity and developing an identity as a world citizen. Consumer can play a major role in the transformation of societies towards sustainability. Tourism is heterogeneous in nature, made up of many different types of traveler, seeking a wide range of tourism products. Tourist demand depends on the availability of time and money, on images, perceptions and attitudes. Tourists want experiences not places.

This paper has aimed to give motivations and behaviors of tourists and new trends in seeking of destinations, which are very important about the tourist supply.

The results of the analysis for the tourist’s profile can be used by actors of tourism in the area, who are interested in planning and development of tourism.

Keywords: motivations, profile’s tourist, consumer, cultural diversity

JEL Classification: M30, M39
Introduction

Researches on tourist behavior should begin with information search (Moutinho, 1987). One of the most influential factors in the purchase of a tourist product is information about goods and services. Moreover, tourists differ in the information sources they use before making a decision. (Arturo Moline and al, 2010).

It is important to realize that the management of tourism will be ineffective without an understanding of the way in which tourism consumers make decisions and act in relation to the consumption of tourism products. We need to study a tourist’s consumer behavior to be aware of:

• The needs, purchase motives and decision process associated with consumption of tourism
• The impact of the different effects of various promotional tactics.
• The possible perception of risk for tourism purchases
• The different market segments based upon purchase behavior
• How managers can improve their chance of marketing success

We can view the tourism consumer decision process as a system made up of four basic elements:

• **Energies of demand.** These are the forces of motivation that lead a tourist to decide to visit an attraction or go on a holiday.

• **Effectors of demand.** The consumer will have developed ideas of a destination, product or organization by a process of learning, attitudes and associations from promotional messages and information.

• **Roles and the decision-making process.** The important role is that of the family member who is normally involved in the different stages of the purchase process and the final resolution of decisions about when, where and how the group will consume the tourism product.

• **Determinants of demand.** The consumer decision-making process for tourism is underpinned by the determinants of demand. Even though motivation may exit, demand is filtered, constrained or channeled due to economic, sociological or psychological factors.
Consumer behavior involves the use and disposal of products as well as the study of how they are purchased. Product use is often of great interest to the marketer, because this may influence how a product is best positioned or how we can encourage increased consumption. The study of consumers helps firms and organizations improve their marketing strategies by understanding issues such as how: (Lars Perner, 2010)

- The psychology of how consumers think, feel, reason, and select between different alternatives (e.g., brands, products, and retailers).
- The psychology of how the consumer is influenced by his or her environment (e.g., culture, family, signs, media).
- The behavior of consumers while shopping or making other marketing decisions.
- Limitations in consumer knowledge or information processing abilities influence decisions and marketing outcome.
- How consumer motivation and decision strategies differ between products that differ in their level of importance or interest that they entail for the consumer.
- How marketers can adapt and improve their marketing campaigns and marketing strategies to more effectively reach the consumer.

**Determinants of demand for tourism**

Goeldner and Ritchie have utilized four categories of motivation:

- Physical motivators: those related to refreshment of body and mind, health purposes, sport and pleasure. This group of motivators is seen to be linked to those activities which will reduce tension.
- Cultural motivators: those identified by the desire to see and know more about other cultures, to find out about the natives of a country, their lifestyle, music, art, dance, etc.
- Interpersonal motivators: this group includes a desire to meet new people, visit friends or relatives and to seek new and different experiences.
- Status and prestige motivators: these include a desire for continuation of education. Such motivations are seen to be
concerned with the desire for recognition and attention from others.

Although an individual may be motivated to travel. The ability to do so will depend on a number of factors related to both the individual and the supply environment. Once a decision to travel has been taken, the ability to undertake the trip and the nature of that trip will be determined by a wide range factors. These are:

- Life-styles factors — include income, employment, holiday entitlement, education attainment and mobility.
- Life-cycle factors, where the age and domestic circumstances of an individual affect both the amount and type of tourism demanded.

Pearce and Stringer (1991) and Ross (1998), emphasize the relevance that motivation has to tourism and the 1980 and 1990 saw a huge surge in research, theories and models of motivation and tourism, and decision making of travel and tourism.

Parinello (1993) shows that “the importance of motivation in tourism is quite obvious; it acts as a trigger that sets off all the events involved in travel”. But Fodness (1994) writes that “the reason people give for their leisure travel behavior represents the psychological functions the vacation serves for the individual”.

**Methodology of research**

In realizing this study, a methodology combining primary and secondary data was used. A series of secondary sources, such reports from international organizations and other publications were provided through using electronic libraries of American, European universities and other sources like Internet and reports of important national and international organizations such as: World Tourism Organization, Eurostat, Bank of Albania, Ministry of Culture, Tourism, Youth and Sports and Ministry of Environment.

As far as tourist sample is concerned, there was created one made of 100 persons, selected by chance in the tourist destination or the accommodating units of the area considered in study.
The questionnaire asked to tourists provided general information on tourist market profile, considering the object of visiting the destination, the information source used, the expenses; Such information helps in determining new tourist developments in the destination which relies on nature activities aiming to preserve the tendency of tourist visits.

**General information about tourists**

The city of Korca is situated in southeastern part of Albania. The area occupied by the city today is a former Illyrian settlement. The potential for tourism development in Korca and the surrounding area is high thanks to its historical, cultural and natural wealth. Korca is mentioned as a castle in 1280 and in 1431, as an inhabited castle. After 1484, the city started to expand and development gaining the feature of an urban and regional centre. The city has participated historically in intensive exchange of culture and trade with Byzantium and Greece. Korca’s region illustrates and encompassed three of these areas: historical tourism; archaeological tourism, religious tourism.

Historical tourism encompasses the design, planning and application of historic elements used by tourism as a source of cultural attraction, such as monuments, tangible and intangible recourses and architecture.

Archaeological tourism is very important for many tourists. So, Korca’s region is well-known for the artifacts housed in the Archaeology museum, some of which date back to the early Iron Age, with others from the Hellenic, Roman and Byzantine periods. This year has inaugurated “Tumble of Kamenica” museum, which gives information’s and scientific data about rites, way and lifestyle, culture until to professions, social position etc. This museum is a object which will visited by the domestic and foreign tourists.

Religious tourism may be considered as the oldest manifestation of tourism. Korca’s region is well-known for old churches and monasteries, such as Orthodox Cathedral, which is the biggest in the Albania.

Korca destination as a city should not be seen as separate from the touristic villages surrounding it, since tourists coming to the city also
demand to visit the touristic villages around, to take part in their activities or to enjoy their accommodations and traditional dishes. Municipal programs concerned with transforming Korca into "The City of Holidays" do not only help to increase the vibrancy of community life, but they also aim at making Korca a famous city in Albania and the neighboring countries. In other words, these activities help to increase the number of foreign and domestic tourists in rural areas, especially in summer time owing to their favorable climate and fresh air. To sum up, we argue that combining tourism development of the city and with that of the touristic villages will lead to the sustainable development of Korca as a touristic destination, in general.

In this analysis were completed 100 questionnaires from visitors in Korca’s Region. Country of residence was: 72.3% from Albania; 12.8% from Greece; 4% from Italy; 3.8% from Macedonia, others - 7.1%. So Greece market was a important market, due to Greece has two international border crossing points with Korca. Most of the domestic tourists came from Tirana-48%; Durres-15%; Elbasan-15.7%; Vlora-6.2%; other-The tourist number from Tirana was higher, due to the continued improvement of the Tirana-Korca road.

These data show that the interest of native tourists is still continuous and according the information gathered from the hotels of the area, there is a tendency of tourists to come during winter time to enjoy the snow and be able to skiing. It is exactly the suitable climate during winter and summer seasons and infrastructural improvements that make the owners of accommodating units feel optimistic about these rural areas.
General information as demographic characteristics and other information to visitors are important for understanding the psychological, educational and other needs of visitors. The respondents were studied concerning the following: “How many times have you visited this destination?” The responses were: 43%- 1-2 times; 24%- visited it for the first time; 33%- more than twice. Taking chance of the results, we are able to notice that there is a continuous interest to visit these areas, enjoy the fresh air and the landscape, and also traditional cuisine that is often the main reason of visiting these rural areas.

The needs and preferences of visitors are directly related to the characteristics and specifics of an ecotourism destination with activities oriented toward natural and cultural heritage. An important question to understand the tourists’ profile is: “What is the goal of visiting this destination?”

The surveyed tourists responded to the above question: 33% of them come to enjoy the wonderful nature; 23% come to know about the culture of these areas; 21% are fond of hiking and 15% are fond of sports.
These data show that the tendency of being attracted by nature still persists. It is present in these rural areas during all the year, but there is a need to look for a more vivid environment and adding services in the destination; attraction by culture inherited from generation to generation shows that these areas are attractive in this aspect, which makes tourists go and visit these areas even though most of them are accommodated in town.

They spend an overnight or half a day with outdoor activities or enjoy the traditional cooking. Sport activities let us know about their early tradition, but those tourists who spend more time in destination should have the opportunity for organized activities such as riding horses as well as ski and mountain-climbing during winter time, going on thus with the sports tradition of these areas.

From the data it resulted that they preferred the destination because they: come usually here; are interested in natural and cultural heritage; there are suitable places for accommodation and food and need to stay away from noises.

The question “Where do you provided information?” the tourists responded: 54% of them were informed from their previous visits”; 42% of them were informed from accommodation brochures; 58% of them do not get information from travel agents and 68.% were informed from their friends”.

Figure 2: Nationality of tourists
The results showed that the information still was provided much more from friends or previous visits' impressions and few from promoting materials or travel agents.

This shows that the way of being informed was not effective and non-professional in many cases. Being informed from friends is a characteristic of rural areas and such limited information limits also the tourist market remaining thus a casual market.

The average length of stay in the region was 3.7 nights, but visitors who resided with friends/family stayed the longest, averaging 6.3 nights. But the visitors were more satisfied with accommodation and least satisfied with the service in restaurants and shopping facilities in the region. So, it is important to improve the shopping and attractions offer, which can increase the length of stay of visitors, in particular leisure visitors.

Tourists ask for accommodation separated elements as important elements respectively shown above and their responses were about how "important are the prices in the accommodation with the services they offer, they appreciated 25.7% -" moderately important "54.1%" important "and 14.9%" very important."

In relation to "service" in accommodation, tourists found 47.3% "moderately important," 37.8% "important" and 8.1% "very important".

Tourist ask for equipment rooms thought that: 44.6% are moderately important, 27% are important and 23% very important.

Thus, we say that a combination of development of town tourism and tourist villages will help the sustainability of the development of Korca as tourist destination in general. Based on theory arguments of tourism scholars and the characteristics of the area intended for study, let us propose the following hypotheses:

• Hypothesis 1: the higher the interest for the rich nature, the higher the frequency of visits in destination.

For the Hypothesis 1: The higher the interest for the rich nature, the higher the frequency of visits in destination, the following results were found: $\chi^2_{\text{log}}=12.31$, df= 8, $p=0.04$, $\chi^2_{\text{tab}}= 15.5$, $F= 4.88$ for $p < 0.05$. 
So, $\chi^2 \text{ llog} < \chi^2 \text{ tab}$, that is why the Hypothesis 1 was proved. This showed that the rich nature of destination makes tourists come back again resulting in a factor which would increase the frequency of tourists’ visits, making thus possible tourist sustainability from this viewpoint and specifically ecotourism one.

**Table 1: Chi-Square Tests**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
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</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
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<tr>
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<td>15.351</td>
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<td>.053</td>
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<tr>
<td>Linear-by-Linear Association</td>
<td>4.626</td>
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<td>.031</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Hypothesis 2**: the more satisfied tourists during their vacation, the more recommendations will they give to other people about the destination affecting thus its image.

For the Hypothesis 2 – The more satisfied tourists during their vacation, the more recommendations will they give to other people about the destination affecting thus its image, the following results were found: $\chi^2 \text{ llog} = 7.11$, df= 6, $\chi^2 \text{ tab} = 12.59$, F= 5.105; p = 0.02. So, $\chi^2 \text{ llog} < \chi^2 \text{ tab}$, that is why the Hypothesis 2 was proved. This shows that the image of destination created from tourists will be an “advertisement” of the destination to other people.

**Table 2: Chi-Square Tests**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>7.113</td>
<td>6</td>
<td>.010</td>
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</tbody>
</table>
Likelihood Ratio | 9.179 | 6 | .164
Linear-by-Linear Association | 4.818 | 1 | .028
N of Valid Cases | 100

Table 3: ANOVA

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<td>68</td>
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<tr>
<td>Total</td>
<td>19.371</td>
<td>69</td>
<td></td>
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</tbody>
</table>

Conclusions

Tourism marketing will become more effective if it develops a fuller understanding of what influences the tourist’s consumer behavior. This requires an appreciation of the way consumers behave and the way they recognize specific needs for the travel, search for and evaluate information, make purchases and then evaluate what has been consumed as part of the tourism experience. This involves the need to understand some of the approaches to how motivation may function, the roles we adopt as tourist and how sociological changes will affect demand. The understanding of the consumer is enhanced by the incorporation of the different variables into simplified models. Although these need improvement, they act as a guide to current thinking of how tourism demand may function.

As far as tourists’ characteristics are concerned, records about new tourists coming to accommodations need to be kept. Meanwhile, indicators of tourists’ needs and preferences will be in the center of a continuous monitoring, regardless the visitors are new or repeated in destination.
The greatest market visiting the area was the domestic market; therefore the development policies will focus on it, aiming to expand the market of foreign tourists. Tourists who visited repeatedly the destination were considerable in number, which shows that the environmental and cultural sustainability were the main source of this flow. Thus, its retention would require high service quality to tourists.

As tourists frequented the area because of its natural features, the community would be encouraged not only to preserve the natural landscape, but look for opportunities of developing such activities as: riding, mountain-climbing, etc, required from tourists as the area possesses such environmental features.

New forms of tourism such as family tourism, ecotourism, cultural tourism intertwine with each other very naturally. But there is a clear tendency to organize camping for youth groups, which do not require luxurious accommodations but difficult mountainous terrain and adventure. Perceptions of the visitors are associated with eco-tourism product features that provide these rural areas - scenic beauty surrounded by cultural and natural heritage.

The exploitation of the weekends would be very fruitful if package tours offering attractive prices and accommodation for groups of tourists are organized. Tourists who visited repeatedly the destination were considerable in number, which shows that the environmental and cultural sustainability were the main source of this flow. Thus, its retention would require high service quality to tourists.

References

Sustainable Resilience of Company Management System

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Resilience management performance comprise the resilience management processes: building awareness of resilience issue, selection of essential organizational components, selection of organizational operation, identification and prioritization of keystone vulnerability. Management knowledge comprise following elements: Commercial knowledge management, Quality knowledge management, Health and safety knowledge management and Environment knowledge management. The assessment of the overall resilience profile for each organization represents the set of rules to be followed in the assessment procedure. Resilience profiles have been developed to give organizations a visual description of their resilience and indicate areas of strength and weakness.

The Resilience Index is the stability parameter of any system and can be used as the measuring parameter for the assessment of the potential hazard events. In particular, it is of interest to mention that the Resilience Index is the parameter of the system which can be used as the diagnostic tool in the assessment of the potential hazard event of the system. As regards management hazard events can lead to mal function of the company and its destruction.
The catastrophic event prediction is imminent to every complex system and requires the permanent measurement of the indicators fluctuation and evaluation of the resilience index in the time scale. If there are simultaneous changes of the indicators there is a need to have validation of their agglomeration in order to verify those situations which are the potential catastrophic events.

**Keywords:** sustainability, resilience, management system, complex system, resilience index, vulnerability

**Introduction**

The company management system is the structure of the elements which functionality is defined with the respective task to be performed in the system [1]. The company management system comprises management process which includes elements devoted to the specific issues to be used as the main in the definition of the resilience of the management system. In this respect the resilience of management system has to meet specific roles to be achieved by the design of the resilience monitoring system. In essence the resilience monitoring system comprise ability to recognize potential vulnerability of the of the company management system.

The Resilience Management process involves [2]:

- **Element 1:** Building an Awareness of Resilience Issues. The tools used to achieve an increased awareness of resilience issues include the use of semi-formal, open ended interviews, surveys, reporting of observations back to the organizations and brainstorming hazard events using Consequence Scenarios.

- **Element 2:** Selection of Essential Organizational Components. Essential organizational components are those parts of an organization critical to ongoing operations and functions. These components are mapped from an internal and external perspective, including the identification of key stakeholder groups.
• **Element 3**: Selection of Essential Organizational Operation. The organization then assesses each of the selected essential components for criticality to operations (both during the immediate response and recovery periods of a crisis) and preparedness for disaster. Additionally, organizations that want to investigate a specific event, or embark on planning for a specific purpose, can assess the susceptibility of components to that event. Assessments are all completed on a qualitative scale.

• **Element 4**: Identification and Prioritization of Keystone Vulnerabilities. Information from the vulnerability assessments is then plotted onto Vulnerability Matrices that allow the organization to visualize those components that present the greatest threat in a crisis. Matrices are produced from an all-hazards perspective (using only criticality and preparedness information) and from a hazard specific perspective (using criticality, preparedness and susceptibility data).

• **Element 5**: Identification and Prioritization of Keystone Vulnerabilities. The tool used in this part of the process is the Readiness Exercises and Disaster Simulations (REDS). REDS offer a way for organizations to practice and test their crisis preparedness, leadership skills, decision making and communication skills in a time and resource efficient way. Desktop REDS can be completed in a matter of two hours and can be scaled to include only a small group of key decision makers through to the entire organization. They can also extend to include key external partners via a multi-organizational approach.

**Organization of management knowledge**

Management knowledge comprise following elements [3]: Commercial knowledge management, Quality knowledge management, Health and safety knowledge management and Environment knowledge management. Each of these elements are defined with respective criteria and corresponding indicators.
The commercial knowledge is a specific action to be performed in order to reach appropriate commercialization of the product. It includes market assessment, market promotion and product pricing policy. The verification of this knowledge is obtained by the assessment of specific procedure including: unit cost, increase in the sale, and profit. The adaption procedure is the commercial knowledge which is the element of the management knowledge.

The quality knowledge is the methodology for the assessment and validation of the object production. It comprise: reject in, reject out, late delivery and complains. In every production process these knowledge is the verification of the product quality. The quality knowledge is explicit knowledge expressed in numerical form as the measuring parameter the process quality.

The health and safety knowledge management is a collection of the data which are aimed to verify potential injury and long term accidents leading to the degradation of process. This knowledge management is aimed to quantify safety aspect of production process. It is an explicit knowledge expressed in numerical, descriptive, and logical form.

The environmental knowledge management comprises environmental concern of the respective production process. This knowledge is the explicit knowledge presented in the form of logical verification specific procedure. It includes legal concern and citation of the similar events. The environmental knowledge management represents collection of data for the environment assessment.

**Resilience of management system**

The assessment of the overall resilience profile for each organization represents the set of rules to be followed in the assessment procedure [3,4]. Resilience profiles have been developed to give organizations a visual description of their resilience and indicate areas of strength and weakness. In the organization resilience assessment the procedure it is of the primary interest to verify the vulnerability of the company management system and its structure.
Situation awareness is a measure of an organization’s understanding and perception of its entire operating environment. Management of keystone vulnerabilities defines those aspects of an organization, operational and managerial, that have the potential to have significant negative impacts in a crisis situation. The impacts of keystone vulnerabilities may be either instantaneous (occur suddenly and take the failure of only one component to have a significant negative impact) or insidious (small failures of key components lead to a large scale cascading-type failure over time).

Adaptive capacity is a measure of the culture and dynamics of an organization that allow it to make decisions in a timely and appropriate manner both in day-to-day business and also in crises. An organization with heightened resilience is able to quickly identify and respond to those situations that present potentially negative consequences and find solutions to minimize these impacts. Furthermore, resilience enables an organization to see opportunities in even the most.

Figure 1: General Management Structure
Definition of resilience index

Data processing is organized with the appropriate definition of the Sustainability Index. The first step in data processing is the data normalization with the aim to obtain specific indicators to be agglomerated in the Sustainability Index. It is assumed that the Sustainability index \([5, 6, 7]\) is a linear agglomeration function of products between specific indicators and corresponding weighting coefficients, in the form of additive convolution. If it will be adapted that each of the specific indicator is weighted by the respective weighting coefficient. The sum of specific indicator multiplied with the corresponding weight coefficient will lead to the Sustainability Index, \(Q (t)\), with the following mathematical formulation

\[
R = \sum_{0}^{n} w_n \int_{t_0}^{t} (1 - q_n)
\]  

(1)

Where:
- \(w_n\) - weighting coefficient for the n-th specific indicator
- \(q_n\) - n-th criterion for sustainability assessment
- \(n\) – number of indicators.

The evaluation of company management system as the complex system is the prestigious goal of modern approach to the validation of the complex system. In this context it is introduced notion of the Resilience Index as the agglomerated indicator for the measurement management system quality \([8, 9, 10]\). Resilience Index presented on Figure 2 is graphical presentation of the sudden Sustainability index change in time and its recovery to the initial state of the system. The integral value of the Sustainability Index recovery after a sudden change leads to the definition of Resilience Index.

The second step in the data processing is the determination of the resilience index component corresponding to the sudden change of the specific indicators. It is anticipated the total Resiliency Index is the sum of the resiliency index components.
Resilience Index is the variable immanent to the specific potential hazard. This means that Resilience index as the parameter which quantifying the potential probability for the malfunction of the system. Definition of the Resilience Index can be simplified with the assumption that the integral format can be determined as the surface of the triangle formed by the amplitude of sudden change of indicator $\Delta q_i$ and time period $\Delta t_i$, Eq. (2), so that Resilience index is expressed with following mathematical formulation

$$R_j = w_i \sum_{i=0}^{n} \int_{t=t_i}^{t_{i+1}} [1 - q_i(t)] = w_i \sum_{i=0}^{n} \frac{\Delta q_i \Delta t_i}{2}$$

Where: $\Delta q_i$ – indicator change
$\Delta t_i$ – time change
In this definition it is anticipated that there is time independent constant for every indicator. In the processing of resilience index components a following simplification is introduced. The sudden change of the specific indicator from the initial value will be recovered within the time period $\Delta t$. Under the assumption that the sudden indicator change resumes is a linear function of time, then we can write

$$R_j = \frac{1}{2} w_i (\Delta q_i \Delta t)$$

If it is assumed that the time interval for resuming starting state is equal for all indicators than and then the Resilience Index for the individual case is

$$R_j = \frac{\Delta t_0}{2} w_i \Delta q_i$$

The total Resilience Index is an additive function of all resilience Indexes as follows

$$\sum w_n . R_n = R_{TOT} = w_1 R_{CP} + w_2 R_{IC} + w_3 R_{PC} + w_4 R_{MP}$$

Where:  
RTOT – Total resilience index  
RCP – Company Profit  
RCI – Company Income  
RPC – Product Cost  
RMP – Company Manpower  
$w_n$ – weighting factor

The procedure for the determination of the weighting coefficient is based on the ASPID method designed to quantify weighting coefficients under specific constrain defined in the verified for every option.

In the procedure for the determination of weighting coefficients there are several steps, namely:

- Normalization of indicators
- Determination of the average values for the weighting coefficients for the option which meet specific constrain
- Determination of the total resiliency index for every specific constrain
Formation of the Rating list among options under consideration

The graphic presentation for the online processing of the resilience index is given on the Figure 3.

**Figure 3:** Schematic presentation of online processing

**Demonstration of resilience index monitoring**

The monitoring of individual indicators is performed by the respective instrument. It is anticipated that instruments are calibrated to appropriate scale for individual units. Signal processing includes a following operation: instrument calibration, signal digitalization and signal acquisition within the respective time increment and calculation of the resilience indicator.
Following the determination of the resilience index in the appropriate time period reflecting sudden change of the individual period the agglomerated value of the total resilience will be monitored.

**Resilience Options of Management System**

In this demonstration exercise we have taken into a consideration the situations defined as the demonstration with the sudden changes of individual indicators.

Following situations are taken into a consideration:

a. **Change of the company profit**

Among the indicators used for the assessment of the company management is the company profit as the commercial parameter used to measure economic effect of the sudden change of the management system [10,11,12]. The effects of this change can be a warning signal for the company crises. It should be mentioned that if this effect will be added to the potential other sudden changes it may lead the catastrophic event. In this respect it is of interest to emphasize that the potential crisis can be envisaged as the multiple effects of the individual indicators. The indicator for this change of will be expressed in ΔEuro/year per Euro/year in steady production

b. **Change of total income of the company**

The potential change of the total income of the company is a measure of the management achievement [13]. For this reason a sudden change in the total income may be envisaged as the important resilience indicator. It is of particular importance to monitor the sudden change of total income in order to verify eventual critical value of the resilience element resulting
from the change of this indicator. The indicator change for this parameter will be expressed in ΔEuro/year per steady total income of the company.

c. Change of the product cost
On of the important parameters which define the company success is market price of the product. Since, it is immanent to any product the fluctuation of the market price [14]. The change of the price beside fluctuation in small scale is sometime result of the sudden change which leads to the resilience index change. The indicator for the change of the product cost is expressed in ΔEuro/product price per steady product cost in normal operation.

d. Change of the company manpower
One of the social parameter effecting state of the system is manpower availability [15]. For the different reason there is potential manpower strike leading to the production shortage. It depend on the management assessment to what extend the change of the manpower may effect company system. If there is a sudden change manpower indicator the crisis of the system may achieve catastrophic event. Indicator for the change of product cost is expressed in ΔManpower per manpower in steady operation.

• Management resilience cases
In the design of the options under consideration it is introduced assumption that the sudden change of indicators is triggered at the same moment for all indicators. In the design of the Option under consideration it is introduced assumption that the sudden change of indicators is triggered at the same moment for all indicators. Also, the change of indicators are normalised and the maximum change for each of the indicator expressed in normalised value. It is of particular interest for this demonstration to have each object defined as the composition simulations sudden changes of all indicators as shown on Table 1. The Total Resilience Index is determined in following cases:

Case 1: \( CP > IC = PC = MP \)
Case 2: \( IC > CP = PC = MP \)
Case 3: \( PC > IC = CP = MP \)
Case 4: \( MP > CP = IC = PC \)

The results obtained for these cases are shown in Table 2.
Table 1: Option Indicators

<table>
<thead>
<tr>
<th>Option</th>
<th>Company profit CP</th>
<th>Income of company IC</th>
<th>Product cost PC</th>
<th>Company manpower MP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔEuro/y/Euro/y %</td>
<td>ΔEuro/y/Euro/y %</td>
<td>ΔEuro/y/Euro/y %</td>
<td>ΔManpower/Manpower %</td>
</tr>
<tr>
<td>Option 1</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Option 2</td>
<td>10</td>
<td>15</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Option 3</td>
<td>5</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Option 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

Graphical presentation of the cases is presented in the following figures. It is of interest to emphasize individual cases.

- Case 1

![Graphical Presentation of the Priority List for the Case 1](image_url)
Case 1 is devoted with the constrain expressed with the relation:

Case 1: \( CP > IC = PC = MP \)

Result obtained is giving priority to the Option 1 followed by the Option 2, Option 3 and Option 4. It is of interest to notice that even priority is given to the Maximum Company Profit Change the effect of the other indicator changes has proved substantial influence to the finale result. In the case the change of company profit parameter will override the maximum change of company profit the catastrophic event will occur. Even this option represents the changes of other indicators the catastrophic event will not necessary occur.

- **Case 2**

![Figure 6: Graphical Presentation of the Priority List for the Case 2](image)

Case 2 is devoted with the constrain expressed with the relation:

Case 2: \( IC > CP = PC = MP \)

The sudden change of the Income Company indicator has affected the priority list rating so that Option 2 is followed by Options 1, 3 and 4. The maximum change of the Income Company indicator leads to the catastrophic event caused by the overriding of the respective value of the indicator with other indicators having the same value. Resilience Index as
the measure of the stability of the management system and results in the occurrence of the unexpected invents.

- **Case 3**

![Graphical Presentation of the Priority List for the Case 3](image)

**Figure 7:** Graphical Presentation of the Priority List for the Case 3

Case 3 is devoted with the constrain expressed with the relation:  

Case 3: \( PC > IC = CP = MP \)

The Case 3 is defined with the sudden change of the Product Cost. It results in the priority list having Option 3 at the first place and followed by Options 2, 1 and 4. It can be noticed that there is substantial difference in comparison with the Case 2.

- **Case 4**

![Graphical Presentation of the Priority List for the Case 4](image)

**Figure 8:** Graphical Presentation of the Priority List for the Case 4
Case 4 is devoted with the constrain expressed with the relation:

Case 4: \( MP > IC = CP = PC \)

If the sudden change of the Manpower indicator is used as the priority indicator in this Case then the priority list will be: Option 4, Option 3, Option 2 and Option 1. In this case the catastrophic event is with the sudden change of Manpower the priority list is: having negligible difference of the Resilience index. This implies that the Resilience index for Option 4 and Option 3 are the same. Under this condition the management system may have two potential causes for the overriding Maximum change leading to the catastrophic events.

**Table 2: Option Rating List**

<table>
<thead>
<tr>
<th>Options</th>
<th>Resilience Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 2</td>
<td>0.85</td>
</tr>
<tr>
<td>Option 3</td>
<td>0.82</td>
</tr>
<tr>
<td>Option 1</td>
<td>0.78</td>
</tr>
<tr>
<td>Option 4</td>
<td>0.66</td>
</tr>
</tbody>
</table>

The Resilience Index is the stability parameter of any system and can be used as the measuring parameter for the assessment of the potential hazard events. As regards the management system analysis it prove that the most stable case in sudden change of the indicators is the Case 2 when the priority of the indicators is given to the company income.

In particular, it is of interest to mention that the Resilience Index is the parameter of the system which can be used as the diagnostic tool in the assessment of the potential hazard event of the system. As regards management hazard events can lead to mal function of the company and its destruction.
Conclusions

Resilience assessment of management system under specific changes

Resilience engineering is applied in a number of systems in order to justify potential stability limits which may lead to the catastrophic events [16]. It is of interest to use the sudden changes of indicators for the assessment of the resilience index and use this data for the evaluation of the critical state of the management system. In particular there is the potential possibility to quantify eventual catastrophic events and the effect of the individual indicator changes on the behavior of the management system.

The catastrophic event prediction is imminent to every complex system and requires the permanent measurement of the indicators fluctuation and evaluation of the resilience index in the time scale. If there are simultaneous changes of the indicators there is a need to have validation of their agglomeration in order to verify those situations which are the potential catastrophic events. As regards management system it is of the particular interest to notify those events which are characteristic for the crisis of the management system.

References

The Efficiency of the Fiscal Policy in the EU and Its Role in the Economic Recovery by Attracting FDIs

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The deep global recession has focused attention on the need for counter-cyclical macroeconomic policies. The scope for monetary policy was hampered by the credit freeze in the financial system, which was constrained by the accumulation of toxic assets awaiting a resolution to restore confidence and efficient intermediation. While a heated debate has emerged on the specifics, the need for fiscal intervention to support demand proved to be larger and of longer duration than initially envisaged. Further, there is a need to consider lags governing the fiscal policy transmission to decide on the speed of fiscal withdrawal without jeopardizing the recovery efforts. The aim of this paper is to establish some important factors for fiscal policy effectiveness and their role in attracting FDIs in the EU countries for sustaining economic recovery here based on literature review and the EU countries’ experience. Even if the tax regime is not the only factor that determines decisions for foreign investments, reducing tax rates in some new Member States has increased the attractiveness of these countries for foreign investors.

Keywords: FDIs, fiscal policy stimulus, automatic stabilizers, macroeconomic stability
Introduction

The debate surrounding the effectiveness of fiscal policy is two-fold. First is the composition of fiscal stimulus. Choices have to be made between tax incentives and government spending, and the allocation of spending between current spending (extended unemployment benefits and transfers) and capital spending (infrastructure and new projects). Tax changes that improve incentives to work or induce greater private investment, and productive public investment in human capital and infrastructure contribute to productive capacity and improve the economy’s potential output in the long-run. Sustained reductions in sales taxes and unproductive public consumption or measures that further artificially boost private consumption could run the risk of higher inflation and imports, increasing pressures on the current account and the international reserve position. Indeed, even poorly conceived infrastructure spending that generates a low rate of return may not generate sustained economic activity, while interfering with incentives for private activity.

Second is the concern about fiscal space. While fiscal expansion may be necessary to stimulate economic activity, not every country has the resources to finance fiscal stimulus. Some countries do not have enough fiscal space to run countercyclical policy during a recession with limited access to financing from international capital markets, and high concerns about policy credibility and debt sustainability.

The need for fiscal stimulus necessitates a careful evaluation of fiscal space and available financing. Fiscal policy in emerging market countries tends to be pro-cyclical because capital flows and commodity exports drive business cycles in these countries. So, when capital flows dry up and commodity prices plunge, financing an expansionary fiscal policy becomes increasingly difficult. Nonetheless, in response to the global slowdown, a number of emerging markets have announced fiscal stimulus plans to revive economic conditions and assist a speedy recovery.

The issue of affordability has turned attention to available international reserves. Countries with adequate international reserves would be seen as more credible and better positioned to respond with fiscal stimulus, with less concern about crowding out private activity. Reserves
availability would increase the scope for accommodating monetary policy, relaxing domestic financing constraints and reducing the risk of crowding out private activity. Furthermore, reserves adequacy would improve credit rating, reducing the risk premium on external financing. Among countries with abundant international reserves are energy-producing countries that have built cushions during the recent surge in world energy prices. Other emerging countries such as China and Brazil have also accumulated record high international reserves, benefiting from a surge in export prices, robust demand and sustained capital inflows (Kandil and Morsay, 2010).

Countries with a limited pool of international reserves tend to have less scope for fiscal stimulus. In their case, fiscal expansion tends to push up borrowing costs, which reduces the credibility of fiscal expansion as it crowds out private activity and offsets the effectiveness of the stimulus. A number of developing countries have become increasingly resource constrained as they continue to struggle to safeguard international reserves in the face of a surge in the cost of imports, particularly for food and fuel, and mounting external debt service costs, which present severe pressures on their limited foreign resources. Countries that have come into the crisis with excessive fiscal deficits or public debts—or that have current account deficits which can no longer be financed—had little room for maneuver. Likewise, loss of revenues—particularly commodity-related or import-related taxes—may also constrain fiscal space (Debrun and Kapoor, 2010.)

The aim of this paper is to establish some important factors for fiscal policy effectiveness and their role in attracting FDIs in the EU countries for sustaining economic recovery here based on literature review and the EU countries’ experience.

Section 2 focuses on literature review regarding fiscal policy effectiveness and its role in achieving macroeconomic stability; section 3 presents conditions for fiscal policy effectiveness and section 4 focuses on fiscal policy conditions and stimulus in the EU countries and their role in attracting FDIs in this area. Section 5 concludes the paper.
Literature review

A number of studies have considered the cyclicality of fiscal policy, differentiating between emerging and high-income countries. A large empirical literature (Ilzetzki and Vegh (2008)) has found that fiscal policy in developing countries tends to be pro-cyclical, in contrast to high-income countries where it is more often countercyclical. IMF (2009a) suggests that policy has tended to be less countercyclical in emerging market economies with a fixed exchange rate. Hemming et.al (2002) conclude that the appropriate fiscal stance during a downturn will depend on a range of factors, and only a country by country approach, and indeed an episode-by-episode approach, can reveal whether a fiscal expansion or contraction is appropriate. Conditioning factors include the source of the downturn, the response of interest and exchange rates, accompanying policies, debt sustainability, the composition of the fiscal impulse, and influences on private behavior.

Others have focused on the limitations of effectiveness of fiscal policy. Freedman et.al (2009) emphasize that temporary fiscal expansion can be highly effective provided that monetary policy is accommodative, involve multiple-country coordination, and that the right fiscal instruments are used. Similarly, the IMF (2009b), highlights that discretionary fiscal policy can successfully stimulate output if stimulus packages are implemented in a timely manner and without interfering with debt sustainability. Spilimbergo et al. (2008) point that the optimal fiscal package to confront the global crisis should be timely, large, lasting, diversified, contingent, collective, and sustainable.

A third group of studies has focused on structural factors that differentiate the effectiveness of fiscal policy in industrial and emerging market economies. Theory suggests that an expansionary fiscal stance is likely to be more effective in stimulating aggregate demand if the economy is relatively closed, has a pegged exchange rate, substantial spare capacity, a high proportion of credit-constrained households or firms, and a sustainable public debt position. Taking these dimensions into account, conditions in emerging market economies could be less conducive to fiscal policy effectiveness, as supported by the empirical evidence (see, e.g., Ilzetzki and
Vegh (2008) and Freedman and others (2008). Lane (2003) provides evidence that emerging market economies have been structurally more exposed to business cycles, and have coped less well in smoothing the impact of fluctuations. In such case, improving the quality of domestic institutions should take priority to establish a stable macroeconomic environment and enhance the effectiveness of fiscal policy.

Recent developments in macroeconomic modeling and pressing policy challenges have revived the classic debate on the effectiveness of fiscal policy as an instrument of macroeconomic stabilization (van der Ploeg, 2005). On the theory side, the rapid development of micro-founded general equilibrium models with non-Ricardian features has allowed researchers to assess the benefits of fiscal stabilization in a coherent and rigorous analytical framework (Botman et al., 2006). These studies confirm the conventional wisdom that a timely countercyclical response of fiscal policy to demand shocks is likely to deliver appreciably lower output and consumption volatility. However, well-intended fiscal activism can also be undesirable, when shocks are predominantly affecting the supply side or squarely destabilizing, when information, decision and implementation lags unduly lengthen the transmission chain.

On the policy side, a growing number of countries turned to fiscal policy as their primary stabilization instrument either because of changes in their monetary regime (currency board, hard peg, participation in a monetary union) or because financial conditions deteriorated to the point of making monetary policy ineffective (Spilimbergo et al., 2008). Fiscal policy can contribute to macroeconomic stability through three main channels.

The first is the automatic reduction in government saving during downturns and increase during upturns, cushioning shocks to national expenditure. Such automatic stabilization occurs because tax revenues tend to be broadly proportional to national income and expenditure, whereas public spending reflects government commitments independent of the business cycle and entitlement programs specifically designed to support spending during downturns, including unemployment benefits. Also, to the extent that government consumption is less volatile than other components
of GDP, the public sector contributes to output stability through a mere composition effect of domestic expenditure.

Second, governments can deliberately change public spending and tax instruments to offset business cycle fluctuations. Finally, the structure of the tax and transfer system can be designed to maximize economic efficiency and market flexibility, thereby enhancing the resilience of the economy in the face of shocks. The notion of fiscal stabilization pertains to the first two channels.

The public’s demand for government-induced stability reflects a number of factors that may vary over time and across countries, including the inherent resilience of the economy and the existence of alternative stabilizers, such as an effective monetary policy and unrestricted access of individual agents to financial instruments. During the recent crisis, the perceived need for fiscal stabilization has been unquestionably high: the resilience of national economies was impaired by the depth and the global nature of the shock, agents faced either limited access to or high cost of self-insurance through credit markets and financial institutions, and the firepower of monetary policy was constrained by the zero-bound on nominal interest rates. In the short term, the stabilizing role of fiscal policy relies on effective automatic stabilizers and on the capacity of governments to engineer (and credibly phase out) a fiscal stimulus in a timely fashion.

The studies builds on earlier work by Gali (1994, 2003), van den Noord (2002), and Fatás and Mihov (2001, 2003, 2009) investigate directly the cross-country relationship between fiscal policy indicators and output volatility. That approach has the advantage to incorporate various determinants of the stabilizing effect of fiscal policy, including policymakers’ “reaction functions” and the actual impact of fiscal measures on output and private consumption. The resulting, reduced from empirical relations thus provide useful information on the effectiveness of fiscal policy, while avoiding the methodological issues related to the estimation of fiscal “multipliers.”

Indeed, multipliers’ estimates highly sensitive to the identification procedure of exogenous fiscal impulses, the nature of the shock (tax cuts, spending increases), and the behavior of monetary policy (Blanchard and
Existing analyses of fiscal stabilization tend to focus on the role of automatic stabilizers in industrial economies. Many of those draw on the seminal insights of Gali (1994) and revolve around the negative relationship between output volatility and government size, used as a proxy for the cyclical sensitivity of the budget balance. While the literature generally confirms the countercyclical impact of automatic stabilizers, the relationship appears to be a complex one. First, non-linearity seems to exist, suggesting that the adverse effect of high tax rates on an economy’s resilience could more than offset the action of automatic stabilizers. Second, the relationship may be changing over time as structural changes moderating output volatility could be faster in economies with leaner governments. Finally, the relationship does not seem to hold beyond a narrow sample of industrial OECD countries. Debrun et al. (2009) confirm the effectiveness of automatic stabilizers in reducing output volatility.

Literature takes into account the potentially destabilizing impact of fiscal policy, as public finances are used to attain other goals than macroeconomic stability. It underlines the role of potential substitutes to fiscal policy as a macrocyclical insurance mechanism, including financial development, improved monetary policy credibility, and better economic policy governance. These variables may account for the decline in output volatility observed until the recent crisis and may prove important to properly identify the causal relation between automatic stabilizers and volatility (Debrun et al., 2009, and Mohanty and Zampolli, 2009). It investigates the extent to which fiscal policy contribute to lower private consumption volatility, as the latter is more closely related to welfare.

The main results can be summarized as follows. First, automatic stabilizers strongly contribute to output stability regardless of the type of economy (advanced or developing), confirming the effectiveness of timely, predictable and symmetric fiscal impulses in stabilizing output. Second, countries with more volatile cyclical-adjusted budget balances also exhibit more volatile output and private consumption. Third, access of individual consumers to credit appears to exert a stabilizing influence on output and private consumption. A weaker contribution of credit supply to smooth
cyclical fluctuations could thus increase the public’s appetite for fiscal stabilization.

A series of studies in European countries suggests that taxation has a relatively low impact on FDI as a result of reduced influence of taxes on relocation costs (Edmiston, K., Mudd, S., Valev, N., 2003). Other authors show that a high level of corporate income tax discourages FDI inflows even though other factors, including volume and quality of goods and services, would be favorable to attracting foreign direct investments. Thus, further analysis of FDI flows between 7 origin countries of multinational companies (Austria, Germany, France, Italy, Netherlands, UK and USA) and 8 host countries (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovakia, Slovenia and Romania) during 1995-2003, Christian Bellak and Markus Leibrecht concluded that the corporate income tax is a key factor in location decision of foreign companies, having almost equal importance to the labor cost factor. A one percentage point reduction in the effective rate of corporate income tax may lead to a maximum increase FDI inflows by 4.5% (Leibrecht, M., Bellak, C., 2005).

Agnès Bénassy-Quéré, Lionel Fontagné and Amina Lahrèche-Révil studied the sensitivity of FDI from the tax rates for 11 OECD countries over the period 1984-2000 and they concluded that tax rates play a significant role in investment location FDI. Thus, while the reduced tax rate contributes significantly to attracting foreign direct investment, high taxes discourage FDI inflows. On the other hand, the positive impact of differences between at the level of taxation is not the same in all countries that choose to reduce the tax rate to attract foreign capital. FDI flows are directly proportional to the differences existing between the level of taxation in different countries.

Disputes about the importance of corporate taxation on FDI location are lit, especially because many empirical studies regarding the elasticity of FDI to corporate taxation have focused most often on the issue of taxation. These studies ignored the possibility that FDI flows to answer not only at fiscal policies and bilateral agreements between countries origin and host countries but also at tax policies from countries that can provide alternatives for the location of foreign direct investments (Hajkova, D., Nicoletti, G., Vartia L., Kwang-Yeol Yoo, 2006).
If studies which attempted to measure the intensity of the relationship between taxation and the decisions location of foreign direct investments does not give relevant results, it is agreed that the corporate income taxation is a strong determinant of the foreign direct investment financial structure. Thus, the econometric modeling performed by P. Moore and F. Ruane in 1994-2002, showed that an increase of the taxation level of a country with 10 percentage points will generate the increase with 3.4 percentage point in the share of debt in the financial structure of subsidiary corporations in the country. Similar results have arrived and H. Huizinga, Laeven L. and G. Nicodème obtained similar results in 2007, showing that through intra-group loans, an increase with 10 percentage points in the level of taxation in one country will lead to an increase with 2.44 points percentage in the share of debt in the financial structure of subsidiary corporations in the country.

**Conditions for Fiscal Effectiveness**

**Inflation**

The inflationary environment does not affect the neutrality of the fiscal impulse in the long-run. High inflation counters policy credibility and the effectiveness of the fiscal impulse on output growth in the short-run. The implication of the analysis is that output growth declines with expansionary fiscal policy (a reduction in the fiscal impulse) in a high inflationary environment. Fiscal expansion increases inflationary expectations and raises the cost of credit, countering policy credibility and the effectiveness of the stimulus impulse in the short-run. Moreover, in the remainder of the sample (lower inflationary environments), the response of output growth to the first and second lags of the fiscal impulse is negative and significant. The implication is that fiscal policy is effective in low inflationary environments. An expansionary fiscal impulse increases output growth significantly over time. Underlying this evidence is higher policy credibility, reflecting the lower cost of borrowing as government spending is more growth inducing in a low inflationary environment. The expansionary
effects of exchange rate appreciation and broad money growth on output growth are robust in the short-run.

**Debt Burden**

The fiscal impulse has a long lasting negative effect on real growth where the debt burden is high. The implication is that an expansionary fiscal policy (a reduction in the fiscal impulse) has a negative effect on output growth in the long-run in countries with high initial debt levels. Higher spending that is financed by borrowing reduces policy credibility and increases the cost of borrowing and the debt ratio, countering the effectiveness of the stimulus. Rising concerns about the cost of debt service and debt sustainability crowds out private activity with long-lasting negative effects on growth in the long-run. In the short-run, however, the effectiveness of the fiscal impulse does not vary between countries with high versus low debt levels.

**Exchange Rate System**

The effectiveness of the fiscal impulse does not vary with the exchange rate system in the short- and long-run. The “conventional wisdom” is becoming that the response of exchange rate to fiscal expansion is crucial to evaluate multipliers. The results of the empirical analyses in the literature suggest that the effectiveness of the fiscal impulse on real growth is not altered by the exchange rate system. In contrast to theory’s expectations, countries with a fixed exchange rate system do not seem to enhance the effectiveness of their fiscal policy. One explanation relates to the previous results demonstrating the negative effect of higher inflation on the effectiveness of fiscal policy. While a fixed exchange rate system forestalls a nominal appreciation in the face of expansionary fiscal policy, the resulting inflation would have a counter effect on competitiveness through its impact on the real exchange rate. The results also indicate that for fiscal stimulus to be effective under a fixed exchange rate system, the authorities would need to curb inflation and preserve competitiveness.
Openness

The effectiveness of the fiscal impulse in the short- and long-run does not vary with the degree of openness. The effectiveness of fiscal policy does not vary significantly in a more open economy. While more openness increases demand for imports and dampens the effectiveness of fiscal policy, higher quality government spending that targets capacity constraints and structural bottlenecks may stimulate exports. As both channels work in opposite directions on real growth, the evidence does not appear to be conclusive regarding significant variation in the effectiveness of the fiscal stimulus with the degree of openness.

Fiscal stimulus and FDI attraction into the EU countries

The role of taxation in attracting direct foreign investments in integrated economies has been somewhat neglected in European literature until it was found that the relaxed fiscal policy adopted by the Irish authorities after joining the European Economic Community created in a short time, the attraction of a substantial amount of foreign investment and a significant increase in prosperity compared with other countries (Greece, Portugal and Spain) which, upon accession, recorded a similar level of economic development.

Even if the representatives of the governments that reformed their corporate income tax systems (tax reduction) often assert that the major inflow of FDI in their countries is largely determined by the existence of a relaxed tax environment, there are controversies on the evaluation of the impact of taxation on FDI location, of scientific. It is clear that the level of taxation incentives the corporations to use different mechanisms (usually financial funds transfer) to move a portion of the tax base from one country to another.

According to information provided by UNCTAD, the European Union is the largest foreign investor in the world. Despite the growing importance of emerging economies in the world as recipients for companies with foreign capital, the European Union also remains the largest recipient
of foreign direct investment. Currently, in the European Union, the foreign direct investment stock is still largely concentrated in the first 15 members because they offer investors access to a developed market, strong industrial base, modern infrastructure and skilled labor. However, the strong growth of FDI flows are observed in the new Member States that have proved particularly attractive to foreign investors due to their geographical location and the relative cost advantages.

In Figure 1 we can observe significant differences between the flows of FDI as a % of GDP in developed countries of the EU and the flows of FDI as % of GDP in new EU Member States in the period up to the international economic crisis. Since 2007, these differences tend to diminish as a result of significant reduction in FDI flows in the new Member States, and in 2009 the differences in the flows of FDI as % of GDP almost disappeared.

![Figure 1: Evolution of FDI flows as % of GDP in developed countries of EU and new EU Member States during 2005-2009](source: UNCTAD, World Investment Report, 2009)

FDI flows between Member States have a particular importance for the EU economy. These flows generated the creation of about 15% of existing jobs in the EU, representing a powerful driver of European productivity and economic integration. The situation of FDI flows between
European Union countries shows considerable variations of these flows from year to year depending on economic opportunities. During the period 2007-2009, we observe a trend of disinvestment (affecting in particular the new Member States) since the corporations focus more on activities in the markets where they are already operating, in recession.

In the current international economic context (new Member States are no longer able to support the dynamic of the investment activity in the single market), European Union must find ways to attract foreign direct investment from non Member States. Even without the recession, the adoption of some measures to stimulate foreign direct investments within the European Union became imperative in view of the following aspects (Matei and Pirvu, 2010):

- new EU Member States, which succeed to attract a significant volume of foreign direct investment because of its benefits (the low cost of production factors, facilities in connection with the access to capital, tax incentives, etc.), would gradually lose its attractiveness, with economic and social development;
- many countries situated near European Union (Russia, Ukraine, etc.) promote an active policy of attracting FDI, constituting an attractive location for investments in search of resources or markets.

The evolution of percentage changes in FDI inflows in one year to another in worldwide, in the European Union and in transition countries demonstrates the increased potential to attract foreign direct investments of EU neighboring countries.

In the years 2007-2009, we observe a growth rate of FDI inflows in the European Union much lower than in the transition countries and sometimes even lower than in worldwide. Therefore, the improvement of fiscal conditions for multinational companies operating in the EU is necessary if we consider the European Commission’s objective to improve the internal market efficiency, so as this market to become more competitive in the future.

The reduction of corporate income tax rates is a frequently practice in the new Member States that have been forced to adopt this measure to keep their economies attractive, in the context of the abolition’ tax benefits
for foreign investors. Thus, in Poland the corporate income tax statutory level fell from 27% in 2003 to 19% in 2010, in Romania from 25% in 2003 to 16% in 2010, in Bulgaria from 23.5% in 2003 to 10% in 2010 (Matei and Pirvu, 2010).

These fiscal policy have received a similar response from the old Member States. The study "Taxation Trends in the European Union" in 2010 shows the average corporate income tax fell from 35.3% in 1995 to 23.2% in 2010 in European Union member states and from 37.5% in 1995 to 25.7% in 2010 in the Euro-zone Member States. In recent years, the most significant reductions were achieved by Germany (8.9 percentage points in 2008 compared to 2007), Italy (5.9 percentage points in 2008 compared to 2007) and Netherlands (4.1 percentage points 2007 compared to 2006). In the 27 European Union countries, the reduction of statutory corporate income tax rates of was accompanied by a reduction in revenue from those taxes expressed as a percentage of GDP in 2001-2004, followed by a revival of their in the context of some high growth rates recorded in 2005-2007 and a new decline in the context of international economic crisis (Figure 2).

In connection with the corporate income taxes as % of total taxes, we observe the same trend of dynamics and a greater difference between the corporate income taxes as % of total taxes in Euro-zone Member States and the corporate income taxes as % of total taxes in the 27 Member States (Figure 3).
As a general trend in 1999-2008, we noted an increase in corporate income tax receipts. This has been determined by the expansion of the business tax base by eliminating tax deductions and provisions, on the one hand, and rising corporate profitability, on the other part.

The corporate tax rates applied (CIT) vary significantly in the new EU member states. The lowest rate for the CIT in CEE region is 10 percent in Bulgaria, followed by the Latvia and Lithuania with 15 percent and, than, Romania with 16%. On the other hand are CEE countries with 19% CIT (Czech Republic, Slovakia, Poland), 20% (Slovenia), 20,6% (Hungary) and the highest CIT is in Estonia (21%). Romania, Bulgaria, Hungary, The large differences in rates in this group of countries may reflect in part the timing of the reforms. The Baltic countries applied the flat tax in a period of tight fiscal constraints in the mid-1990, and the danger of having a drop in revenues pushed the authorities toward higher rates. On the other hand, the countries which introduced the reforms from 2004 onward, enjoyed higher rates of economic growth and better fiscal balances at the time of implementation (Lane and Varoudakis, 2007).
The Efficiency of the Fiscal Policy in the EU and Its Role in the Economic Recovery by Attracting FDIs

In most European Union member countries a high level of the effective investment tax rate is accompanied by a low level of FDI inflows as % of GDP and vice versa. In 2005, Estonia has succeed to attract the largest stream of FDI inflows as % of GDP, practicing an effective tax rate on investment of 21.1% (higher than those in Romania, Bulgaria, Cyprus and Poland in the same period). The highest effective tax rate of investment observed in Spain (36.5%) was correlated with low levels of FDI inflows as % of GDP (2.21%).

In 2006, the countries with effective tax rate of investments was reduced (Bulgaria, Romania, Slovenia, Estonia) have achieved a level of FDI inflows to GDP also raised. This correlation is however not valid in all situations. For example, in Poland and Ireland, the low level of taxation on investment was not accompanied by a significant inflow of foreign direct investments.

In 2007, Bulgaria was in the top of countries that attracted the most foreign direct investments (29.6%), practicing the lowest effective tax rate on investment (8.8%). States where the tax rate on investment was high (Italy, Germany, France) attracted a small volume of direct foreign investments (to GDP). However, in Belgium and the Netherlands have

Source: UNCTAD, World Investment Report, 2009

Figure 3: Evolution of the average corporate income tax as % of total taxes
recorded inflows of foreign direct investments more than the EU average, even where there is a high rate of taxation on investment. In these countries there is, however, a special tax regime for holding companies.

Therefore, the statistical evidence on foreign direct investment inflows and the taxation of investments in European Union countries cannot provide us clear results regarding the effects of taxation on FDI location, because there are exceptions to the rule of inverse correlation between the two factors. It is clear that during the period studied, the tax rate level diagram deforms more and more for the effective investment tax rate series, providing evidence of the existence of an EU tax competition. In most cases there is a positive correlation between tax rates and location of FDI in the EU.

**Conclusions**

During expansions, government spending increases relative to budgetary revenues, providing additional fiscal stimulus that may increase the risk of overheating, absent efforts to target government spending towards relaxing capacity constraints and structural bottlenecks. During contractions, government spending shrinks in response to inadequate budgetary resources, further exacerbating economic downturns and hampering recovery efforts.

The scope of counter-cyclical policies increases where international reserves are adequate. Indeed, where international reserves coverage exceeds three months of imports, the fiscal impulse can be counter-cyclical, indicating more fiscal efforts to stabilize the cycles. Reserves availability increases policy credibility as it relaxes financing constraints, increasing the possibility to implement a fiscal stimulus during downturns, without the risk of depleting limited reserves and jeopardizing external stability. In contrast, the degree of openness of the economy, rate of inflation, the debt ratio, or the exchange rate system do not appear to limit or support the pro-cyclical stance of fiscal policy. While fiscal space increases with reserves availability, other factors appear less relevant.

Reserves availability increases credibility and the effectiveness of fiscal policy. Fiscal policy is neutral in the long-run, indicating no significant
effect of the fiscal impulse on capacity building. However, in the short run, where reserves are less than three months of imports, fiscal expansion tends to increase the cost of borrowing and debt service, crowding out private activity with a negative net effect on output growth. If international reserves are adequate; resource availability increases policy credibility and mitigates these concerns about fiscal expansion, which enhances the effectiveness of the fiscal stimulus on output growth in the short-run (Kandil and Morsay, 2010).

High inflation decreases policy credibility and counters the effectiveness of fiscal stimulus in the short-run. Where inflation exceeds ten percent, expansionary fiscal policy further crowds out private activity with more pronounced contraction in real growth. Higher fiscal spending in a high inflationary environment increases inflationary expectations and the cost of borrowing, hampering policy credibility and the short-run effectiveness of the fiscal stimulus.

Fiscal expansion has a long-lasting negative effect on real growth where the debt burden is high. Mounting debt burden relative to GDP decreases policy credibility and increases concerns about debt sustainability and debt service obligations. Accordingly, persistent fiscal expansion under these circumstances crowds out private resources and decreases incentives for private activity, with negative effects on real growth in the long-run.

The evidence reaffirms concerns about policy credibility and the effectiveness of the fiscal stimulus where international reserves are not adequate. While fiscal spending should be prioritized to increase growth and limit inflationary pressures, the effectiveness of the fiscal stimulus depends on the perceived credibility and the availability of resources to finance private activity while ensuring debt sustainability. Countries that have accumulated a cushion of international reserves are in a more comfortable position to adopt the necessary stimulus to weather external shocks and counter the effects of the global slowdown on domestic activity. In contrast, where reserves availability appears to be critical, limited options are available for credible fiscal stimulus, including mobilizing additional revenues or prioritizing spending and/or securing affordable financing. Constraints on these options, amidst concerns about mounting debt burden and increased external vulnerability, may necessitate, however, limited
scope for credible and effective counter-cyclical fiscal policy (Debrun and Kapoor, 2010).

Outside fiscal policy, financial development seems to exert a moderating influence on income and, even more so, on consumption growth, but robustness analysis indicates that it may proxy the role of other country-specific features not included in our analysis. As regards monetary policy, central bank independence is associated with lower volatility, provided that the interaction between monetary and fiscal policies is taken into account.

That said, an exclusive reliance on automatic stabilizers as the channel of fiscal stabilization has limits and potential drawback. Given the difficulty to design effective fiscal stimulus plans and the incomplete credibility of subsequent consolidations, automatic adjustments in selected tax rates or expenditure programs could be envisaged (Baunsgaard and Symansky, 2009).

Looking forward, further research will need to address a number of pending issues. First, it has to be explored more systematically the apparently strong impact of monetary-fiscal conflicts on macroeconomic volatility, as this could have important implications for the design of macro-fiscal frameworks. In particular, alternative measures of the quality of monetary policy should be envisaged. Second, it should be considered the impact of expenditure and revenue composition on the size of fiscal stabilizers, possibly introducing measurement errors. Third, and related, more work is needed to improve measures of automatic stabilizers—particularly to have a better grasp of the role of expenditure composition—and of fiscal discretion.

In the European Union, the tax competition could come in the next period, a phenomenon with implications more important because the movement of production factors, especially capital, will become much easier on the global market. Under these conditions, dissensions between European countries will increase, increasing controversies about the limits of national sovereignty in the field of direct taxation and especially corporate income taxes.

Even if the tax regime is not the only factor that determines decisions for the relocation of foreign capital, reducing corporate tax rates
in some new Member States has increased the attractiveness of these countries for foreign investors. In these circumstances, the countries of Western Europe announced (and implemented) significant reductions in their rates, accusing the new-states have initiated a fiscal competition with adverse consequences in long-term. There is little evidence that the good economic performance of new EU states after the reform until the crisis period was due to the taxes themselves: this could be attributed to wider macroeconomic recovery, FDIs inflows, better tax compliance and tax administration as a consequence of EU membership requirements. But, in the field of direct taxation a certain degree of tax competition is not only inevitable but also desirable, if it take the form of a fair tax competition.

This stimulates the Governments to provide the best possible conditions for business at a certain level of taxation. Member States' efforts should focus on combating harmful tax competition that generates attracting corporate tax bases and hijacking capital flows.

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How Much Control Does the Central Bank of Iran over Money Supply?

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In discussions about the efficacy of monetary policy instruments, attention is often focused on analyzing the money supply process. Monetarists, in general, argue that the monetary authorities can exercise effective control over the stock of money; others, especially those who share the new view of monetary theory argue that the determination of the stock of money is part of the economy. In this view, the stock of money is the outgrowth of the behavior of the public, the financial sector (banks), the finance ministry, and the rest of the world as well as of the actions of the central bank. The paper investigated the co-integrating property and stability of the supply of money function in Iran. The paper employed the ARDL approach together with CUSUM and CUSUMSQ tests. The results show that $M_1$ and $M_2$ is co-integrated with net claims on the government, net foreign assets, and rate of profit on bank deposit (interest rate and a major implication of using interest rate elasticity estimates from $M_2$ function is that money is endogenous.

Keywords: money supply, monetary policy, money multiplier, central bank, ARDL, financial sector
Introduction

The strategy of monetary targeting, as pursued by the Central Bank, relies on two basic assumptions. One, the targeted monetary aggregate has to be a stable function of a few indicators (GDP, interest rate, etc.). This condition is commonly referred to as the necessary stability of money demand. Two, the money supply has to be controllable by the monetary authorities. Otherwise unpredicted changes in the growth rate of the money multiplier can jeopardize the usefulness and success of monetary targeting.

As far as the first condition is concerned, in recent years several studies confirmed the existence of a stable Iran money demand function with adequate statistical properties. With regard to controllability, far less studies have been presented, however, the Central Bank had documented difficulties in meeting its growth targets for the observed broad aggregate M2. In this study we focus on the problems of controlling the latter during the unstable monetary period of after revolution.

Having determined the most appropriate definition of money and its relation to the price level, monetary authority must understand how its behavior is determined in order, to control it (if possible) in a way consistent with price and other policy objectives. This is a non-trivial undertaking, as a central bank’s activities influence but do not directly determine money’s behavior. Therefore The purpose of this paper is to investigate the nature of the money supply process in light of the debate over the concept of exogenous and endogenous money supply to provide a detailed picture of the controllability of Iranian money supply under the reign of the Central Bank from the beginning of its monetary targeting period in 1968 until 2007.

This paper is organized as follows. In Section II we outline the conventional money multiplier model and permit the multiplier to depend upon some relevant macro-economic variables. Section III is a brief literature review. Section IV discusses the methodology used to test the nature of the relationship and develops a autoregressive distributed lag (ARDL) approach to examine the stability of the money and using Iranian monetary data for the period March 1968 to March 2008. Section V examines the analytical case for money instability and undertakes a ARDL
empirically identify the determinants of factors affecting money supply and the multipliers so as to identify the determinants of alternative multipliers. Section VI concludes the paper.

Theoretical and formulation of supply for money in Iran

A simplified money-multiplier approach

The multiplier model of the money supply, originally developed by Karl Brunner (1961) and Brunner and Meltzer (1964), has become the standard paradigm in macroeconomics and money and banking textbooks to explain how the policy actions of the Federal Reserve influence the money stock. It also has been used in empirical analyses of money stock control and the impact of monetary policy actions on other economic variables (Garfunkel and Thornton, 1991).

The stock of money can be determined within the money multiplier approach under two alternative assumptions. The first assumes stability of the money-multiplier (M = m. MB); the second, allows for variation in the money-multiplier and its component ratio, which we elaborate below (M = m ( ).MB). The implication of the first assumption is that variations in the stock of money are explained by the variations in monetary base. The latter assumption implies that both the money-multiplier and monetary base have a role to play in variations in the stock of money. "The modified equation implies that the money-multiplier (m) is a function of certain endogenous variables (which are to be specified in the empty parenthesis: after m). It has the merit of segregating policy variables affecting monetary base and determinants of money multiplier. It incorporates a behavioral element in the theory of money supply (Mithani, D. M., 1993).

In the orthodox theories of money and monetary policy quantity of money is determined exogenously by the central bank. According to the portfolio approach of monetarists, money can appear as the result of the injection of some high-powered money by the central bank and the intention of economic units (usually households) to modify their asset portfolios.
Quantifying the relationship between movements in the monetary base and money supply requires first identifying each of the two variables. The base money is then related to a broader money stock with the well-known credit multiplier:

\[ M = MB \cdot \frac{1}{c} + (1 - c) \cdot \text{res} \]  

(1)

where MB is the monetary base, res is the reserve ratio, that is, the ratio of bank reserves (BR) to total demand plus time deposits, c is the cash to money ratio, and M is the monetary aggregate containing cash in circulation and bank loans. Monetarists proved that the credit multiplier shows historical stability: modifying high-powered money generates proportional changes in the money stock. This is the rationale for the assumption that the quantity of money can be and is determined exogenously by the central bank.

Two monetary aggregates for Iran, M1 and M2, are used, where M1 consists of currency held by the non-bank public (C) plus demand deposits kept with the banks (D), and M2 is M1 plus time deposits (T).

By definition the total money stock is equal to the monetary base times the money-multiplier. That is

\[ M1 = k1.MB \]  

(2)

\[ M2 = k2.MB \]  

(3)

or \[ k1 = M1/MB \]  

(4)

\[ k2 = M2/MB \]  

(5)

We rewrite equation (4) and (5) as:

\[ 1 \frac{1}{k1} = \frac{cml - (r1.cml) + r1}{cml + (1 - cml) \cdot r1} \]  

(6)

\[ 1 \frac{1}{k2} = \frac{cm2 - (r2.cm2) + r2}{cm2 + (1 - cm2) \cdot r2} \]  

(7)

where \( cml = C/M1, cm2 = C/M2, r1 = BR/D, r2 = BR/(DD+T) \)

This gives us the money multiplier in terms of cml, r1 for k1 and in terms of cm2, r2 for K2. The monetarist argument is based on the postulates that the central banks control their monetary liabilities and that the changes in monetary base derived from these monetary liabilities induce predictable changes in money supply, given the money multiplier.
From equation (6) and (7) we can see that the money multiplier depends on the currency-money (cm = C/M) ratio and reserve requirement (r = RR/D). The assumed stability of the money multiplier implies that the cm ratio and the r ratio are stable. The r ratio is a policy variable subject to the central bank control, while the cm ratio is a behavioral variable. The application of the r ratio varies among different countries and, in some countries; it is not used as an active policy tool. It is reasonable to assume that the r ratio is stable and that it has no major impact on the observed changes in the money multiplier. Theoretically, therefore, the cm ratio would be the major behavioral determinant of the money multiplier.

The emphasis on the cm ratio in the money supply determination process, and its determinants can be seen for example, by Khatkhate, Galbis and Villanueva(1974), and Been stock(1989) works:

This ratio (currency-money ratio) is negatively related to the opportunity cost of holding currency as measured by the domestic Interest rate. It is also negatively related to income, since Individuals and corporations tend to become more efficient in their cash management as their income rises (Khatkhate, Galbis and Villanueva, 1974, pp.43, 44).

In this study the desired currency to money ratio(C/M) is assumed to a function of interest rate (rate of profit) on bank deposits and income (we will examine both of real and nominal income).

\[
(C/M) = a_0 + a_1Y - a_2RP \tag{8}
\]

Where Y can be Yr : real income or Yn: nominal income, and RP is rate of profit on bank deposit (interest rate).

Implicit in equation (8) are the assumptions that the public holds less currency in favor of saving and time deposits, C/M bring down the C/M ratio, as income increases, and that the interest rate on deposits influences the portfolio composition of total money (broadly defined).

Since it is assumed that it will take some time for the public to adjust the currency to money ratio to a desired level, it is postulated that a change in the ratio in a given period is a fraction of the gap between the “desired” ratio and the actual ratio in the previous period. As a result, with
use of a partial adjustment framework we get the currency to money ratio equation as:

\[
(C/M)_{t} - (C/M)_{t-1} = \delta \left[ (C/M)_{t} - (C/M)_{t-1} \right] \tag{9}
\]

\[
(C/M)_{t} = \delta.a_0 - (\delta.a_1).Y - (\delta.a_2).RP + (I- \delta) (C/M)_{t-1} \tag{10}
\]

Where \(0 < \delta < 1\)

The origin of any money supply process investigation is the relationship of the (adjusted) monetary base and the money multiplier. The (whole) monetary base or source base can be divided into two parts. One part is supposed to be exogenous, i.e. it is directly controllable by the monetary authorities. The other part is supposed to be partly or fully endogenous, i.e. the central bank cannot exert direct and/or full control over this part of the monetary base. Typically two types of reserves are recognized i.e.,

\[
R = \text{Required Reserves (RR)} + \text{Excess Reserves (ER)} = kD + ER \quad (11)
\]

Where \(ER/D = \phi (r \text{ mkt})\) \(\tag{12}\)

Where \(\phi\) is a decreasing function of the market rate of interest \((r \text{ mkt})\) i.e., \(d\phi /dr\text{mkt} = \phi'(r \text{ mkt}) < 0\). The rationale for this assumption is that banks may want to hold excess reserves beyond the required level so that unexpected demands on them for cash payments to other banks can be facilitated without allowing total reserves to fall below the required minimum. However, these excess reserves are costly to hold as they earn no interest, and by reducing such reserves, a bank would be able to increase the investment on which it earns interest. Consequently, the opportunity cost of holding excess reserves can be represented by interest rates \((r \text{ mkt})\). The higher the \(r \text{ mkt}\), the less will be the excess reserves held. Equation (11) and (12) together yield;

\[
R/D = k + \phi (r \text{ mkt}) \quad (13)
\]

Since \(\phi(2)(r \text{ mkt}) < 0\), reserve deposit ratio will be smaller, for a given value of statutorily determined \(k\), the higher the rate of interest \((r \text{ mkt})\).

Over period of several years money’s behavior is almost always overwhelmingly dominated by the monetary base. The supply of free
high-powered money (monetary base), MB, is defined as the sum of the central banks claims on the commercial banks (BCC) its net claims on the government(NGBC), and net foreign assets(NFA); MB = BCC +NGBC + NFA. The monetary base, in turn, invariably dominated by the net foreign assets and/or the government’s debts to central bank. Therefore we can examine relationship between MB, NGBC and NFA, MB = f (NGBC, NFA) with equation (14):

\[
MB = f (NGBC, NFA , RP )
\]

(14)

Using the expression for money multiplier given in equations (6) and (7), the basic equation for the money multiplier approach can be written for M1 and M2 as:

\[
1 = \frac{MB}{cml + (1 - cml) \cdot r1}
\]

(15)

\[
1 = \frac{MB}{CM2+ (1 - cm2) \cdot r2}
\]

(16)

Finally, using the equations (10),(14) we shall estimate two model for money supply(M1 and M2), where the models are defined as follows: Model (1); consist of two behavioral equations, which are expressed in log linear form:

Model (1) for M1:
\[
LM1 = f (LRP, NFA, NGBC)
\]

(17)

Model (1) for M2:
\[
LM2 = f (LRP, NFA, NGBC)
\]

(18)

Review of literature

Early theories of money supply developed a mechanistic approach that did not allow for the possibility of ratios being behavioral functions of economic variables (such as the studies by Friedman and Schwartz (1963), and Phillip Cagan (1956)). This stage of the theory's development is evocative of early quantity theory and Keynesian multiplier analysis. There is now considerable evidence showing that the supply of money can be expressed as a function of a few variables (Miegs (1962), Hendeshoot and
Deleeuw (1970). Basically, these functions are two types: Brunner (1961) and Brunner and Meltzer (1963) consider money supply as a function of the monetary base, currency-deposit ratio, and reserve-deposit ratio. They contend that, with the monetary base given, the current rate of interest can have very little effect on the supply of money. In contrast, Teigen (1964), Goldefeld (1966), Smith (1967), Modigliani, Rasche, and Cooper (1970), and Bhattacharya (1974) attach importance to the interest rate. Baghestani and Mott (1997) have argued that the notion of an endogenous money multiplier leads to a better understanding of monetary impacts on the economy.

One of the first studies using time-series models to analyze the money multiplier was undertaken by Bomhoff (1977). He used the time-series technique for the United States and the Netherlands. Büttler et al. (1979) and Fratianni and Nabli (1979) also used this technique to forecast the money multiplier in Switzerland and in seven EEC countries respectively. Johannes and Rasche ((1971), (1981)) extended the time series approach to predict money multiplier by using a ‘component’ approach.

They claimed that the predictive performance of this disaggregated model was superior to the aggregate model. At the aggregated level Johannes and Rasche (1987) attempted to forecast the multiplier with the help of ARIMA modeling techniques at the aggregate level. When Hafer and Hein (1984) tested this claim, they found that the gain in terms of forecast accuracy from the component procedure was not significant, also Haffer and Hein (1998) find that the aggregate model yields quite accurate out of sample forecasts even when compared with a components approach, Siddique and Ahmad (1994) developed different models for the projection of the money multiplier and Gauger and Black (1991) identify multiplier movements as a major source of volatility of aggregates but do not analyze factors causing such multiplier movements.

The implications of the Post Keynesian position for both macroeconomic theory and policy are fundamental. At the theoretical level, the Post Keynesian position implies rejection of all models of macroeconomic activity new classical, neoclassical, Keynesian, as well as traditional monetarist-that assign major independent influence to the behavior of the money supply. In terms of policy analysis, it suggests that central bank interventions to control the growth rate of money and credit
How Much Control Does the Central Bank of Iran over Money Supply?

Theoretical literature has convincingly put forward arguments in favor of money endogeneity. To support this theoretical argument, the empirical literature on the endogeneity of money has vehemently demonstrated that money supply is endogenously determined for various economies. However, all these studies exclusively encompass developed and middle-income economies. Lavoie (2005), Shanmugam et al. (2003), Nell (2001), Vera (2001), and Pollin (1991) have presented a time series analysis to test the money endogeneity hypothesis for the case of Canada, and USA, Malaysia, South Africa, Spain, and US respectively. Marcelin W. Diagne (2010), Chor F. Tang (2009) and Tuck C (2007). Tang also empirically reinvestigates the long-run money demand function and its stability.

**Methodology**

**Monetary and Credit Policies of Iran**

Monetary policy in Iran, as in most developing countries, is not as effective and efficient as in developed economies because of the absence of a well-developed financial network and limited monetization of the economy. To clarify the exposition, monetary policy of Iran can be divided into two distinct periods:

- monetary policy during 1962-1973, when Iran faced a severe scarcity of foreign exchange;
- monetary policy during 1973-1978, a period of relative abundance of foreign exchange;
- monetary policy after revolution and war, the Islamic Republic’s monetary and credit policy since the revolution has been virtually dictated by the public sector’s financial requirements.

The monetary authorities’ obligation to finance annual budget deficits, and their statutory mandate to preserve the value of the Iranian rial, have overshadowed all other considerations. Bank Markazi has almost obsequiously lent money to the central government each year to meet its expenses, and has enjoined the banking system from unauthorized credit issuance.
expansion. Faced with these constraints, the thrust of monetary policy in Iran has been to minimize the multiplier effect of growth in the monetary base. To this end, the Bank Markazi has relied on two key policy instruments:

- those that alter the cost of using funds, i.e., rediscount and interest rates
- those that directly regulate the supply of money, i.e., reserve requirements and credit ceilings

![Graphical presentation of NFA, NGB, BM, M2 and k2 in Iran](image)

**Figure 1:** A graphical presentation of NFA, NGB, BM, M2 and k2 in Iran
ARDL approach

Various factors are considered as determinants of the money supply function. The general agreement in the literature a money supply studies is assumed that the money supply function takes the following form:

$$\text{Ln}\text{M}_t = \alpha_0 + \alpha_1 \text{RP}_t + \alpha_2 \log \text{NFA}_t + \alpha_3 \log \text{NGBC}_t + u_t$$  \hspace{1cm} (19)

Where NGBC is net claims on the government, NFA = net foreign asset, RP is rate of profit on bank deposit (interest rate).

In applying the co-integration technique, we need to determine the order of co-integration of each variable. However, as noted in the literature, depending on the power of the unit root tests, different tests yield different results. In view of this problem, Pesaran and Shin (1995) and Perasan et al. (2001) introduce a new method of testing for co-integration. The approach known as the autoregressive distributed lag (ARDL) approach. This method has the advantage of avoiding the classification of variables into I (1) or I (0) and unlike standard co-integration tests, there is no need for unit root pre-testing. However, the ARDL approach is very suitable to our formulation of the demand for money because we may have a stationary variable such as inflation rate along with non-stationary variables such as money or income.

The error correction version of ARDL model pertaining to the variables in Eq. (19) is as follows:

$$\Delta \log \text{M}_t = \alpha_0 + \sum \alpha_1 \Delta \log \text{M}_{t-1} + \sum \alpha_2 \Delta \text{RF}_t + \sum \alpha_3 \Delta \text{NFA}_t + \sum \alpha_4 \Delta \log \text{NGBC}_{t-1} + \gamma_1 \log \text{M}_{t-1} + \gamma_2 \text{RF}_{t-1} + \gamma_3 \log \text{NFA}_{t-1} + \gamma_4 \log \text{NGBC}_{t-1} + u_t$$  \hspace{1cm} (20)

The null of no co-integration defined by \( H_0 : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0 \) is tested against the alternative of \( H_1 : \gamma_1 \neq 0, \gamma_2 \neq 0, \gamma_3 \neq 0, \gamma_4 \neq 0 \), by means of familiar F-test. However, the asymptotic distribution of this F-statistic is non-standard irrespective of whether the variables are I (o) or I(1). Pesaran et al. (2001) have tabulated two sets of that they are all I (o). This provides a band covering all possible classifications of the variables into I(1) and I(0) or even fractionally integrated. If the calculated F-statistic lies above the upper level of the band, the null is rejected, indicating co-integration. If the calculated F-statistic falls below the lower level of the band, the null cannot be rejected, supporting lack of co-integration.

If, however, it falls within the band, the result is inconclusive.
Empirical results

The paper used data from CBI, Central Bank of Iran, over the period 1968–2007 to test the null of no co-integration against the alternative hypothesis. For this section, the Microfit (version 4) statistical software by Pesaran and Pesaran (2003) was used for all the computations of ARDL approach for co-integration (Pesaran et al., 2001) and error correction model estimates. We employ Akaike’s information criterion (AIC) in selecting the lag length on each first differenced variable and Eq. 20 is estimated for M1 and M2 monetary aggregate and the results are reported in Tables 1, 2. In this stage, considering that monetary aggregates (M1 and M2), net claims on the government, net foreign assets, and rate of profit on bank deposit (interest rate) are co-integrated, the error correction model Eq. 20 is estimated. The main aim here is to capture the short-run dynamics. Table1, reports the coefficient estimates of all lagged first differenced variables in the ARDL model (short-run co-efficient estimates).

Not much interpretation could be attached to the short-run coefficients. All they show the dynamic adjustment of all variable.

Table 1: Short-run coefficient estimates

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM2(-1)</td>
<td>.96751</td>
<td>.01119</td>
<td>86.4552 [.000]</td>
</tr>
<tr>
<td>NFA</td>
<td>.2173E-5</td>
<td>.8342E-6</td>
<td>2.6052 [.014]</td>
</tr>
<tr>
<td>NFA(-1)</td>
<td>-.2583E-5</td>
<td>.1172E-5</td>
<td>-2.2040 [.035]</td>
</tr>
<tr>
<td>NGB</td>
<td>-.1522E-5</td>
<td>.9221E-6</td>
<td>-1.6510 [.109]</td>
</tr>
<tr>
<td>LRP</td>
<td>.35196</td>
<td>.10718</td>
<td>3.2838 [.002]</td>
</tr>
<tr>
<td>C</td>
<td>-.28628</td>
<td>.21818</td>
<td>-1.3121 [.199]</td>
</tr>
<tr>
<td>D4</td>
<td>.058375</td>
<td>.040032</td>
<td>1.4582 [.155]</td>
</tr>
</tbody>
</table>

Diagnostic Tests
How Much Control Dose Central Bank of Iran over Money Supply?

* Test Statistics * LM Version * F Version

************************************************************

* A: Serial Correlation * CHSQ(1) = 1.7373[.187] * F(1, 31) = 1.4453[.238]*

* B: Functional Form * CHSQ(1) = 2.2587[.133] * F(1, 31) = 1.9057[.177]*

* C: Normality * CHSQ(2) = 1.3071[.520] * Not applicable *

* D: Heteroscedasticity * CHSQ(1) = 6.5088[.011] * F(1, 37) = 7.4121[.010]*

************************************************************

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

In Table 2, the long-run coefficients are reported. These are the coefficients of $\gamma_1 - \gamma_4$ from the ARDL model. Following the literature, we normalize these long-run elasticity on LM by dividing them by $\gamma_1$. According to Table 2 the interest rate elasticity is 10.8323, which is highly significant as reflected by a t-statistic of 2.6150. The after war dummy variable elasticity is 1.7966 and significant supporting our theoretical expectation. The long-run model of the corresponding ARDL(1,1,0,0) for the supply of money can be written as follows:

$$\text{LnM}_t = -8.8109 + 10.8323 \log \text{RP}_t - .1262E^{-4} \text{NFA}_t + -.4686E^{-4} \text{NGBC}_t$$

**Table 2:** Estimated Long Run Coefficients using the ARDL Approach

ARDL (1,1,0,0) selected based on Akaike Information Criterion

*******************************************************************

Dependent variable is LM2

39 observations used for estimation from 1348 to 1386

*******************************************************************

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA</td>
<td>-.1262E-4</td>
<td>.1441E-4</td>
<td>-.87558[.388]</td>
</tr>
<tr>
<td>NGB</td>
<td>-.4686E-4</td>
<td>3602E-4</td>
<td>-1.3011[.203]</td>
</tr>
<tr>
<td>LRP</td>
<td>10.8323</td>
<td>4.1423</td>
<td>2.6150[.013]</td>
</tr>
</tbody>
</table>
Table 3: Error Correction Representation for the Selected ARDL Model
ARDL (1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is dLM2
39 observations used for estimation from 1348 to 1386

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio [Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>dNFA</td>
<td>.2173E-5</td>
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<td>dNGB</td>
<td>-.1522E-5</td>
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<tr>
<td>dLRP</td>
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<td>.10718</td>
<td>3.2838 [.002]</td>
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<tr>
<td>dC</td>
<td>-.28628</td>
<td>.21818</td>
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<td>dD4</td>
<td>.058375</td>
<td>.040032</td>
<td>1.4582 [.154]</td>
</tr>
<tr>
<td>ecm(-1)</td>
<td>-.032491</td>
<td>.011191</td>
<td>-2.9034 [.007]</td>
</tr>
</tbody>
</table>

Ecm = LM2 + .1262E-4*NFA + .4686E-4*NGB -10.8323*LRP + 8.8109*C - 1.7966* D4

Table 3 also reports some diagnostic statistics. Kremer et al. (1992) has shown that the significant lagged error correction term is a more efficient way of establishing co-integration. We use estimates of γ1 - γ4 to form a lagged error correction term,

EC t −1 = γ 1 log M t−1 + γ RP t−1 + γ log NFA t−1 + γ log NGBC t−1.

After replacing the linear combination of the lagged level of variables in the ARDL model Eq.(19) by ECt−1, we re-estimate the model by imposing the same lag structure selected by the AIC criterion, and look for the significance of ECt−1. A negative and significant coefficient of ECt−1 will be an indication of co-integration. As can be seen from Table3, the ECt−1 carries an expected negative sign, which is highly significant, indicating that, M1 and M2, net claims on the government, net foreign assets, and rate of profit on bank deposit (interest rate) are co-integrated. We also report the Lagrange Multiplier (LM) statistic for serial correlation and
Ramsey’s RESET test for functional specification. Since our calculated LM statistic is less than the critical value we conclude that the residuals of the estimated ARDL are free from serial correlation. and also, since our calculated RESET statistic is less than its critical value we conclude that the ARDL model is correctly specified.

Appendix tables reports the results for M1 monetary aggregate. As can be seen, there is co-integration relation as indicated by the significant coefficient attached to ECt-1 or by significant long-run coefficient estimates reported in Panel B.

The existence of a stable and predictable relationship between the supply of money and its determinants is considered a necessary condition for the formulation of monetary policy strategies based on intermediate monetary targeting. In the third stage the stability of the long-run coefficients are used to form the error-correction term in conjunction with the short run dynamics. As pointed by Laidler (1993) and noted by Bahmani-Oskooee (2001), some of the problems of instability could stem from inadequate modeling of the short-run dynamics characterizing departures from the long run relationship. Hence, it is expedient to incorporate the short run dynamics for constancy of long run parameters. In view of this we apply the CUSUM and CUSUMSQ tests proposed by Brown, Dublin and Evans (1975).

The CUSUM test is based on the cumulative sum of recursive residuals based on the first set of n observations. It is updated recursively and is plotted against the break points. If the plot of CUSUM statistic stays within 5% significance level, then estimated co-effects are said to be stable. Similar procedure is used to carry out the CUSUMSQ that is based on the squared recursive residuals.
Figure 2: A graphical presentation of these two tests for M1
Figure 3: A graphical presentation of these two tests for M2.
Since the plots of CUSUM and CUSUMSQ statistic for M1 and M2 do not cross the critical value lines, we are safe to conclude that M1, M2 and money supply is stable.

**Conclusions**

The paper investigated the co-integrating property and stability of the supply of money function in Iran. The paper employed the ARDL approach together with CUSUM and CUSUMSQ tests. The results show that M1 and M2 is co-integrated with net claims on the government, net foreign assets, and rate of profit on bank deposit (interest rate). With respect to stability, the results show that the estimated relation is somewhat stable most especially with CUSUM test. The question, then, is what are the implications of these findings on policy formulation in Iran?

One, the result shows that there is co-integration among M2, NFA, RP, NGB and a major implication of using interest rate elasticity estimates from M2 function is that money is endogenous and argues that endogeneity of money matters for both short run comparative static macroeconomics and longer run macro dynamics. Second, the endogeneity of money means that attempts to control the economy through monetarist styled money supply rules and targets are likely fail. This suggests that policy authorities should look to other means of control. The notion that the supply of money is, or could be, carefully controlled as in Friedman’s famous money supply growth rate rule is also rejected.

Third, the money supply is a function of the currency-money ratio, the excess reserve ratio, the required reserve ratio and the monetary base. Therefore, monetary base is the main factor and main determinant of money supply. Among the three elements of monetary base, only the third part is under the control of central bank and the other two elements are fall out of the control limit of monetary authorities and therefore, considering the net foreign assets in the years before the revolution and share deficit of in the years before the revolution and share deficit of budget after revolution in the total monetary base, it become apparent that the money supply in Iran was affected by the rate of import and export, commercial policies and mainly under the influence of rate of sale
of oil and annual budget and therefore, the Central Bank was only able to control once again the debt of banks by resorting to means i.e. authorized limitation of credit, rate of discount, determining the legal ratio, proportion of purchasing bonds. But considering that the share of debt of bank was little in the total monetary base and the share of money-multiplier was little in the growth of supply of money.

References

How Much Control Does the Central Bank of Iran over Money Supply?


APPENDEX (1)

Autoregressive Distributed Lag Estimates
ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LM2
39 observations used for estimation from 1348 to 1386

<table>
<thead>
<tr>
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<td>.172E-5</td>
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</tr>
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</table>

R-Squared        .99947   R-Bar-Squared .99937
S.E. of Regression .064376  F-stat. F( 6, 32) 10092.1 [.000]
Mean of Dependent Variable 9.8166  S.D. of Dependent Variable 2.5705
Residual Sum of Squares .13262  Equation Log-likelihood 55.4966
Akaike Info. Criterion 48.4966  Schwarz Bayesian Criterion 42.6741
DW-statistic 1.4945  Durbin’s h-statistic 1.5823 [.114]

Diagnostic Tests

* Test Statistics * LM Version * F Version *

* A:Serial Correlation  CHSQ( 1) = 1.7373 [.187]  F( 1, 31) = 1.4453 [.238]*

* B:Functional Form  CHSQ( 1) = 2.2587 [.133]  F( 1, 31) = 1.9057 [.177]*
How Much Control Does the Central Bank of Iran over Money Supply?

* C: Normality  * CHSQ( 2) = 1.3071[.520]  Not applicable  *
* D: Heteroscedasticity  * CHSQ( 1) = 6.5088[.011]  F( 1, 37) = 7.4212[.010]*

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LM2
39 observations used for estimation from 1348 to 1386

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<td>NGB</td>
<td>-.4686E-4</td>
<td>.3602E-4</td>
<td>-1.3011[.203]</td>
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<tr>
<td>LRP</td>
<td>10.8323</td>
<td>4.1423</td>
<td>2.6150[.013]</td>
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<td>D4</td>
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Error Correction Representation for the Selected ARDL Model
ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is dLM2
39 observations used for estimation from 1348 to 1386

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
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<tbody>
<tr>
<td>dNFA</td>
<td>.2173E-5</td>
<td>.8342E-6</td>
<td>2.6052[.014]</td>
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<tr>
<td>dNGB</td>
<td>-.1522E-5</td>
<td>.9221E-6</td>
<td>-1.6510[.108]</td>
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<tr>
<td>dLRP</td>
<td>.35196</td>
<td>.10718</td>
<td>3.2838[.002]</td>
</tr>
<tr>
<td>dC</td>
<td>-.28628</td>
<td>.21818</td>
<td>-1.3121[.199]</td>
</tr>
<tr>
<td>dD4</td>
<td>.058375</td>
<td>.040032</td>
<td>1.4582[.154]</td>
</tr>
</tbody>
</table>
ecm(-1)  -.032491  .01191  -2.9034[.007]

List of additional temporary variables created:
dLM2 = LM2-LM2(-1)(
dNFA = NFA-NFA(-1)(
dNGB = NGB-NGB(-1)(
dLRP = LRP-LRP(-1)(
dC = C-C(-1)(
dD4 = D4-D4(-1)(
ecm = LM2 + .1262E-4*NFA + .4686E-4*NGB -10.8323*LRP + 8.8109*C - 1.7966*D4

R-Squared  .38815  R-Bar-Squared  .27343
S.E. of Regression  .064376  F-stat.  F( 5, 33)  4.0602[.006]
Mean of Dependent Variable  .23447  S.D. of Dependent Variable .075524
Residual Sum of Squares  .13262  Equation Log-likelihood  55.4966
Akaike Info. Criterion  48.4966  Schwarz Bayesian Criterion  42.6741
DW-statistic  1.4945

R-Squared and R-Bar-Squared measures refer to the dependent variable dLM2 and in cases where the error correction model is highly restricted, these measures could become negative.
### APPENDIX (2)

Autoregressive Distributed Lag Estimates

ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LM1

39 observations used for estimation from 1348 to 1386

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
</thead>
<tbody>
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</tr>
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<td>1.7966[.082]</td>
</tr>
<tr>
<td>NFA(-1)</td>
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</tr>
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<td>NGB</td>
<td>-.3321E-5</td>
<td>.1187E-5</td>
<td>-2.7978[.009]</td>
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<tr>
<td>LRP</td>
<td>.53390</td>
<td>.13549</td>
<td>3.9406[.000]</td>
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<tr>
<td>C</td>
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<tr>
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<td>-.0050882</td>
<td>.050943</td>
<td>-.099881[.921]</td>
</tr>
</tbody>
</table>

R-Squared    | .99912    | R-Bar-Squared | .99895 |
S.E. of Regression | .082702   | F-stat. F( 6, 32) | 6024.5[.000] |
Mean of Dependent Variable | 9.0126   | S.D. of Dependent Variable | 2.5518 |
Residual Sum of Squares | .21887 | Equation Log-likelihood | 45.7271 |
Akaike Info. Criterion | 38.7271 | Schwarz Bayesian Criterion | 32.9047 |
Durbin’s h-statistic | 1.4009 |

Diagnostic Tests

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F Version</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Serial Correlation*CHSQ( 1)= 1.5290[.216]<em>F( 1, 31) = 1.2650[.269]</em></td>
<td>*</td>
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<td>*</td>
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<tr>
<td>B:Functional Form *CHSQ( 1)= 5.5775[.018]<em>F( 1, 31) = 5.1733[.030]</em></td>
<td>*</td>
<td>*</td>
<td>*</td>
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<tr>
<td>C:Normality <em>CHSQ( 2)= .89846[.638]</em> Not applicable</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

*CHSQ( 2)= .89846[.638]* Not applicable
How Much Control Does the Central Bank of Iran over Money Supply?

* D:Heteroscedasticity*CHSQ( 1)= 5.8837[.015]*F( 1, 37)= 6.5737[.015]*

A: Lagrange multiplier test of residual serial correlation
B: Ramsey’s RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals
D: Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LM1
39 observations used for estimation from 1348 to 1386

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio[Prob]</th>
</tr>
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<tbody>
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<td>-1.2255[.229]</td>
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<td>D4</td>
<td>-.27368</td>
<td>2.8498</td>
<td>-.096036[.924]</td>
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</table>

Error Correction Representation for the Selected ARDL Model
ARDL(1,1,0,0) selected based on Akaike Information Criterion

Dependent variable is dLM1
39 observations used for estimation from 1348 to 1386

<table>
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<tr>
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<td>1.7966[.082]</td>
</tr>
<tr>
<td>dNGB</td>
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<td>.1187E-5</td>
<td>-2.7978[.009]</td>
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<tr>
<td>dLRP</td>
<td>.53390</td>
<td>.13549</td>
<td>3.9406[.000]</td>
</tr>
<tr>
<td>dC</td>
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List of additional temporary variables created:

\[ \text{dLM}_1 = \text{LM}_1 - \text{LM}_1(-1) \]
\[ \text{dNFA} = \text{NFA} - \text{NFA}(-1) \]
\[ \text{dNGB} = \text{NGB} - \text{NGB}(-1) \]
\[ \text{dLRP} = \text{LRP} - \text{LRP}(-1) \]
\[ \text{dC} = \text{C} - \text{C}(-1) \]
\[ \text{dD}_4 = \text{D}_4 - \text{D}_4(-1) \]

\[ \text{ecm} = \text{LM}_1 + 0.4970E^{-4} \text{NFA} + 0.1787E^{-3} \text{NGB} - 28.7171 \text{LRP} + 42.3320 \text{C} + 0.27368 \text{D}_4 \]

R-Squared and R-Bar-Squared measures refer to the dependent variable \( \text{dLM}_1 \) and in cases where the error correction model is highly restricted, these measures could become negative.
Coaching: A Philosophy, Concept, Tool and Skill

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Nowadays you will come across the word ‘coaching’ anytime and anywhere in the world. It is used in education, but also in business. It is used in big organizations, but also in small ones. It is used in non-profit organizations, but also in profit ones. It is used on an executive level, but also on the work floor. You come across various types of coaching, like personal coaching, buddy coaching, peer coaching, executive coaching, board coaching, business coaching, performance coaching, etc.

But what exactly is coaching? Is it a philosophy, a concept, a tool or a skill? When is it useful, and when not. And how can coaching be applied in everyday life? In this article I will give a short summary of important elements of coaching.

Keywords: coaching, tool and skill, organizations
History of Coaching

The concept of coaching has been around for as long as the human race itself. Right from the earliest days the older or more skilled taught the young how to hunt, cook, paint pictures on cave walls and just how to be useful and effective members of their tribes or communities in general.

This type of practical, skill-related coaching still exists in most societies to this day. However, a more sophisticated form of coaching, aimed at inspiring greater understanding or awareness can be seen emerging in the earliest philosophies and religions, ranging from the lessons incorporated in Aesop's Fables to the lessons incorporated in the Parables.

Throughout history and literature there are examples of coaching in action but surprisingly the practice (at least in terms of executive development) appeared to fall into disuse in the late twentieth century. These were the days of the full-blooded management training program. Remember when most management development programs lasted at least five days? The major management training colleges advertised general 'open programs' to which managers and executives from all walks of life and business would come to be put through a pre-set and unalterable program irrespective of their individual needs. Some programs were often considerably longer and the five to eight week 'total executive development experience' was not uncommon.

This approach to development was not without its merits. It brings about immediate benefits to those being trained. But there are problems inherent in this approach and they are both economic as well as more subjective in nature.

The economic issue became apparent with the downturn of the economy in the 1990s when the organizations that had hitherto supported lengthy 'open programs' found that they could no longer afford to go down this costly route and started to demand more tailor made solutions from training providers. This initially took the form of requiring customized programs that were aimed at addressing specific organizational issues as opposed to the more general 'sheep dipping' approach.

At the same time both organizations as well as their managers started to see the benefits of a more individualized approach to personal
development. This is mirrored in society where we have gone from a situation based on the collective where the emphasis was on community and the nation, to one focused on the individual where we all have to manage our own careers and lives.

While generic skills could be taught, there were a host of issues ranging from complex to highly personal or confidential matters that demanded something different to training. People needed something that enabled issues to be discussed in depth and solutions arrived at by debate, reflection and discovery over a period of time. This was in stark contrast to the pre-packaged solutions so typical of most training programs.

But coaching still took time to catch on. As the idea of coaching developed, organizations started employing psychologists to understand employee motivation and development needs, as well as for recruitment, selection and assessment. Sport also had a strong influence on the rise of coaching. Tim Gallwey's book "The Inner Game of Tennis" in 1974 related to a more psychological approach to peak performance. He stated that the opponent in one's head was greater than the one on the other side of the net.

In 1992, Sir John Whitmore, a motor racing champion, published "Coaching for Performance" where he developed the most influential model of coaching - the GROW model (goal, reality, options, will). Gurus such as Stephen Covey and Antony Robbins also fuelled the appetite for personal development and awareness.

In the 1990's the US went into recession and corporate downsizing became the rage. One of the downsizing interventions was to reduce the number of management layers within organizations. It may have seemed good in theory, but as the world around was turning in an accelerating speed, it left managers and leaders in highly stressed environments.

This development spread around the world and gave a boost to the upsurge of coaching. With fewer managers in a more complicated and faster evolving world the old Harvard principle of ‘span of control’ became obsolete. If the focus was only on span of control, you would surely be late in anticipating on decisive developments in the world, its societies and markets. The need for a paradigm shift from ‘span of control’ to ‘span of support’ became evident. If there are less managers available and they have
to perform their role in a more complicated and faster evolving world, then the employees need to be empowered to develop higher levels of self-conduct. A process in which they need to be supported more than to be controlled.

The industry also changed from one where coaches were brought in as often for poor performers as for high performers (often dealing with performance issues where the manager did not want to hassle or conflict) to today, where the vast majority of coaching is aimed at high level performers rather than remedial cases. Coaching today is for the high performer, top talent and those leading an organization.

Many large private, public and voluntary sector organizations (as well as small and medium sized businesses) use executive coaching as a stand-alone development solution or dovetail coaching with other organizational development programs.

Role of the Coach

Executive, business or performance coaching can be simply described as helping someone to learn in order to improve their performance. It is usually, but not only, a one-to-one activity and is not about issuing instructions but is about helping, showing, giving feedback, explaining and encouraging.

Coaching recognizes that most development takes place on the job and that often real learning requires a demanding task or problem to be tackled. The process requires regular and effective contact between coach and client and recognition that all sorts of occasions - ranging from a change in the 'coachee's' job to gearing up for a specific project - may require this sort of intervention.

Coaching recognizes that the coach already has the vast majority of answers/facts and the coach’s role is to stimulate that knowledge/learning and allow the coaches to unlock and achieve their true potential. As a coach, leader or manager it can be as simple as asking your colleague one single question so they can engage their brain and learn. One question is all it takes for the coach to be inspirational.
Six Roles of an Executive Coach

At the International Coach Federation European Conference in Italy in 2003, Robert Dilts ran a seminal session titled 'From Coach to Awakener'. He stated that coaching is the process of helping another person perform at the peak of his or her abilities. It doesn't presuppose that people are broken - on the contrary, it helps them identify and develop their strengths. It starts from the assumption that people have the answers and that the coach's role is to help that person to overcome internal resistances and interferences, give feedback on behavior and give tips and guidance.

But Dilts added that a coach plays five further roles:

**Guiding and Caretaking**
Guiding is the process of directing another person along the path leading from where they are presently to where they want to be, providing a safe and supportive environment without unnecessary distractions or interferences from the outside.

**Teaching**
Teaching relates to helping a person develop cognitive skills and capabilities and the emphasis is on learning. It focuses on the acquisition of general skills, rather than on performance in specific situations. A teacher helps a person to develop new strategies for thinking and acting.

**Mentoring**
A teacher instructs, while a coach provides specific behavioral feedback, in order to help a person learn or grow. Mentors, on the other hand, guide us to discover our own unconscious competences, and strengthen beliefs and values, often through their own example.

**Sponsorship**
Sponsorship involves creating a context in which others can act, grow and excel. Sponsorship is about the development of identity and core values, awakening and safeguarding potential within others. It involves the
commitment to the promotion of something that is already within a person or group, but which is not being manifested to its fullest capacity.

**Awakening**
Awakening goes beyond coaching, teaching, mentoring and sponsorship to include the level of vision, mission and spirit. An awakener puts other people in touch with their own missions and visions and thus the coach needs to know his/her own vision and mission and purpose.

**Core Coaching Competences**

Knowledge: As a coach you need to know...
- What the coaching process involves
- What models of coaching can underpin your role as a coach
- What personal and professional capabilities the coachee needs to develop
- How to manage the coaching relationship
- How to set boundaries
- How people learn and how to adapt to different learning styles

Skills: As a coach you need to be able to...
- Listen
- Communicate at different levels
- Ask searching questions
- Influence with integrity
- Give feedback without causing offence
- Be empathetic
- Demonstrate confidence in oneself and also the coachee
- Facilitate goal setting
- Be challenging
- Be compassionate
- Always act with integrity and in the best interests of the coachee

Behaviors: As a coach you should...
- Encourage self-discovery
• Act as a role model
• Be non-judgmental
• Use humor appropriately
• Illustrate that you value diversity
• Show tact and diplomacy
• Always maintain confidentiality
• Seek to build client’s confidence and self esteem
• Show other sources of support to client
• Critically evaluate one’s own effectiveness

GROW-model for Coaching

The GROW model, originally conceived by Graham Alexander and brought to the fore by Sir John Whitmore, is possibly the best known model for coaching. Whitmore, made his name in the field of high performance coaching in the sporting arena but the technique is flexible enough to be applied virtually anywhere. Like most models it provides a structure for the coaching conversation that is designed to ensure some form of outcome.

Goals
At this stage the process focuses on the goals that the coachee wishes to achieve, not only from the specific coaching session, but also in the longer term.

Reality
This is a time for exploring the real nature of the problem, ensuring that the session is not sidetracked by false assumptions and for gathering information that will shed realistic light on the issue. It is not a time for problem solving.

Options
This stage of the process is to explore the possible options of behavior or decision that will lead to the right solution.
Wrap Up or Will
At this stage the focus moves onto what the coachee is going to do in terms of specific steps to reach the goal. It is also a stage of examining the potential obstacles that may arise and of discussing ways of overcoming them and of agreeing the resources needed and the nature of further support.

Approach of a Coaching Project

In a coaching project the following step are usually taken:

Making acquaintance interview
This step is only taken if the coachee and coach don’t know each other yet. During this step the coachee and coach ask each other job- and issue related questions, and sometimes even personal questions. In a coachee-coach-relationship it is important that the coachee feels a ‘click’ with the coach, and trusts and respects him/her. Sometimes a first impression doesn't feel good, and that is not a very promising start for a coaching project.

Intake interview
During this step the coachee and the coach agree on the long term and short term goals the coachee wishes to achieve with the coaching project. The goals are stipulated as SMART (Specific, Measurable, Acceptable, Realistic and Time-bound) as possible. With ‘specific’ we mean context-specific and sensory-specific, specifying in which contexts the coachee wishes to achieve the goals, and how this achievement can be demonstrated in behavior and observed by the senses.

With ‘measurable’ we either mean measurable in figures or in demonstrable and observable behavior. With ‘acceptable’ we mean ethically acceptable to the coachee and his/her environment. With ‘realistic’ we mean that the goals can be achieved based on realistic potential and challenge. And with ‘time-bound’ we mean the timeframe within which the goals will be achieved. Finally the number, duration and frequency of the coach sessions are determined.
Personal Portfolio
With this step the coachee enters the above mentioned goals into his/her personal portfolio. This portfolio helps the coachee to guide and monitor his/her own coaching process. In most cases the following documents are inserted into the portfolio: goals, learning’s, actions, results, and final conclusions. With ‘learning’s’ we mean all relevant things the coachee learns during the coach process. With ‘actions’ we mean those learnings which the coachee really intends to apply and how he/she wishes to apply them. With ‘results’ we mean the effects the coachee experiences when applying the learning’s. And with ‘final conclusions’ the coachee evaluates his/her own learning process.

Coach Sessions
These are the sessions in which the actual coaching takes place. The keywords during these coach sessions are ‘creating awareness’ and ‘taking responsibility’. The coach tries to discover the real issue, problem or challenge of the coachee. He also tries to increase the level of awareness of the coachee regarding all influencing elements and all elements to be influenced, including the awareness of any potential of the coachee to tackle the issue, problem or challenge. Knowledge is gathered, understanding is created and skill is practiced. The coach first creates an atmosphere in which the coachee feels comfortable in order to obtain the conscious and/or subconscious permission of the coachee to be confronted. Finally the coach stimulates the coachee to take responsibility and to apply what has been learned, discussed or agreed upon.

Evaluation
During this session the coachee presents his personal portfolio to the coach as a demonstration of self-evaluation. The coach will give his comments on this self-evaluation and adds feedback and suggestions if necessary. Finally the options to further enhance transfer of learning after ending the coach project are discussed and agreed upon. Sometimes the coachee and coach decide for additional coach sessions, if certain element of the previous coach sessions needs more detailed attention.
Financial Incentives and their Impact for Attracting FDI
Survey with Foreign Investitures in Albania

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Introduction to market economy brought the need to attract FDI in Albanian economy. Governments of different countries often used several incentives to attract foreign investors. In this aspect, Albania has attempted to attract FDI by applying several measures in order to create a favorable environment to foreign investments. This study considers the relation between demanders of financial aspects taking into account thus the incentive packages, the business sector where these packages are applied, tax levels and the opportunity for foreign investments in the coming years. In order to provide thorough information, the study will be focused on analyzing the conclusions of the interviews made to foreign investors who have their activity on Albania. The study will include also the results of a statistical analysis. It is used to verify if there exist a relation between incentives and FDI level. The contingency test is $\chi^2$.

Keywords: FDI, financial aspects, incentive packages, business sector, tax levels
Introduction

Albania, like many other countries, has intensified its efforts towards reforms in improvement the business climate. A special role played the incentive packages for attracting the foreign investors. If we have a quick look at FDI in Albania, it seems that during 1992-1996, it is 1996 which gives the highest growth level with 97 million US$. 1997 and 1999 coincided respectively with the crisis caused from the pyramidal companies and troubles in Kosovo and they were reflected of course in the reduction of foreign investment flows. Since 2002, the level of FDI has been increased. 2005-2007 coincides with the highest FDI intensity on telecommunication sector, whereas 2008 resulted a successful year in attracting the FDI towards the extraction industry and banking sector.

Based on a study of the Bank of Albania (2010), during the second trimester of 2009 has been noticed an increasing tendency of FDI as result of increase of incomes from privatization process. According the last report of United Nations, the estimation of FDI in Albania in 2010 was 1.11 billion dollars, which classifies it in the second position in the Region, coming right after Serbia. The Institute of Statistics in Albania shows that FDI portfolio in Albania is made up of 70% coming from public privatization process and concessions. The economic sectors that have attracted more direct investments in Albania are energy, transport, tourism and banking-financial.

However, land ownership problems block long-term FDI which of course create new jobs, reduce unemployment, introduce new technologies and increase the competitiveness. According the World Bank, in the top of South-Eastern Europe countries, considering the FDI, is Croatia with over 4000 US$ per capita, followed from Montenegro with 3800 US$, Serbia with 2000 US$, Bosnia-Herzegovina with 1600 US$, Macedonia with 1268 US$ and Albania with 1024 US$ per capita.

As far as the origin country of foreign enterprises is concerned, the investors coming from EU countries are the main investors in Albania, possessing about 77% of the foreign enterprises. Italy takes the main place with about 40% and then Greece about 26%.
The countries of the Region have invested in about 13% of the foreign and joint enterprises in Albania and are represented from Turkey as the main investor taking 8% of the enterprises. Also, the number of Macedonian enterprises has been increased lately. The number of the American enterprises has been increased also taking 4% of them.1 Thus, foreign capital companies operating in Albania have a wider geographical extension.

Concerning the geographical distribution of foreign enterprises, it is noticed that investments are concentrated in the main areas of Albania, where Tirana and Durres take about 65% of the total foreign and joint enterprises. The Albanian areas where foreign capital access is smaller are the northern and east-northern. Korca and Gjirokastra are an exception as there are 33% of foreign enterprises doing business mainly Greek ones. 9% of Italian enterprises have invested in Shkodra.2

The Albanian experience in attracting the foreign investments has been related mainly to privatization processes in strategic sectors. As far as the enterprises by economic sectors are concerned, the industry that represents the higher number of foreign enterprises is the processing industry, with about 47% of them. Within the processing industry, the textile and clothing industry takes an important place (about 18%), where a good part of the Italian capital is concentrated in the form of textile enterprises with fashion.

**Methodology of study**

In order to realize this research, secondary data as well as primary research were used. Secondary data concerned the information provided from literature study on FDI determinants, focusing special attention on financial and tax incentives in attracting FDI.

Special attention was focused on the primary research, so gathering the main data. Realization of the project was planned in such way to facilitate the cost of collecting information and in the same time achieve

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1 Bank of Albania, Economic Bulletin Volume 11 nr 4 December 2008 page 110
2 Endrita Xhaferaj Bank of Albania “FDI Analysis in Albania”, 2005
satisfactory results which would be helpful in producing accurate results. Efforts were made for the process to be as simple as possible.

Contacts with target companies were realized through personal interviews, e-mail or phone contacts, etc. The latter was made when personal interviewing was difficult.

Primary research was performed in two stages. During the first stage, a questionnaire was drawn which belonged to the production sector, and the second stage concerned the interviews to service companies. Samples were represented respectively from (1345 total population) and 14 service companies (20 total population).

Formulation of questions was done based on some studies: - Bitzenis study on the effect of financial and non-financial incentives in Bulgaria, and the Eclectic theory of John Dunning.

The statistical analysis of questionnaire was performed with SPSS 17 programs, making use of Guide for Doctorate Research. This guide was used not only for calculating the frequency of responses, but also for the creation of cross tabulation, verification of hypothesis by $\chi^2$ test. In selecting the businesses according the towns, http://www.directory.albic.net/ was used. This is the official webpage of business directory in Albania.

Analysis of research questionnaires

With regard to the business sector, among selected sectors, the processing industry was represented by 44 companies or (36.1%), agriculture 4 companies (3.3%), the textile industry 50 enterprise (41%), construction with 20 companies (16.3 %), and other businesses with 4 enterprises (3.3%).

Concerning the position of the interviewees, 23% of the respondents were business owners, 44% were directors or managers, 30% accountants and 3% were an unspecified category. In this research, 26% of companies interviewed belonged to joint-venture form, 53% fully foreign owned 21% belonged to the form of contracting production.

Providing incentives is considered from governments as a promotion in attracting foreign investors. The Albanian Government has applied several incentives. So, asked if there was any special incentive in
their investment, 54.1% of the respondents said “Yes”, whereas 45.9% said “No”. The results are presented in the Figure 1.

![Figure 1: Is there any special incentive in your investment?](image)

Another argument related to incentive packages. Asked if they decided to invest in Albania for this reason, 18% answered “none”, 26% of them chose to answer “very little”, 37% answered “little”, 16% answered “on average”, 3% chose to answer “very much”, and none of them or 0% answered “extremely”. It seems like incentives packages are not been considered as important for investment decisions. Results of these answers are presented in the Figure 2.
Figure 2: Did you decide to invest in Albania for incentive packages?

Tax levels are another discussion topic. Asked how do they consider the tax levels in Albania, none of them, so 0% thought that taxes are “very low”, 11% of them considered them “low”, 44% answered about “an average” level of them, 38% thought taxes are “high” and 7% considered them “very high”. From these results dominates the percentage of those respondents who think that levels of taxes are “average” and “high”. Results of these answers are presented in the Figure 3.

Figure 3: How do you consider the level of taxes in Albania?
Application of a favorable tax system helps in encouraging business activities, not only for domestic investors, but foreign ones as well. Often foreign investors are attracted from favorable policies on low business taxes. Related to this, there is an almost similar perception between those who consider taxes on “average” and “high” levels, whereas there is a small perception on “low” and “very high” levels.

Also, favorable tax policies are not always dominating factors in attracting foreign investors, and care should be taken after them, in order to not discriminate domestic investors compared to the foreign ones.

Formulation of hypotheses

Governments have always used tax incentives to influence business relocation, expansion and start-ups, or to promote some businesses’ initiatives over others, rescuing them from failure and bankruptcy or alternatively protecting them against competition. (Buss 2001). In Central and East European countries, incentives have been used in order enhance positive spillovers (technology transfers, decrease of debt, budget financing, gross domestic product (GDP) growth and help in the transition to a market economy.3 UNCTAD studies, World Investment Report 1996, show that not always incentives are an important factor in investment decisions in a country. But, their role is of course important and foreign investors are not insensible to them.

Benacek et al. (2000), concludes in their literature review that according to Lankes and Venables (1997), “Tax incentives for foreign investment are not considered important to the location decision in CEECs, although individual agreements between the investor and the government are significant for a small group of investors. Such a fact is mentioned in the Hungarian experience, whereas the Czech Republic offered less incentives to foreign investors. OECD(1997, p 101) concluded that “FDI incentives must not necessarily be seen as FDI promotion, but the consequent enforcement of

the law on bankruptcy can work better than any FDI incentive.. FDI incentive policies can drive an investor’s decision of investment attractiveness given by macroeconomic and political stability is achieved or other disincentives for investment are eliminated (p 98).

OECD (1997,p96) pointed out that according to a survey carried out by Deloitte & Touche for foreign investors investing in Central and Eastern Europe the taxes in the host country constituted the single most decisive factor in the investment decisions of these investors. Moreover, most of 100 respondents (50 MNCs) stressed the need for a stable and transparent legislative framework for investment and argued that taxation influenced their decisions in a major way.

Brewer et al (1997,p 178) argued that “there is anecdotal evidence that, even when incentives may be strictly unnecessary to attract an investment project, MNE s will still (inevitably ) attempt to maximize aid levels at the point of negotiation with host governments or regional authorities”

Bitzenis (2003) in his study on the role of fiscal incentives or taxes provided from the Bulgarian Government for the foreign investors, shows that fiscal incentives were successful in attracting foreign investors. In this study (Bitzenis 2003) argued that the results indicate that when a host country provides incentives and especially tax incentives, the outcomes are infrastructure improvements, increased employment, growth, stability, and other positive spillovers due to the attraction of inward FDI flows.

Some professionals, economists and state officials who claim that tax incentives (corporate income tax exemption, job creation tax incentive exemption, equipment and machinery tax exemption etc.) are costly, ineffective and detrimental Buss (2001, p90).

Buss (2001,p 101), argued that “ taxes should matter to states, but researchers cannot say how, when, and where with much certainty. Firms may need tax incentives to increase their viability in some locations, but researchers cannot definitively say which businesses or which locations”.

Bitzenis (2003) argued that the government will evaluate the costs and the benefits of different types of incentives that it will offer to foreign MNEs and to decide if there is a necessity to offer the incentives in a specific time period.
Researchers cannot say what is the most suitable type of incentives, that each country should apply. The study of the transition of the Bulgarian economy strongly suggests that the imposition of fiscal/financial incentives has only moderate results and thus the Bulgarian government has recently diminished or eliminated most of them. Bitzenis (2003)

The Albanian experience shows that foreign investors are provided with facilities in certain aspects such as the importers of machineries and equipments providing 100% VAT crediting by Decision Nr. 3 date 30.01.2006, corporate tax reduction from 20% in 10% (January 2008), new laws on concessions and public procurements, 30% reduction on the price of electric power on businesses, facilitation of business procedures on registering process and finally the establishment of National Licensing Center.

Although incentives could be offered to foreign investors, care must be taken to not discriminate the domestic investors and also beware of false and flimsy investors.

Other problems that appear during the application of incentives have to do with the bureaucracy, corruption and bribery. OECD (1997, p 92) argued that” the greater the number of conditions to be fulfilled by the investors, the less the transparency and the greater the possibility of manipulation. In addition, selective approaches also postpone decisions and in reality, dissuade investors while serving primarily to demonstrate who decides what in the country: the market or the bureaucrat?

Based on these discussions and taking chance by the fact that investor incentive packages have been applied in Albania, the following hypotheses are drawn which aims the verification of financial aspects demanders.

• **Hypothesis 1a**
  Increase of foreign investor incentive packages increases the probability of investment reasons being attributed to this very factor.

• **Hypothesis 1b**
  Business sector where foreign investor belongs, determines the investment reasons which relate to the incentive packages being applied for this sector.

• **Hypothesis 1c**
The lowest tax levels for foreign investors in the country increase the probability of foreign investments in the future.

**Results of the statistical analysis**

After a general analysis to foreign companies being studied, which operate in Albania in production and service sectors, will follow the results of the statistical analysis in order to verify whether the drawn hypotheses are true. In this study, the statistical test is used for verifying the existence of a relation between two variables. To do this, the contingency $\chi^2$ test is used which aims to verify the existence of an accordance between two variables.

As far as testing of financial aspects demanders is concerned, we draw these conclusions, hypothesis 1 a, was not true, for the production sector, ($\chi^2 \text{log} = 22.066, \alpha=0.05$, number of freedom levels 4, $\chi^2 \text{tab}= 9.49$, so, $\chi^2 \text{log} > \chi^2 \text{tab}$). (In this study $\chi^2 \text{log}$ is the calculated value by Chi Square test and $\chi^2 \text{tab}$ is the critical value found from the distribution of Pearson). Statistical results are displayed on Tables 1 and 2.

**Table 1**: Was there any special incentive on your investment? * Did you invest in Albania because of incentive packages? Cross-tabulation

<table>
<thead>
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<th>Did you invest in Albania because of incentive packages?</th>
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<tr>
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<td>4</td>
</tr>
<tr>
<td>No</td>
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<td>28</td>
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<tr>
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Table 2: Chi-Square Tests

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<td>Pearson Chi-Square</td>
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<td>Likelihood Ratio</td>
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<tr>
<td>Association</td>
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<tr>
<td>N of Valid Cases</td>
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</table>

This shows that incentive packages are not a significant factor in determining the foreign investments in the coming years. Hypothesis 1 b was not true for the service sector. (χ²llog = 14.000, α=0.05, number of freedom levels 3, χ²tab = 7.81, so, χ²llog > χ²tab).

This shows that there was no relation between the business sector and its sensibility toward incentive packages. Statistical results are displayed on Tables 3 and 4.

Table 3: Business sector *
Did you invest because of incentive packages? Cross-tabulation, Count

<table>
<thead>
<tr>
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<th>Did you invest because of incentive packages</th>
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<td>None</td>
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<td>0</td>
</tr>
<tr>
<td>T/communication services</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 4: Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>14.000</td>
<td>3</td>
<td>.003</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>11.483</td>
<td>3</td>
<td>.009</td>
</tr>
<tr>
<td>Linear-by-Linear</td>
<td>.007</td>
<td>1</td>
<td>.931</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

So, this sector did not show sensibility toward the incentive packages. Hypothesis 1c was true, ($\chi^2_{1\log} = 6.243$, $\alpha=0.05$, number of freedom levels 3, $\chi^2_{tab}= 7.81$, so, $\chi^2_{1\log} < \chi^2_{tab}$). This shows that the lowest levels could affect the increase of investment levels. Statistical results are displayed on Tables 5 and 6.

Table 5: How do you consider the tax levels in Albania? * Are you going to undertake new investments in three coming years? Cross-tabulation

<table>
<thead>
<tr>
<th>How do you consider the tax levels in Albania?</th>
<th>Are you going to undertake new investments in three coming years?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Average</td>
<td>48</td>
<td>6</td>
</tr>
<tr>
<td>High</td>
<td>34</td>
<td>22</td>
</tr>
<tr>
<td>Very high</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>32</td>
</tr>
</tbody>
</table>
Table 6: Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>6.243</td>
<td>3</td>
<td>.100</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>6.575</td>
<td>3</td>
<td>.087</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>1.785</td>
<td>1</td>
<td>.182</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>122</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

UNCTAD studies, Benacek et al. (2000), Lankes and Venables (1997), Buss (2001), Bitzenis (2003), etc, show that incentives play a limited role in investment decisions, if compared with other factors.

From the results of this study we reached the conclusion that also in Albania incentive packages are not considered as dominating factors in attracting FDI. Such a result was confirmed from the statistical verification of hypothesis on financial aspects demanders.

Application of a favorable tax system helps stimulation of business activities, not only for domestic investors but foreigners as well. Often, foreign investors are attracted from favorable policies of low taxes on businesses. Concerning this problem, there is an almost similar perception among them who consider an average level of taxes and those who consider them high, while there is a narrow perception on “low” and “very high” levels.

Incentive packages are considered as elements which attract the foreign investors in a country; although, indicators on incentive packages should not be a main factor in investors’ motivation. This finding remains
inside the theoretical and empirical literature where incentives as FDI determinants are not considered to have a great impact.

In the present research, it is confirmed that incentive packages are considered “less important” for investment decisions in Albania, while the economic conditions are considered “average” and “extremely” important.

These results draw the conclusion that incentive packages should be studied carefully from policy makers, for not making undeserved favors to foreign investors and because of the fact that these incentive packages not always are dominant for investment decisions. Political and economic stability factors should be more important when an investment decision is made.

References

[9] UNCTAD -Investment Brief Number 1 2008
[10] UNCTAD -Investment Brief Number 3 2006
Arbitration as Mean of Solving Litigations between Professional Traders – Novelties Inserted in the New Civil Procedure Code

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Based on the “New York” Convention of 1958 [1] arbitration has become a true and efficient alternative of the common law jurisdiction.

The regulation of arbitration in the new Civil Procedure Code [2] is found in the same Book (Book 4), divided into 7 Titles, instead of 11 Chapters. As a concept, the regulation of different specific arbitration institutions is similar to that provided for by the actual Book 4. The 7 Titles includes the general provisions on arbitration, arbitration agreements, arbitration tribunal, arbitral procedures and institutionalized arbitration (Art 533-612). Regarding arbitration procedure, it regulates the notification of the arbitration tribunal, arbitration trial, arbitration expenses and the decision of arbitration. Institutionalized arbitration is, for the first time settled by Art 607-612 of the Civil Procedure Code. Also, Title 4 of Book 7, named “International civil trial”, settles the international arbitration (Art 1096-1118).

Keywords: arbitration agreement, trial procedures, arbitrator, institutionalized arbitration, international arbitration
Conceptual delimitations and limitation in the application of arbitration as mean for solving litigations between professional traders

1. Concepts

One of the main novelties inserted in the new regulation of arbitration is the definition of arbitration (Art 533, Title 1, Book 4) and of institutionalized arbitration (Art 607, Title 7, Book 4). Thus, arbitration is defined as an alternative jurisdiction having a private nature with the recognized possibility for the parties in litigation and for the competent arbitration court to establish procedural rules derogating from the common law, limited for reasons of public order, or because of certain imperatives of the law.

Regarding institutionalized arbitration [3], it is defined as being that form of arbitration jurisdiction which is established and operates on a permanent basis attached to an organization or domestic or international organization or as an independent public interest nongovernmental organization, according to law, based on its own regulation applicable in the case of all disputes submitted for its settlement according to an arbitration agreement.

International arbitration has the competence in terms of solving the international litigations. Specifically, Art 1096 of the new Civil Procedure Code an arbitration litigation taking place in Romania it is considered international if it is derived from private law relationships having foreign features.

2. Categories of subjects and the object of arbitration procedures

Regarding the general provisions on arbitration, the new Code settles a set of new and important regulations.

Thereby, according to Art 534 the parties that may agree that a future or an already existing litigation be solved by arbitration are “legally competent persons”. Art 534 Para 2 states special conditions for certain
categories of subjects who may invoke arbitration, thus, for instance, the state and public authorities are empowered to conclude arbitration agreements only if are authorized by law or by international conventions to which Romania is party. The same provision also states regarding the object of arbitration that public law persons who have as object economic activities are competent to conclude arbitration agreements, only if the law, their articles of incorporation or organization rules states this.

Concerning the object of arbitration, the above mentioned article states in the same paragraph that legally competent persons can decide to solve litigation by arbitration. The text expressly and limitative establishes the exceptions with respect to the object subjected to arbitration, namely: litigations on civil status, legal capacity of persons, family relationships, as well as the rights on which the parties cannot agree.

Another interesting provision refers to the representation of parties in arbitration, stating that the legal representation mandate represents the domicile or the address for service, if is not otherwise stated; such a legal representation mandate offers the lawyer the right to invoke an obsolete arbitration, as well as to request or accept the extension of the terms of arbitration.

**Specificity of arbitration as an alternative to common law procedures**

1. **Arbitration agreement**

   Concerning the arbitration agreement as an institution, the principle of concluding it in written form under the sanction of nullity is maintained. New is the provision on the manner in which the parties have concluded the agreement. Thereby, it is considered as fulfilled the condition of written form of the agreement when it was agreed through correspondence, regardless of its forms, through exchange of procedural acts or when the existence of the agreement was alleged in written by one of the parties and not contested by the other party [4].

   We also note as novelty Art 540 Para 2 where referring to the object of arbitration, namely to the transfer of the right to property and/or the
creation of another type of real right on an immovable property, it is requested the written form for the notary authenticated form under the sanction of absolute nullity.

So, it becomes practically recommendable the inclusion of the arbitration clause in the legal act ascertaining the transfer of the right of property (or the creation of another real right on an immovable property), in the absence of such clause, the parties having the possibility to choose the arbitration only by concluding a compromise in authenticated form.

On the categories of arbitration agreement, Art 541 of the new Code maintains the provisions of the actual Code in the meaning of concluding the arbitration clause inserted in the main contract or concluding the compromise concluded separately from the main contract.

In this context we mention that the existence of the arbitration agreement shall be presumed if the applicant files a request for arbitration, and the defendant does not take any objections on the first term he has been legally summoned (by the arbitration court, our emphasis, E-N.V) does not raise objections to arbitration trial [5].

According to compromise, it is defined as being the document by which the parties agree that litigation between them to be solved by arbitration. The new regulation states that it can be concluded only if the parties are in litigation in front of another court (a common law court) [6].

On the competence of solving arbitration, the new Code does not state that the arbitration tribunal must ground its own jurisdiction on the part dedicated to arbitration agreements, but on Title 4 “Arbitration Procedures”, namely on Chapter 2 which states the arbitration trial (Art 571 – checking the competence). Thus, checking the competence by the arbitration tribunal is considered to be part of the arbitration procedure, which seems to be structurally and formally fair.

Even more, Art 545 provides that the conclusion of an arbitration agreement excludes the competence of courts to try the object of litigation. This provision is strengthen by the next article which states that if a common law court was seized with a case for which was concluded such an agreement, except express cases stated by the law [7], the court shall declare its lack of competence.
Arbitration tribunal is settled by Title 3, in which we note some novelties. Specifically, considering Art 547 we note that, unlike the actual Code, the condition of Romanian citizenship in order to be an arbitrator was removed, the new Code maintaining only the legal capacity as condition for arbitrators.

The number of arbitrators must always be odd [8]. If the parties did not agree on the number of arbitrators, then the litigation is solved by a commission of three arbitrators [9]. Also, the principle of designating the umpire by the other two arbitrators is maintained. This provision must be corroborated with and applied in relation to the provisions on institutionalized arbitration of the new Code, namely Art 609 Para 2, covering the case in which the arbitrators fail to agree on the umpire, the nominating authority shall indicate this person. If the person nominated as arbitrator accepts the nomination, Art 551 of the new Code states that it shall only be made in written and it shall be communicated to the parties by any means insuring the receipt and confirmation of receipt of the text, namely by mail, fax, email or in any other mean.

On the terms of arbitration, Art 559 of the new Code states that if the parties have not agreed otherwise in their arbitration agreement, the arbitration court shall issue a decision in maximum 6 months, unlike the actual term of 5 months, from the moment of its notification, under the sanction of declaring the arbitration as obsolete. For grounded reasons, the tribunal may decide a single extension of the term of arbitration with maximum 3 months, unlike 2 months from the actual regulation. “The single time” extension is designed to remove any interpretation on the term decided by the arbitration tribunal. Art 559 Para 5 maintains the actual provisions of 3 months extension in case of death of one of the parties.

A new and useful provision refers to the language of arbitration [10]. If the parties fail to state in their agreement or fail to subsequently agree on this aspect, the language of arbitration is the language of the contract that generated the litigation or an international language established by the arbitration tribunal.
2. Arbitration procedure

Like the common law procedure, the arbitration tribunal is notified by a request of arbitration filed by the plaintiff. Regarding the content of the request we notice that unlike the provisions of the actual regulation, we find in the new Code as mandatory the elements of identification of the parties, as well as the ID number of natural persons, namely the VAT number or trade Register registration number for legal persons. To such requirements are added the already stated ones, namely: surname, first name and the quality of the party’s representative in litigation, name of the arbitration agreement, the annexation of a copy of the contract providing for the agreement, for the compromise a copy of it, the object and value of the request, de facto and de jure reasons, as well as the evidences grounding the request, surname, first name and address of arbitration tribunal’s members, signature of the parties. If the plaintiff resides abroad [11], it shall be indicated also a Romania address (headquarters), where are communicated the procedures [12].

Concerning the arbitration request (summons), the defendant can file a respondent plea [13] or a counterclaim [14]. Specifically, the texts referring to the two procedural institutions are maintained in relation to those inserted in the actual code. Thus, the defendant can file a respondent plea within 30 days from the receipt of the copy of arbitration request, the counterclaim being filed within the same term stipulated for the respondent plea or the latest until the first term he was legally summoned. While the respondent plea can invoke exceptions on the summon of the plaintiff, the de facto and de jure answer to this summon, evidences in his defense, the counterclaim is filed every time the defendant invokes his own claims regarding the request filed by the plaintiff.

The arbitration tribunal verifies his competence at the first term of the trial, if the procedure has been legally carried out (Art 571 Para 1). So, if the arbitration tribunal considers itself competent registers this in a ruling which can be attacked only by annulment filed against the arbitration decision. If it considers being incompetent, declines its competence by a decision which cannot be subjected to annulment according to Art 571 Para 3.
Regarding the burden of proof, we note that, unlike common law procedures where the burden of proof is carried out by the plaintiff, namely the person filing a request to the court [15], in arbitration each of the parties must prove its claims in litigation, namely the claim or the defense. The evidences are proposed either by summon, respondent plea or counterclaim, until the first term the plaintiff has been legally summonsed. Art 579 Para 2 must be corroborated with Art 248 Para 2, specific to common law procedures, in the meaning that the arbitration tribunal can accept evidences over the above mentioned term only if “the need of administrating that evidence derives from the judicial research and the party could not have foreseen it”.

The administration of evidences is performed in the court, in front of all arbitrators and umpire. Nevertheless, the tribunal may accept that the administration of some evidences be made either only in the presence of the umpire, or only in the presence of one of the arbitrators, but only the agreement of both parties. We must note that unlike common law trials, the procedure of evidences in front of the arbitration tribunal is more flexible, because in the first one the evidences are administrated only in the presence of the judge panel according to Art 255 stating that “the administration of evidences is performed in front of the notified court, counsel chamber, if the law does not state otherwise”.

The same flexibility is noted also regarding the interrogation of witnesses and experts in front of the arbitration tribunal in the meaning that, on the one hand they can be interrogated without an oath, at their request or with their consent, at their home or office address. Unlike arbitration procedure, the common law procedure is rigid and express, thus Art 313 states the “obligation of oath” for witnesses and Art 314 states the categories of persons and situation allowing derogation from the oath. The arbitration tribunal may postpone the cause for that witnesses or experts to answer the question addressed to them in written (Art 581 Para 1-2).
3. Arbitration decision

According to the new Code of Civil Procedure, the deliberation of the arbitrators on the arbitration decision is secret, by the mean stated by the agreement. The sentencing can be postponed for maximum 21 days with the condition of preserving the term of arbitration. The decision is taken with majority of votes, including, where necessary, the separate opinion. After deliberation is drafted a minute shortly stating the purview of the decision. Arbitration decision communicated to the parties is final and mandatory [16].

The arbitration decision is written and must comprise: the nominal structure of the arbitration panel, surname, first name and address, surname and first name of parties’ representatives, where appropriate, the arbitration agreement, the object of litigation and brief pleadings of the parties, de facto and de jure grounds of the decision, purview and signature of all arbitrators. We consider as interesting Art 594 Para 2 regarding litigation on transfer of ownership of property and/or the establishment of other real right on immovable property, where the decision to be applied must have an enforceable title from the tribunal or to be presented to public notary in order to issue an act based on which the immovable property is registered in the Real Estate Register.

The above article is an atypical provision for a regulation specific to the Code of Civil Procedure, because it joins elements from fiscal legislation with elements specific to cadastre and Real Estate Register areas. We consider that such regulation was used to avoid the ambiguity created because of different interpretations given to some fiscal obligations or regarding the regime of the Real Estate Register on applying the arbitration decision; thereby, the arbitration decision can be performed with celerity, without obstacles or delays from public authorities or institutions called to ensure the definitive and mandatory feature of the decision in the special case of transferring the ownership of property, in the real estate area.

The annulment of arbitration decision is settled by Title 5 of the new Civil Procedure Code.
• The reasons for annulment of the arbitration decision are stipulated by the new regulation, as following: The litigation cannot be solved by arbitration
• The tribunal has solved the litigation without an arbitration agreement
• The arbitration tribunal was not established according to the arbitration agreement
• The party missed the debates and the procedure of summon was not legally performed.
• The decision was issued after the expiration of the term of arbitration stated by Art 559, though at least one of the parties has invoked the obsolete feature of the decision, and the parties did not agree the pursuit of the trial.
• The arbitration decision is against public order, morals or law.

It is also stated that cannot be invoked as reasons for annulment irregularities (such as requests and exceptions on the existence and validity of the arbitration agreement, the composition of the arbitration tribunal, the limitations in arbitrators’ competences and the performance of the procedure) not stated in front of the arbitration tribunal until the first term the parties were legally summoned. Also, cannot be reasons for annulment those irregularities which can be solved according to the procedure of clarification, amendment or correction of the decision, stated by Art 595 (of the new Code).

Regarding the competence of solving the action for annulment of the arbitration decision, it belongs to the Appellate Court, which rules in the form stated by the law for appeals. The respondent plea is mandatory in actions for annulment of arbitration decisions. The term in which the action for annulment can be filed is 1 month from the moment of communication of the arbitration decision [17].

The solutions of the court when such action is admitted depend on the reasons invoked in support of annulment, namely:
• the litigation could not be solved by arbitration [18]
• when the arbitration tribunal trailed in lack of an arbitration agreement or based on a void or inoperative arbitration agreement [19]
• when the decision was issued after the expiration of the term of arbitration stated by Art 559, though at least one of the parties invoked the obsolete feature of the agreement, and the parties did not agree the pursuit of the trial [20].

In all other situations [21] (for instance, when the arbitration tribunal was not formed in accordance to the arbitration agreement or when the party missed the debates and the procedure of summon was not legally performed), the Appellate Court shall trial as first instance, and if are necessary new evidences, the Court shall trial as first instance after the administration of the new evidences.

In the latter situation, the Court shall issue two decisions, thus, according to Art 604 Para 3 the decision for annulment of arbitration shall be issued, and only after the administration of evidences, shall issue the decision as first instance.

The decisions of the Appellate Court are final. Thus it is removed the actual regulation which states that the decision of the court on the annulment of arbitration can be attacked. This situation creates the premises of a quicker solution of the annulment decision, especially in the case of a new trial in front of the court competent to solve the action for annulment.

4. The application of the arbitration decision

The new Code maintains the main provisions on the application of the arbitration decision from the actual regulation, but in a simpler and more organized manner, stating them in two articles “Willingly application” [22] and “Foreclosure” [23]. Thereby, it is considered as willingly execution the situation in which the party who has lost the arbitration decision performs the purview of the decision as soon as he receives it or in the term stated by it. Foreclosure requires the enforceability of the decision, which thus is performed according to specific procedures, applicable in common procedural law stated by the new Code of Civil Procedure.
For the first time, *institutionalized arbitration* is settled by Art 607-612 of the new Code of Civil Procedure.

The new regulation states that the activity of the institutionalized arbitration does not have an economic nature and does not pursue to obtain profit, an important statement removing any future attempt to structure this type of arbitration as a commercial society. It is (re)affirmed the autonomous feature of the institutionalized arbitration in relation to its management, principle confirming the independence of arbitrators and their objective decision.

Procedure rules of the institutionalized arbitration shall be adopted by its management according to its operation norms [24]. Appointing by the arbitration agreement a certain institutionalized arbitration, the parties agree on the application of its own procedure rules, the new Code stating that any derogation from this principle is void. Nevertheless, exceptionally, considering the conditions of the litigation and the content of the procedure rules indicated by the parties as applicable, the management of the institutionalized arbitration shall decide if are applicable also the rules agreed on by the parties, establishing if their application is effective or analogous.

According to Art 612 in case of refuse of the organization or institution named to provide for the institutionalized arbitration, the later one remains valid, and the litigation follows its course to be solved according to common law in arbitration, the regulation of agreed by the parties arbitration institution being invalid.

**International arbitration – procedure applicable to litigations between professional traders in the international market**

Concerning the international arbitration and the effects of foreign arbitration decisions, these are stated in the “International civil trial”. Thus, international arbitration is a special mean of solving international litigations. We note that Art 1096-1108 restates the essential aspects concerning general arbitration. Art 1096 of the new Code considers
arbitration litigation unfolded in Romania as being international if it is derived from a private law relationship with foreign element.

Referring to the arbitration agreement, formally, it shall be proven by the existence of any written mean of communication appropriate for the establishment of evidence, as well as referring to the first instance requirements this is valid if it meets the conditions imposed by the law established by the parties in the agreement, law governing the object of litigation, the applicable law of the contract (stating the arbitration clause) or the Romanian law.

In international arbitration are doubled the terms established in Book 4. The procedural language is established in the same conditions as for national arbitration.

On the applicable law, Art 1105 Para 1 states that the arbitration tribunal shall apply the law decided by the parties, and if the parties have failed to decide it in their arbitration agreement, then it shall be applied the law considered as appropriate by the tribunal, also taking account of the usages and professional rules[25].

The effects of foreign arbitration agreements, stated by Chapter 2 of Title 4 (Book 7) firstly state the qualification of these decisions as “foreign arbitration decisions”, defining them as being those national or international arbitration decisions issued by a foreign state and not considered as national by Romania (Art 1109). The efficiency of the foreign arbitration decisions is ensured when these decisions are recognized and can be applied in Romania, to the extent to which its object is solvable by arbitration in Romania and if the decision does not state against Romania private international law public order [26].

Conclusions

As conclusion, the new regulation on arbitration creates the premises of access for litigants to an arbitration tribunal, as an alternative to common law jurisdiction, having specific procedural forms ensuring the issuance with celerity of fair decisions.
References


[3] Art 607 Para 1; Art 540 Para 1; Art 541 Para 2; Art 543 Para 2

[4] Art 546 Para 2; Art 568 Para 1

[5] The designation of the umpire is mandatory in the new regulation, as according to Art 550 Para 5 “At the proposal of arbitrators... the parties shall also propose an umpire...”

[7] Art 563 Para 1 Let a)
[8] Art 563 Para 1 Let a)
[9] Art 566; Art 234; Art 597; Art 602
[10] Art 604 corroborated with Art 559 Para 1 Let a)
[12] Art 604 corroborated with Art 559 Para 1 Let e)
[13] Art 604 corroborated with Art 559 Para 1 Let c), d), f), g) and h)
[14] Art 605
[15] Art 606
[16] Art 610 Para 1
[18] Art 1110
The Changing Pattern in International Trade and Capital Flows of the Gulf Cooperation Council Countries in Comparison with other Oil-Exporting Countries

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This study provides an overview of the pattern of the gross capital flows of the current and capital accounts of the balance of payments of the group of six Gulf Cooperation Council countries during the last decade that includes the global crisis years. As a comprehensive overview is lacking in the literature, while this country group has gained in importance in the global economy in particular in the years before the global crisis, this study tries to fill this gap. It benchmarks the GCC countries with the other oil-exporting OPEC countries that have a comparable size of natural resources. The GCC countries’ high investments in the world economy financed by their abundant income from oil revenues, showed their remarkably high degree of trade and financial integration in the world economy. Thanks to policies geared towards opening up borders, the GCC countries have imparted a significant stimulus to the world economy, to a much greater extent than other oil exporting countries in similar conditions. Aspects of globalization, trade and financial integration,

1Currently the author has a research sabbatical. This paper was written when the author was an Expert National detached at the European Commission, DG Economics and Financial Affairs, Unit European neighborhood and Macro Financial Assistance, Brussels. Current e-mail-address: Marga.Peeters@gmail.com. The views presented are those of the author and do not necessarily reflect those of the European Commission. The author thanks the participants in the workshop on The evolving international role of the GCC economies at the Mediterranean Research Meeting of the European University Institute and colleagues from the European Commission.
such as the dependence on oil, “Dutch disease”, regional integration, foreign
direct investment and cross-border assets and loans are addressed. The results
show that the impact of the crisis has reverted international capital flows of
the GCC, in particular cross-border bank loans, deposits and foreign direct
investment. Current and future global policymaking needs however more
timely and consistent statistical information.

Keywords: capital flows, gulf cooperation countries, oil, oil-exporting
countries, international trade oil

Introduction

The Gulf countries which together make up the Gulf Cooperation Council (GCC) – namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and
the United Arab Emirates - have up to the global crisis created abundant oil
revenues due to positive price shocks and strong world demand. This holds
in particular for the years 2007 and 2008. The current account of the GCC
went up from 53 billion euro in 2000 to 177 billion euro in 2008 (see Graph
1). In 10 years’ time it recorded almost 1 trillion euro. A comparable group of
countries is the other oil-exporting countries of the Organization of
Petroleum Exporting Countries (OPEC), which includes Algeria, Angola,
Ecuador, Iran, Iraq, Libya, Nigeria and Venezuela. Together with the Asian
economies that have a comparative advantage at the world markets through
cheap labor, these oil exporting countries mainly accounted for the current
account surpluses in the world (see also OECD, 2010). In sharp contrast,
other regions in the world among which the advanced economies such as
the US and the EU, had deficits at their current accounts. In the discussion
on global imbalances, the oil exporters therefore play an important role.
Even in the recession year 2009, where economic growth of the world gross
domestic product fell by -3.2%, their current accounts recorded surpluses.

2 In this paper the group that will be used as a benchmark for the GCC countries will be
referred to as “other” OPEC countries, as Saudi Arabia, the United Arab Emirates, Kuwait and
Qatar are also OPEC countries.
The Changing Pattern in International Trade and Capital Flows of the Gulf Cooperation Council Countries in Comparison with other Oil-Exporting Countries

Figure 1: Development current account oil exporters in comparison with the rest of the world

Source: IMF World Economic Outlook October 2010 and own calculations.

Note: The countries in the world are subdivided into advanced and emerging/developing. The GCC and the other OPEC countries are part of the latter group.

Especially the GCC countries play an important role. Comparison with the other OPEC economies shows that the GCC economies were very open. Their high surpluses have led to abundant investments outside their own borders in the years before the global crisis, hence benefiting the global economy.

Consistent and timely statistical information on the balance of payment items from some GCC countries is lacking, let alone for the GCC as a region. Analysts and policy makers need however this information as the GCC as a region is highly relevant for global economic and financial developments. This study tries to fill this gap and adopts an eclectic approach. It uses different statistical sources to gather the information on the main items of the balance of payments, such as exports, imports, foreign direct investment, portfolio investments and cross-border bank flows for the period 2000-2010 for each of the GCC countries and presents the information for the GCC as a group. Although the other OPEC countries
form a heterogeneous group that is not in all aspects comparable with the GCC economies, they are comparable if it comes to their basic resources (energy).

According to the KOF index of globalization (Figure 2), GCC countries score far higher than the group of other OPEC countries. According to this measure, the GCC countries are more "globalized" than the average of all 158 countries worldwide included in the KOF analyses. The degree of economic, social and political globalization (split-up not shown here), has clearly been on the rise during this whole period under review, being 1995-2008.

Although the gap between the GCC countries and the average of all countries narrowed to some extent, the gap with the other OPEC countries actually widened - which is more due to the other OPEC countries (among which Venezuela) than to the GCC countries. In terms of long-distance flows of trade in goods, capital and services – including foreign direct investment, portfolio investment, tourism income and transfers as percent of GDP - the GCC countries are therefore relatively highly integrated in the global economy.

In terms of trade openness, the GCC almost achieved double the score of other country groups (see Table 1). While exports and imports of goods exceeded their total nominal GDP in 2008, the other OPEC countries and the EU countries reached rates of 67% and 66% respectively. As higher foreign demand for goods by definition pushes up nominal GDP as nominal exports increase, ceteris paribus, the big difference between the GCC and the other OPEC countries partly comes from the level of imports that is far lower in the latter countries owing to their more autarkic and protectionist domestic policies. Like trade openness, financial integration is a measure that reflects the degree of integration of a given country with other economies. As to the GCC, financial integration increased tremendously as domestic banks, companies and citizens started cross-border banking, both for business purposes and investment in foreign capital or securities. In 2008 financial integration of the GCC more than tripled that of the other OPEC-countries (74% as against 21%).
The Changing Pattern in International Trade and Capital Flows of the Gulf Cooperation Council Countries in Comparison with other Oil-Exporting Countries

Figure 2: Degree of globalization mean of the indices of the Individual countries

Source: Konjunkturforschungsstelle (KOF) Index of Globalization 2010, Zürich, and own calculations.

Note: The index has three dimensions: economic globalization, political globalization and social globalization. Long distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges characterize economic globalization. A diffusion of government policies characterizes political globalization. The spread of ideas, information, images and people characterizes social globalization. According to Dreher (2007), econometric evidence for the period 1970-2000 for a sample of 123 countries proves that globalization promotes growth, though not to an extent necessary to reduce poverty on a large scale.

Table 1: Summary statistics for 2008

<table>
<thead>
<tr>
<th></th>
<th>GCC</th>
<th>Other oil-exporting countries¹</th>
<th>European Union²</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (in EUR bn)</td>
<td>733</td>
<td>916</td>
<td>12,509</td>
</tr>
<tr>
<td>Population (in mn)</td>
<td>37</td>
<td>346</td>
<td>495</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>19,798</td>
<td>2,647</td>
<td>25,270</td>
</tr>
<tr>
<td>Trade openness³</td>
<td>102</td>
<td>67</td>
<td>66²</td>
</tr>
<tr>
<td>Financial integration⁴</td>
<td>74</td>
<td>21</td>
<td>177</td>
</tr>
<tr>
<td>Crude oil production⁵</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>
1. The other OPEC-countries are Algeria, Angola, Ecuador, Iran, Iraq, Libya, Nigeria and Venezuela.
2. Bulgaria and Romania not included.
3. Exports and imports as percentage of GDP.
4. Foreign bank assets and foreign bank liabilities as percentage of GDP.
5. In million barrels per day. Sources: IMF WEO Spring '10 and IFS, Bank for International Settlements Basel, OPEC and own calculations.

Although the financial channels turned out to be a source of contagion in the recent global crisis, they are nevertheless an important engine for economic growth. In this respect, one should embrace financial integration - like trade integration - although caution is the watchword when it comes to the attendant vulnerabilities such as excessive debt, credit booms and foreign currency borrowing and lending.

Globalization and economic and financial integration have many dimensions. The next section shows the development of the GCC’s balance of payments, which is divided into the current account and the capital account (including the financial account). It highlights the similarities among the two groups of countries of the current account developments, but also shows the big differences of the capital account developments. Section 3 continues with an analysis of the current account, looking in particular at exports of oil-related goods and the flows of remittances. Section 4 analyses the development of foreign direct investments, cross border loans and deposits and cross border portfolio investments, as these are pivotal for the capital account. Section 5 summarizes main findings, concludes and identifies some future research areas.
The current account surpluses of the GCC countries have grown strongly until 2007, even up to almost 30% of GDP (see Graph 3a). A similar pattern, though of a smaller size, is observed for the other OPEC-countries (Graph 3b). The development of the GCC and the other OPEC-economies' capital accounts differ however much.

Up until the start of the global crisis in 2007, the capital account of the GCC economies had become the mirror image of its current account, indicating that the money flowing out of the GCC was about the same size as the money entering the GCC. This is an important finding, as it underlines the growing open character. In sharp contrast, the capital account balance was much smaller in the other OPEC-countries (as follows from a comparison of the brown bars in Figure 2a and 2b).

The current account of the GCC countries has posted strong surpluses for many years in succession, as the positive trade balance more than compensates for the deficit in the balance of services and the outflow of remittance. The global crisis reduced imbalances across the world, including the oil-exporting countries, as commodity-exporting countries faced falling exports, while developed economies - of which many are commodity importers - reduced their imports following a drop in their domestic demand. One may expect that imbalances will widen again in times where world demand will pick up but the GCC countries are likely to be on the high side of the imbalances in the world. Their strong exports of goods position offsets the deficits they incur on their services and the relatively high amounts of remittances that they pay for the large numbers

3 There is no harmonization of the balance of payments across the countries. For this reason, I simplify the analyses, and stick to the broad division of a current account and a capital & financial account. Appendix A lists the definitions adhered to in this paper, where it is here relevant to mention that for convenience's sake all the capital account comprises all financial and capital flows. Therefore, the balance of payments is split into a current and capital account, where the current account includes the trade of goods, services and income, as well as current transfers. The capital flows include all other flows, such as foreign direct investment, capital transfers, portfolio investment and other investment.
of foreign workers employed in all sectors of their economies. See section 3 for more in-depth information concerning the current account.

**Figure 3a: Current and capital account GCC countries**

*Sources: Arab Monetary Fund, Monetary authorities, Bloomberg, IMF IFS and Article Iv, ECOWIN, Reuters and own calculations.*

*Note: The current account balance as a percentage of GDP is calculated as the sum of the current account balances of the six GCC countries divided by the sum of the nominal GDP of the six GCC countries. Similarly, the capital account and balance of payments are calculated. Errors and omissions are included in balance of payments but not in the current and capital accounts; the sum of the current and capital accounts in addition to the errors and omissions equal the balance of payments.*
Figure 3b: Current and capital account other OPEC countries

Note: See note of Figure 3a. Iraq is not included due to lack of date at the beginning of this millennium

Information about the capital account is in general more difficult to obtain than information on the current account and this holds in particular for these groups of countries. In comparison with the current account developments, the capital account consists of items that are more volatile, vulnerable and therefore difficult to measure accurately.

According to the information here, obtained from various sources (see appendix C for the detailed information), the balance of this account for the GCC was negative from 2000 until 2008 (as follows from Figure 2a). This reflects by definition a change in ownership of assets. The change in domestic ownership of foreign assets exceeded the foreign ownership of domestic assets. Consequently, net investments by the GCC abroad were higher than net investments by foreigners in the GCC. The balance of their foreign direct investment, portfolio and other investments such as bank loans and deposits was negative. In 2007 the pattern altered, as repatriation of foreign funds by the GCC in reaction to the global

364
developments triggered by the subprime crisis in the US narrowed the capital account in relation to their current account. More details on the FDI and cross-border bank loans can be found in Section 4.

Gross Flows of the Current Account

a) Fluctuations in the oil price affect nominal exports by 80%

The main inflows of the current account for these groups of countries follow obviously from the exports of goods. Exports in both the GCC and the other OPEC countries closely follow the developments in the oil prices. The sharp fall in oil prices from more than €85 in June 2008 to less than €30 in December 2008 was accompanied by a sharp drop in nominal exports of goods from oil exporting countries, with a short lag (see Figure 4a). Monthly exports fell by more than half, from €45 billion to just over €20 billion. This illustrates the strong dependence of exports on oil. Also, the resurgence of the oil price at the beginning of 2009 led to a similar rebound in the exports.

![Figure 4a: Developments of the exports of goods in relation to the oil price](image)

*Source: Reuters ECOWIN, IMF Directorate of Trade Statistics, own calculations*
But much more relevant than the correlation between oil prices and nominal exports is the degree to which changes in oil prices cause changes in nominal exports. Using monthly data for the period from January 2000 to December 2009, it follows that a 10% shock in oil prices per month leads to a 2% increase in nominal exports of the GCC directly for the GCC (Table 2 and Figure 4b). For the other OPEC countries the short-term impact is even more than 3%. A shock of 10% in each month during a year leads in the 12th month to around 8% higher exports for both groups of countries (see Graph 4b). The oil price elasticity’s with respect to exports are thus high and, as follows from Table 2, highly significant.

Figure 4b: Response of exports of goods to a 10% increase in oil prices
Note: These simulations are calculated from a baseline scenario and a scenario in which the oil price is twelve months in a row 10% higher in comparison with the baseline for 12 months in a row (illustrated by the grey line) using the results of the SUR-model as described in Table 2.
Table 2: SUR-regression results of exports of the GCC and the other OPEC countries

<table>
<thead>
<tr>
<th></th>
<th>GCC</th>
<th>other OPEC countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta \text{exports}_{t-1} )</td>
<td>0.69**</td>
<td>0.61**</td>
</tr>
<tr>
<td>( \Delta \text{oil} )</td>
<td>0.24**</td>
<td>0.32**</td>
</tr>
<tr>
<td>( \text{Adj-R}^2 )</td>
<td>0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td>2.18</td>
<td>2.08</td>
</tr>
</tbody>
</table>

Note: These are regression estimates of the monthly growth rate of nominal exports on the monthly growth rate of nominal exports one month lagged, the growth rate of oil prices and monthly dummies, for the GCC countries (second column) and for the other OPEC countries (third column). Subscript \( t \) indicates the \( t \)-the month. A ** indicate significance at the 1% level. The sample period is January 2000 – December 2009. The computing programme and data are available upon request. See also appendix B for similar regressions with leading indicators.

b) Remittances

High oil prices during the last decade fuelled the GCC region’s boom and, in return, forced the local economies to look at other countries for cheap labor. As GCC economies employ many foreigners so that there is a high outflow of workers' remittances. Graph 5 shows that the gross flows outflows are far higher than the inflows. During the period 2000 until 2009 the outflows from the GCC were around 3 to 6% of GDP while the inflows were negligible. For the other OPEC countries, reversely, the inflows were higher at around 1% of GDP while the outflows were at 0.1-0.2% of their GDP.

The high level of the remittances is the reason that the balance of net factor income from abroad (see appendix A) tends to be negative, indicating that more remittances flow out of the GCC than that enter the GCC. In size, this deficit is however only a tiny share of the proceeds from the exports of goods, so that the current account of the GCC remains positive.

While there are many uncertainties around the precise amount of remittances, estimates indicate that Saudi Arabia transferred USD 20 billion in 2008 (World Bank, 2009). For the GCC (with Qatar and the UAE not included) the annual outflow of remittances grew strongly in the period
2005-07 and stabilized in 2008 and even 2009 (Figure 5). Despite the global crisis, the inflows of FDI, as a percentage of GDP, remained thus high.

Remittances worldwide in absolute terms slowed down significantly during the global crisis due to slackening demand for labor following the onset of the global credit crisis. The higher cost of lending in the region led to a number of expensive industrial projects in the region to be delayed or cancelled in this year and, subsequently, forced many expatriates working in the GCC region to cut back on cash transfers to their spouses and family members.

![Figure 5: Outflows and inflows of workers' remittances](image)

*Source: Worldbank, IMF WEO and own calculations.*

*Note: Outflows from Qatar and the UAE are not included due to lack of information. Inflows from Bahrain, Kuwait, Qatar and the UAE are not included.*

In the more populated other OPEC countries there is no shortage of labor. Not many immigrants are working in these countries and there is thus hardly an outflow from the other OPEC countries to the rest of the world in the form of remittances.

c) *The composition of the current account of the GCC*
The composition of the current account during the last decade has been dominated by the exports of goods of more than 40% of GDP (see Graph 6). While the imports of goods approached this level of 40%, and gained in importance over the years up before the global crisis as did the imports of services, the outflow of remittances looks rather bleak.

A substantial part of the current account remains unexplained, due to errors and omissions and other in- or outflows (such as transfers).

**Gross Flows of the Capital Account**

*d) The strong increase in inward and outward foreign direct investment*

Many oil-exporting countries have a reasonable amount of inward Foreign Direct Investment that is invested among others in the energy sector for extraction purposes, but also in infrastructure projects. By comparison with other oil exporting countries, the GCC countries receive a considerable amount of FDI and invest a considerable amount of FDI abroad in relation to this inward FDI (see Figure 7). In 2007, GCC’s inward FDI peaked. In return, Bahrain, Kuwait, Qatar, Saudi Arabia and the United
Arab Emirates invested as much abroad as they received in the form of inward FDI. Apart from the GCC countries, Libya is also showing more openness, as the FDI it received accounted for of 6.5% of its GDP in 2007 and it invested 5.5% of its GDP abroad. Apart from Libya and the GCC countries, none of the oil-exporting countries spent more than 5% of their GDP on foreign investments.

FDI is in general an investment involving a long-term relationship. The flows of FDI comprise equity capital, reinvested earnings and intra company loans. The large sums of money invested abroad by Saudi Arabia, the United Arab Emirates and Kuwait mainly come from their Sovereign Wealth Funds or other national or private funds built from oil income. At the end of 2008, the Saudi Arabian Monetary Agency (SAMA) possessed USD 501 dollar, the Abu Dhabi Investment Authority (ADIA) and the Abu Dhabi Investment Council (ADIC) USD 328 billion, and the Kuwait Investment Authority (KIA) USD 228 dollar (see UNCTAD, 2009).

Figure 7: Inward & outward FDI of oil-exporting countries in 2007
Source: Own calculations on the basis of the data from UNCTAD and IMF WEo.
Note: Included are the six GCC countries (in orange), the other OPEC countries (Algeria, Angola, Ecuador, Iran, Iraq, Libya, Nigeria and Venezuela) but also Egypt, Norway, Kazakhstan, Russia and Syria.

Up until the start of the turmoil on the global financial markets in 2007, the inflows of FDI had been steadily growing (see Figure 8). In 2007 – which was the best year - the GCC countries spent almost 6% of their GDP on FDI abroad, while foreigners invested also 6% in the GCC. This inward FDI has contributed significantly to domestic investment, and thus to economic growth in the GCC. Similarly, outward FDI has helped economic development, particularly in Northern Africa (Algeria, Egypt, Morocco and Tunisia).

While the GCC demonstrates its openness by the high level of the outward FDI flows, it received - like the other OPEC countries - more FDI than it spent abroad and therefore posted a surplus on the part on net FDI on the capital account⁴. In comparison with the other OPEC countries the GCC not only has higher outflows of FDI due to its policies geared toward global investments, but also received much more FDI as a percentage of GDP in the years 2005-08. In this way, the GCC has reaped the benefits of its openness as this form of investment directly contributes to its economic development.

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⁴ In view of the negative balance on the capital account in the period 2000-06 (see Figure 3a and 3b) this FDI balance surplus by definition (see appendix A) implies that the other components of the capital account posted more out- than inflows, which points at the high portfolio and other investments abroad by the GCC in that period.
The Changing Pattern in International Trade and Capital Flows of the Gulf Cooperation Council Countries in Comparison with other Oil-Exporting Countries

Figure 8: Inflows and outflows of FDI

Source: Own calculations based on UNCTAD and IMF World Economic Outlook Oct 2010.

Note: Iraq is not included due to lack of data in the war period.

e) The surge and recent fall in cross border loans and deposits

Along with the sharp rise in other cross border transactions until 2007, cross border banking also surged in the GCC. Deposits from citizens in the GCC at foreign banks grew significantly (see Figure 9, north-west). But, even more interesting, loans taken by GCC at foreign banks grew from 20% of GDP up to 36% of GDP in 2007 (Figure 9, north-east). The developments of cross-border deposits and cross-border loans show a clear turning point in 2008.

This follows directly from the changes in the cross border bank deposits and loans (Graphs 9, south-west and south-east), that count for the capital account of the balance of payments. In 2008 the GCC withdrew deposits from its foreign bank accounts of around 3% of GDP while citizens of the GCC still took loans from foreign bank account of 27 billion euro. Some of the GCC countries became even indebted to the outside world. Also
the other OPEC countries reduced their deposits at foreign bank accounts, but not earlier than 2009. Their cross border level of loans in terms of their GDP hardly changed during the crisis, but this was already at a low level, in sharp contrast with the GCC countries.

Figure 9: Cross border bank deposits and loans

Source: Own calculations based on the Bank for International Settlements and IMF WEO databases
f) The composition of the capital account

Although surrounded by uncertainties due to measurement errors and omissions, the picture of the composition of the capital account of the GCC is interesting (Figure 10). In recent years the account has been dominated by flows in cross border bank loans and deposits and portfolio investments. Despite from the fact that portfolio investments are hard to measure (and probably partly contained in the "errors, omissions and others component"), a conclusion that can be drawn here is that the composition of the GCC's capital account has drastically changed over the last years. Not only FDI inflows and outflows have become more important in recent years, but the other capital account investments have widened – capital inflows tripled and capital outflows probably doubled over the years 2004 until 2007.

Figure 10: Composition of gross flows of the capital account of the GCC

Intraregional Trade and Financial Integration in the GCC

Calculations of the current and capital flows for the GCC as a region should ideally be purified from intraregional flows. Although the previous analyses included the intraregional flows, the expectation is that the
composition of the current and capital account would change little if only extra-regional flows would have been included.

After all, the facts tell us that only 5% of the goods exported by one GCC country in 2008 went to another GCC country. This applies to 9% of the total goods imported by the GCC countries. The facts also tell us that this intra trade of goods within the GCC has not increased during the last decade, as these export and import shares of the GCC countries remained at 4-5% and 8-9% respectively. The interregional flows of services are expected to be even lower in view of the similarity in economic structures of the GCC countries, while interregional flows of remittances in view of the relatively low population in relation to the economic activity and FDI flows seem negligible. Studies on interregional financial integration of portfolio types of investment show that flows are non-negligible and increasing but still relatively low (see Espinoza et al. and Balli et al., both 2009).

By comparison with other regions in the world, therefore, there is a scope for the GCC region to increase this interregional cross-border trade, not least by means of a further diversification of economic activity. This will contribute to the functioning of this aspect of the common market among the GCC countries. This will require more complementary economic structures (particularly in agriculture, construction, transport, the financial sector and other services).

![Figure 11: Intra trade GCC countries in 2008](source: IMF DoTS and own calculations)

5 Please notice that the 5% of intra-GCC exports equals the 9% of intra-GCC imports in absolute terms.
Summary, Conclusions and Future Research

Being countries endowed with abundant natural resources, the GCC countries are fortunate to receive large streams of foreign money that, in the recent past, was spent proportionally more abroad than other countries facing similar conditions. This high degree of trade and financial openness was conducive for the GCC economies and contributed significantly to global economic growth.

This study concentrates on the developments of trade and capital flows of the GCC in comparison with its peers during the past decade. It follows that, up until the start of the global financial turmoil at the end of 2007, the GCC countries received unprecedented high oil revenues thanks to soaring global commodity prices and high world demand. Not only the exports of oil and gas, but also the high inflows of foreign direct investment and access to international bank loans helped the GCC economies to develop their financial and real estate sectors, among others. The high inflows into the GCC countries generated in return a surge in imports of goods and services, along with high outflows in the form of foreign direct investments worldwide (tough particularly North Africa) and, last but not least, high portfolio investments. To a much greater extent than other oil-exporting countries, the GCC opened its borders and that is why it was closely integrated in the world economy, not only economically but also financially.

Thanks to GCC policies geared towards openness, the welfare levels of the GCC economies have been raised, but the GCC economies remain vulnerable. Due to their high dependence on energy there is a risk that a negative oil price shock may impact the GCC economies severely. Further diversification of economic activity will be needed in order to mitigate the negative effects of a drop in oil revenues. Across the GCC countries, more diversified economic structures would also benefit the intra-GCC trade if the economies become more complementary. More trade within the GCC region will be conducive to economic growth. In case economies can diversify, the further development of the economic union will help accelerate trade and economic growth in the region.

In successive years, a strong current account characterized the GCC economies. It consisted of a very positive trade balance due to high oil exports, a relatively small negative balance in services and – prior to the global crisis – a net factor income account dominated by outflows in the form of remittances and inflows of dividends and profits on foreign
investments. The balance of the capital account was almost the mirror image of the current account during the period 2000-2007, implying that the abundant funds received were to a large extent invested in the global economy. Consequently, during those years the GCC decreased its ownership of foreign assets relative to foreign ownership in the GCC. These were abundant high levels of investments other than FDI investments in comparison with other oil-exporting countries. For the development of the world economy, this is highly relevant as these capital flows have been important sources of income to other countries. The greater degree of openness of the GCC countries in comparison with other countries in a similar situation in the past not only benefited the GCC economies but also the world economy.

The year 2008 was a turning point in that the capital account started shrinking, because the GCC repatriated funds for its domestic needs. The GCC authorities and the private sector in the GCC countries opted for investment opportunities in their home countries instead of abroad. The GCC economies took less foreign bank loans and withdrew bank deposits abroad at the same time. In 2008 outward FDI fell significantly in comparison with 2007. These changes in investment policy raise the question to what extent these (apparently) more cautious GCC investment strategies impact their own economies, but in turn, also the world economy in comparison with the booming period before the global economic and financial crisis.

The main aim of this study was to provide a rather comprehensive overview of the capital flows of the GCC economies. Although this aim was achieved to a great extent, the analyses were hampered, among others by the lack of statistical information on portfolio investment. Greater transparency on statistics in this respect, but also more timely statistical evidence of other balance of payments' items will help policy makers and analysts in understanding the capital flows from this Middle East region. Also, more research on the trading or counter parts of the GCC can shed more light on missing elements and provide consistency checks (see appendix B providing an example for trade statistics).
Appendix

A. The balance of payments

In this study the following definitions are adopted:

The balance of payments = current account + capital account \hspace{1cm} (i)

Current account = balance of trade
+ net factor income from abroad
+ net unilateral transfers from abroad \hspace{1cm} (ii)

Capital account = foreign direct investment
+ portfolio investment
+ other investment \hspace{1cm} (iii)

Following this definitions, it holds that:

Current account = changes in net foreign assets \hspace{1cm} (iv)

Capital account = change in foreign ownership of domestic assets
- change in domestic ownership of foreign assets \hspace{1cm} (v)

The current account reflects a nation’s net income while the capital account reflects a country’s net change in ownership of assets.

A current account surplus increases a country’s net foreign assets by the corresponding amount, and a current account deficit does the reverse. Both government and private payments are included in the calculation. The somehow misleading term “current” account originates from the fact that goods and services are generally consumed in the current period. Remittances are part of the net factor income where money earned by foreign workers that are sent abroad is typical income outflows. Foreign direct investment and portfolio investment are part of the capital account, but income from investments (interest, dividends) is recorded in the current account.
Cross-border loans and deposits are treated in the section on the capital flows (see section 4). Their interest payments are recorded on the current account.

The GCC countries have a positive current account if the surplus on the trade account of goods and services (abundant exports of goods) largely compensates the deficit of the net factor income account (outflow of remittances). The sign of the GCC’s capital account has changed during the last decade – which is a focal point in this study.

B. Analyzing the GCC exports & imports in the absence of timely data

The analysis of the balance of payments for some of the oil-exporting countries is hampered by the lack of timely data for some of the countries or incompleteness. Among the many BoP components (exports and imports of goods, exports and imports of services, remittances, portfolio investments) this holds least for the FDI.

As the exports and imports of goods is the biggest component on the balance of payments for the GCC, and most relevant for trade analyses a leading indicator is constructed. The GCC’s main trading partners’ imports from the GCC are used to approximate the GCC’s total exports. Alike, the GCC’s main trading partners’ exports to the GCC are used to approximate the GCC’s total imports (for this methodology, see also Welzenis (2009)).

A Seemingly Unrelated Regressions model with monthly data is used to explain the annual growth rate of total nominal exports and imports of the GCC countries (Table B1). GCC’s exports are explained by the imports of the euro area and the United States from the GCC countries and the oil price. In a similar way, GCC’s imports are explained by the exports of the euro area and the US to the GCC. The estimated model is subsequently used for forecasting the GCC’s total exports and imports, by using the actual imports and exports from the Eurozone and the US.
Table B1: SUR-regression estimates for exports and imports of goods of the GCC

<table>
<thead>
<tr>
<th></th>
<th>exports</th>
<th>imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>exports_{t-1}</td>
<td>0.60**</td>
<td></td>
</tr>
<tr>
<td>imports_{t-1}</td>
<td></td>
<td>0.64**</td>
</tr>
<tr>
<td>oil_{t}</td>
<td>0.14**</td>
<td></td>
</tr>
<tr>
<td>imports euro area and US to the GCC</td>
<td>0.17**</td>
<td></td>
</tr>
<tr>
<td>exports euro area and US to the GCC</td>
<td>0.30**</td>
<td></td>
</tr>
</tbody>
</table>

Adj-R² | 0.96 | 0.77

Durbin-Watson statistic | 2.14 | 1.56

Note: These are regression estimates of the monthly growth rate of nominal exports on the monthly growth rate of nominal exports one month lagged, the growth rate of oil prices, monthly dummies and an approximation of GCC exports, in case the imports of the euro area and the US from the GCC (see second column). Similarly, nominal imports are regressed (see third column), using an approximation of GCC imports, in case the exports of the euro area and the US to the GCC. Subscript t indicates the t-th month. A ** and * indicate significance at the 1% and 5% level, respectively. The sample period is January 2000 – December 2009.

Figure B1: Leading indicator for GCC’s exports and imports of goods

Apart from the strong downturn in the beginning of 2009, the growth rate of imports of the Eurozone and US from the GCC moves nicely in line with the growth rate of total exports of the GCC (see left Graph B1). The same holds for the indicator used for the GCC’s imports (see right in Figure B1). Also the econometric analyses points at the high significance of the indicators (Table B1). Using the statistical information from the main
trading partners is therefore a reliable indicator. The simulated forecast for the trade balance (exports minus imports) is presented in Figure B2.

![Figure B2: Trade balance of the GCC](image)

The time lag between the trading partners’ availability of statistics on the trade of goods and the IMF DoTs statistics for the GCC is two to three months. But for statistics on services, for instance, this lag is much longer. Given the high relevance of the components of the GCC’s BoP for macroeconomic and financial analyses, application of this methodology is part of future research.
C. International trade and financial flows of the GCC

This appendix lists the statistical information per country used in this study. The multitude of data sources and the definitional differences across countries make it hard to indicate in which situation which data source provides the most reliable and best information for the purpose of analyzing the balance of payments. Therefore, and out of transparency reasons, I provide here the statistics that were used in the graphs and tables of this study after cross-checking in the available data sources and using common sense.

The data sources consulted are the following:

- Arab Monetary Fund
- Bloomberg (national sources)
- ECOWIN Reuters Economic Data
- IMF Article IVs
- IMF Directorate of Trade Statistics
- IMF International Financial Statistics
- IMF World Economic Outlook
- Central Bank of Saudi Arabia, i.e. the Saudi Arabia Monetary Authority Annual Reports, United Arab Emirates' Central Bank Annual Report 2008 and resources of other central banks.

Main definitions adhered to are those used by the AMF (in case consistent time series until 2007), if and only if they are in agreement with ECOWIN Reuters national data.

All data used and calculations made in this study are available upon request.

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The Financial System of the New EU Member States: Experiences and Current Challenges

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The current financial crisis has had a severe impact on the European financial systems, reinforcing the ongoing discussion about the scale, scope, performance, safety and soundness of the financial system and its institutions. In this context, the purpose of this research is to highlight, using an empirical approach and a quantitative analysis, the vulnerabilities accumulated by the financial systems from the new EU member states (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania) during the period before the current global economic crisis broke out and to emphasize the extremely serious consequences of the current crisis on their financial systems, the interaction between the financial sector and the real economy, the measures taken by the authorities in order to avoid the collapse of financial systems, as well as the new challenges aroused for the authorities in the current context. Finally, we argue then that building a safer financial system with better crisis management and a compelling solution for burden-sharing should be the current priority.

Keywords: financial system, banking sector, credit growth, capital market, new EU member states, financial crisis
Introduction

From the beginning of the 1990s, change in the European financial system was driven by the forces of deregulation, financial integration and financial innovation. The deregulation process has not only removed the geographical barriers but also has blurred the line that existed between the banking sector and the other financial sectors, especially as a result of the legislative changes that allowed the large scale adoption of the universal banking model. These changes affected not only the financial systems from the US or Western Europe but also the ones from the emerging markets of the new EU member states.

The financial integration process, either regional or global, allowed financial institutions to extend their businesses in new markets as entering barriers were removed and the legislative framework became more harmonised. The entering of foreign financial institutions on national financial systems, determined an increase of the completion level, as these new entrants benefited from superior know-how, better risks management models and optimal organizational schemes, which in term allowed a better allocation of financial resources.

Until the first part of 2007 the general consensus was that the high-performing financial systems, which benefited from excessive capital, presumably state-of-the-art risk management schemes and a market-based regulatory system, will be able to provide finance to investments at the same historically low interest rates which were previously achieved. However, since the beginning of the financial turmoil the global financial system has registered a series of consecutive set-backs, losing its fast growing pace, high profitability margins, its dynamic and especially its drive to innovation. Many financial institutions have suffered large loses as the events of the financial crisis unfolded, some of them going into bankruptcy while other applying large restructuration schemes and struggling to raise additional capital, either privately or through various governmental bailouts programs. These events have triggered vivid discussions in the academic world regarding the scale, scope, performance, governance, safety and soundness of the financial system and its institutions.
In this context, the purpose of this research is to highlight the vulnerabilities accumulated by the financial systems from 8 new EU member states (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania) during the period before the current global economic crisis broke out. These accumulated major imbalances, along with external factors, have led to extremely serious consequences for the economic and financial environment from those countries. Thus, our paper aims to underline the major importance for a sustainable functioning of the banking sector and capital market, as well as the emerging challenges for financial and monetary authorities, from national, European and international level.

To achieve this purpose, we consider a comparative analysis of the imbalances accumulated in the financial and banking systems from the analyzed countries. Thus, the first part of our research contains introduction remarks regarding the importance and relevance of the approached theme; the second part is dedicated to an extended literature review which summarizes the main researches undertaken so far on this subject, pointing out their conclusions and limits; the third part highlights the particularities regarding the development of the financial systems from the 8 new EU member states taken under study; part fourth contains an analysis regarding the dynamics of the banking lending activity from the analyzed countries and the implications of the current global crisis; while the fifth part emphasizes the impact of the current crisis on the capital markets from the analyzed countries, using an empirical approach and a quantitative analysis; part sixth provides an overview of the measures undertaken by the authorities from the states considered in order to sustain their banking and capital market sectors; while the final part provides the concluding remarks.

The methodological approach used in order to develop this paper starts with a literature review, which establishes the role and the place of this research. Thus, we have indentified the main studies from this field, the way that they are dealing with this matter, the methodology used and nevertheless the limits of their conclusions. The analysis undertaken in our research is based on the official statistics of the central banks from the analyzed states, official statistics of the Eurostat, IMF, World Bank, different reports, studies and researches. As a method of data analysis we have used
systematization techniques and also a series of various indexes and indicators. The usage of these methods has been materialized in a series of comparative tables and graphics showing the imbalances accumulated in the financial systems from the analyzed countries, the limited efficiency of the measures adopted by the authorities in order to correct them, as well as the implications of the current global crisis on the banking sector and the capital market from the countries included in out sample.

Theoretical background and literature review

The financial system, represented by the complex of financial markets, intermediaries and infrastructures through which firms, households and governments, on the one hand, acquire the resources necessary for their activity and, on the other hand, invest their savings [1], has a vital role for the real economy, ensuring the economic growth through its main functions, namely: the dissemination of information on potential investment opportunities and capital allocation; the enabling of trading; and the capacity to mobilize and pool savings and to ease the exchange of goods and services [2].

A series of theoretical and empirical studies have highlighted the strong correlation between the functioning of the financial system and the long-term economic growth ([3], [4], [5], [6], [7]). Thus, this studies emphasis that the healthy functioning of the financial system contributes to the economic growth by ensuring the financing of the best investment opportunities, promoting the accumulation of capital and improving risk sharing. The performances of a financial system are assessed in terms of two dimensions, its efficiency and stability, which directly influence the real economy performance (see figure 1).

In turn, the efficiency and the stability of the financial system are significantly influenced by financial integration and financial development. In this respect, financial integration leads to increased competition between financial intermediaries, creates economies of scale, increases the overall market’s liquidity and improves the scope for diversification and risk sharing [8].
Regarding the financial development, [1] considers that it refers to the process of financial innovation as well as institutional and organizational improvements in a financial system that reduce asymmetric information, increase the completeness of markets, add possibilities for
agents to engage in financial transactions through (explicit or implicit) contracts, reduce transaction costs and increase competition, and in order to measure the degree of domestic financial development, [9] constructed a composite normalized index, which includes three dimensions: the institutional dimension, size and access to finance and financial market performances.

In this context, taking into account the increasing degree of financial integration and the central role played by financial systems in modern economies, the insurance of the financial system stability becomes an issue of utmost importance, contributing significantly to achieving a stable and sustainable economic growth.

In general, most of the studies undertaken on the subject regarding the importance of ensuring the stability of the financial systems and the impact of the current financial crisis tend to be focused on the US or the European Union as a whole, and to a lesser extend take into consideration the particular case of the states from Central and Eastern Europe, an exception to this being for example the studies of [10] and [11]. In their research [10] are first assessing the strengths and vulnerabilities of the banking sectors from the CESEE states before the beginning of the financial crisis. Afterwards, the paper finds that, since the crisis has started to impact the CESEE, the developments in this region have been rather heterogeneous, the countries with the largest economic imbalances tending to be the most affected. In a different approach, [11] undertake a comparative analysis regarding the impact of the global financial crisis between CESEE states and the ones from Latin America underling that even if initially both regions were surprisingly resilient to the crisis, afterwards both were severally affected by the sharp retrenchment in capital inflows and the decline of the global demand. Therefore, taking into consideration the reduced number of studies regarding the effects of the global crisis on the CEE states, our research could represent another step towards the possibility of filling this gap, by focusing on the vulnerabilities and the challenges of the main components of their financial systems: the banking sector and the capital market.
Main features of the financial system from the analyzed countries

Most of the analyzed countries have registered, over the past two decades, significant transformations regarding their financial development. In this respect, an evidence of the progresses achieved so far is given by the indicators computed by the EBRD that evaluate the banking reform and interest rate liberalization as well as the securities markets and non-bank financial institutions reform, highlighting major progresses regarding the financial institutional reform (see table 1).

Notwithstanding, over the last years, it can be noted in the majority of the analyzed countries a stagnation of the reforms or a slower progress of them, pointed out by the values of the financial system reform indicators. Hence, for example, despite the problems faced by the financial systems of most studied countries, in 2010 EBRD indicators have not registered significant changes, with the exception of the particular situations from Hungary and Poland (see table 1). In the case of Hungary, the financial system reform indicator has recorded a downgrade as a result of the adoption by the Hungarian government of a “financial activities tax” on financial and banking activities. Comparatively, Poland received an upgrade in this indicator because of the successful introduction of a new bond trading platform, an innovation that is expected to stimulate the development of local capital markets [12].

A significant feature of the financial system from the studied countries is represented by the dominance of the banking sector, which can be evidenced by the share of bank assets in total financial institutions assets (see figure 2). In this context, it can be appreciated that the stability and efficiency of the banking sector is an essential precondition for the states’ sustainable economic development as well as for the insurance of a proper conduct of the nominal and real convergence process. In addition, a sound and competitive banking sector allows the efficient transmission of monetary policy impulses to the real economy and thereby contributes to achieving the fundamental objective of the central banks from the analyzed countries, namely to ensure and maintain price stability.
Table 1: The evaluation of the financial sector reform based on the EBRD* index in the case of the analyzed countries

<table>
<thead>
<tr>
<th>Banking reform indicator and interest rate liberalisation</th>
<th>Securities markets and non-bank financial institutions reform indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>1990</td>
<td>1.</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1995</td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>3.</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>3.</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td>2007</td>
<td>3.</td>
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<tr>
<td></td>
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<tr>
<td>2008</td>
<td>3.</td>
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<tr>
<td></td>
<td>7</td>
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<tr>
<td>2009</td>
<td>3.</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

**Source:** data centralized based on [12], [13] and [14]

* The values of the indicators are between 1 and 4+, where 1 means little progress in the reform of the financial system. For banking sector reform, 4+ represents full convergence of banking laws and regulations with BIS standards and a full set of competitive banking services. For securities markets and non-bank financial institutions, 4+ represents full convergence of securities laws and regulations with IOSCO (The International Organization of Securities Commissions) standards, and fully developed non-bank intermediation.
The Financial System of the New EU Member States: Experiences and Current Challenges

Regarding the banking sector of the analysed countries an important structural change that was registered in the analysed banking sectors is represented by the presence of a high number of foreign owned banks which have contributed to the enhancement of the financial integration process of these countries. The quick liberalisation of the internal market and the opening of the capital accounts have attracted important capital flows and a rapid growth of the foreign banks presence, which now have a dominant position on these national markets, especially in the case of Estonia, Lithuania, the Czech Republic, Romania and Bulgaria (see figure 3).

The presence of foreign banks has brought a series of advantages for the host countries, through the diversification of the product lines offered and the raise of their quality, the significant expansion of the lending process focused especially on the private sector of the host country, a better management of the banking risks, an efficiency enhancement of the banking activity and nevertheless the facilitation of the access of enterprises and

Source: Own simulation based on data provided by [15]

Figure 2: The structure of the financial institutions assets from the analyzed countries, in 2009
individuals to external financing options. But, alongside these advantages, the presence of foreign banks possess a significant risks for contagion, proven by the current international crisis. We consideration here the turbulences that arouse on the foreign developed bank markets and which were propagated also in the banking sectors of the analyzed countries.

**Figure 3: Market share of foreign owned banks (% of total assets)**

Another feature of the examined countries banking market is the concentration level measured by the share of total assets of the five largest credit institutions (see figure 4). In all countries surveyed with the exception of Poland, the first five credit institutions hold more than 50% of total banking assets. In Poland’s case the degree of concentration is significantly lower which means a higher competition among banks, while a opposite situation is found in Estonia where, due to the much smaller size of the banking market, the degree of concentration is over 90%.
The structural changes which have been registered in the banking systems of the analyzed countries have determined a fast financial development of these states. Thus, if we take a look at the financial intermediation index, we can see a significant raise of this indicator in the analyzed countries in 2008 from 2005, despite the fact that these values are still below the EU-27 and the euro zone average (see figure 5). Such a development underlines the growth potential that these banking markets have. Taking into account the period prior to the financial crisis, between 2005 and 2008, we can see that the sharpest growth, with over 30%, of this index was obtained by Romania, Bulgaria, Hungary and Lithuania. Two digits growth rates have been registered also by Estonia and Latvia, while in the case of the Czech Republic and Poland the growth was more moderate, with a increase of 4.08%, respectively 8.37%. In 2009 the increase of the banks actives in GDP can be attributed to the strong contraction of the GDP as a result of the economic recession that characterized most of the analyzed countries.
The second important component of the financial systems of the analyzed countries is represented by the capital market. Despite having a secondary role in the financing of the economy, the capital markets of the analyzed countries have gone through a sustained development in the period before the unfolding of the financial and economic crisis.

Their development has been triggered by the transition process from a centralized to a market economy and especially as a result of the privatization process which has been taking place since 1990, being sustained afterwards by the European integration process which imposed the stabilization of the macroeconomic environment and the openness of these countries to foreign investors. As we can see from figure 6 the capitalization ratio of the listed companies in GDP was on an upward trend in all the analyzed countries before the financial crisis and registered a backlash as the financial and economic crisis unfolded.

**Source:** Own simulation based on the data provided by [15]

**Figure 5:** Evolution of the financial intermediation between 2005 and 2009
In regard to the number of domestic listed companies (see figure 7), most of the analyzed countries have below one hundred listed companies except for Bulgaria and Poland. In the case of the Baltic States, Hungary and the Czech Republic, the low number of listed companies can be attributed to the relative small size of the countries, while in the case of Romania this fact is more related with the relative low development of the economy and the low number of listed state owned companies.

If we link the data from figure 6 and figure 7 it becomes also evident that Poland has the most advanced capital market from all the analyzed countries, as it has the most number of listed companies with the highest capitalization. In the case of Bulgaria, despite of a large number of listed companies, their capitalization is very low. On the contrary, in the case of the Czech Republic the small numbers of listed companies tend to be very well capitalized.

Probably the most important indicator of the capital markets efficiency is represented by the ratio of total trades in GDP (see figure 8).
Despite the financial and economic crisis, Poland, Hungary and the Czech Republic all have relatively high liquid stock markets.

![Figure 7: The total number of domestic listed companies at the main stock exchanges from the analyzed countries between 2005 and 2010](image)

*Source: Own simulation based on the data provided by the [15] and [16]*

By comparison, the Baltic States have rather a low liquidity on their stock markets, this being partially attributed also to the low number of listed companies and to the relatively low capitalisation of the market. In contrast to this, the low liquidity of the Bulgarian and Romanian capital markets highlights the rather conventional set-up of the activities, in the case of Bulgaria and the low diversity in investment opportunities in the case of Romania.

Taking into account the presented data, we can conclude that the financial systems from the analyzed countries have gone through a period of strong development prior to the financial and economic crisis. Their financial systems are all banked based, as the capital market has known a period of slow development at the beginning of the 1990 as a result of the slow reform and privatization process and also because of the lack of informed national investors. Despite their sustained development, the capital market never actually managed to grow close in importance to the banking sector.
Thus we can affirm that the future development of these countries depend in great measure on the efficiency of their banking sectors and also on the ability to transform their capital markets in functional systems which would provide a real alternative for the finance of the economy.

**The banking loans rapid growth and the implications of the current global crisis**

One of the most significant events that marked the analyzed country’s banking sector is the extremely high dynamic (expressed by two digits) of the credit granted to the economy (see figure 9). A particular situation has been registered in Romania and the Baltic countries, where the growth of the credit granted to the economy was on average of more than 50%, respectively over 42%, during 2005-2008.
The sharp increase of the lending process can be highlighted also through the ratio between the value of the granted credits and the value of the attracted deposits (see figure 10), which in the case of most analyzed countries is at over 100%. This high level underlines a significant development at the national level of the lending process in comparison with the level of attracted deposits, especially in the case of the Baltic counties and Hungary. Such a development was possible through external financing at very low interest rates, as international markets were characterized by abundant and cheap liquidities and a relatively facile access to lending opportunities. By comparison, in the case of the Czech Republic, this ratio is well below 100%, which underlines a financing strategy of the banks present in this country based on the attraction of deposits. As a result of this, the Czech banks had a lending policy which didn’t depend very much on their ability to obtain foreign financial resources.
In most of the analyzed countries, the significant increase of the loans granted to economy was the result of a very pronounced increase of the loans granted to households (see figure 11), especially in Romania, the Baltic countries and Bulgaria. In the case of these countries, the increase was on average of more than 70%, 46% and 43.24% during 2005-2008.

In this context, the loans granted to households were the main driver of the accelerated dynamic of the loans granted to economy. It is also noteworthy that in the case of most countries, the loans granted to households have increased more rapidly than the ones granted to non-financial corporations.

Regarding the structure of the loans granted to households, can be noted in 2008, the share of over 50% of the loans for housing purchase in most countries, with the exception of Romania and Bulgaria (see figure 12). However, Romania is significantly detached from the other countries through the large share of consumer credit (74.29%), which emphasizes the population low standard of living. Another outstanding trend is represented by the rapid pace of the increase of loans granted for housing purchase in 2008 compared to 2005 (see figure 12), especially in Romania (with approximately 60%) and in Bulgaria (with 51%).

*Total loans as a percentage of total deposits

Source: [17]

Figure 10: Evolution of the loan-to-deposit ratios* between 2007 and 2010
The Financial System of the New EU Member States: Experiences and Current Challenges

Figure 11: The evolution of the loans granted to non-financial corporations and households, between 2005 and 2008

Source: Own simulation based on the data provided by [15] and [25]

Figure 12: The structure of households’ credit portfolio according to destination in 2005 and 2008

Note: 1 - refers to the year 2005; 2 - refers to the year 2008

Source: Own simulation based on the data provided by [15]
Another significant feature of the loans granted to households is given by the high share of foreign currency-denominated loans in housing loan portfolio (see figure 13). In all the analyzed countries, except for Bulgaria, the share of these loans is over 60%. In this respect, extremely high shares, namely over 90% were registered in Latvia, Romania and Estonia, thus increasing significantly the exposure of the households to the national currency depreciation risk. By contrast, in Czech Republic the foreign currency lending of households is almost inexistent (below 1%) and is therefore not reflected in the figure below. The high share of the foreign currency-denominated loans in the housing loan portfolio and the risks involved determined certain reactions of the authorities. For example, in Hungary, in August 2010, the Parliament adopted a regulation that has banned the granting of this type of loan.

![Graph showing the share of foreign currency-denominated loans in housing loan portfolio in the analyzed countries, between 2005 and 2009](image)

Source: [18]

**Figure 13:** Share of foreign currency-denominated loans in housing loan portfolio in the analyzed countries, between 2005 and 2009

The extremely accelerated dynamic of the loans granted to the economy, and especially of the loans granted to households, has driven major imbalances materialized especially in the huge growth of the housing price, increased consumption and sharp deterioration of the current account balance (see figure 14). Also, in most of the analyzed countries were recorded extremely high ratios (expressed by two digits) of the current
account deficit in GDP. Thus, in 2005-2008, the average ratio of the current account deficit in GDP stood at more than 20% in Bulgaria, over 17% in Latvia, more than 13% in Estonia and over 11% in Lithuania and Romania.

**2005-2008 avg (as percentage in GDP)**

*Source: Own simulation based on the data provided by [19]*

**Figure 14:** The evolution of the current account balance, between 2005 and 2008

The extremely rapid growth of the granted credits and the financial and macroeconomic imbalances involved had determined a reaction from the supervisory authorities and the central banks. Among the measures most commonly adopted by the monetary authorities of the analyzed countries we can mention those included in the category of “moral suasion”. These measures have materialized in improved communication by central banks of the risks related to rapid credit growth, especially through Financial Stability Reports and recommendations made by prudential supervisors aiming to increase banks’ risk awareness [20]. In some countries, particularly in Bulgaria and Romania, the monetary authorities have responded through the use of indirect monetary policies tools (like, minimum banking reserve requirements and the adjustment of the monetary policy interest rate) and also measure of management nature, such as introducing some crediting limits and limits to loans expressed in foreign currencies [21]. However, the impact of these measures has been limited, mainly due to possibility of non-financial corporations to borrow directly from abroad and from non-bank financial institutions.
The current global economic crisis stopped the extremely high increases (expressed by two-digit rates) of the loans granted by various credit institutions. As a result of the economic downturn and implicitly of the consumption reduction, but also of some significant cross-border outflows, in 2009 has been registered a significant decrease in the growth rate of the loans granted to the economy (see table 2). Unlike Poland, the Czech Republic and Bulgaria where the growth rate although it has decreased remained positive, in the case of the other countries, especially in Lithuania and Romania, the bank loan market collapsed (see table 2), as a result of the rapid and significant restraining both of the supply and of the demand for loans. Regarding the structure of the credit portfolio in terms of beneficiaries, it can be noted in most of the studied countries a more pronounced decline of the loans granted to non-financial corporate loans than of the loans granted to households (see table 2), with the exception of Romania, where as a result of the significant growth of the unemployment rate, the uncertainty about the prospects for the economy and the austerity measures adopted by the government, banks are more reluctant in lending to the households.

Table 2: The evolution of the loans granted to the economy in the analyzed countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Loans growth in % year on year</th>
<th>Growth in loans granted to non-financial corporations (in % year on year)</th>
<th>Growth in loans granted to households (in % year on year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008</td>
<td>2009</td>
<td>2008</td>
</tr>
<tr>
<td>BG</td>
<td>31.87</td>
<td>3.60</td>
<td>32.15</td>
</tr>
<tr>
<td>CZ</td>
<td>17.22</td>
<td>4.10</td>
<td>14.89</td>
</tr>
<tr>
<td>EE</td>
<td>8.87</td>
<td>-3.95</td>
<td>6.72</td>
</tr>
<tr>
<td>HU</td>
<td>14.85</td>
<td>-2.32</td>
<td>7.28</td>
</tr>
<tr>
<td>LV</td>
<td>11.62</td>
<td>-5.65</td>
<td>17.95</td>
</tr>
<tr>
<td>LT</td>
<td>18.26</td>
<td>-7.00</td>
<td>16.36</td>
</tr>
<tr>
<td>PL</td>
<td>19.90</td>
<td>7.37</td>
<td>12.18</td>
</tr>
<tr>
<td>RO</td>
<td>20.43</td>
<td>-3.54</td>
<td>16.36</td>
</tr>
</tbody>
</table>

Source: Own simulation based on data provided by [15].
The pronounced reduction of the bank lending activity has had significant implications for the housing market, leading to a dramatic decrease in housing prices, especially in the Baltic countries (see figure 15). In this context, the value of the real estate’s put as collateral for the already granted credits has dropped, leading to an accumulation of risks which could affect the stability of the financial system.

![Figure 15: Variation of housing price before and after the crisis (percentage points)](image)

Another direct consequence of the current severe crisis on the banking credit activity from the analyzed countries is represented by the significant deterioration of the quality of the banks credits portfolio starting with 2009. As a result of the economic downturn, the raise of the unemployment rate, the diminishing of the households incomes and the depreciation of some national currency from the analyzed states, the banks have registered an increase in the ratio of non-performing loans (see table 3), especially in Latvia, Lithuania and Romania. In this context the banks being forced to create additional provisions which had an important impact on their profitability. Thus, the profitability indicators were substantially depreciated, especially in the Baltic States. It is remarkably that, despite these evolutions, the capital adequacy index has registered a value above the
minimal requirements of the European and international regulations (of 8%) in all the analyzed states.

**Table 3:** Capital adequacy index and the indicators of banking sector soundness

<table>
<thead>
<tr>
<th></th>
<th>Bank non-performing loans to total loans</th>
<th>ROA</th>
<th>ROE</th>
<th>Capital adequacy (% of risk weighted assets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2.5</td>
<td>1.1</td>
<td>7.9</td>
<td>BG</td>
</tr>
<tr>
<td>2009</td>
<td>6.4</td>
<td>0.9</td>
<td>10.2</td>
<td>EE</td>
</tr>
<tr>
<td>2010</td>
<td>11.9</td>
<td>23.1</td>
<td>14.9</td>
<td>HU</td>
</tr>
<tr>
<td></td>
<td>2.1</td>
<td>1.4</td>
<td>17.0</td>
<td>LV</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>2.1</td>
<td>15.6</td>
<td>LT</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>-24.6</td>
<td>22.2</td>
<td>RO</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>21.7</td>
<td>14.1</td>
<td>PL</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>23.1</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Source: [22]</td>
</tr>
</tbody>
</table>

1BG, EE, HU, LV, LT, PL, RO – December; CZ – September

**The impact of the current financial and economic crisis on the capital markets from the analyzed countries**

The current financial crisis has represented a good opportunity to test the maturity degree of the Central and Eastern Europe capital markets, especially taking into account the sustained growth that they have registered in the last ten years. Thus, in order to illustrate the evolutions of the analyzed capital markets we have taken a look at the evolution of their main indexes during the unfolding of the financial crisis and its aftermath events, using as a benchmark the date of 1st of January 2006, almost one year and a half before the economic downturn.

We can observe from figure 16 that between 2006 and 2008 the analyzed markets have registered a correlated evolution, caused especially by the economic and political changes that took place in these countries and
which provided some degree of economic stability, thus attracting a multitude of foreign investors. We can note that the Bucharest Stock Exchange has registered the highest growth rate in this period from all the analyzed stock markets.

Source: Own simulation based on data provided by DataStream

Figure 16: The evolution of the main indexes of the stock exchanges from the analyzed countries for the period January 1, 2006 to January 31, 2011 (daily values)

The subsequently decline registered by these stock markets was also correlated, as foreign investors, alarmed by the developments that took place on the American stock markets and on the major European ones, reduced their presence in emerging markets as a precautionary method to avoid further losses. This has led to the fact that despite an economic and financial climate which wasn’t yet hit by the global financial crisis, the stock exchanges from these countries have registered substantial losses. Another factor that came into play was the fact that these markets had a relatively medium to low degree of liquidity, which meant that significant sell orders couldn’t be traded unless the price was severally reduced. The massive liquidation of portfolios undertaken by the foreign investors also inhibited regional and local investors which in turn drove prices even lower. The
The deepest fall of the index was registered by the SOFIX Index, with a drop of almost 85% percent, followed by the BET with a 72% drop, while the other markets registered a slightly lower fluctuation during the crisis.

The almost perfect correlation that existed between the analyzed stock markets before and during the first stages of the financial crises is underlined in table 4, which highlights a correlation of over 0.90 between these markets in the period from January 1st 2006 to July 1st 2008.

**Table 4**: The correlation matrix of the main indices of the stock exchanges from the analyzed countries for the period 1 January 2006 to 31 December 2009

<table>
<thead>
<tr>
<th></th>
<th>BET</th>
<th>BUX</th>
<th>WIG20</th>
<th>PX</th>
<th>OMXN40</th>
<th>SOFIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>BET</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUX</td>
<td>0.9434</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIG20</td>
<td>0.9643</td>
<td>0.9363</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PX</td>
<td>0.9655</td>
<td>0.9572</td>
<td>0.9574</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OMXN40</td>
<td>0.9638</td>
<td>0.9332</td>
<td>0.9776</td>
<td>0.9685</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>SOFIX</td>
<td>0.9658</td>
<td>0.9421</td>
<td>0.9531</td>
<td>0.9681</td>
<td>0.9568</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Own simulation

However, the evolution of these stock exchanges in the later stages of the financial and economic crisis and its aftermath didn’t match their previous high correlation. This has happened primarily as a consequence of several factors, most importantly being: the measures adopted by the central government of each country in order to counteract the effects of the financial and economic crisis, the degree on which the real economy was hit by the economic downturn, the level of maturity and sophistication of each individual stock exchange (e.g. the usage of financial innovations in the daily activities of the exchange) and consequently of the local investors and nevertheless the size, number and field of activity of the listed companies.

If we correlate the figure 16 with table 5 we can see that the previous correlated evolution of the analyzed stock exchanges didn’t held up in the aftermath of the financial crisis.
In this respect, observing the data from table 5, it can be noticed a distinction between the stock markets from the Baltic States, Poland and Hungary, which have registered a speedier recovery and those from Romania, Bulgaria and Czech Republic.

Table 5: The correlation matrix of the main indices of the stock exchanges from the analyzed countries for the period 31 December 2009 to 31 January 2011

<table>
<thead>
<tr>
<th></th>
<th>BET</th>
<th>BUX</th>
<th>WIG20</th>
<th>PX</th>
<th>OMXN40</th>
<th>SOFIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>BET</td>
<td>1,0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUX</td>
<td>0,6967</td>
<td>1,0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIG20</td>
<td>0,1125</td>
<td>0,0007</td>
<td>1,0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PX</td>
<td>0,6992</td>
<td>0,5332</td>
<td>0,2262</td>
<td>1,0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OMXN40</td>
<td>0,7005</td>
<td>0,5351</td>
<td>0,8476</td>
<td>0,3063</td>
<td>1,0000</td>
<td></td>
</tr>
<tr>
<td>SOFIX</td>
<td>0,6943</td>
<td>0,5217</td>
<td>0,0247</td>
<td>0,6157</td>
<td>0,7215</td>
<td>1,0000</td>
</tr>
</tbody>
</table>

Source: Own simulation

In the case of Poland, the macroeconomic characteristic and the maturity of the stock exchange in itself played a major role in the rapid recovery that it has known. Nevertheless, Poland was the only European Union member state which achieved a positive macroeconomic evolution during the crisis and in its aftermath. Also, the Warsaw Stock Exchange has the most listed companies from all the analyzed stock markets, except for OMX which is a pan-European stock exchange. It also offers fairly complex financial products and also provides the investors with the opportunity to trade the shares of the most important companies in Poland from every major economic field.

In the case of Hungary, the financial and economic crisis has severally destabilized the macroeconomic environment, which in turn has led to a destabilization of the stock market. The particular fact that in Hungary derivatives are largely used, even by individual investors, provided an opportunity for the diminishing of the losses which followed as a backlash of the global financial crisis. Also the strong reform measures undertaken by the Hungarian government have helped to some degree the recovery of the Budapest Stock Exchange, although the introduction of a
“Robin Hood” type of tax for financial services didn’t inspire too much confidence in the investors.

The Baltic States have been hit also hard by the financial crisis, but the macroeconomic effects were rather different. In the case of the capital markets these states benefited from the fact that they were part of a pan-European exchange, OMX, which provided in this tough economic context sufficient liquidity in order to prevent severe consequences for the listed companies.

In the case of the Czech Republic the recovery period for the capital market is much slower. Although it provides a wide functional range of financial products the Czech Stock Exchange has been directly affected by the macroeconomic conditions of the country. As the Czech Republic economy is centred on exports, it was severely crippled first by the financial and then by the economic crisis which followed, as exports dropped significantly. These evolutions had a direct negative impact on the quotations of the Czech firms, which made the recovery of stock market even harder.

By contrast, the stock markets from Romania and Bulgaria are suffering directly because of their shortcomings in term of size and diversification. The lack of major listed companies and even the lack of the presence of whole economic sectors from the stock market, like the IT sector in the case of Romania, coped with the relatively unsophisticated products which are offered and to which we add a relatively low liquidity, almost brought to a halt the activity on these stock markets. We must also add to this that the measures taken by the governments in order to counteract the effects of the financial and economic crisis didn’t paid exactly the envies results, this being more evident in the case of Romania, which in turn had a negative effect on the capital markets of these countries.

The measures undertaken by the authorities in order to counteract the effects of the current crisis

The sever implications of the global economic crisis on the European economies and financial sectors have determined the European Commission to adopt in November 2008 the European Economic Recovery
Plan. In regard to the loan activity and the role of the banks in the national economies the European Economic Recovery Plan emphasis’s the necessity that the European Union member states will financially support the banking sector in order to ensure that the real economy can access its credit facilities. Also as a result of the current crisis several measures have been adopted at EU level, that aim at reforming the European financial sector, including a rethinking of the financial regulatory framework based on the activity of the Larosière group. Thus, through the creation of the new European Supervision Authorities (European Banking Authority, European Insurance and Occupational Pensions Authority, European Securities and Markets Authority), for the first time in the history of the EU, the supervision activities of the different segments of the financial sectors would be correlated at European level, this process being still in its early stages (see figure 17).

Source: own simulation based on data from [23]

Figure 17: The new architecture of the European financial supervision framework
An important role in the re-establishment of the trust in the banking sector of the analyzed countries and the prevention of the possible redrawing of the foreign banks from these markets was attributed to the initiative of the IMF, the EBRD and the EU which created the “Vienna Initiative” also known as “the European Bank Coordination Initiative”, through which the parent banks engage themselves to refinance their subsidiaries from CEE.

The major implications of the current economic and financial crisis have led to an intensification of the efforts from the national monetary and governmental authorities in order to prevent the collapse of their banking systems and to re-launch the bank’s credit activities. Thus, most European central banks have adopted a relaxed monetary policy, which was materialized in a prudential reduction of the monetary policy interest rate without discouraging capital inflows and avoiding fluctuation of the rate of exchange (see figure 18).

![Figure 18: The evolution of the key policy rate between 2007 and 2010](source: Own simulation based on data provided by the National Bank of Czech Republic, the Magyar Nemzeti Bank, the National Bank of Latvia, the National Bank of Poland and the National Bank of Romania)
Regarding the governmental measures adopted by the analysed countries the most important one was the raise of the minimum guaranteed level for deposits, in order to prevent mass panic and to re-establish the trust of the depositors in banks (see table 6).

Overall, all the measures adopted at EU level and also by each member state have contributed to avoid the collapse of the financial systems and the stabilisation of the financial markets.

Table 6: The governmental measures undertaken in the analyzed countries*, between October 2008 and May 2010

<table>
<thead>
<tr>
<th></th>
<th>Capital injection</th>
<th>Liability guarantees</th>
<th>Asset support</th>
<th>Total commitment as % 2008</th>
<th>Deposit insurance EUR</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within Schemes</td>
<td>Outside Schemes</td>
<td>Guaranteed issuance of bonds</td>
<td>Other guarantees loans</td>
<td>Within Schemes</td>
<td>Outside Schemes</td>
</tr>
<tr>
<td>BG</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>- ( )</td>
<td>-</td>
</tr>
<tr>
<td>CZ</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>- ( )</td>
<td>-</td>
</tr>
<tr>
<td>EE</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>- ( )</td>
<td>-</td>
</tr>
<tr>
<td>HU</td>
<td>0.1 (1)</td>
<td>- ( )</td>
<td>2.3 (5)</td>
<td>- ( )</td>
<td>7%</td>
<td>45,252</td>
</tr>
<tr>
<td>LV</td>
<td>- ( )</td>
<td>0.3 (6)</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>27%</td>
<td>50,000</td>
</tr>
<tr>
<td>LT</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>- ( )</td>
<td>-</td>
</tr>
<tr>
<td>PL</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 (5)</td>
<td>- ( )</td>
<td>3%</td>
<td>50,000</td>
</tr>
<tr>
<td>RO</td>
<td>- ( )</td>
<td>- ( )</td>
<td>0 ( )</td>
<td>- ( )</td>
<td>- ( )</td>
<td>-</td>
</tr>
</tbody>
</table>

*billions of EUR unless stated otherwise.
Source: Data centralization based on [24]

The macroeconomic and financial imbalances recorded by the countries that in the years previous to the outbreak of the current global crisis have registered a rapid and unsustainable growth of the loans, as well as the extreme negative effects of the crisis, emphasizes the international financial system major gaps regarding the institutional and regulatory framework. In this context, the efforts in order to reform the financial system have been enhanced. From the regulatory point of view, the adoption of the Basel III accord by The Basel Committee on Banking...
Supervision has a major importance, which in terms of the banking lending activity makes reference to an important macro-prudential tool, namely “countercyclical capital buffer”, meant to, especially, prevent excessive lending periods and banking systems crashes. Regarding the institutional framework, for example, at the EU level, came into operation on 1 January 2011 the European System of Financial Supervision, which major objective is the macro-prudential supervision of the EU financial system.

In the current state, the central banks and the supervisory authorities from the surveyed countries, as well as the European authorities, are facing new challenges related to the process of improving the financial system risk management and of providing a proper regulation and supervision for it in order to ensure its stability.

Conclusions

Over the last years previous to the start of the current global crisis, the financial systems of the analyzed countries have recorded a rapid development. Such an evolution is considered positive in terms of convergence, but it was accompanied, in most countries, by certain vulnerabilities from the financial and macroeconomic point of view. From the financial point of view, the vulnerabilities have been materialized into the rapid and often unsustainable growth of the banking loans, determined, especially, by the significant capital inflows and the increasing competition in the banking market. Also, financial risks have been exacerbated by the rapid growth of the mortgage loans and the high percentage of the foreign currency-denominated loans. From the macroeconomic point of view, the easy access to credits and their extremely rapid increase has determined the significantly increase of the demand for goods, which under the conditions of an insufficient domestic supply and the appreciation of the national currencies has conducted, especially in Bulgaria, the Baltic countries and Romania, to a sharp aggravation of the current account deficit and exposed those countries to external financial vulnerabilities.

The financial and macroeconomic imbalances registered by the analyzed countries, prior to the triggering of the current global crisis, have
considerably amplified the crisis effects as most of the examined countries were severely affected.

The financial and economic crisis had also a direct and strong impact on the analyzed countries capital markets. In this respect, it must also be taken into account the fact that the fall of the capital market was very correlated and triggered by events which didn’t necessary had anything to do with their macroeconomic environment, these negative consequences being rather a spill over effect of the event that took place on the more advanced European and American capital markets. Despite these, the recovery process was very heterogeneous, as some countries managed to provide the necessary measures in order to stimulate the real economy and in turn provide sufficient liquidity for their capital markets, while other countries had more negative results in this process. Overall, we can conclude that despite a rapid development of the capital markets in the last decade in the case of the analyzed states, these markets are still far from being full growth and mature, the current financial and economic crisis providing a good argument for this statement.

The serious implications of the current crisis on the analyzed countries highlight the vital role for the real economy of the sound functioning of the financial system and the indispensable need for its reformation. Hence, among the elements of the European financial system reform a significant role is occupied by the approval of Basel III Accord, the significant improvement of risk management process and the reformation of the micro- and macro-prudential regulatory and supervision framework.

Therefore, the entire European financial environment is in full transformation process, aiming the elimination of a series of serious gaps in its functioning and the building on solid foundations of a new financial system that will be able to prevent or limit the building up accumulation of imbalances which could generate deep crisis.

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Promotional Strategies Direct Marketing and Technological Innovations in Banking

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Modern advertising strategies involve the use of a bank’s media and consumer incentives, so that banking institution, and thus offer products/services to cause favorable changes in mentality and their consumption habits, also important is the establishment an effective communication with employees, shareholders, competitors. Promotion strategies are essential to business success. Success is guaranteed if the message is sent to the right people at the right time. Promotion has a special place in the marketing mix because it is created by, developed and made known image of the institution, services and products. Technological innovations, but fierce competition and changing purchasing behavior of the beneficiaries of banking services and products banks have challenged management, directing their work towards introduction of modern technologies to promote banking products and services. Adapting to new technologies and innovations in the field needs is strategic for any financial institution aimed at both retail and corporate activity which leads to improved operative staff, by targeting the growing activities of guidance, coordination and advice to clients.

Keywords: direct marketing, promotion strategies, banks, technological innovation
Introduction

Advertising today undergone little change since the experts are trying to focus increasingly on direct forms of communication with consumers. Marketing communications in the past was a monologue - were used to address ways consumers through mass media today, communication has become in dialogue. Phone, mail, Internet, institutions communicate directly with consumers, being able to answer their messages immediately. A short definition of direct marketing is all about: it is close to current and potential consumers by influencing their attitudes and behavior, leading to an answer quickly and accurately assessed.

Direct marketing is to "connect directly with consumers carefully selected and targeted to achieve an immediate response and to cultivate long term relationships with them", (Armstrong G., Kotler Ph., 2003).

According to Ph. Kotler (Ph. Kotler, K.L. Keller, 2008), "direct marketing channels is the use of direct connection with consumers to address their customers and deliver goods and services without using the mediator of marketing. These channels are: direct mail offer, selling on the catalogs, telemarketing, interactive television, computer sales presentations calling for public websites and mobile sites".

Using databases of current customers, banks adjust their offer to specific needs of each client and communicate with him personally. Market research contributes greatly to the establishment of direct marketing strategies by gathering market information, competition, consumer needs, distribution channels.

Laurent and Jean Paul Quioc Hermel (Hermel, L., Quioc, J.P., 1994) define direct marketing as "an element of the communication policy of the enterprise ... which is characterized by a relationship that facilitates the creation of individualized, personalized and interactive customer potential".

Richard Weiner (Richard Weiner, 1990) defines direct marketing as "distribution, promotion and sales through one or more media that connects seller and buyer and are designed to generate a direct response, differentiated by advertising, created by a producer specialized that motivate consumers to purchase through an intermediary such as a retailer".
As a conclusion, based on definitions provided we can say that direct marketing is presented as all communication techniques used by institutions in order to establish direct contacts and interactive individual other than those that put the consumer face to face with a service/product contacts aimed at triggering a rapid response from the target consumers.

In services, direct marketing, relationship has grown as an institution - the client is a direct and beneficial for both parties. Banks using direct marketing strategies because it is direct and effective method of communication with clients of the bank offering the possibility of achieving relationships individualized, personalized and interactive with them.

Thanks to technology development in informatics and telecommunications, direct marketing strategies have a strong impact on the communication process all messages to customers. This requires direct communication to take certain methods of communication, efficiency and seriousness from those who sent messages. Due to the emergence of the new distribution channel - the Internet have created great opportunities for direct marketing.

Specialists in marketing strategies stated (G. Hamel, J. Sampler, 1998): "The Internet is not just another distribution channel for marketing or other communications medium, or a way to trade in speed, the Internet is the foundation for a new industrial order. Will change the relationship between consumers and producers (providers) in ways more profound than we can imagine". The new direct marketing concept change institutions on building relationships with consumers. Figure 1 are direct marketing components and connections between them. The components of direct marketing presented in Figure 1.

Messages are designed to clearly defined and focus on achieving benefits. How to maximize profit is the focus of any institution, is the leading direct marketing to achieve immediate performance or develop long term relationships with clients.

Still present advantages and disadvantages of direct marketing used in banking:
Direct marketing strategies

Their development aims, as well as general marketing strategy of the institution to seize all opportunities offered by the external environment of marketing skills using its own resources in relation to or attracted, technical, financial, human and information. Banks believe in direct marketing strategies a number of reference elements among which are: the objectives of campaigns, updating databases with information about current and potential customers, target segments, positioning relative to competition, continuing the campaign and specific activities.

![Diagram of Direct Marketing Components](image)

**Figure 1:** Components of Direct Marketing (W. Wells, J. Burnett, S. Moriarty, 2003)

Databases are key to direct marketing. According to the Direct Marketing Association, a database has four main objectives:

- maintain current and potential customers list;
- to provide a means of storing and measuring results with direct response advertising;
• to provide a means of providing storage and performance measurement;
• provide a direct means of communication continues, by mail or telephone.

Table 1: Advantages and disadvantages of direct marketing used in banking

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>- easy to use, comfortable and personalized (customers can get information about the institution, existing product range, ongoing promotions at any time using the Internet);</td>
<td>- database of customer information must be accurate;</td>
</tr>
<tr>
<td>- value added service/product because buying interests, they are not limited to a certain space or a banking premises of the institution;</td>
<td>- there is still a slight reluctance from consumers to conduct online transactions, or to provide personal information, otherwise than by direct contact with bank employees, the lack of banking and financial education;</td>
</tr>
<tr>
<td>- tool that creates and strengthens customer relationships through database created and updated;</td>
<td>- some consumers believe, sometimes, direct marketing as an invasion of privacy (consumers who use the services/products the bank, or used in databases are added, such institutions with access to their personal data to send messages about the offer existence);</td>
</tr>
<tr>
<td>- offers flexibility in space and time of all consumers, this is due to access and use the Internet;</td>
<td>- Consumers sometimes feel irritated by the increasing number of direct marketing insistent requests in order of sale.</td>
</tr>
<tr>
<td>- obtain immediate performance and long-term development of relationships with customers;</td>
<td></td>
</tr>
<tr>
<td>- direct marketing today holds an important position in relation to traditional marketing activities;</td>
<td></td>
</tr>
<tr>
<td>- offers banks can control and adapt them according to specific requirements of each client.</td>
<td></td>
</tr>
</tbody>
</table>

Marketing database is composed of (W. Wells, J. Burnett, S. Moriarty, 2003):
Collection
Data entry
Evaluation of data
Group data
Application data
Data sharing
Maintaining data.

The link that exists between direct marketing strategies and marketing the traditional direct marketing as it shaped the outlook of the institutions. Establishing direct marketing strategies involves the following steps:

- setting goals and determining strategic decisions - it starts from the results of a previous market study done by the market segmentation and choosing target segment of consumers; direct marketing objectives are: providing information to current and potential customers, motivating customers to visit bank to participate in certain events, receipt of payment after delivery and receipt of orders.
- offer services/products - choosing the best channel for communicating the message description of the service/product by communicating customer benefits; the message must be simple, to avoid confusion;
- immediate response - while train tracks consumer interest in advertising a particular service/product, direct marketing is to target immediate response;
- the actual performance - takes place simply and promptly;
- maintain and update the database with current and potential customers essential aspect in the success of direct marketing.

By developing direct marketing strategies, institutions shall consider, among other issues, customer segments, which are divided into: individual consumers, consumers organizational both.

For each segment in part are created different direct marketing strategies, as these major groups significantly different needs and
requirements so as well as purchasing behavior and expectations in relation to the banking institution. Thus, we talk about:

- Strategy oriented segment consumers (consumer retail banking) - is used when the target market consists only of the institution of individual consumers, whom it is addressed through direct marketing campaigns in order to generate sales. (e.g. job and banking products offered to individuals);
- Consumer-oriented strategy organizational segment (corporate banking customers) - used to address different dimensions of institutions, public institutions, non-profit organizations through the implementation of direct marketing campaigns which aim in particular to prepare the sale or creation of traffic operational points of the institution;
- Oriented strategy both consumer segments - requires consideration in launching direct marketing campaigns, some elements of differentiation to determine the objectives pursued, the target definition, choosing media and creating messages to be transmitted.

In launching direct marketing campaigns are used a lot of channels to address current and potential individual clients, through: mail (direct mail address), catalogs, telemarketing, television, internet and other direct-response media.

Regardless of the means chosen to communicate with customers, manage customer information is essential for many companies. Always direct marketing will play an important role in the marketing mix. Having to do with consumers becoming better informed, a market becoming more dynamic, marketing and sales decisions go primarily to consumers, so customers need direct communication with those who make profit company, is imperative.

Direct marketing involves dialogue, and it cannot be achieved only by one or one's postal mail. Is a sequence of interactions, beneficial for both parties.

Direct marketing campaigns have been, are and will be used by all institutions who understand the benefits of direct communication with the consumer.
We believe that direct marketing strategies should not miss the mix of communication strategies, especially for institutions that want to personalize promotional message or channel their communication efforts to a sharp target market.

Technological innovations in banking sphere

The evolution of technology, increased competition and changing consumer buying behavior challenged the leadership of banks, leading to the introduction of modern technologies in their work to promote banking products and services. OSLO Manual (for collecting and interpreting Manual. Guidelines OSLO data. 3rd ed. OECD innovation/European Communities, 2005), recommends the following definition of conceptual innovation (technical): "An innovation is the implementation of new or significantly improved product (good or service), or a process, a new marketing method, or methods of organization in our business practice in workplace organization or external relations".

Minimum requirement for innovation is that product, process, marketing method or methods of organization must be new (or significantly improved) for the company. Access to information contributes to the development of modern society, by training volume and diversity of information processing and information and communications technology, leading to an information society.

It is a new stage of human civilization, which involves intensive use of information with a strong impact on the economy and society, in order to achieve and fulfill certain purposes.

Banking area known today significant changes influenced by the needs and wants. As a result, the operations of banking institutions should become more "intelligent" and conventional functions of agencies should change at the same rate. Example: Citibank Romania opened in early 2011 the first agency in Romania digitized after the release of the latest smart banking agencies in New York, Tokyo, Singapore and Hong Kong. The new agency is built around the customer carefully using high technology to put his experience on the most important plan, bank customers may have a unique banking experience, customized products and services through the
most innovative technologies. Smart banking - is for customers who understand the value of modern time and choosing comfortable banking experience. Customers benefit from innovations in design and high technology:

- Online banking terminal that allows a workstation to access your site account Citibank and Citibank Online;
- Dual currency ATM first ATM in Romania enabling cash withdrawals in both currencies: USD and Euro;
- A media wall read LCD 2X2 system, which displays the latest news, financial and weather data, information on Citibank products and services;
- Product Information Wall An interactive touch screen interactive with information about Citibank products and services;
- Videophone - A video conference service, through which visitors can interact with representatives of Citibank;
- Citi Touch - An interactive brochure installed on iPhone sites with information about Citibank products and services.

Figure 2: Citibank branch  Source: www.citibank.ro

The emergence of the new Internet channel led to revolutionize all areas of activity. The major advantage of this is to obtain information quickly, real, both for individual users and companies. Banks in Romania
have come to meet customer needs and desires with me, releasing electronic banking services, a viable alternative to traditional banking services.

These types of services are divided into three categories: Internet Banking, Home Banking and Mobile Banking which allows carrying out banking transactions via computer connected to the Internet (Internet Banking and Home Banking) or mobile phone (Mobile Banking). (Example: BCR - first bank in Romania that offers its clients to pay taxes or other obligations to the state budget via Internet banking and phone banking Click 24 Banking Alo 24 Banking).

The extensive process of adaptation to technological innovations of the banking system, BRD Groupe Societe Generale was always an active, emitting a wide range of cards and offers the Electronic Banking Services. The group is always busy and diversify supply Monet, Instant Pay launching a unique payment instrument in the form of stickers that incorporate contactless technology "MasterCard PayPass". (Instant Pay contactless card is attached to a current account opened at BRD national currency, issuance fee is 0. Shelf life is like for a classic card for 3 years with automatic renewal option. Contactless card is issued in various forms sticker attachable wallet or mobile phone or keychain and can be used exclusively for payments to merchants.

For payments less than or equal to the sum of 100 lei made with contactless card PIN code is required. But it becomes mandatory when the payments exceed 100 lei. Contactless cards can be used both in the supermarket or hypermarket stores, as well as fast food restaurants, pharmacies, distribution network media, fashion retailers, bookstores, gas stations or transport).
Chip cards (smart cards) from BRD Groupe Société Générale are cards incorporating a microprocessor (chip) that stores and processes more information about the cardholder, and the issuing bank's account, new technology added to standard functionality of cards BRD highest level of internationally recognized security. BRD cards are so dual cards, is provided not only with magnetic stripe, and chip.

Use cards with chip has several advantages, including: increased security level transactions, eliminating the risk of copying or counterfeiting of cards, fraud will decrease, rapid deployment of merchant transactions. Counterfeiting credit cards and for enhancing data security, the EU intends to replace the entire portfolio of magnetic stripe cards with chip some teams only.

Research shows that the field of electronic transactions involve lower costs than their equivalents in cash or in traditional payment instruments, stimulating consumer spending to reduce its volume and increase in savings deposits, thereby supporting economic development. The products in the field of electronic payments can act as true "gates" to the banking system, for people who do not currently work with banks.

Factors (Capraru B., 2010) that determined implementation of technological innovations in banking institutions work are presented below:

- new discoveries in the field of technological innovation;
- development of economic relations and the number of transactions;
- restructuring of banking and metamorphosis;
- growth and diversification of customer demand, especially amid increasing degree of education in banking;
- increasing customer demands for products and banking services;
- maintenance and development costs increase traditional banking networks;
- extension Personnel Expenses;
- focus increasingly on resource "time".
And add the above factors: increased competition, the emergence and development of chain stores that have signed partnerships with banking institutions, globalization of markets and acceptance of new rules of marketing (targeting consumers through social networks, blogs, web sites, viral marketing etc.). The need to strengthen relations with clients should always be to the attention of banks, regardless of the means of communication with them.

Thus, the introduction and use of new technologies and innovations is the strategic needs for any financial institution that targets both retail and corporate segment, which leads to an improvement in operational staff work, by targeting the growing activities of guidance, coordination and counseling clients.

Conclusions

In the new economy, built and developed based on information and communications technologies, marketing strategies in establishing the starting point should be to represent the consumer and his needs.

The bank marketing strategies, marketers pursue so choosing the best combinations of various distribution channels, and weighting in the entire distribution system. This choice depends on many factors, including: market, customer financial literacy, financial possibilities of customers, the bank's financial possibilities, benefits can be obtained using a particular distribution channel.

Direct marketing strategies - their development aims to seize all opportunities offered by the external environment of marketing skills using its own resources in relation to or attracted, technical, financial, human and information. Banks believe in direct marketing strategies a number of reference elements among which are: the objectives of campaigns, updating databases with information about current and potential customers, target segments, positioning relative to competition, continuing the campaign and specific activities.

In carrying out direct marketing campaigns to appeal to a lot of individual channels to address current and potential customers, such as mail (direct mail address), catalogs, telemarketing, television, internet and
other direct-response media. Regardless of the means chosen to communicate with customers, manage customer information is essential for many companies. Always direct marketing will play an important role in the marketing mix.

Banking area faced with significant changes lately due to their development needs and desires of customers, increased competition, technological innovations. Following these changes, the operations of banking institutions should become more intelligent and conventional functions of the agencies should change at the same rate.

Access to information contributes to the continued development of modern society, which trains the volume and diversity of information processing and information and communications technology, leading to an information society.

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Logistic Task of Fuel Supply for the Regional Distributed Heat Supply System

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The technique for solving the logistic task of fuel supply in the region, including the interconnected tasks of routing, clustering, optimal distribution of resources and stock control is proposed. The complex algorithm for solving the routing task contains Astar method, Yen method, as well as the genetic algorithm adapted for the task being solved. To identify the location of facilities for fuel preparation the two-stage algorithm of cluster analysis applying the hierarchical cluster analysis and method of k-averages has been worked out. The effective algorithm for solving the task of optimal resource distribution on district and regional has been proposed. To solve the task of optimal stock control the hybrid algorithm consisting of genetic algorithm and Hooke-Jeeves method has been applied. The calculations have been carried out on the example of fuel supply system of the Udmurt Republic.

Keywords: logistics, fuel supply, routing, clustering, stock control, genetic algorithm

Introduction

Logistic control is very important when organizing and planning the processes when introducing innovative technologies. Thus the urgent
task for the transition to local renewable energy resources formulated in the framework of resource-saving policy of regional fuel supply are solved based on logistic approach. We will consider the task of fuel supply logistics during the transition of regional fuel supply distributed system to wood types of fuel. The expediency of their utilization as renewable energy sources for the Udmurt Republic has been identified in the Concept of Republican target program “Supply of the population, objects of social sphere in distant settlements of the Udmurt Republic with local types of fuel alternative to natural gas” [1].

The details of the location of timber harvesting and conversion facilities, settlements with heat sources that are planned for the conversion from traditional fuel (coal, oil fuel, electric energy) to alternative one (woodchips, fuel pellets) were used as the initial information to solve the logistic task.

The logistic scheme of heat sources supply with fuel comprises 4 levels (Figure 1). Timber harvesting and conversion facilities have wood raw materials which are transported to raw material accumulation points (RMAP) where they undergo initial machining. Initially machined wood raw materials are sent to fuel preparation points (FPP) where the woodchips are sorted out, heat treated and packed. At the final stage the woodchips are transported to consumers – regional heat sources. At all the stages of logistic scheme the warehouses for raw material storage are involved.

![Diagram](image_url)

**Figure 1:** Scheme of fuel supply system
The solution of logistic fuel supply task comprises five stages, at each the certain tasks will be solved: routing, clustering, optimal distribution of resources on district and regional levels, optimal stock control.

**Routing task**

- **Task description**

One of the stages for the solution of logistic task is the determination of optimal routes of fuel transportation. The minimization of transportation costs included into the fuel price is considered as the optimization criterion.

Let us consider the multitude of possible routes connecting two random nodes of road conjunction. Let us mark the trajectory of $k$ route from the road conjunction node $g^k_1$ to the road conjunction node $g^k_{n_k}$ as $M^k_{1n_k} = (g^k_1, g^k_2, ..., g^k_{n_k-1}, g^k_{n_k})$, where $g^k_i$ – nodes successively located in $k$-route; $i = 1, n_k$, where $n_k$ – number of nodes on $k$ route; $k = 1, N$, where $N$ – number of routes. Let us introduce the matrix of transportation costs $S^k = \{s(g^k_i, g^k_j)\}$, where $s(g^k_i, g^k_j)$ – costs for the transportation of one ton of nominal fuel (rub./t of n.f.) from the node $g^k_i$ to the node $g^k_j$ ($i, j = \{1, 2, ..., n_k\}$). The transportation costs depend on the type of road pavement $l$ (asphalt, crushed stone, gravel, ground).

**Assumption 1.** Let us assume that the road pavement does not change between the two adjacent nodes. Let us mark as $c^k_{ij}$ the specific rate of transportation of one ton of nominal fuel along the road of $l$ type from the node $g^k_i$ to the node $g^k_j$, rub./(km·t of n.f.). Then the cost of fuel transportation from the node $g^k_i$ to the node $g^k_j$ can be found by the formula: $s(g^k_i, g^k_j) = c^k_{ij} d^k_{ij},$  (1)
where \( d_{ij} \) – distance of the transportation of one ton of nominal fuel from the node \( g_{i}^{k} \) to the node \( g_{j}^{k} \) along \( k \) route, km.

Further for \( s(g_{i}^{k}, g_{j}^{k}) \) we introduce the designation \( s(g_{i}^{k}, g_{j}^{k}) = s_{ij} \).

In general, the specific rate for the transportation of one ton of nominal fuel is found by the formula:

\[
c_{ij} = \frac{a + u_{ij} + w_{ij}}{Gk_{j}},
\]

where \( a \) - auto transport amortization costs, rub./km; \( u_{ij} \) - fuel costs, rub/km; \( w_{ij} \) - workers’ labor costs, rub./km; \( G \) - load-carrying capacity of the vehicle, t; \( k_{j} \) - calorie equivalent (ratio of the amount of heat produced during the combustion of the unit of natural fuel to the amount of heat produced during the combustion of nominal fuel), t of n.f./t.

Costs for the transportation of fuel from the node \( g_{1}^{k} \) to the node \( g_{n_{k}}^{k} \) along \( k \) -route consist of the costs for the transportation of fuel along each road section:

\[
s(g_{1}^{k}, g_{n_{k}}^{k}) = s(g_{1}^{k}, g_{2}^{k}) + s(g_{2}^{k}, g_{3}^{k}) + ... + s(g_{n_{k-1}}^{k}, g_{n_{k}}^{k})
\]

The routing task – to find the route with minimal costs for the transportation of 1 t of n.f. from the node \( g_{1}^{k} \) to the node \( g_{n_{k}}^{k} \):

\[
s(g_{1}, g_{n}) = \min_{k} s(g_{1}^{k}, g_{n_{k}}^{k}).
\]

#### Algorithm for solving the routing task

To solve the routing task in the system of regional fuel supply the complex algorithm comprising three stages has been proposed:

1. finding the initial (basic) route with the help of modified A* algorithm (Astar);
2. obtaining the multitude of possible routes with the help of Yen method;
3. finding the optimal route with the help of genetic algorithm adapted for the routing task.
Algorithm A* allows finding the route with the lowest fuel transportation costs from the initial node $g^{k}_{1}$ to the final one $g^{k}_{n_k}$, where $k$ – route number [2]. The modification of A* algorithm is targeted at increasing its flexibility and possibility of getting into the global minimum. Modified A* algorithm comprises the following stages:

1. Route $M^{k}_{li}$ consisting of the initial node is formed:
   $$M^{k}_{li} = (g^{k}_{i}) , \quad i = 1.$$ 

2. Nodes $j = 1, n^{(i)}$ adjacent with the given $i$ - node are considered; $n^{(i)}$ - number of nodes adjacent with $i$ node. For each of these nodes the heuristic function is found:

   $$f(M^{k}_{ij}) = \bar{s}(M^{k}_{1j}) + \bar{h}(M^{k}_{jn_k})$$  \hspace{1cm} (3)

   where $\bar{s}(M^{k}_{1j})$ - evaluation of the cost of transportation from the initial node $g^{k}_{1}$ to the node in question $g^{k}_{j}$; $\bar{h}(M^{k}_{jn_k})$ - evaluation of the distance from the node in question $g^{k}_{j}$ to the final node $g^{k}_{n_k}$ found by the following formulas:

   $$\bar{s}(M^{k}_{1j}) = \sum_{i=1}^{j-1} d^{k}_{i(i+1)} c^{k}_{li(i+1)},$$

   $$\bar{h}(M^{k}_{mn_k}) = \tau r^{k}_{mn_k},$$

   where $d^{k}_{i(i+1)}$ - length of the road connecting $i$ and $(i+1)$ node of $k$ route; $c^{k}_{li(i+1)}$ - specific tariff being the cost of transportation of one ton of nominal fuel at the distance of one km at the section from $i$ to $(i+1)$ node of $k$ route along the road of $l$ type; $\tau$ - set parameter determining the influence force of $\bar{h}(M^{k}_{jn_k})$ on heuristic function (3), $0 < \tau < \infty$; $r^{k}_{jn_k}$ - distance between the node in question $g^{k}_{j}$ and final node $g^{k}_{n_k}$. 

436
3. For the nodes in which the function $f(M_{ij}^k)$ is calculated at stage 2, the probability function is found:

$$P(M_{ij}^k) = \frac{\left[ f(M_{ii}^k) - f(M_{ij}^k) \right]^\lambda}{\sum_{j=1}^{n(i)} \left[ f(M_{ii}^k) - f(M_{ij}^k) \right]^\lambda}$$  \hspace{1cm} (4)

where $\lambda$ - set parameter determining the influence force of function $f(M_{ii}^k)$ on probability function $P(M_{ii}^k)$, $0 < \lambda < \infty$.

Further the uniformly distributed value $\xi \in [0,1]$ is randomly generated. Among all the nodes we select the one the probability (4) of getting into which is closest to the random value generated.

This procedure is carried out to increase the probability of getting into the global minimum.

4. Node found is added to the route:

$$M_{ij}^k = (g_1^k, ..., g_i^k, g_{i+1}^k).$$

5. Condition of algorithm operation finish is checked – condition of getting into the final node: $i = n_k$. If the condition is fulfilled, the route from the initial node $g_1^k$ to the final node $g_{n_k}^k$ is considered as found. Otherwise we move to stage 2.

As a result of application of modified A* algorithm the basic route is found. Further the multitude of possible routes is arranged with the help of Yen method [3].

Algorithm of Yen method comprises the following stages:

1. Initial route found with the help of modified A* algorithm is set:

$$M_{in_k}^k = (g_1^k, g_2^k, ..., g_{n_k}^k), \quad k = 1, \ i = 1.$$

2. Edge $(g_i^k, g_{i+1}^k)$ is excluded from the route $M_{in_k}^k$. Then, using the nodes beyond $k$ -route, new routes are found using the modified A* algorithm:
\[ M_{ln_j}^j = \left\{ g_1^j, g_2^j, \ldots, g^j_{n_j} \right\}, \quad j = 1, n^{(i)} \]

where \( j = 1, n^{(i)} \) – numbers of the routes arranged; \( n^{(i)} \) – amount of the routes arranged.

3. From the routes found we select the one with the lowest transportation costs:

\[ M_{ln_{k+1}}^{k+1} = M_{ln_{j_{\min}}}^{j_{\min}}, \quad j_{\min} = \arg\min_{j=1, n^{(i)}} s \left( g_1^j, g_{n_j}^j \right), \quad k := k + 1. \]

4. Condition \( k \geq N \) is checked, where \( N \) – set number of possible routes (is found as the number of routes being the initial population set for the operation of genetic algorithm). If this condition is not fulfilled, then \( i := i + 1 \) and we move to stage 2.

Thus, the possible routes are found. Then the genetic algorithm is applied to the possible routes found [4]. The action diagram of genetic algorithm adapted for the routing task is given in Figure 2.

**Figure 2:** Action diagram of genetic algorithm adapted for the routing task
The criterion of the stop in genetic algorithm operation is finding the route with minimal transportation costs which will be unchanged with further iterations. The important part of the algorithm is the operation of applying the crossing over operator which is used if two routes have the same node or edge.

As an example, we will demonstrate the algorithm of applying the crossing over operator for the same node.

1. Let us assume that there are two possible routes:
   \[ M_{ln_k}^k = (g_1^k, g_2^k, ..., g_{n_k}^k) \]
   \[ M_{ln_i}^l = (g_1^l, g_2^l, ..., g_{n_i}^l) \]
   For the routes (5), (6) the initial and final nodes are the same:
   \[ g_1^k = g_1^l, \quad g_{n_k}^k = g_{n_i}^l, \]
   And there is also the same node
   \[ g_i^k = g_j^l, \quad i \in \{2,3,...,n_k-1\}, \quad j \in \{2,3,...,n_l-1\} \]

2. Routes (5) and (6) are intercrossed by the same node \( g_i^k = g_j^l \) and the new routes are found
   \[ M_{ln_i}^{id} = (g_1^k, g_2^k, ..., g_{i-1}^k, \overline{g_i^k}, g_{i+1}^k, ..., g_{n_l-1}^k, g_{n_i}^l) \]
   \[ M_{ln_k}^{ik} = (g_1^l, g_2^l, ..., g_{j-1}^l, \overline{g_j^l}, g_{j+1}^l, ..., g_{n_k-1}^l, g_{n_k}^k) \]

3. For the newly found routes we calculate the costs for the transportation of one ton of nominal fuel (1) – (2). If the cost for transportation along the new routes (7), (8) is below the costs for the transportation along the initial routes (5), (6), then they participate in further operation of genetic algorithm.

**Clustering task**

- **Task description**

  The cluster analysis is carried out to define the location of fuel preparation points and heat sources linked with them.
The initial data for cluster analysis is the information about the location of settlements with heat sources planned to be transferred from traditional types of fuel to woodchips, as well as their need in fuel. It is necessary to optimally combine the settlements with heat sources into the groups of closely located objects. In each cluster it is required to distinguish one settlement in which the fuel preparation point will be located under the condition of minimizing the costs for fuel transportation from the preparation point to heat sources.

Let us assume that \( H = \{h_i\} \) – multitude of settlements with heat sources, \( i = 1, n \), \( n \) – amount of settlements considered. Let us point out the multitude of closely located settlements forming the \( P \) -cluster, \( T^p = \{h^p_j\} \), \( p \in \{1, 2, \ldots, K\} \), \( K \) – amount of clusters, \( j \) – number of the settlement in the cluster, \( j = 1, n_p \), \( n_p \) – amount of settlements in the cluster.

It is necessary to divide the multitude of settlements \( H = \{h_i\} \) into clusters in such a way that the total costs \( Z \) (rub./year) for fuel transportation from FTP to heat sources to be minimal:

\[
Z = \sum_{p=1}^{K} \sum_{j=1}^{n_p} s(h^p_m, h^p_j) Q^p_j \rightarrow \min ,
\]

where \( h^p_m \) – settlement in which FTP will be located (cluster center); \( s(h^p_m, h^p_j) \) - costs for the fuel transportation (rub./t of n.f.) from the cluster center to \( j \) settlement; \( Q^p_j \) – total annual need in fuel of heat sources of \( P \) cluster located in \( j \) settlement, \( t \) of n.f./year.

In the same way, having the information about the location and output of wood conversion facilities and timber harvesting areas the task is set to find the places for raw material accumulation points. The essence of cluster analysis, in this case, is to optimally combine wood conversion facilities and timber harvesting areas into clusters and select the place for RMAP in each cluster.
• **Algorithm for solving the clustering task**

The general algorithm for solving the task of clustering the objects of regional distributed heat supply system comprises two stages: at the first stage the hierarchical cluster analysis is applied, at the second – method of $k$-averages. The hierarchical cluster analysis is used to define the optimal amount of clusters [5]. The method of $k$-averages is used to distribute the objects in clusters and define optimal locations for RMAP and FTP which are the centers of these clusters [6].

**Algorithm of hierarchical cluster analysis**

1. Multitude of settlements is set $H = \{h_i\}$, $i = 1, n$.
2. By the formulas (1) – (2) we calculate the matrix with the costs of fuel transportation between the settlements as its elements: $S = \{s(h_i, h_j)\}$, $i, j = 1, n$.
3. Amount of clusters $K$ is set, each of which contains one settlement: $K = n$. We obtain the multitude of clusters $\{T^1, T^2, ..., T^K\}$.
4. Clusters obtained are combined by two forming the temporary clusters $T^p$, $p = 1, C_k^2$, where $C_k^2 = K(K-1)/2$.
5. Centers $h^p_m$ of temporary clusters $T^p$ are found by heuristic Ardolan method [7]. The cluster center is the settlement $h^p_j$ the total costs for fuel transportation from which to all other settlements in the cluster are minimal:

$$h^p_m = h^p_j,$$

where

$$j = \arg\min_{j = 1, n^p} \left( \sum_{i=1}^{n_p} s(h^p_i, h^p_j)Q^p_i \right),$$

where $Q^p_i$ – total annual need in fuel of heat sources of $P$ cluster located in $i$ settlement, t of n.f./year.
6. Radii $r^p$ of temporary clusters are defined as the measures of nearness from the cluster centers to the most distant settlements in each of
them. As the measure of nearness between the objects we use the fuel transportation cost between the settlements:

\[ r^p = \max_{j=1,n_p} \left( h^p_m, h^p_j \right), \quad p = 1, K(K-1)/2. \]

7. Out of all the temporary clusters we select the one with the least radius:

\[ T^\rho : \rho = \arg\min_{p=1, K(K-1)/2} \left( r^p \right). \]

8. The temporary cluster \( T^\rho \) obtained is added to the multitude of initial clusters \( \{T^1, T^2, ..., T^K\} \) of stage 3, at the same time, the clusters forming it are excluded. Then \( K := K - 1 \).

9. Stages 4 - 8 are implemented until further amalgamation results in exceeding the set optimal radius \( R_{opt} \) which was defined as the maximum transportation cost at which it is practicable to transport woodchips:

\[ r^\rho < R_{opt}. \]

If there are clusters consisting of one settlement, they are combined with the nearest cluster. As a result, the center of the new cluster is shifted; therefore, the transition to stage 4 is performed. The amount of clusters \( K \) obtained is optimal.

As a result of implementing the hierarchical cluster analysis the optimal number of clusters has been defined. Further the method of k-averages is applied for distributing the objects by clusters and fixing their centers.

Algorithm of the method of k-averages

1. The amount of clusters \( K \) obtained after the hierarchical cluster analysis is set.

2. Cluster centers are initialized:

\[ h^p_m = h_j, \quad j = \text{random}(1,n), \quad p = 1, K, \]

where \( n \) - number of settlements.
3. Each settlement \( h_i \) \((i = 1, n)\) is assigned to a certain cluster \( T^p = \{h^p_j\} \), \( p \in \{1, 2, ..., K\} \) due to the minimum of transportation costs towards the cluster centers:

\[
h_i \rightarrow h^p_j, p = \arg\min_{p=1,K} \left( s(h^p_m, h_i) \right), i = 1, n.
\]

4. Cluster centers are redefined by Ardolan method:

\[
h^p_m = h^p_j, j = \arg\min_{j=1,n} \left( \sum_{i=1}^{n_p} s(h^p_J, h_i)Q^p_i \right), p = 1, K
\]

5. If the cluster centers change or the objects are redefined, the transition to stage 3 is performed. Otherwise the cluster centers \( h^p_m, p = 1, K \) obtained and distribution of objects by the clusters \( T^p = \{h^p_j\}, j = 1, n_p \) are considered as optimal.

**Task of optimal distribution of resources**

- **Task description**

The task of optimal distribution of resources is solved on two levels: district and regional. The transportation costs for delivering wood raw material from raw material accumulation points to fuel preparation points within one district serve as the minimization criterion on the district level. Further, due to the difference in the volumes of production and consumption of fuel on the district level there is a necessity to redistribute its excess between FPPs of different districts. Therefore the task for minimizing the costs for transporting fuel excess between districts is solved on the regional level.

Inside the district with FPP woodchips are delivered to heat sources, while due to long distances it is more practical to transport fuel pellets between the districts. Let us consider the task of optimal distribution of resources on the district level. The minimization criterion is as follows:
\[ Tr^{(1)} = \sum_{j=1}^{N} \sum_{i=1}^{M} s_{ij}^C Q_{ij}^C \rightarrow \min \]

where \( s_{ij}^C \) – specific transportation costs for delivering wood raw material from \( i \) RMAP to \( j \) FPP, rub./t of n.f. found by the formulas (1) – (3), where RMAP and FPP, respectively, serve as the initial and final route node; \( Q_{ij}^C \) – annual volume of wood raw material transported from \( i \) RMAP to \( j \) FPP, t of n.f./year; \( M \) – amount of RMAPs in the district; \( N \) – amount of FPPs in the district.

Let us impose limitations on the delivery volumes:

\[ \sum_{j=1}^{N} Q_{ij}^C \leq Q_{i}^{RMAP}, \quad i = 1, M \]

\[ \sum_{i=1}^{M} Q_{ij}^C \leq Q_{j}^{FPP}, \quad j = 1, N \]

On the regional level the minimization criterion is as follows:

\[ Tr^{(2)} = \sum_{j=1}^{N} \sum_{i=1}^{M} s_{ij}^T Q_{ij}^T \rightarrow \min \]

\[ \sum_{i=1}^{M} Q_{ij}^T \leq Q_{ij}^{FPP}, \quad j = 1, N \]

\[ \sum_{j=1}^{N} Q_{ij}^T \leq Q_{ij}^{FPP}, \quad i = 1, N \]

where \( s_{ij}^T \) – specific transportation costs for delivering fuel excess from \( i \) FPP to \( j \) FPP with fuel deficiency, rub./t of n.f.; \( Q_{ij}^T \) – annual volume of fuel transportation between \( i \) and \( j \) FPPs, t of n.f./year; \( Q_{ij}^{FPP} \) – annual fuel deficiency at \( j \) FPP, t of n.f./year; \( Q_{ij}^{FPP} \) – annual fuel excess at \( i \) FPP, t of n.f./year.
\( n.f./year \); \( N^+ \) – amount of FPPs at which fuel excess is produced; \( N^- \) – amount of FPPs with fuel deficiency.

- **Algorithm for solving the task of optimal distribution of resources**

To solve the task of optimal distribution of resources we are applying the method of differential rent [8].

If the following condition is fulfilled:

\[
\sum_{i=1}^{M} Q^\text{RMAP}_i = \sum_{j=1}^{N} Q^\text{FPP}_j ,
\]

(15)

The task of optimal distribution of resources will be a closed transportation problem and can be solved by the method of differential rent. If the condition (15) is not fulfilled, the given task will be an open transportation problem and it should be deduced to the closed type.

If for the district considered the total annual production of wood raw material exceeds the total annual consumption of the raw material, the excess of wood raw material is formed in this district \( Q^{+C} \) (\( t \) of \( n.f./year \)), found by the formula:

\[
Q^{+C} = \sum_{i=1}^{M} Q^\text{RMAP}_i - \sum_{j=1}^{N} Q^\text{FPP}_j .
\]

(16)

If the transportation task is open and there is an excess of wood raw material in the district, to deduce the task to the task of closed type it is necessary to introduce the fictitious fuel preparation point with the annual consumption equaled to the excess found by the formula (16).

If the total annual production of wood raw material in the district is below the total annual consumption of raw material, the deficiency of wood raw material \( Q^{-C} \) (\( t \) of \( n.f./year \)) is formed in this district found by the formula:

\[
Q^{-C} = \sum_{j=1}^{N} Q^\text{FPP}_j - \sum_{i=1}^{M} Q^\text{RMAP}_i .
\]

(17)
If the transportation task is open and there is a deficiency of wood raw material in the district, to deduce to the task of the closed type the fictitious raw material accumulation point is introduced with the annual volume of wood raw material processing of fictitious RMAP equaled to the deficiency (17).

Algorithm for solving the task of optimal distribution of resources

1. Let us designate the multitude of RMAPs \( \{ h_i \}, \quad i = 1, M \); the multitude of FPPs \( \{ h_j \}, \quad j = 1, N \). The matrix of transportation costs for the delivery of wood raw material from \( i \) RMAP to \( j \) FPP is complied: \( S = \{ S^C(h_i, h_j) \} = \{ S_{ij} \} \).

2. In each column of the matrix \( S \) the element corresponding to the minimal value of transportation costs for the delivery of wood raw material is defined:

\[
  i_j^\text{min} = \arg\min_{i=1,M} (S_{ij}), \quad j = 1, N.
\]

3. The delivery matrix is compiled:

\[
  X = (x_{ij}), \quad i = 1, M, \quad j = 1, N:
\]

\[
  x_{ij} = \begin{cases} 
  Q^\text{FPP}, & \text{if } i = i_j^\text{min}, \\
  0, & \text{if } i \neq i_j^\text{min}.
\end{cases}
\]

4. In the matrix \( X \) the excessive and deficient lines are defined to find either the excess or lack of raw material at RMAP. The lines are defined as follows:

- line \( i \) is excessive if the following condition is performed for it:

\[
  \sum_{j=1}^{N} x_{ij} < Q^\text{RMAP}_i,
\]

(18)

- line \( i \) is deficient if the following condition is performed for it:

\[
  \sum_{j=1}^{N} x_{ij} > Q^\text{RMAP}_i.
\]

(19)
If the line does not satisfy simultaneously the conditions (18) and (19), such line is called zero.

5. For each column of the matrix $S$ the difference between the nearest values of transportation costs in the excessive line and number $S^C(h_{i\min}, h_j)$ is defined. If the number $S^C(h_{i\min}, h_j)$ is in the excessive line, the difference is not defined. The minimal of the differences obtained corresponds to the intermediary rent.

6. The intermediary rent is added to the elements of the matrix of transportation costs located in deficient lines and the new matrix of transportation costs is compiled. Then the transition to stage 2 is performed. The process is fulfilled until all the lines become zero, i.e. all the stock is distributed and demands met.

As a result of implementing the method of differential rent we obtain the solution for the task of optimal distribution of resources on the regional level:

$$Q_{ij}^C = x_{ij}, i = 1, M, j = 1, N.$$

The task of optimal distribution of resources on the regional level (12) – (14), if required, is deduced to the closed type and is solved by the method of differential rent.

**Task of optimal management of stock**

- **Task description**

To arrange and adjust the stock and its reserve to provide the continuity and reliability of heat energy production, it is necessary to solve the task of optimal management of stock.

The three-level storage system of fuel supply for distributed sources of the region heat supply is considered.

The first level comprises the wood raw material accumulation points. These points maximally close to timber harvesting zones and, as a rule, are located on road junctions. The raw material is collected at RMAP at the time moment $t^*_N$ and continues till the time moment $t^{+}_N$. At RMAP the
wooden mass is dried under natural conditions within 1-3 months in warm season. After drying the humidity of wood raw material decreases from 60% to 30%. The raw material is taken from fuel preparation points from the time moment $t_C^-$ and continues till the moment $t_C^-$.

The second level comprises fuel preparation points. The preliminary prepared wood raw material is delivered to these points. At fuel preparation points the raw material is milled into the fuel – woodchips (output of the line at FPP $p(t)$, t of n.f./day).

The third level comprises the storages of heat sources where the prepared woodchips are transported within the time period $[t_{O1}^-, t_{O1}^+]$. In parallel, the heating season starts from the late September $[t_{O1}^-, t_{O1}^+]$ during which the fuel is consumed (Fig. 3). The fuel consumption at heat sources is defined by their load and change in the temperature mode within the heating season.
Figure 3: Scheme of raw material and fuel movement on different levels of logistic system

Assumption 2 - We assume that there are $M$ raw material accumulation points, $L$ heat sources and only one fuel preparation point in the considered three-level storage system.

Assumption 3 - We assume that the transportation of raw material and fuel in the considered system is centralized.

Let us designate as $Q_{RMAP}^i$, $Q_{C}^F$, $Q_{T}^F$, $Q_{RMAP}^T$ – current amount of wood raw material at $i$ RMAP ($i = \overline{1,M}$), current amount of wood material and fuel at FPP, as well as current amount of fuel at $j$ heat source ($j = \overline{1,L}$), respectively, $t$ of n.f.; $q_{+RMAP}^{Ci}$, $q_{+T}^{Tj}$ – speed of replenishing wood raw material at $i$ RMAP and replenishing of fuel at $j$ heat source, $t$ of n.f./day; $q_{-RMAP}^{Ci}$, $q_{-T}^{Tj}$ – speeds of consuming wood raw material at $i$ RMAP and fuel at $j$ heat source, $t$ of n.f./day; $q_{-FPP}^{C}$, $q_{+FPP}^{T}$ – speeds of consuming wood raw material and replenishing of fuel at FPP, $t$ of n.f./day. Let us mention that in accordance with Assumption 2 there is only one FPP in the system, therefore the speed of raw material replenishing at FPP is defined by summing the speeds of wood raw material consumption $q_{-RMAP}^{C}$ at all RMAPs.

Assumption 4 - We assume that the line for woodchips production is started at the time moment $t_{Ci}$ of wood raw material delivery to FPP storage.

In accordance with Assumption 4 the speeds of wood raw material consumption and fuel replenishing at FPP are equal and are defined by the equipment output $p(t)$, $t$ of n.f./day:

$$q_{-FPP}^{C}(t) = q_{+FPP}^{T}(t) = p(t).$$
The speeds of wood raw material replenishing at RMAP are defined due to deforestation volumes approved by the forest plan. The amount of fuel consumed by heat sources during the heating season \( [t_{\text{begin}}, t_{\text{end}}] \) is not constant. The dynamics of fuel consumption at heat sources \( q^{T}_{Tj} (t), j = 1, L \) is defined taking into account the seasonality function \( s(t) \) 

\[
q^{\dot{T}}_{Tj} (t) = q^{T}_{Tj} s(t),
\]

where \( q^{T}_{Tj} \) – fuel specific consumption at \( j \) heat source at uniform consumption during the heating period, \( t \) of n.f./day.

The system of equations describing the stock change at different points of three-level fuel supply storage system is as follows:

\[
\frac{dQ_{RMAP}^{Ci}}{dt} = q^{+RMAP} (t) - q^{-RMAP} (t), i = 1, M, \]

\[
\frac{dQ_{C}^{FPP}}{dt} = \sum_{i=1}^{M} q^{RMAP} (t) - q^{FPP} (t), \]

\[
\frac{dQ_{T}^{FPP}}{dt} = q^{+FPP} (t) - \sum_{j=1}^{L} q^{T} (t), \]

\[
\frac{dQ_{Tj}^{FPP}}{dt} = q^{FPP} (t) - q^{Tj} (t), j = 1, L. \]

Let us formulate Assumption 5: In the end of each period all the stock at FPP storages and heat sources, as well as the stock of wood raw material at RMAPs are completely consumed. Based on Assumption 5, the following balance equations need to be realized:

\[
\int_{\Delta t_{j}}^{+RMAP} (t)dt = \int_{\Delta t_{j}}^{-RMAP} (t)dt, \]

\[
\sum_{i=1}^{M} \int_{\Delta t_{i}}^{RMAP} (t)dt = \sum_{j=1}^{L} \int_{\Delta t_{j}}^{+T} (t)dt. \]
Logistic Task of Fuel Supply for the Regional Distributed Heat Supply System

\[
\int q_{\text{fj}}^{+\overset{\Delta t_0}{}}(t)dt = \int q_{\text{fj}}^{-\overset{\Delta t_0}{}}(t)dt,
\]

where \(\Delta t_C^+, \Delta t_C^-, \Delta t_T^+, \Delta t_T^-\) - periods of replenishing and consuming wood raw material and fuel, respectively, so:

\[
t_C^+ + \Delta t_C^+ = t_C^- + \Delta t_C^-, \quad t_T^+ + \Delta t_T^+ = t_T^- + \Delta t_T^-.
\]

The essence of solving such task of optimal management of stock in fuel supply storage system is to minimize total storage consumption during the whole period \([t_{\text{Ni}}, t_{\text{Oe}}]\) from the beginning of wood raw material collection till the end of heating period:

\[
F(q_{\text{CM}}^{-\text{RMAP}}, q_{\text{CM}}^{+T}, q_{\text{CL1}}^{-\text{RMAP}}, q_{\text{CL1}}^{+T}, ..., q_{\text{CLL}}^{-\text{RMAP}}, q_{\text{CLL}}^{+T}) \rightarrow \text{min},
\]

where the functions \(q_{\text{Ci}}^{-\text{RMAP}}(t), q_{\text{fj}}^{+T}(t)\) are the controlling functions.

Since the natural drying of wooden mass takes place at RMAPs, the humidity of wood raw material decreases from 60 % to 30 %. The humidity of woodchips is also 30 %.

Let us impose the limitations onto the stock volumes at storages taking the raw material humidity into account:

\[
0 \leq \int_{t_{\text{Cu}}}^{t} \beta_1 q_{\text{Ci}}^{-\text{RMAP}}(\tau)d\tau - \int_{t_{\text{Cu}}}^{t} \beta_2 q_{\text{Ci}}^{-\text{RMAP}}(\tau)d\tau \leq V_{\text{Ci}}^{\text{RMAP}}, \quad i = 1, M,
\]

\[
0 \leq \sum_{i=1}^{M} \int_{t_{\text{Cu}}}^{t} q_{\text{Ci}}^{-\text{RMAP}}(\tau)d\tau - \int_{t_{\text{Cu}}}^{t} q_{\text{C}}^{-\text{FPP}}(\tau)d\tau \leq \frac{V_{\text{C}}^{\text{FPP}}}{\beta_2},
\]

\[
0 \leq \int_{t_{\text{Cu}}}^{t} q_{\text{Ti}}^{+\text{FPP}}(\tau)d\tau - \sum_{j=1}^{L} \int_{t_{\text{Tu}}}^{t} q_{\text{fj}}^{+T}(\tau)d\tau \leq \frac{V_{\text{T}}^{\text{FPP}}}{\beta_2},
\]

\[
Q_{\text{ij}}^{0r} \leq \int_{t_{\text{Ti}}}^{t} q_{\text{fj}}^{+\overset{\Delta t_0}{}}(\tau)d\tau - \int_{t_{\text{Ti}}}^{t} q_{\text{fj}}^{-\overset{\Delta t_0}{}}(\tau)d\tau \leq \frac{V_{\text{fj}}^{0r}}{\beta_2}, \quad j = 1, L.
\]
where $\beta_1, \beta_2$ – coefficients defining the amount of bulk cubic meters of wood raw material with the humidity 60 % and 30 %, respectively, in one ton of nominal fuel, bulk m$^3$/ t of n.f.; $V_{RMAP}^{Ci}$ – volume of storage for keeping wood raw material at $i$ RMAP, bulk m$^3$; $V_{FPP}^C, V_{FPP}^T$ – volumes of storages for keeping wood raw material and fuel at FPP, bulk m$^3$; $Q^\Theta_j$ – size of reserve fuel stock at $j$ heat sources, t of n.f.; $V_{Tj}^T$ – volume of fuel storage at $j$ heat source, bulk m$^3$.

The total storage costs (20) consist of three parts: cost of material stock, organizational costs connected with the documentation of material stock, its delivery, unloading, etc, as well as storage costs:

$$F = F^I + F^{II} + F^{III}.$$  

1. Cost of material stock:

$$F^I = \sum_{j=1}^L c^\otimes_{Tj} \int_{\Delta t_j} q^\otimes_{Tj}(t) dt,$$

where $c^\otimes_{Tj}$ – cost of fuel delivered to $j$ heat source with FPP, rub/t of n.f.

2. Organizational costs:

$$F^{II} = \sum_{i=1}^M z_{Ci} n_{Ci} + \sum_{j=1}^L z_{Tj} n_{Tj},$$

where $z_{Ci}$ – costs of the organization of one delivery of wood raw material from $i$ FPP, rub/delivery; $z_{Tj}$ – costs of the organization of one delivery of fuel to $j$ heat source, rub/delivery; $n_{Ci}, n_{Tj}$ – number of deliveries of wood raw material from $i$ RMAP and fuel to $j$ heat source during the heating period.

Let us introduce the functions $\eta_{Ci}(t), i = 1, M$ and $\eta_{Tj}(t), j = 1, L$ such as:

$$\eta_{Ci}(t) = \begin{cases} 1, & \text{if } q_{Ci}^{RMAP}(t) > 0, \\ 0, & \text{if } q_{Ci}^{RMAP}(t) = 0; \end{cases} \quad i = 1, M,$$

$$\eta_{Tj}(t) = \begin{cases} 1, & \text{if } q_{Tj}^{RMAP}(t) > 0, \\ 0, & \text{if } q_{Tj}^{RMAP}(t) = 0; \end{cases} \quad j = 1, L.$$
\[ \eta_{T_j}(t) = \begin{cases} 1, & \text{if } q_{T_j}^+(t) > 0, \\ 0, & \text{if } q_{T_j}^+(t) = 0. \end{cases} \]

Then

\[ n_{C_i} = \sum_{k=1}^{M} \eta_{C_i}(t), i = 1, M, \]

\[ n_{T_j} = \sum_{j=1}^{L} \eta_{T_j}(t), j = 1, L. \]

3. Costs for the storage of main stock:

\[ F_{III} = h_C \int_{t_{C_i}}^{t_{FPP}} Q_{C}^{FPP}(t)dt + h_T \int_{t_{T_j}}^{t_{FPP}} Q_{T}^{FPP}(t)dt + \sum_{j=1}^{L} h_{T_j} \int_{t_{T_j}}^{t_{FPP}} Q_{T}^{FPP}(t)dt \]

where \( h_C, h_T \) – specific costs for the storage of wood raw material and fuel at FPP, rub/(t of n.f.-day); \( h_{T_j} \) – specific costs for fuel storage at \( j \) heat source, rub/(t of n.f.-day). Specific costs comprise the costs for the storage rent, depreciation during storage, etc.

- **Algorithm for solving the task of optimal management of stock**

To solve the task of optimal management of stock in the system of heat supply of the region, we are going to impose a number of limitations:

1. Volumes of the lots of wood raw material deliveries from RMAP to FPP are constant and need to satisfy the conditions of continuous fuel production taking into account the equipment output \( p(t) \) (t of n.f./day) at FPP:

\[ q_{RMAP}^{-C_i}(t) = \begin{cases} x_i^{(i)}, & \text{if } Q_C^{FPP}(t) \leq Q_C^{*FPP}, \\ 0, & \text{if } Q_C^{FPP}(t) > Q_C^{*FPP} \end{cases}, \quad i = 1, M, \]
where $Q_{C}^{*FPP}$ – volume of wood raw material processing at FPP ($t$ of $n.f.$) within the delivery period $t_{del}^{FPP}$ (day) found by the formula:

$$Q_{C}^{*FPP} = p(t) t_{del}^{FPP}.$$

2. Volumes of the lots of fuel deliveries to heat sources within the heating period are constant and found taking into account the reserve stock of fuel $Q_{O}^{Tr}$ at the storages of heat sources:

$$q_{ij}^{T}(t) = \begin{cases} x_{j}^{(2)}, & \text{if } Q_{ij}^{T}(t) \leq Q_{ij}^{Tr}, \\ 0, & \text{if } Q_{ij}^{T}(t) > Q_{ij}^{Tr}; \quad j = 1, L. \end{cases}$$

Let us assume that $X_1 = (x_1^{(1)}, x_2^{(1)}, ..., x_M^{(1)})$ and $X_2 = (x_1^{(2)}, x_2^{(2)}, ..., x_L^{(2)})$ – vectors of the volumes of lots of wood raw material deliveries from RMAP to FPP and fuel to heat sources, respectively, which will be the parameters of the task of optimal management of stock. Then the objective function of the task of optimal management of stock (20) is written down as follows:

$$F(X_1, X_2) \rightarrow \min.$$  \hspace{1cm} (25)

In the limitations on the stock volumes at the storages of heat sources represented by the formula (24), storage volumes $V_{Tj}^{T}$ ($m^3$) are found as follows:

$$V_{Tj}^{T} = \beta_2 (Q_{ij}^{Tr} + x_{j}^{(2)} t_{del}^{T}), \quad j = 1, L,$$

where $t_{del}^{T}$ – period of fuel delivery to heat sources, day.

The task of stock management in the regional fuel supply system comprises the search for optimization parameters $X_1 = (x_1^{(1)}, x_2^{(1)}, ..., x_M^{(1)})$ and $X_2 = (x_1^{(2)}, x_2^{(2)}, ..., x_L^{(2)})$ satisfying the conditions (25), (21) – (24).

This task is referred to the class of tasks of mathematical programming and is solved by the hybrid algorithm consisting of the genetic algorithm (GA) and Hooke-Jeeves method [9].
When applying the genetic algorithm, the optimization parameters are represented as coded values (genes) \([4]\). The aggregation of genes forms a chromosome. Chromosomes form the population. The chromosome example \(\bar{y} = (y_1, y_2, ..., y_n)\) for the task in question is given in Figure 4.

<table>
<thead>
<tr>
<th>6.35</th>
<th>25.1</th>
<th>...</th>
<th>6.15</th>
<th>...</th>
<th>12.12</th>
<th>4.95</th>
<th>86.25</th>
<th>...</th>
<th>47.25</th>
<th>...</th>
<th>10.11</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x_1^{(1)})</td>
<td>(x_2^{(1)})</td>
<td>...</td>
<td>(x_1^{(2)})</td>
<td>(x_2^{(2)})</td>
<td>...</td>
<td>(y_1)</td>
<td>(y_{M+1})</td>
<td>(y_{M+2})</td>
<td>(y_{M+j})</td>
<td>(y_{M+L} = y_n)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4:** Chromosome example

To each chromosome we assign the fitness function which serves as the measure of solution quality described by the given specimen. The objective function acts as the fitness function \((25)\). The algorithm of hybrid genetic algorithm with additional leader training by Hooke-Jeeves method was given in \([10]\).

The hybrid algorithm applied is based on the successive operation of two methods whose essence means that on each iteration of the main method (GA) the attempt is made to improve the solution with the help of additional optimization method (Hooke-Jeeves method). Due to this, the hybrid genetic algorithm improves the adaptation properties of each method applied in this scheme and, in most cases, provides better results than separate methods.

**Results of solving the logistic task of region fuel supply (on the example of the Udmurt Republic)**

- Optimal scheme of locating the facilities of wooden fuel production

Arrangement of the optimal scheme of locating the facilities of wooden fuel production in the Udmurt Republic (UR) is performed as a result of solving the clustering task.
The calculations demonstrated that in UR 24 fuel preparation points need to be arranged which will supply woodchips to 297 heat sources located in distant settlements of the Republic. Also, the locations of 94 raw material accumulation points have been defined. In Figure 5 you can see the scheme of RMAPs and FPPs location on the territory of UR.

**Figure 5:** Scheme of locating the points of woodchip production on the territory of UR
Thus the optimal scheme of the location of facilities of woodchip production in 14 districts of the region comprising 24 fuel preparation points and 94 raw material accumulation points has been arranged.

In other districts the energy potential of wood resources is insufficient to provide heat sources with local types of fuel. Therefore it is necessary to organize the delivery of fuel from other districts to them. Since the transportation distances are considerable, it is practical to transport energy-concentrated fuel – fuel pellets.

Thus, there is already the plant for fuel pellets production in Zavyalovo district (Lyukshudya), therefore it is necessary to additionally construct the plant for fuel pellets production in Mozhga district (Mozhga). It is suggested to set up fuel pellet plants in Balezino district (Balezino) and Yakshur-Bodya district (Lynga). The pellets produced at these plants are supposed to be delivered to heat sources in central and northern districts of the Republic. As a result of the analysis of energy potential and demands of the districts of the Republic in local fuel, the scheme of production arrangement and provision of heat sources with fuel pellets taking the transportation networks into account demonstrated in Figure 6 is proposed.

- **Optimal routes of raw material and fuel delivery**

  The optimal routes of wood raw material and fuel delivery are arranged based on the solution of routing task.

  The task of optimal distribution of resources between fuel preparation points and raw material accumulation points is solved on district level using the map of optimal routes. As a result, the plan of wood raw material deliveries is prepared.

  Thus, for instance, the routes of wood raw material deliveries to Debessy district of the Udmurt Republic are given in Figure 7, a). The optimal routes of fuel transportation from FPPs to heat sources are shown in Figure 7, b).
Logistic Task of Fuel Supply for the Regional Distributed Heat Supply System

Figure 6. Colorgram of raw material potential for fuel pellet production and scheme of the location of fuel pellet production plants on the territory of UR
Logistic Task of Fuel Supply for the Regional Distributed Heat Supply System

Figure 7: Scheme of the routes for Debessy district of UR:

a) transportation of wood raw material from RMAPs to FPPs;

b) transportation of fuel from FPPs to heat sources

The optimal routes of wood raw material transportation from RMAPs to FPPs, as well as the optimal routes of fuel transportation from FPP to heat sources of the Udmurt Republic are demonstrated in Figure 8.

- Optimal management of stock in fuel supply system

As a result of solving the task of optimal management of stock in fuel supply system of the region, the volumes and time of wood raw material delivery to FPPs and fuel to heat sources have been defined.

Let us consider the results of solving the stock management task on the example of FPP planned in the village Zarechnaya Medla in Debessy district of UR. The scheme of fuel supply of heat sources from FPP is given in Figure 9.
Figure 8: Optimal transportation routes for UR:

a) transportation of wood raw material from RMAPs to FPPs;

b) transportation of fuel from FPPs to heat sources

The wood raw material will be delivered to FPP in the village Zarechnaya Medla from 2 RMAPs, the total energy potential to be 941.82 t of n.f./year. This FPP will supply fuel to six heat sources in Debessy district.

The wood raw material is delivered to FPP from early July to late November. During this period the woodchip production line is operated at FPP. The line output is 7.66 t of n.f./day. The wood raw material is delivered from two RMAPs by equal lots with the periodicity for RMAP No 1 – once in 3 days, for RMAP No 2 – once in 4 days. In Figure 10, as you can see the graph of changes in wood raw material stock at FPP storage.

Taking into account the line output and functions $q^O(t)$ of fuel delivery to heat sources obtained as a result of solving the task of stock
management, we have constructed the graph of changes in the fuel stock volume at FPP (Figure 10, b).

The duration of heating period is 220 days – from late September to late April. In Figure 10, c you can see the graphs of changes in the fuel volume at heat sources within the heating period.

**Figure 9:** Scheme of the fuel supply system
Figure 10: Changes in the stock volume at the storages of fuel supply system objects in the village Zarechnaya Medla:
   a) wood raw material at FPP; b) fuel at FPP;
   c) fuel at heat sources supplied from FPP
Logistic Task of Fuel Supply for the Regional Distributed Heat Supply System

References

Potential of Renewable Energy Sources in Uzbekistan

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The competitive market is able to regulate simple innovative processes. In those of a more complex nature whose principal players may belong to either the same or a different firm a different form of organization is required: one which coherently defines rules and resources designed to avoid, in conditions of uncertainty, tensions arising between the different players which prevent their coordination. In this essay, the hypothesis that such organizations require both contract and leadership will be presented and discussed. The contract is required to ensure ex-post efficiency, avoiding wastage of resources, and ex-ante efficiency, i.e. mutual commitment between the different players in the innovative process. Leadership is required to progressively manage the conflicts that occur between contrasting visions of how best to proceed that emerge from different specializations, legitimized through a shared commitment. Notwithstanding such characterization, leadership may also not assume the same functions of contract. The contract may not be sufficient and require leadership, but strong leadership cannot replace contract. In such a case, there would be a risk of disengagement. An initial application of this simple model (leadership and contract) seems encouraging against competing theories conceiving contract or leadership as sufficient conditions for innovation.

Keywords: renewable energy, sources of renewable energy, renewable energy in Uzbekistan, renewable energy potential
Introduction

Contemporary energy policies in many countries worldwide emphasize great importance of renewable energy sources as a road map for reform and future development (Lund, 2007). Most developed countries have coherent renewable energy targets, while most of the developing countries put high emphasis on the extension of power generation from renewable energy sources (REN21, 2007). In Uzbekistan, the potential of some renewable energy sources is sufficiently high, but it requires increased awareness and the development of an incentive driven renewable energy propagation policy for a rapid and effective expansion of the renewable energy source utilization (IRG, 2005).

Indeed, Uzbekistan possesses an enormous potential of solar, biomass and biogas energy sources, while the potential of small scale hydropower and wind is also significantly high. However, the share of renewable and non-fossil fuels in Uzbekistan account currently for 600 ktoe (0.33%) (Abdullaev et al., 2000). Moreover, the geographic distribution of the available renewable energy sources is uneven and hence ‘one policy fits all’ approach in renewable energy source application may not be appropriate. Moreover, there are social, cultural and institutional factors that prevent renewable energy sources from being an optimal solution: inefficiency on the demand side, people’s poor knowledge of the economic and ecological advantages of the available renewable energy sources and a coherent incentive policy to promote the use of renewable energy sources (IRG, 2005) being few of them.

The urbanization rate is around 35% and more than 65% of the population lives in rural settlements in Uzbekistan. Currently, 1500 remote rural settlements with 1.5 million (5%) people are not connected to the grid in the country due to a remote and low intensity allocation of these settlements. Renewable electricity sources could serve as an optimal energy solution for these settlements. Moreover, off-grid renewable energy source application in the remote areas could ease and accelerate the renewable energy penetration since it is not only economically viable but also cheaper than the traditional energy sources that require an expansion of the existing distribution infrastructure and high operational and maintenance costs.
First of all however, the techno-economic potential, the scope of the current renewable energy utilization process and the opportunities for the future expansion should be reviewed. The present section discusses the available theoretical potential, the current trends in renewable energy utilization in the country, analyses their technical feasibility and economic viability, and attempts to identify high priority beneficiaries (i.e. remote settlements, residential consumers, or state and public authorities) for each of these resources.

**Hydropower potential**

GW of this potential is already being exploited, the share of the large scale hydropower stations being 70% and small hydropower stations being 30% (REEEP, 2011). The currently installed hydropower capacities produce ca. 6 $THz/year$ of electricity. The level of precipitation in Uzbekistan is low with an average annual rate of 200-220 mm and the country is not endowed with a significant number of glaciers (Perelet, 2007). Hence most of the hydropower resources available in the country originate in the neighboring Kyrgyzstan and Tajikistan. The Styr Darya river formed in Kyrgyzstan is shared also with Uzbekistan and Kazakhstan and the Amu Darya river originating in Tajikistan is shared also with Turkmenistan and Uzbekistan. It is worthwhile to bear in mind that peace and development processes in the riparian Afghanistan will make that country another major beneficiary of the Amu Darya river basin, putting even more constraint to the water availability in Uzbekistan both for irrigation and energy generation purposes.

Currently, the theoretically available hydropower potential accounts to nearly 12 GW of exploitable capacity in the four main river basins of Uzbekistan (Table 1). Around 1.2

Considering the fact that the country generated an annual gross electricity amount of 44-48 $TWh/year$ between 1992 and 2008 reveals that the currently installed hydropower facilities are more technologically efficient in comparison with the fossil fuel based generation facilities. Indeed, the share of hydropower in the total installed capacity corresponds to 10% while it produces 12.5% of the electricity. However, the efficiency of
the small scale hydropower generation is relatively low in comparison with the large scale hydropower due to the seasonal decrease of the flow. As most of the available large hydropower generation capacity is already being exploited, the technically feasible undiscovered hydropower potential mainly corresponds to small scale electricity generation, which will be less efficient.

**Table 1:** Gross theoretical hydropower potential of all major rivers basin in Uzbekistan

<table>
<thead>
<tr>
<th>Basins</th>
<th>Gross Capacity (GW)</th>
<th>Energy (TWh/yr)</th>
<th>Output Share (%)</th>
<th>Capacity intensities (kWh/sq km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chirchiq-Angren basin</td>
<td>4.079</td>
<td>35.74</td>
<td>33.40</td>
<td>202.00</td>
</tr>
<tr>
<td>Ferghana valley</td>
<td>2.933</td>
<td>25.66</td>
<td>24.00</td>
<td>166.00</td>
</tr>
<tr>
<td>South-West</td>
<td>4.250</td>
<td>37.10</td>
<td>34.80</td>
<td>20.70</td>
</tr>
<tr>
<td>The Lower Amudarya</td>
<td>0.969</td>
<td>25.66</td>
<td>7.80</td>
<td>5.64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12.231</td>
<td>107.00</td>
<td>100.00</td>
<td>98.60</td>
</tr>
</tbody>
</table>

*Source: (IRG, 2005)*

The theoretically exploitable hydropower capacity equals the current total installed electricity generation capacity of the country using all the fuels. Nevertheless it is realistic to assume that no utilization of all of this theoretical potential is techno-economically feasible, nor all the techno-economically feasible potential can be exploited in the medium or even long term. However, it is clear that hydropower has a substantial role to play in the future energy supply of Uzbekistan. It also offers a number of environmental advantages, in terms of avoided power generation based on diminishing fossil fuels and reduction of atmospheric emissions.

The Asian Development Bank (ADB) funded technical assistance study carried out by the International Resource Group (IRG, 2005) for the Ministry of Agriculture and Water Resources of Uzbekistan concluded that
the small scale hydropower generation is the most promising off-grid renewable energy resource for meeting the agricultural energy demand in Uzbekistan. Due to the high share of agricultural production in the national economy of Uzbekistan, the largest part of the water received in the rivers is used for irrigation purposes. Consequently, the share of water spent for irrigation corresponds to ca. 95% of the total received waters in the most downstream Lower Amu Darya region, while the figure is still high in the upper regions. Due to the high irrigational water demand, the amount that can be dedicated for power generation is very limited especially in the internal canals which were artificially built for sustaining arid agricultural production in a dry climate. Hence the prospect of the Rogun dam being constructed in Tajikistan revives the inevitable danger of changing the water flow regime in the Amu Darya River, to which the agriculture sector of the downstream countries cannot withstand.

Moreover, small scale hydropower generation is relatively more expensive in terms of each unit of installed capacity in comparison with the large hydro power generation facilities and has a longer payback period (Twidel & Weir, 2006). Therefore small scale hydropower is less attractive for the investors. Additionally, due to a relatively much higher capacity and consequently high amount of capital investment requirements among the renewable sources, the small scale hydropower generation demands state or public organization initiated and controlled project realization and operation, hence is not preferred or affordable for the individual consumers. As mentioned above, another disadvantage of small scale hydropower generation in the sharp continental climate is its not functioning during the winter period due to the decreased water flow. The internal canals and small river basins freeze completely during a certain period that corresponds to the peak energy demand and hence does not provide a standalone energy solution. Therefore utilization of small scale hydropower should be realized in combination with some other sources that can replace the small hydropower production during the winter.

Hence, the small scale hydropower generation can be a more preferred renewable energy solution as a government funded medium or small scale project, especially for meeting the agricultural energy demand due to its correspondence in terms of demand-supply time period. As for
the residential consumption, small scale hydropower can be used as a supplement to the centralized electricity supply system during the periods of availability of water, but is not a promising solution for meeting the residential electricity demand as it is not a remote standalone renewable energy resource.

**Solar potential**

Similar to most of the Asian countries, solar power is considered as one of the most promising renewable energy source in Uzbekistan. The number of sunny days is very high with more than 300 sunny days a year all over the country (Komilov, 2002). Approximately 75% of the country consists of deserts, which is favorable for solar PV and solar thermal power utilization. However its utilization is yet not organized despite this high potential.

A study by Abdullaev and Isaev (2005) revealed that among the renewable sources solar photovoltaic (PV) power generation might be the most appropriate residential energy source from a technical point of view (Table 2) with gross solar radiation potential of 50793 Mtoe, of which 176.8 Mtoe is technically exploitable. The technically exploitable amount is triple the amount of the current total primary energy production of 55 Mtoe (including exports).

The solar radiation intensity (insolation) varies slightly due to the geographic location and natural condition within the country, where only few pre-mountain areas are in the range of low techno-economic viability due to a lower insolation rate. In average the insolation ranges from 0.80 to 1.21 in Uzbekistan, which is higher than the most Western European Countries and slightly lower than the South European countries such as Italy and Spain (Figure 1).
Table 2: General solar energy characteristics in Uzbekistan

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar elevation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North: 45°35’ n.l.</td>
<td>68°</td>
<td>21°</td>
</tr>
<tr>
<td>South: 37°10’ n.l.</td>
<td>76°</td>
<td>29°</td>
</tr>
<tr>
<td>Daily sunshine duration, hours/day</td>
<td>3 - 5</td>
<td>10 – 13</td>
</tr>
<tr>
<td>Days without sun, days/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>45-50</td>
<td>10 – 15</td>
</tr>
<tr>
<td>South</td>
<td>22 - 25</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Average sunshine duration, hours/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>2800</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>3050</td>
<td></td>
</tr>
<tr>
<td>Direct solar radiation intensity (S), kW/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>on plains</td>
<td>0.80 - 0.94</td>
<td></td>
</tr>
<tr>
<td>on high-altitude stations</td>
<td>0.94 - 1.06</td>
<td></td>
</tr>
<tr>
<td>on Kyzylcha station, S_{max}</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>Duration of minimal sunshine, hours/month</td>
<td>80.0 - 100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Abdullaev & Isaev, 2005)
Figure 1: Average daily solar insulation map of the European continent, 2007 Source: (SolarGIS, 2011)

Table 3 shows the solar potential of photoelectric energy in the provinces of Uzbekistan conditional to 1% of the total area of the province being covered with solar panels of 10% and 18% conversion efficiency. The range 10% and 18% conversion efficiency rate is based on the potential of the current photovoltaic panels available on the market (Probst et al., 2001).
Table 3: Technical potential of solar photoelectric energy in the provinces of Uzbekistan based upon 1% of area usage

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Area (thousand sq km)</th>
<th>10% efficiency (TWh/year)</th>
<th>18% efficiency (TWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Karakalpakstan Rep.</td>
<td>164.90</td>
<td>130.00</td>
<td>224.00</td>
</tr>
<tr>
<td>2</td>
<td>Andijan</td>
<td>4.20</td>
<td>0.18</td>
<td>0.33</td>
</tr>
<tr>
<td>3</td>
<td>Bukhara</td>
<td>39.40</td>
<td>23.00</td>
<td>41.00</td>
</tr>
<tr>
<td>4</td>
<td>Jizzakh</td>
<td>20.50</td>
<td>9.80</td>
<td>17.50</td>
</tr>
<tr>
<td>5</td>
<td>Kashkadaryo</td>
<td>28.40</td>
<td>14.00</td>
<td>25.00</td>
</tr>
<tr>
<td>6</td>
<td>Navoi</td>
<td>110.80</td>
<td>58.00</td>
<td>105.00</td>
</tr>
<tr>
<td>7</td>
<td>Namangan</td>
<td>7.90</td>
<td>0.34</td>
<td>0.60</td>
</tr>
<tr>
<td>8</td>
<td>Samarkand</td>
<td>16.40</td>
<td>8.40</td>
<td>15.00</td>
</tr>
<tr>
<td>9</td>
<td>Surkhandaryo</td>
<td>20.80</td>
<td>13.00</td>
<td>36.00</td>
</tr>
<tr>
<td>10</td>
<td>Sirdaryo</td>
<td>5.10</td>
<td>1.10</td>
<td>2.00</td>
</tr>
<tr>
<td>11</td>
<td>Tashkent</td>
<td>15.60</td>
<td>4.90</td>
<td>9.10</td>
</tr>
<tr>
<td>12</td>
<td>Fergana</td>
<td>7.10</td>
<td>0.29</td>
<td>5.30</td>
</tr>
<tr>
<td>13</td>
<td>Khorezm</td>
<td>6.30</td>
<td>2.10</td>
<td>3.80</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>447.40</td>
<td>265.11</td>
<td>484.63</td>
</tr>
</tbody>
</table>

Source: (IRG, 2005)

As seen from Table 3, only 0.1% to 0.2% coverage of the country’s area can provide a sufficient amount of electricity (including the exports) currently. However, the price of the solar photovoltaic panels is relatively high compared to the subsidized centrally supplied electricity prices, while additional accumulators are required for night time electricity supply, which increase the capital investment amount substantially.
Currently a square meter PV panel (without accumulators) with an average production capacity of 100 Wp\(^1\) costs ca. US$ 270-300 in Uzbekistan and the price of the accumulators vary depending on their capacity and quality. Hence total PV installation costs for an average family as well as small business can only be guessed at this level. Cost-Benefit Analysis (CBA) of the PV system application can be provided only after obtaining precise data and information on the crucial indicators. Some of these indicators are the total costs, benefits, average per capita electricity and natural gas demand and household electricity and natural gas consumption levels.

Expansion of photovoltaic (PV) electricity generation in Uzbekistan requires more technical innovation penetration such as PV charged electricity storage accumulators and efficient electricity consuming appliances being the most crucial ones for efficient solar power utilization.

Due to the diverse geographic allocation of the population, some large solar power generation plants are being studied with an explicit spatial approach by the Government of Uzbekistan and some international investors. The Russian oil giant Lukoil, in cooperation with the Asian Development Bank is planning the construction of a 100 MW solar facility which is expected to be enlarged to 1GW. However, exact dates for this project are not clear yet (Business Insider, 2011).

In comparison to the solar PV power generation, solar space heating and hot water supply requires relatively less initial capital investments and less technological innovation penetration. Therefore it has more perspective in terms of quick penetration and dissemination in the residential sector. Although there is no figure about the current level of energy consumption for space and water heating, it should be considered that, due to a sharp continental climate, the solar thermal potential is high during the summer when the demand is at its minimal point while the potential reaches its minimum during the winter when the demand is at its peak.

\(^1\) Wp (Watt-peak) is a measure of the nominal power of a photovoltaic solar energy device under laboratory illumination conditions. Related units such as kilowatt-peak or kilowatts-peak (kWp) and megawatts-peak are also used, and in the context of domestic installations kWp is the most common unit encountered.
Moreover, although the Table 4 gives the potential of solar thermal in electric power units of $THz$, actual energy value for gross solar thermal potential is 90 and 180 $ktoe$ for 40% and 80% collector efficiency respectively under 1% total area coverage. This is an enormous thermal energy, however cannot be used for other purposes than space and water heating.

Although there is no exact figure for Uzbekistan, space heating and hot water supply account for 65% of the residential energy consumption in the Western countries (Stettler, 2010). Bearing in mind the fact that the population of Uzbekistan with lower life standards has less electricity consuming devices and lower thermal insulation efficiency, we can assume that the figure is at least similar in Uzbekistan. Hence solar thermal potential can be utilized in the residential sector for space and water heating for domestic uses, especially in the rural areas where central supply of hot water for heating and domestic purposes is not organized contrary to the urban areas.

IRG (2005) accounted the residential energy demand of the rural population in Uzbekistan as 3370.6 $GWh/year$. Concluding from above that 65% of this energy was used for space and water heating, a residential demand for solar thermal energy of 2191 $GWh/year$ can be assumed. This leads to a conclusion that only 0.001 to 0.002 % of the total area coverage (or 450 – 900 km²) with solar thermal heaters can meet the energy spent for space and water heating in the rural residential sector (ca. 19 million people).

Based on their purpose, public buildings can also switch to solar thermal water heating with relatively small investments while solar thermal space heating may require significantly higher investments for renovation and improved thermal insulation. Another potential beneficiary of the solar thermal power in Uzbekistan may be the greenhouse based agricultural production, which is also responsible for most of the natural gas consumption in the agricultural sector. IRG (2005) indicates the greenhouse heating and livestock and poultry keeping demand of energy as 166 $GWh/year$, which can easily be met by applying solar thermal heaters.
Table 4: Technical potential of solar thermal energy in the provinces of Uzbekistan for heat supply based upon 1% area usage

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>40% Collector efficiency (TWh/year)</th>
<th>80% Collector efficiency (TWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Karakalpakistan Rep.</td>
<td>520.00</td>
<td>1040.00</td>
</tr>
<tr>
<td>2</td>
<td>Andijan</td>
<td>0.72</td>
<td>1.44</td>
</tr>
<tr>
<td>3</td>
<td>Bukhara</td>
<td>92.00</td>
<td>184.00</td>
</tr>
<tr>
<td>4</td>
<td>Jizzakh</td>
<td>39.20</td>
<td>78.40</td>
</tr>
<tr>
<td>5</td>
<td>Kashkadaryo</td>
<td>56.00</td>
<td>112.00</td>
</tr>
<tr>
<td>6</td>
<td>Navoi</td>
<td>232.00</td>
<td>464.00</td>
</tr>
<tr>
<td>7</td>
<td>Namangan</td>
<td>1.36</td>
<td>2.72</td>
</tr>
<tr>
<td>8</td>
<td>Samarkand</td>
<td>33.60</td>
<td>67.20</td>
</tr>
<tr>
<td>9</td>
<td>Surkhandaryo</td>
<td>52.00</td>
<td>104.00</td>
</tr>
<tr>
<td>10</td>
<td>Sirdaryo</td>
<td>4.40</td>
<td>8.80</td>
</tr>
<tr>
<td>11</td>
<td>Tashkent</td>
<td>19.60</td>
<td>39.20</td>
</tr>
<tr>
<td>12</td>
<td>Fergana</td>
<td>1.16</td>
<td>2.32</td>
</tr>
<tr>
<td>13</td>
<td>Khorezm</td>
<td>8.40</td>
<td>16.80</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1060.00</td>
<td>2120.00</td>
</tr>
</tbody>
</table>

Source: (IRG, 2005)

Wind potential

Uzbekistan, a double landlocked country with no coastal area, consists of 25% mountainous valleys and 75% desert covered oasis. Therefore the average yearly wind speed on the whole territory of the country is estimated between 2-2.5 m/sec, which indicates a non-promising future for wind power engineering in Uzbekistan, especially for wind turbines of middle and high power (Abdullaev & Isaev, 2005).

Consequently the wind energy potential in Uzbekistan is relatively less exploitable in comparison with the solar and hydropower potential.
Potential of Renewable Energy Sources in Uzbekistan

Even in the provinces with a reasonable potential wind resource is very seasonal and it is necessary to study the coincidence between peak wind months and the electricity demands.

**Table 5**: Gross Potential of Wind Energy in the Provinces of Uzbekistan

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Area of wind resource $km^2$</th>
<th>Gross potential $W/m^2$</th>
<th>Gross energy $GWh/year$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Karakalpakistan Rep.</td>
<td>1649</td>
<td>93</td>
<td>10752.20</td>
</tr>
<tr>
<td>2</td>
<td>Andijan</td>
<td>42</td>
<td>20</td>
<td>60.00</td>
</tr>
<tr>
<td>3</td>
<td>Bukhara</td>
<td>294</td>
<td>90</td>
<td>2421.80</td>
</tr>
<tr>
<td>4</td>
<td>Jizzakh</td>
<td>205</td>
<td>49</td>
<td>649.60</td>
</tr>
<tr>
<td>5</td>
<td>Kashkadaryo</td>
<td>284</td>
<td>58</td>
<td>1162.00</td>
</tr>
<tr>
<td>6</td>
<td>Navoi</td>
<td>1108</td>
<td>104</td>
<td>7931.40</td>
</tr>
<tr>
<td>7</td>
<td>Namangan</td>
<td>79</td>
<td>28</td>
<td>155.40</td>
</tr>
<tr>
<td>8</td>
<td>Samarkand</td>
<td>164</td>
<td>61</td>
<td>690.60</td>
</tr>
<tr>
<td>9</td>
<td>Surkhandaryo</td>
<td>208</td>
<td>30</td>
<td>434.80</td>
</tr>
<tr>
<td>10</td>
<td>Sirdaryo</td>
<td>51</td>
<td>58</td>
<td>212.00</td>
</tr>
<tr>
<td>11</td>
<td>Tashkent</td>
<td>156</td>
<td>100</td>
<td>1066.00</td>
</tr>
<tr>
<td>12</td>
<td>Fergana</td>
<td>71</td>
<td>34</td>
<td>49.60</td>
</tr>
<tr>
<td>13</td>
<td>Khorezm</td>
<td>63</td>
<td>55</td>
<td>264.00</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>4474</td>
<td>84</td>
<td>25849.00</td>
</tr>
</tbody>
</table>

Source: (IRG, 2005)

Interestingly however, the techno-economic potential of wind energy in the country is studied more than the other sources, including also some pilot projects (Gov.uz, 2011). The IRG (2005) study however found two of the districts as techno-economically feasible for wind power generation: Bekobod district in the Tashkent province and Maydanak district in Karakalpakistan.

With about 3 million tons of annual output, cotton stalks deserve more attention for efficient use in energy generation. Combined combustion
in the natural gas powered turbines would increase the energetic value derived per kilogram of cotton stalk, but it requires prerequisites such as

**Biomass potential**

Due to its large agricultural sector Uzbekistan has an enormous potential of biomass energy generation. Main source of biomass in the country is cotton stalks (*Table 6*). Almost all of this cotton stalk resource is consumed for cooking and space heating in the rural areas by using the most conservative combustion process.

**Table 6:** Gross and technical potential of agricultural biomass residues (cotton stalks) in the provinces of Uzbekistan (1998)

<table>
<thead>
<tr>
<th>No, Province</th>
<th>Area of cotton fields (thousand hectares)</th>
<th>Produced cotton stalks (thousand tons/year)</th>
<th>Gross energy potential (ktoe/year)</th>
<th>Technical power potential (GWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Karakalpakistan Rep.</td>
<td>145</td>
<td>290</td>
<td>111</td>
<td>145</td>
</tr>
<tr>
<td>2 Andijan</td>
<td>110</td>
<td>220</td>
<td>84</td>
<td>110</td>
</tr>
<tr>
<td>3 Bukhara</td>
<td>129</td>
<td>258</td>
<td>99</td>
<td>129</td>
</tr>
<tr>
<td>4 Jizzakh</td>
<td>111</td>
<td>222</td>
<td>85</td>
<td>111</td>
</tr>
<tr>
<td>5 Kashkadaryo</td>
<td>173</td>
<td>346</td>
<td>132</td>
<td>173</td>
</tr>
<tr>
<td>6 Navoi</td>
<td>44</td>
<td>88</td>
<td>34</td>
<td>44</td>
</tr>
<tr>
<td>7 Namangan</td>
<td>91</td>
<td>182</td>
<td>70</td>
<td>91</td>
</tr>
<tr>
<td>8 Samarkand</td>
<td>97</td>
<td>194</td>
<td>74</td>
<td>97</td>
</tr>
<tr>
<td>9 Surkhandaryo</td>
<td>120</td>
<td>240</td>
<td>92</td>
<td>120</td>
</tr>
<tr>
<td>10 Sirdaryo</td>
<td>141</td>
<td>282</td>
<td>108</td>
<td>141</td>
</tr>
<tr>
<td>11 Tashkent</td>
<td>108</td>
<td>216</td>
<td>83</td>
<td>108</td>
</tr>
<tr>
<td>12 Fergana</td>
<td>127</td>
<td>254</td>
<td>97</td>
<td>127</td>
</tr>
<tr>
<td>13 Khorezm</td>
<td>100</td>
<td>200</td>
<td>76</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1496</strong></td>
<td><strong>2992</strong></td>
<td><strong>1145</strong></td>
<td><strong>1496</strong></td>
</tr>
</tbody>
</table>

*Source: (IRG, 2005)*
With about 3 million tons of annual output, cotton stalks deserve more attention for efficient use in energy generation. Combined combustion in the natural gas powered turbines would increase the energetic value derived per kilogram of cotton stalk, but it requires prerequisites such as buying from the population, properly drying, chopping and storing as well as upgrading the thermal power furnaces to ones that allow combined biomass combustion.

Moreover, there are some other locally available resources in the remote areas of the country. Muynak town surrounded with infertile wetlands that are located in the seabel of the shrunk Aral Sea and its surrounding, has a large amount of annually re-growing reed output. It can be a local solution both for biogas production and for traditional combustion just like the cotton stalks in the other areas. The potential of these resources is not studied so far.

Another source of biomass is the household waste. Urban areas with already existing waste collecting infrastructure can enjoy waste combustion in the dense cities such as the capital Tashkent, Andijan and Samarkand. However, public awareness and waste sorting should be organized before being able to use the household waste as a source of energy. Already existing landfills cannot be used for combustion due to the existing hazardous content such as mercury and lead based batteries and incombustible polymer products. Hence organizing efficient use of biomass requires increased public awareness, and capital investments and not less importantly–a behavioral change.

Conclusions

The potential of small scale hydropower, solar and biomass energy sources is enormous in Uzbekistan, while exploitable wind potential is available seasonally in some regions. Small scale hydropower is an optimal solution for a centralized larger scale and state or public institution funded renewable energy projects in the rural areas. The wind power potential viable in certain areas also requires state intervention for project realization due to a higher initial capital requirement. Solar PV is the most appropriate energy source for individual household application, however is expected to
have a very long payback period due to the low residential electricity tariffs. Hence the economic viability of solar PV sources should be studied more deeply for precise conclusions. The most appropriate, easy to install and easily affordable source is solar thermal heaters which can be used by the households as well as in the public facilities such as rural hospitals, libraries and schools.

To exploit these renewable energy sources which are enormous considering the total demand for electricity of 48 THz/year, it is absolutely necessary that a behavioral change occurs. It is also crucial that the current energy supply is used more efficiently. This is possible for example by steadily replacing the electricity consuming appliances such as light bulbs, TV-sets and refrigerators with new, more efficient ones. To discover whether such a behavior change is possible, the perceptions of the people towards renewable energy utilization should also be investigated.

References


People’s Perceptions on Renewable Energy Sources Penetration Prospects in the Khorezm Province, Uzbekistan

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The energy sectors of fossil fuel-rich Kazakhstan, Turkmenistan and Uzbekistan are heavily dependent on non-renewable resources. The abundance of these resources acts as a retardant the process of energy diversification in the above mentioned Central Asian states. Nevertheless, the future diversification of energy sources is an inevitable process due to many reasons; man-made climate change, the need for transition to reliable and secure energy sources and availability of a vast potential for renewable energy generation being the most important ones.

Keywords: potential of renewable energy, source, energy sources, environment

Introduction

The impact of climate change in Central Asia can already be observed in the increasingly frequent climate anomalies such as high deviation from the historical average in precipitation levels, increased droughts and unusually harsh winters. These anomalies cause even more disturbing problems such as energy crises during the winters (Laldjebaev, 2010). Moreover, they also increase energy consumption, which, as
mentioned above, is highly based on fossil fuels, thus creating a closed cycle. Therefore renewable energy penetration in Central Asia is one of the central questions of energy sector reform, and hence, sustainable development. However, the potential of renewable energy sources is one of the less investigated areas in these fossil fuel-rich countries. The technical feasibility study of the off-grid renewable energy resources in Uzbekistan, carried out by the International Resource Group (IRG) in 2005, concluded that small-scale hydropower facilities were the most feasible off-grid energy options for Uzbekistan for that period (IRG, 2005). The study was a report prepared for the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan and did not focus on assessing the socio-economic feasibility of individual, household level (residential) renewable energy application.

Worldwide experience demonstrates that a high share of renewable energy application is used by the residential sector. Since the share of residential energy consumption is high with 39% in the total energy consumption (EarthTrends, 2005), Uzbekistan also has an immense potential for introducing renewable energy, especially in the residential sector. Because 65% of the population in the country live in the diversely/remotely located rural residential settlements with lower population density. Around 1.5 million people living in the ca. 1500 remote settlements do not have access to energy infrastructure while the maintenance costs of the existing distribution infrastructure is very high. However, renewable energy penetration did not occur in Central Asia despite continuous energy undersupply (Komilov, 2002) and climate change induced winter anomalies. What are the factors that stifle or stimulate household level renewable energy penetration in Central Asia? What conditions have to be met and what can be done to diversify the energy sector through residential renewable energy penetration?

The European Renewable Energy Council (EREC) indicates investment subsidies and credits as an important supporting tool for renewable energy application (EREC, 2010). Grants and credits are the commonly used tool all over the world. The countries interested in expanding the share of renewable energy sources are also known to implement legal frameworks with support mechanisms that create the necessary framework to attract investments in renewable energy. Creating
investment subsidies and/or crediting renewable energy penetration is also an important issue for Uzbekistan.

Painuly (2001) lists barriers to renewable energy penetration such as (i) market failure; (ii) market distortions; (iii) economic and financial barriers; (iv) institutional barriers, (v) technical; and (vi) social, cultural and behavioral barriers. All these obstacles are present in Central Asia, where the price of energy supply is one of the lowest in the world. However, the present study concerns itself only with yet unidentified aspects of residential renewable energy penetration such as social, cultural and behavioral acceptance of renewable energy sources. Hence, the present study will focus on disclosing how the Uzbek people perceive the application of renewable energy sources in the residential sector.

The study of application of renewable energy sources in the residential sector in Western countries revealed that social, cultural and behavioral aspects of renewable energy source application is at least as important as other aspects. For example, Wolsink (2007) discovered that citizens in European countries demonstrate high public support for renewable energy, which can be explained by the people’s concern about the dependence of European economies on imported fossil fuels and their willingness to pay more for the benefit of environmental sustainability. The views of the people in developing countries, where national income is lower and environmental awareness is less developed, is expected to be different. However, there may also be some other factors furthering renewable energy penetration in the developing countries.

Investigating the demand for green energy in Texas, Zarnikau (2003) concluded that informed dialogue about energy alternatives results in broader interest and support for these resources. Public discussion of decision-making on alternative energy resources was also found to be particularly important for certain types of alternative energy sources such as wind, biogas and biomass, the generation facilities of which affect the day-to-day lives of citizens in the neighborhood due to their appearance, noise, odor, risk of explosion, etc. Thus, people’s concerns about these factors also need to be investigated.

By surveying the ideas of the Swedish people, Johansson and Laike (2007) found that involving the surrounding public in the decision-making
process of installing a new power wind plants is more important for the people than the benefit of these wind turbines on the quality of their daily lives. Interviewed people opposed to the installment of wind power due to its aesthetic impact on the environment and recreation, while minor importance was emphasized by them on the effects of wind turbines on their daily quality of life. Similarly, the present paper also aims to survey the importance of public opinion for decision-making.

Investigating the relationship between willingness to pay for renewable energy and three main factors, (i) environmental concern; (ii) knowledge on renewable energy; and (iii) consequences of renewable energy application, a study by Bang et al. (2000) revealed that emotionally charged decisions are more important than facts and knowledge-based decisions among US citizens. It must be questioned whether this is also the case in the developing countries, where people are not sufficiently familiar with the availability and techno-economic feasibility of renewable energy, or whether, on the contrary, lack of knowledge itself is the stifling factor for individual decision making.

Kilinç et al. (2009) used a closed form questionnaire to probe the ideas of Turkish students about the characteristics of renewable energy, its perceived advantages and disadvantages, and, their views about the importance of the characteristics of energy production, their expectation being that the combination of such beliefs could act as incentives or disincentives to the acceptability of renewable power in the future, when the generation of these students become real decision makers. The authors concluded that the belief that renewable power could produce a reliable supply of electricity and, encouragingly, that it could contribute to a reduction in global warming, would be persuasive arguments for its implementation. Again, it should be tested if the perception of real decision makers in developing countries is similar, or if there are other driving forces, which could serve as an incentive for residential renewable energy penetration.

In order to investigate these factors, a modified version of the questionnaire developed by Kilinç et al. (2009) was used to explore people’s views about the characteristics of renewable energy production, its perceived advantages and disadvantages, and, separately, their views about
the importance of various characteristics of energy production in general. Based on the literature consulted, modifications were made to include key factors such as the importance of knowledge (Bang et al., 2000), consumption efficiency (Zarnikau, 2003), availability of external financial support and reliance on renewable energy (EREC, 2010) (whether renewable energy sources can fully replace both electricity and natural gas or not). Negative ideas about the characteristics of renewable energy are expected to serve as a disincentive while positive ideas could serve as an incentive for residential renewable energy application.

**Methodology**

A closed-form questionnaire (see Appendix A) modified from Kilinc et al. (2009) was used to explore the prevalence of ideas of rural (n=95) and urban (n=55) inhabitants of the Khorezm Province, Uzbekistan \(^1\) on renewable power generation. Section A of the questionnaire included questions on the age, gender and position in the family \(^2\). The respondents’ willingness to pay a premium for energy from renewable sources and whether they would wish to live close to a renewable energy generation facility such as solar PV stations, small scale biogas and biomass power generators, were asked in the same section. Additional questions were asked to draw a broader picture of the situation, which included the average weekly hours of electricity cut-offs in their area and whether the respondents have seen an operating renewable energy plant in their neighborhood.

Section B of the questionnaire probed the respondents’ ideas about various characteristics, advantages and disadvantages of renewable energy generation. The section consisted of 14 items, the first item being “Substantial knowledge on the application of renewable energy (solar, wind, biogas, biomass) sources is required for its successful application in the household.” The responses available for all the items in this section took the

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\(^1\) The share of rural and urban people in the study region is 65% and 35% respectively, hence the share of the respondents.

\(^2\) The aim of the question on position in the family (head of the family or not) was to investigate the average age of decision makers and not to probe the dominance by gender.
People’s Perceptions on Renewable Energy Sources Penetration Prospects in the Khorezm Province, Uzbekistan

The survey was conducted during two weeks of March 2011, by a professional group visiting randomly selected houses of respondents who voluntarily decided to participate. The STATA 11 statistical package was used to analyze the results.
The Likert scale method and survey based perceptions studies are criticized by some for being “general” or “vague” (White & Mackay, 1973). Moreover the number of respondent of 150 is not sufficiently large to draw best conclusions. Therefore present study should be considered as a preliminary study of renewable energy application. More precise and implementable conclusions can be derived by surveying more participants and by applying alternative robustness techniques.

Results

The interviewers explained the purpose of the questionnaire. They have also given a brief description of the available renewable energy sources focusing on the solar, biomass, biogas and wind power generation facilities. The total number of respondents surveyed was 150, with 95 rural and 55 urban participants. The special importance was given on the role of the respondent in the family and only ‘decision makers’ available in the household were interviewed. The unequal gender share of the respondent is due to this aspect and consists 32% and 68% for female and male respondents respectively. Figure 1 is showing the age of the respondents. Furthermore, respondents emphasized the problems regarding the reliability of their residential electricity supply. Figure 2 depicts the weekly average electricity cut-offs in the respondents’ homes. Only two of the respondents indicated that they did not have systematic electricity cut-offs and 10 respondents had more than 30 hours of electricity cut-offs per week.

Average daily cut-off hours corresponded to 1.5 hours a day, while maximum daily cut-offs reached 5 hours a day.
Figure 1: Frequency histogram of the age of the respondents

Figure 2: Frequency histogram of weekly average electricity cut-offs

According the responses to an additional question, about 55% of the respondents answered that they were ready to pay a premium for electricity from a renewable source and 75% of the respondents were ready to pay more for electricity from a renewable source if everyone else would be doing so. Some 60% of the respondents answered that they would not agree with
the construction of a renewable energy facility close to their house; however, about 90% of the respondents admitted that they did not have any firsthand experience of how a renewable energy facility works.

As for global warming, 60% of the respondents thought that they knew at least something about global warming, while people who knew ‘a lot’ and ‘little’ amounted to 25% and 15% of respondents respectively. People who were sure that global warming is happening consisted of 54% of the sample while 41% of the respondents thought that it is happening and some 5% were not sure whether it was happening or not. About 52% of the respondents considered themselves ‘quite environmentally friendly’, 44% claiming to be ‘very environmentally friendly’, while the figures for ‘a little bit’ and ‘not at all environmentally friendly’ were 3% and 1% respectively. Consequently, 52% of the respondents were ‘very worried’, 45% were ‘quite worried’ and only 3% were ‘not very worried’ about the harm caused to the environment due to global warming.

**Perceptions about the characteristics of renewable energy**

Figure 3 illustrates the respondents’ ideas about the characteristics of renewable electricity generation. The results are ordered from the highest to the lowest share of responses corresponding to respondents who ‘Strongly agree’ (on the right-hand side). Thus, the dark right-hand bar shows the share of the respondents who ‘strongly agreed’, the next light grey bar represents the share who ‘agreed’, the central white bar denotes the ‘neutral’ respondents (neither agreed nor disagreed), the next light grey bar corresponds to respondents who ‘disagreed’ with a given statement and finally, the dark left-hand bar shows the share of respondents who ‘strongly disagreed’.

About 50% of the respondents ‘strongly agreed’ and 45% ‘agreed’ that knowledge of how the potential for renewable energy can be utilized is crucial for its application. Some 33% of respondents ‘strongly agreed’ that renewable energy sources can replace both electricity and natural gas, creating independent off-grid energy generation for their neighborhoods, while 5% ‘disagreed’ with this point.
People’s Perceptions on Renewable Energy Sources Penetration Prospects in the Khorezm Province, Uzbekistan

Figure 3: Khorezm people’s perceptions and ideas about the characteristics of renewable energy

Around 31% of the respondents ‘strongly agreed’ and some 50% ‘agreed’ that public discussion is required for renewable energy application in a certain neighborhood. Some 25% of the respondents said that renewable energy application is not viable with their own funds and ‘strongly agreed’ that getting a loan or credit is a prerequisite, while 56% ‘agreed’ on this point. About 23% of respondents ‘strongly agreed’ and 51% ‘agreed’ that renewable energy sources guaranteed a continuous energy supply. About 21% of the respondents ‘strongly agreed’ and 66% ‘agreed’ on the point that electricity generated with renewable energy sources is cheaper compared to the other sources. Around 16% of respondents ‘strongly agreed’ and 41% ‘agreed’ that renewable energy sources help combat global warming. As for the harm of renewable energy generation facilities to people, 16% ‘strongly agreed’, 19% ‘agreed’, 26% took a ‘neutral’ stance, 35% ‘disagreed’ and 5% ‘strongly disagreed’ with this statement. About 13% of the sample ‘strongly agreed’ and 63% ‘agreed’ on the point that
they needed to increase their energy consumption efficiency to viably use renewable energy.

Regarding the comparative safety of renewable energy facilities, 11% ‘strongly agreed’ and 63% ‘agreed’ that they are more safe than other types of energy generation facilities. The perception of respondents on potentially harmful effects from renewable energy sources that have not yet been discovered, was less homogenous, resulting in a 9% share for ‘strongly agree’, 51% for ‘agree’, 17% who were ‘neutral’ and 21% for ‘disagree’. The respondents’ ideas about the harm done by renewable energy sources to animals was the following: ‘9% ‘strongly agreed’, 22% ‘agreed’, 24% took a ‘neutral’ position, 35% ‘disagreed’ and 12% ‘strongly disagreed’ with the statement. Some 55% ‘agreed’ that post –use processes of renewable energy sources are hazardous. About 29% were ‘neutral’ and 33% ‘disagreed’ with the statement that renewable energy sources may harm plants.

Views about the importance of various characteristics of electricity generation

Figure 4 illustrates the respondents’ views about the importance of several characteristics of energy generation. The results are ordered from the highest to the lowest share of responses corresponding to ‘Very important’ (on the right-hand side). Thus, the dark right-hand side bar shows the share of the respondents who rated the given characteristics ‘very important’, the next grey bar represents the share of ‘quite important’ and the white bar denotes those who thought the statement ‘not very important’. The left-hand grey bar corresponds to those respondents judging the statement to be ‘not important at all’ and the dark left-hand bar denotes the share of respondents who ‘strongly disagreed’ with it. A very high share of respondents found the characteristics they were asked about to be either very important or quite important.
People’s Perceptions on Renewable Energy Sources Penetration Prospects in the Khorezm Province, Uzbekistan

Figure 4: Khorezm people’s views about the importance of various characteristics of general energy production

Apparently, continuous supply seemed to be the most important characteristic to many respondents, with scores of 80% for ‘very important’ and 19% for ‘quite important’. They also seem to be concerned about the potential environmental damage that renewable energy sources might cause, with some 73% judging this to be ‘very important’ and 24% ‘quite important’. As for the threat from renewable electricity generation to people, 72% thought it was ‘very important’ and 22% thought that it was ‘quite important’ to have energy sources that would not harm people. The statement that electricity should be cheap was judged to be ‘very important’ by 72% and ‘quite important’ by 21% of the respondents. Regarding efficient use of electricity, 71% of the sample thought it to be ‘very important’ and 29% ‘quite important’. The harm caused by electricity generation to animals, was found to be ‘very important’ by 67% of the people polled and ‘quite important’ by 26%. The safety of electricity generation was found to be ‘very important’ by 66% of respondents and about 33% said it was ‘quite important’. Switching to sustainable energy sources in the households was ‘very important’ for 66% of the respondents. 58% of the people polled thought it ‘very important’ and 38% ‘quite important’ that electricity

492
generation should not harm plants. The statement concerning knowledge of the availability and sustainability of energy sources, was seen by 57% of the respondents to be ‘very important and 43% thought it ‘quite important’. Finally, the availability of credit and loans for making the switch to sustainable energy sources; respondents judged this statement to be ‘very important’ by 47% ‘quite important’ by 42% and ‘not very important’ by 12% of the respondents.

Homogeneity of responses

In order to explore the degree of homogeneity, respondents’ answers for Section B and C were subjected to a cluster analysis by means of the Ward method. The Ward method draws a dendrogram of homogeneity linkage between the results for discovering the level of similarity in the responses. This dendrogram clusters the responses into a different level sub-groups based on the similarity of the responses. The resulted dendrogram allows carrying-out a detailed analysis of the responses, emphasizing more importance on the properties of the clusters. For the current case, it assumed that people’s perceptions about renewable energy application might vary depending on factors such as their age (Figure 5) and their livelihoods (Figure 6). However, the cluster analysis showed that the respondents’ age and livelihood do not largely affect the homogeneity of their choices. Yet, there should be some other currently unknown factors that lead to a similarity and dissimilarity of the responses given.
Figure 5: Homogeneity dendrogram based on the respondents’ ages
The homogeneity test revealed that the respondents can be categorized into two groups with nine similar answers from the given 25 questions of the Section B and C. Group 1 includes 70 respondents and Group 2 includes 80 respondents. The mean age of Group 1 is one year less than that of Group 2, while Group 2 also has 10% more female respondents than Group 1. Group 2 also has slightly more respondents living in a rural...
area. Respondents in Group 1 experienced an average of 11.5 hours of electricity shortages during a week, while those in Group 2 reported an average of 10 hours of weekly electricity cut-offs. The share of respondents willing to live close to a renewable energy facility was 6% higher in Group 2; however, the share of people who have seen an operating renewable energy facility was higher in Group 1. Also, respondents in Group 1 considered themselves to be more concerned and informed about global warming.

The respondents’ views about the importance of various characteristics of energy generation in general were highly homogenous, while their perceptions and expectations about renewable energy sources varied significantly in some cases. Although the overall results demonstrated people’s high interest and belief in renewable energy, relative deviations from the trends were also considered.

Some 9% of the respondents in Group 1 disagreed with the statement about the role of knowledge in renewable energy penetration, while Group 2 did not contain any such respondents. However some 80% of Group 1 considered renewable energy sources to deliver uninterrupted electricity supply, while in Group 2 72% of people thought so. Some 70% of the respondents in Group 1 were concerned about possible harm from the renewable energy sources while only 50% percent voiced concerned in Group 2. Some 94% of Group 1 believed that renewable energy sources could phase out traditional energy sources in the households while this belief was shared by 82% of respondents in Group 2. As for the post-use utilization complexity of the renewable energy sources, 20% of the respondents do not agree and 39% agree in Group 1 28% people disagree and 34% agree on the point.

Group 2 seems to be more environmentally concerned and hence cautiously optimistic (or pessimistic), while Group 1 seems to be significantly more optimistic based on their responses.

**Incentives and disincentives for application of renewable energy sources**

Following the reasoning of Kilinç et al. (2009), if a certain characteristic of renewable energy was considered as positive and this same
characteristic was found to be very important according to the perception of the respondents, the combination of these beliefs could be considered as an incentive for renewable energy application. Likewise, the opposite was true, if the respondents’ common views on certain characteristics were found to be negative and rated ‘very important’, then the combination of these beliefs could serve as disincentive. When the respondents’ common views were either positive or negative towards a certain characteristic, and if they judged this specific characteristic to be less important, then this characteristic was assumed to have no influence in decision making related to renewable energy application. In order to explore this in a quantitative way, responses were given relative strength values as illustrated in Figure 7.

The relative strength values are based on a basic scaling denoting 0 for neutral and allow calculating the average values of each pair of characteristics. From these values, the mean scores of the respondents’ perception on each characteristic of renewable energy and their views about the importance of each characteristic was calculated. The products of the mean of perception of each characteristic and means of their importance yielded a quantitative explanation of whether the characteristics should be treated as an incentive or disincentive (Figure 7)

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>+1.0</td>
<td>Very important</td>
<td>1.00</td>
</tr>
<tr>
<td>Agree</td>
<td>+0.5</td>
<td>Quite important</td>
<td>0.66</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>Not very important</td>
<td>0.33</td>
</tr>
<tr>
<td>Disagree</td>
<td>-0.5</td>
<td>Not important at all</td>
<td>0.00</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>-1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All the characteristics were found to be very important while the most important of them were continuous supply and achieving efficiency. As for the potential harm of renewable energy facilities to plants and animals, respondents disagreed with the statement in general while they neither agreed nor disagreed on the potential harm to people. The issue of having sufficient knowledge regarding renewable energy sources, their potential to replace both natural gas and non-renewably generated electricity and the issue of the price of renewable energy were found to be the most important incentives.

Based on the homogeneity tests, Group 1 and Group 2 were examined separately for consistence of responses between Section B and C. The cross tabulation of results for Section B and C also confirmed that members of Group 1 are slightly less concerned about possible environmental impacts of renewable energy source application and more supportive of the positive characteristics of renewable energy sources. Members of Group 2 placed a significantly high emphasis on the overall safety of renewable energy sources and considered factors such as harm to people, animals, plants and potential risk of environmental damage. Hence, Group 2 is bit more cautious regarding the positive aspects of renewable

<table>
<thead>
<tr>
<th>Mean of Perceptions</th>
<th>Mean of importance</th>
<th>Mean Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>0.67</td>
<td>0.85</td>
</tr>
<tr>
<td>Phase out traditional</td>
<td>0.58</td>
<td>0.87</td>
</tr>
<tr>
<td>Cheaper</td>
<td>0.51</td>
<td>0.88</td>
</tr>
<tr>
<td>Continuous supply</td>
<td>0.45</td>
<td>0.93</td>
</tr>
<tr>
<td>Require crediting</td>
<td>0.50</td>
<td>0.78</td>
</tr>
<tr>
<td>Safer</td>
<td>0.40</td>
<td>0.88</td>
</tr>
<tr>
<td>Require high efficiency</td>
<td>0.39</td>
<td>0.90</td>
</tr>
<tr>
<td>Damage Environment</td>
<td>0.21</td>
<td>0.90</td>
</tr>
<tr>
<td>Harm people</td>
<td>0.04</td>
<td>0.88</td>
</tr>
<tr>
<td>Harm animals</td>
<td>-0.09</td>
<td>0.87</td>
</tr>
<tr>
<td>Harm plants</td>
<td>-0.09</td>
<td>0.84</td>
</tr>
</tbody>
</table>

**Figure 7**: Comparative strength of responses and their mean indexes
energy sources such as their contribution in the fight against global warming and their potential to provide a continuous supply of electricity.

Discussion

The penetration of renewable energy sources in residential electricity generation in the developing countries is one of the most central questions of emissions reduction and combating global warming. Central Asian countries, with relatively higher technical potential (Dorian, 2006), have more favorable prospects for renewable energy implementation compared to most Western European countries, where the share of renewable energy in total energy generation is already the highest in the world. While Central Asian countries continue to expand their energy sector with vastly available traditional energy sources, global warming and the need for decreasing anthropogenic emissions place the necessary gradual transition to sustainable energy sources in the close future. With a significantly high share in energy consumption, residential consumers would be a good starting point for this transition. Hence, the objective of the present study was to explore the people’s perceptions about the characteristics of renewable energy and their importance, with its aim of determining the possible incentives and disincentives for renewable energy penetration.

Transition to sustainable energy sources is important in the context of global warming and reducing anthropogenic emissions. About 25% of respondents claimed to know a lot about global warming and 60% indicated that they possessed some knowledge of global warming, which is very reasonable bearing in mind the immense worldwide attention given to the subject. Kilinç et al. (2009) have also observed that at least two-third of the population in most other studies claimed to know at least something about global warming. In the present study, about 55% of the respondents agreed that they were ready to pay a premium for electricity from a renewable source and 54% of the respondents claimed that they were confident that global warming is actually happening, which also supports their claim of having some knowledge of the latter.
Nevertheless, the analysis of the survey results revealed that in Uzbekistan, where traditional energy prices are quite low, the desire for individual energy independence could serve as the foremost driving force behind residential renewable energy penetration. Electricity cut-offs or shortages persist in Uzbekistan due to old distribution infrastructure in remote rural areas, or in places where there is a need for reduced energy consumption due to high distribution losses, poor distribution management and illegal energy tapping. Since the same problem exists with the centralized gas supply, people seek individually independent energy systems. The respondents strongly agreed that renewable energy sources could phase out traditional sources and it was very important to them that renewable energy sources could completely meet all of their household energy needs. Renewable energy sources are therefore especially preferred when they can replace both centralized natural gas and electricity supplies in households. However, creating such an off-grid independent energy system requires much higher capital investment, especially in the case of windmills or photovoltaic systems, since they produce only electricity while apart from electricity, households need energy for heating and cooking.

Although most of the people have no firsthand experience with any renewable energy sources, they assumed that renewable energy source installation is not affordable for them. Therefore people considered the availability of credit or loans for renewable energy source installation to be very important. Considering the fact that residential renewable energy installations are credited everywhere, including in Western economies with the highest per capita gross national income, the concern of the Uzbek people seems to be appropriate.

Again, although respondents did not have firsthand experience with renewable energy sources, they held quite prominent views about various renewable energy sources. They had both negative and positive perceptions towards certain aspects. Most respondents were positive about the characteristics of “knowledge” (or education about the available sources), ability to phrase out traditional sources, and effect/role of public opinion in renewable energy application, and credit (availability of external financing). Negative characteristics were potential threat to plants and animals and need for special post-use disposal (post-use utilization). The respondents
People’s Perceptions on Renewable Energy Sources Penetration Prospects in the Khorezm Province, Uzbekistan

were confident that renewable energy in general is safer than other types of energy sources. However, they were concerned about any potential environmental impact of renewable energy sources that has not yet been discovered due to mankind’s shorter experience with them, as opposed to traditional energy sources.

As for the harm caused by renewable energy sources to animals and plants, it was very important for the respondents that their energy should be produced in a way that does not harm both categories, but they disagreed with the statement that renewable energy sources harm either of them. As for the harm caused by renewable energy sources to people, respondents neither agreed nor disagreed with the statement.

Concerning the importance of price, it was very important for the respondents that their electricity be cheap and they strongly agreed that electricity produced with renewable energy sources is cheaper compared to other sources. Of course it can be argued that renewable energy sources require higher capital investment and hence, the electricity produced with them cannot possibly be cheaper than that produced by traditional sources. However, this can explain by the fact that according to the popular idea, once installed, renewable energy sources require almost no operation and maintenance costs and hence, produce “free energy”. This is to some extend true only for solar and wind sources while biogas and biomass resources involve costs.

The respondents thought it very important that their electricity consumption would be more efficient and agreed that application of renewable energy source requires higher efficiency for smaller investment costs and improved cost-recovery. Energy efficiency, for example the use of fluorescent bulbs, has been promoted in Uzbekistan through the mass media for the last two years and people are aware that there is an enormous energy saving potential in their households.

Regarding the need for sufficient knowledge on application and utilization of renewable energy sources, people are interested to find out what renewable energy sources are available to them, how are the technical feasibility of these resources and which of these renewable sources can best meet their needs without creating unexpected environmental problems. Respondents’ views on the need for sufficient knowledge might also be
explained by their concern about whether there are enough skilled technicians that can install and maintain these sources properly. This might especially be appropriate for biogas facilities, where higher standards of professionalism and technical safety are required (Amon et al., 1999).

**Conclusions**

The results of the study revealed that any need for renewable energy sources at the present exists mainly due to the cut-offs or shortages in the traditional energy supply. The cut-offs and shortages in the system are caused by old infrastructure, high distribution losses and poor distribution management as well as illegal energy tapping. The solution for these problems requires significant investment and time. Therefore, state could focus more on crediting residential renewable energy applications, which was found to be another important incentive for renewable energy penetration.

Boosting public awareness concerning renewable energy sources and their potential was found to be another aspect of creating favorable preconditions for their application. The acquisition of sufficient knowledge was found to be the most important aspect respondents agreed on.

Furthermore, capacity building and availability of qualified technical personnel seems to be very important. Actions towards increasing public awareness of the potential of energy conservation also create favorable conditions for renewable energy penetration. Increased public awareness on the safety of renewable resources, when compared to other types of energy generation facilities in term of emissions, would also serve as an incentive.

Bearing in mind the fact that energy transition is inevitable for Uzbekistan during the next two decades and also the need for reforms in energy generation, distribution and consumption, it seems to be a most appropriate time to launch a transition to renewable energy sources in the residential sector, where most of the characteristics of renewable energy promise to serve as an incentive. In line with creating a continuous supply and transition to sustainable energy generation with a promising future, this
switch would also help in reducing anthropogenic emissions and combating global warming.

**Appendix A - The Questionnaire**

The front-page of the questionnaire included some brief information about the study. The confidentiality of the data gathered was also mentioned. The respondents filled out the questionnaire under the supervision of the interviewer.

**QUESTIONNAIRE IN ENGLISH**

Section A. General Information
A1. Age: 
A2. Sex: (M) Male
(F) Female

A3. Location of home: (1) Urban (2) Rural

A4. Would you be willing to pay more for electricity from a renewable source (solar, wind, biomass or biogas)?
(1) Yes (0) No

A5. Would you be willing to pay more for electricity from a renewable source if everyone else did?
(1) Yes (0) No

A6. Would you be willing to live close to a renewable energy power plant (photovoltaic power plant, wind turbines, biomass or biogas power plant)?
(1) Yes (0) No

A7. How many hours a week do electricity cut-offs occur in your neighborhood? _____ hours/week

A8. Have you ever seen an operating renewable energy facility in your neighborhood? (1) Yes (0) No

**Section B. Perceptions about various characteristics, advantages and disadvantages of renewable energy generation**
B1. Substantial knowledge on the application of renewable energy (solar, wind, biogas, biomass) is required for its successful application in the household.
B2. Electricity generated with renewable energy sources is cheap compared to other sources.
B3. Credit/loans are necessary for household renewable energy application.
B4. Electricity from renewable sources is more reliable in terms of continuous supply.
B5. Renewable energy facilities harm/disturb the people in their surroundings.
B6. Renewable energy facilities harm/disturb animals in their surroundings.
B7. Renewable energy facilities harm/disturb plants in their surroundings.
B8. Renewable energy facilities are safer compared to other types of power stations.
B9. Since renewable energy sources are a relatively new type of energy, we do not have enough experience to come to a conclusion about the long term impact of renewable energy sources on the environment.
B10. For higher cost effectiveness, renewable energy requires improved energy conservation measures.
B11. Renewable energy sources are capable of phasing out the traditional energy sources in households in the future.
B12. The production and post-use process of a renewable energy facility is hazardous.
B13. Global warming would be reduced if more of our electricity was generated from renewable energy sources.
B14. Most of the people I know are not familiar with renewable energy sources and their benefits.

Section C. Perceptions about the importance of various characteristics of power generation in general

C1. How important is it to you that people need to know more about the various aspects of the energy options available to them?
C2. How important is it to you that electricity does not cost too much?
C3. How important is it to you that the state/bank supports your energy supply/transition decision?
C4. How important is it to you that your electricity supply is reliable and continuous?
C5. How important is it to you that the energy facility supplying you with energy would not harm/disturb the people in their surroundings?
C6. How important is it to you that the energy facility supplying you with energy would not harm/disturb the animal in their surroundings?
C7. How important is it to you that the energy facility supplying you with energy would not harm/disturb the plants in their surroundings?
C8. How important is it to you that your energy supply is from a technically safer source? (hydro instead of nuclear)
C9. How important is it to you that all possible environmental threats of your energy supply be clear in advance without any uncertainty?
C10. How important is it to you to apply energy saving measures in your household?
C11. How important is it to you to switch to sustainable energy sources?

**Section D. Perceptions about Global Warming**

D1. How worried are you about what global warming might do to the environment?
D2. How much do you think you know about global warming?
D3. How ‘environmentally friendly’ do you think you are? (How much do you think you ‘take care of’ the environment by the things you do?)
D4. Do you think that global warming is really happening now?

**References**


Solvency II an opportunity or challenge for insurance industry in Kosovo

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The purpose of this assignment is to provide a research that will be used further during the dissertation. The research is focused at benefits of the Solvency II and possibilities that would follow its implementation in the insurance industry in Kosovo.

This assignment will briefly explain how it is can be applied on to the Solvency I regime that exists in the insurance industry in Kosovo and potential for the insurance industry of Kosovo when Solvency II is implemented. For both of these methods of the Solvency I and II we tried to offer proper solutions.

For this research we prepared a questionnaire for the top managers of the insurance companies and experts in this field. The questions focused on their perspective of the implementations of Solvency II on the insurance industry in Kosovo. We also have interviewed the director of insurance supervision at the Central Bank of Kosovo (CBK). The responses to the questionnaire are summarized in the following part of this research.

Keywords: solvency, insurance industry, CBK

Introduction

The insurance industry plays a crucial role in domestic and global economies. The role of the insurance industry within the financial system expands and changes in response to a wide range of social, financial and
economic developments. Insurance companies are of great importance to the economy of a country. They are moving from a system of direct supervisory control to a more deregulated environment. This step requires new systems of risk control and risk management. Their soundness has a clear impact on the financial market. The key benchmark of an insurance company is its solvency or its financial strength. It is important that insurance companies remain in sound financial condition in order to ensure the smooth functioning of insurance markets and the protection of policyholders. The maintenance of sound financial positions, adequate levels of capital and reserves for insurance companies plays a large part in achieving the objectives of supervisory frameworks.

**Concepts of Solvency**

The solvency margin is a buffer in a company’s assets, which covering its liabilities. For the supervisor, this is important that policyholders are protected, but it is also important to ensure the stability on the financial markets. In view of this, the definition of the solvency margin (SM) is given by Pen-Tikäinen (1952).

The solvency margin, (SM), is the difference between assets, A, and liabilities, L; SM = A – L

In insurance industry in Kosovo we have put some restrictions on the assets, e.g., (Receivables are not recognized as assets in calculating of the Solvency Margin) so that assets should be of good quality, this definition could be called the available solvency margin (ASM), Benjamin (1977). Other essential element in assessing the financial soundness of an insurer is the level of its capital relative to its risk profile, in other words, its capital adequacy. However, capital adequacy is only part of the story. Another critical element is the adequacy of provisions for claims that are expected to be made. These provisions may be called:

(i) Insurance liabilities  
(ii) Actuarial liabilities  
(iii) Policy reserves
Determining the appropriate level of capital has been the subject of much study in insurance industry. In Europe, a significant review of insurance company solvency requirements is under way. It is known as Solvency II.

**Research objectives**

The original EU-wide insurance supervisory and solvency requirements date from the 1970s. The 1973 directive required members of the European Economic Community (EEC) to set minimum capital standards for insurance companies in their jurisdictions. With the passage of time and significant development of the insurance industry, the supervisory elements of EU-wide requirements became outdated. As a result, an initiative was started to revise the insurance supervision regulations in the late 1990s which resulted in limited reform in 2002, this became known as a Solvency I.

However, it was recognized that a more fundamental review was needed, and a second phase, known as Solvency II, was undertaken, with an implementation target of 2012.

**Research background**

Research in this case is intended to collect the information and to analyze the current situation of the business environment on the insurance industry in Kosovo. Based on existing information the insurance industry in Kosovo is one of the lowest levels in Europe, i.e. just 5 -7 Euro per capita, this is result; (Annual Report of Central Bank of Republic of Kosovo 2010)

- The Insurance Industry in Kosovo is a new it started in 2001, when the first insurance company was licensed;
- There is lack of insurance culture and heritage;
• The limited restrictions through a low level of legislation has enabled the initial development of the insurance industry to Kosovo;
• Today approximately 90% of all national wealth remains uninsured;
• 80% of the insurance companies’ portfolios of gross written premiums consist of compulsory Third Party Liability insurances.

Kosovo as a country in transition it has made some slow steps to develop of the insurance industry. The development has only in one direction; i.e. the number of companies has increased but the appropriate level of services and elements that characterize a modern insurance industry have not improved.

<table>
<thead>
<tr>
<th>Description</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tr>
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<td>1</td>
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<tr>
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<td>9</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

*Source: Central Bank of the Republic of Kosovo*

In 2010 the Gross Written Premiums were 70 million euro, comprised of;
• 51 million euro have been of the compulsory motor liability insurance, and just
• 19 million euro has been property insurance which can be considered a very small increase and no substantial value on the conditions and possibilities of our country.

**Research process**

Solvency I and its implementation in the insurance industry in Kosovo is based on UNMIK Regulation 2001/25, in the past we have use this model for calculation of Solvency Margin for non-life insurance company,
known as Solvency I, presented as table below. (Central Bank of the Republic of Kosovo)

Table 2: Solvency I - the model applied in the insurance industry in Kosovo

<table>
<thead>
<tr>
<th>Required solvency margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted premium index</td>
</tr>
<tr>
<td>Adjusted claims index</td>
</tr>
</tbody>
</table>

18% of total premiums received during the financial year up to 10 million euros, and
16% of total premiums received during the financial year in excess of 10 million euros,

And the adjusted claims index is:
26% of the average of claims paid out during the last 3 years up to 7 million euros, and
23% of the average of claims paid out during the last 3 years in excess of 7 million euros, (Directive 2002/13/EC)

Research that relate with weaknesses of Solvency I

Solvency I is a simple framework that is minimally risk sensitive and relies on a small number of indicators that are only vaguely related to insurers' risks.

A number of key risks, including market, credit and operational risk, are not explicitly captured under the Solvency I regime. The regime does not contain meaningful qualitative requirements relating to risk
management and governance, and does not require supervisors to conduct regular reviews of these qualitative aspects. The lack of risk sensitivity does not provide incentives for insurers to improve and invest in risk management.

Regimes, such as Solvency I, which have used factor-based regulatory capital requirements, have not been very effective in identifying insurers that become financially weak. This means that insurance supervisors have had little time to intervene and rectify the situation, if an insurance company’s financial position deteriorates or its risk profile increases.

The weaknesses the identified of Solvency I are summarized as following:

- It does not provide risk sensitive approach
- Supervisors do not have to conduct regular reviews of these qualitative aspects of an insurance company’s business.
- No investments in risk management processes and policies by the insurance company
- No timely intervention by supervisors
- Very few requirements for risk management and corporate governance,
- The Solvency I regime does not align the capital requirements of an insurance company with insurers’ risk profiles
- Solvency I does not help to protect the industry from any deterioration of market and financial risk, (G. Lekatis, President of the Solvency ii Association).

The shortcomings of the EU insurance solvency requirements led a number of countries to undertake updates of their regulatory frameworks. For instance, the United Kingdom developed and adopted its Individual Capital Assessment Standards (ICAS), Switzerland, the Swiss Solvency Test (SST) and the Netherlands, the Financial Assessment Framework (FTK). These countries’ updated requirements are consistent with the concepts and approaches proposed for the new EU insurance solvency regime.

Solvency II is an opportunity to improve insurance regulation by introducing:
• More timely intervention by supervisors
• A risk-based system
• An integrated approach for insurance provisions and capital requirements
• A comprehensive framework for risk management
• Capital requirements that are defined by a standard approach or internal model
• Recognition of diversification and risk mitigation.
• Greater regional cooperation between regulators

Research related to the benefits of Solvency II

“Solvency II is not just about Capital. It is a change of behavior” (Th. Steffen, Chairman of CEIOPS)

The EU Solvency II project will introduce a new solvency regime for life and non-life insurers and reinsurers in Europe. Solvency II will be a risk-sensitive approach to assessing solvency that is intended to better take into account the risks faced by insurers than the current EU solvency regime.

Solvency II is being designed to reflect the economic risks facing insurers and reinsurers by considering both asset- and liability-side risks and the interactions within and between those risks.

Risk-sensitive solvency requirements will align the capital held by insurers to their risk profile. It is intended to improve the financial soundness of insurers and reinsurers, resulting in better protection for policyholders, including in difficult periods. In addition, the new regime aims to promote more efficient supervision.

Solvency II will substantially change the philosophy of the current framework relative to group supervision. While the current approach to group supervision is merely supplementary to the solo supervision of insurers, Solvency II will be a more integrated approach. Solvency II risk measure will be based on a Value at Risk (VaR) level of 9.5% which is equivalent to a 0.5% target default probability, and specifies a time horizon of one year.
Three - pillars main of Solvency II

1. Pillar 1 will focus on the quantitative aspects of solvency and how to calculate the capital requirements.
2. Pillar 2 will focus on qualitative measures (including the supervisory review process) and allow for additional capital requirements to supplement those calculated under Pillar 1.
3. Pillar 3 will consist of disclosure requirements.

It is evident that meeting the requirements of Solvency II demands a far-reaching program. The Directive is about to be ratified and now is the time to drive the program forward. The challenge is how to implement such extensive change whilst maintaining ongoing business operations Solvency II is being developed in an iterative manner following the Lamfalussy approach. The target of implementation date for Solvency II is 2012.

The main objectives of Solvency II are?

• To deepen the integration of the EU insurance market
• To enhance the protection of policyholders and beneficiaries
• To improve the competitiveness of EU insurers and reinsurers
• To promote better regulation
• Improve the risk management of EU insurers and reinsurers
• Advance supervisory convergence and co-operation
• Encourage cross-sectorial consistency–no regulatory arbitrage
• Promote international convergence
• Increase transparency.

Research that relate with potential implementation of Solvency II in Kosovo

During the interviews with supervisors, managers of insurance companies, experts in this field including heads of department Insurance Supervision of Central Bank of Kosovo (CBK), conclude that; Solvency II will affect the capital levels and limited amount of capital to invest in industry,

To improve the recognition of diversification and risk mitigation in the capital requirements for each insurance company.
Solvency II will affect the amounts of reinsurance that insurance companies have agreement,

Solvency II will affect the increase pricing of premiums

Solvency II will lower the total capital requirement for insurance companies

Insurance companies only selling products that they have expertise in

Limited capability of board of directors to manage risk

The ability of the CBK to provide effective supervision that protects policy holders right and financial position

In Solvency II, the aim is to develop a coherent framework with consistent solvency measures across all types of business. The framework will also take into account the quality of risk management as well as the accuracy of risk assessment.

To explain how the Solvency II will affect risk management in the Insurance Industry in Kosovo and whether these changes can result as opportunities for insurance companies Kosovo, we set up these hypotheses;

**Conclusion and Hypotheses**

These hypotheses we considered were tested during the research and interviews conducted with managers of insurance companies. Although the interviewees did not all give similar answers to the same question we were able to come to the following common conclusion that:

- There is no definition of best estimate of technical provisions and this is a major obstacle in implementation of the Solvency II project.
- Poor quality data is the main obstacle for Insurance Companies in Kosovo due to the lack of good of the lack of an information centers and sufficient databases.
- If we start implementing Solvency II, the CBK will require more than 1 year to control just the Pillar 1 requirements of capital and the required level of technical provisions. None of the existing
Insurance companies in Kosovo will meet these requirements from the beginning

- The most complicated problem that will CBK will face is finding the balance between, on one hand, that the Insurance Companies should be allowed to use their own internal models and on the other hand, ensuring a level playing field from a competitive perspective
- The internal models in Solvency II are more loosely defined, making supervision more complicated
- The progress with the preparation for Solvency II is different between companies and depends whether company has enthusiasts and an expert among its employees for implementing of Solvency II.
- Kosovo insurance companies need to have more differentiated pricing of premiums in order to stay competitive. Insufficient price differentiation is harmful to insurance companies and their consumers in the long run.
- Reinsurance may become more expensive due to higher demands on capital reserves in reinsurance companies and it could impair the operation of insurance companies in Kosovo.

It is therefore not very surprising if conclude that the Insurance industry in Kosovo is characterized by a general wait-and-see mentality towards Solvency II. So far, the details, requirements and implications of Solvency II are far too uncertain for the insurance companies of Kosovo to throw themselves into large-scale implementation projects, as is Solvency II. The Solvency II should be based on a standard approach or a standard internal model. In other words, the aim is that CBK preliminarily should find or create an internal model for Solvency II that would describe how Kosovo insurance companies should comply with Solvency II in the best possible way, but all this should happen after year 2012.

Solvency II should cover all relevant kinds of risk and should be able to supervise and improve internal risk management systems on an international level.
References


Globalization – Miracle or Mirage for the Economy and Business Environment

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The present article aims to bring into discussion the process of globalization - as central phenomenon of the 21st century. The areas of intervention where globalization is being noticed are various, from early history to the present day, in economics, marketing, IT, the educational system, politics, business, etc. The main idea that we want to set forth is the way globalization occurs in the economy, in general, and in some countries of the world (such as Bulgaria) and in Romania, especially, as well as the manner through which they succeed or not to take advantage of the effects of globalization. More or less, we depend on globalization, and the process of globalization and its impact in our times can be more or less controlled.

Keywords: globalization, national identity, linear regression, business environment, FDIs

Introduction

Globalization, a rather discussed phenomenon, by some even criticized, seems to be brought more and more to the attention of political and economic analysts, each of them giving it different meanings. For some, globalization is nothing but a chimera, which simply scents at nations
minimizing their existence and importance in this beginning of century. For others, especially (we could refer to the great leaders of transnational corporations), it is the means through which the strategy and policy that need to be followed can be used to obtain and counteract new markets, globalization ultimately representing the reduction of any existing barriers in the way of their expansion.

Nevertheless, globalization describes the increase of trade and investments due to falling barriers and interdependence between states. In this economic context, it is frequently met the almost exclusive reference to the effects of trade and, in particular, of trade liberalization or free trade.

The economical dimension of globalization has, without no doubt, a great importance, being one of the most important causes and driving forces of globalization processes in other areas. However, it cannot be overlooked the fact that globalization means much more than an increased integration of world economy. Therefore, it cannot be limited strictly to economical processes, a situation which unfortunately happens quite often. The various scientific disciplines involved, economical sciences primarily, historical, political, but also sociological, meet problems when defining this notion.

As a generic definition, globalization refers to the increase of global interactions at global level and to a high interdependence at economical, social, technological, cultural, political and ecological level, being often mentioned in connection with a series of features:

- linking people (increasing dependence of nations);
- reducing distances throughout technology;
- creating a common economic market.

The global nature of science and technology means that, although the main technical progresses are encountered in the developed countries, scientific research is based on global resources, while the implementation of technology aims at global goals. Global marketing is characterized through firms’ marketing strategy, companies that meet the requirements of globalization, promoting this process: global brands, "Coca-colonization" consumption, etc.

The global financial system includes the "symbolic" world economy that relies on a network which involves, at global level, financial
institutions, capital market’s operators, national regulatory bodies and so on [1].

Communication infrastructure refers to the technical progress recorded in order to improve material communication systems (transports), to achieve worldwide media coverage, and, especially, to establish a global transmission/information reception network.

Finally, the global institutional framework comprises a series of governmental or nongovernmental organizations aimed at promoting discussions and actions addressing to global issues: pollution, criminality, poverty, terrorism, hunger, lack of water resources, etc [2].

A consequence of economical globalization is the improvement of relations between the developers of the same industry from different parts of the world (that is the globalization of an industry), but also the erosion of national sovereignty over the economical sphere. Thus, the IMF defines globalization as being “the growing economic interdependence of countries worldwide through increasing volume and variety of cross-border transactions in goods and services, freer international capital flows, and more rapid and widespread diffusion of technology” [3]. On the other hand, the World Bank defines globalization as “Freedom and ability of individuals and firms to initiate voluntary economic transactions with residents of other countries”.

Globalization in the period after the World War II was led by rounds of negotiations, in a first phase under the auspices of GATT (General Agreement on Tariffs and Trade), which brought to several agreements being signed as to remove several restrictions on free trade. The Uruguay Round led to the signing of a treaty which created the World Trade Organization, having the role of mediating trade disputes. Other bilateral trade agreements, including sections of the Maastricht Treaty and NAFTA have also been signed in order to reduce tariffs and trade barriers.

**National identity in the context of globalization**

National identity is necessary for a people in order to articulate itself with the meaning of existence in a given territory. The fusion between language and culture symbolizes particular complementarities to the
multilateralism and universality of this world. Only through culture and language, assimilated with free will, you can belong from the bottom of your soul to a people, to share some aspirations and can move forward. National identity cannot be opened to some rational thoughts in what concerns the presentation and characterization of a life in a modern state. She comes to us through the language we speak and learn to articulate the most primitive wishes.

“The reaction to the globalization phenomenon is still significant. National communities return to their irreducible traditions – the identity, which they understand to assert more strongly from some time now. Even one of the promoters of the EU, France, warned that it will not give up its identity under no circumstances. France wants (and is not the only one) a Europe of nations, an idea promoted by Ch. De Gaulle, built following a logic of integration in line with the logic of differentiation.”, says N. Ionescu in his article named “Globalizare și identitate națională” [3].

The same author writes that “the erasure of national culture will never be possible, as well as the erasure of literature, art, religion, folklore and musical traditions, the history of any nation. The world would be much poorer without the diversity of national cultures. But the contemporary connections between cultural life and political life must find their own natural and lucrative forces through which nations in general, including Romania, can consolidate their qualities and material and spiritual accomplishments”.

National identity is a relation between states and territories and includes concepts such as threat, inferiority or superiority and is correlated to the idea of common action against third party states and foreign policies creations. This concept of national identity is accompanied by strong group membership feelings and by the delimitation of “we” and “them”, developing in the same time interpersonal connections within a group.

The phrase often cited that nations are too small for big problems and too big for small problems, comes from an article written by Daniel Bell in 80’s [4]. Global issues such as the greenhouse effect cannot be solved at a single state level, as local problems cannot be solved in the educational system. Consequently, the national state erodes. It does not disappear, nor becomes useless, such as it is mentioned in various comments, but it
transforms itself. This raises some additional levels that can solve problems - both superior and inferior to the national state. Rigid boundaries that were recently marking the territory of a country, state power and people’s power become thus permeable. Behind the debate about "national state erosion" hide neither more nor less than the above mentioned facts. This "erosion" shines through a particularly advanced way in the EU. Here, states have transferred to a new supranational organization from central competences up to monetary sovereignty. Still, these phenomena are not new - they are known and discussed since the 70's under the term "interdependence"-, processes have accelerated, reaching new dimensions both qualitatively and quantitatively. This is actually the novelty of globalization. Both the environmental damage and the unfair distribution existed long before the discussions about globalization began and these problems have worsened because of it. On the other hand, globalization creates the conditions to react properly, worldwide, in certain global issues.

The importance of globalization upon business

Globalization is considered to be a process in which barriers separating the different regions of the world (economical, cultural and political) are usually reduced or removed in order to stimulate exchanges both in knowledge and goods.

Nowadays, more and more people pay attention to the so-called economical revolution. This one is easily to be noticed: the number of those who have been living in market economy for the last twenty years has arisen from 1.5 billion persons to almost 6 billion. At this moment there is no country that would not have experienced market-oriented policies. Almost all countries have reduced customs barriers, many enterprises from the public sector have been transferred to the private area when these actions seemed to be done at the proper time, the role of the government has been reduced as an economic agent, increasing its importance upon regulation and stimulation and giving competition the opportunity for some public facilities. Generally speaking, markets tend to acquire an important role while public involvement is less and less encouraged [5].
It is well known that transnational corporations represent a great image of power within the globalized world economy. Many big companies are richer and more powerful than the states that seek to regulate them. Therefore, corporations have been growing very quickly and some of them have annual profits exceeding the GDP’s of low and medium income countries. The following table reflects how business within globalization dominates the global economy and its influence over global policymaking.

**Table 1: The globalization impact upon business**

<table>
<thead>
<tr>
<th>Shareholders</th>
<th>It might be a financial instability without a stable law.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>Many companies give up on some centers and begin a new activity within developing countries so as to reduce costs.</td>
</tr>
<tr>
<td>Users</td>
<td>There are some vulnerable users to different products.</td>
</tr>
<tr>
<td>Chandler and competitors</td>
<td>It has to be noticed the fact that chandlers are submitted to corporations laws and internal competitors may be exposed to strong contenders.</td>
</tr>
<tr>
<td>Administration and laws</td>
<td>Globalization leads to some weak points of administration. It also represents a legal frame for environmental protection, standards living, civilization and so many other things.</td>
</tr>
</tbody>
</table>

As a major concern for the international institutions, an important study was published by The International Monetary Fund regarding the business regulation report in 181 countries. This report reflects globalization in statistics data known as *Doing Business*. That will be the sixth edition of this comparative study that takes into consideration national regulations
and the modality of how these ones improve or compel the global business environment.

Doing Business measured a set of regulations affecting 10 stages of national life cycle of a company: starting a business, obtaining building permits, laws on labor, property registration, access to credit, protecting investors, paying taxes, border trade, contract enforcement and closing business. Nevertheless, Doing Business encounters two types of data: the first category comes from laws and regulations and the second one consists of time and motion indicators that measure efficiency in achieving the established goal.

It is well known that in such places that are characterized by a poor quality of infrastructure services – companies’ productivity, profit and growth suffer. That is why this international study and the standard cost model (first appeared and developed in Netherlands) represent the unique standards used across a huge range of jurisdictions so as to evaluate the influence of government rule-making within globalization on business activity. So as to take a whole picture, the standard cost model represents a quantitative methodology for determining administrative burdens that regulation imposes on businesses. The method can be used to measure the effect of a single law or of selected areas of legislation or to perform a baseline measurement of all legislation in a country [6].

Last year was a hard one for the business field. Companies all over the world had to handle with the effects of a financial crisis that started in rich economies and finally led to a global economic downturn. As far as policy makers and governments are concerned, great challenges appeared - stabilizing the financial sector, restoring confidence and trust among people (almost 50 million people risked to lose their jobs as a result of the crisis), implementing regulatory reforms that had as a main objective the “economy refreshment” [7].

Recognizing the importance of firms – small and medium size enterprises – for the development of the country, some governments have included reforms of business regulation in their economic recovery plans (table 2). Thus, it can be easily observed the fact that for the first time a Sub-Saharan African economy, Rwanda led the world concerning business reforms. Rwanda succeeded last year to introduce a new company law that
simplified business start-up and increased minority shareholder protections. Delays at the borders were also reduced due to simpler requirements for documents.

The situation shows that Arab Republic of Egypt, Liberia, Moldova, the Kyrgyz Republic and Tajikistan - joined Rwanda on the list of global top reformers. All in all, these top ten reformers are economies that thanks to reforms improved the most on the ease of doing business.

Table 2: The top 10 reformers in 2008 / 2009

<table>
<thead>
<tr>
<th>Economy</th>
<th>Starting a business</th>
<th>Dealing with construction permits</th>
<th>Employing workers</th>
<th>Registering property</th>
<th>Getting credit</th>
<th>Protecting investment</th>
<th>Paying taxes</th>
<th>Trading across borders</th>
<th>Enforcing contracts</th>
<th>Closing a business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda</td>
<td>✓</td>
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<td>Kyrgyz</td>
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<td>Macedonia</td>
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<td>United Arab</td>
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<td>Moldova</td>
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<td>Colombia</td>
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<tr>
<td>Tajikistan</td>
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<tr>
<td>Egypt, Arab</td>
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<tr>
<td>Liberia</td>
<td>✓</td>
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</table>

Romania and Bulgaria – from foreign investments to gross domestic product

For many years it has been discussed about the duo Romania – Bulgaria, almost never the two countries being taken into consideration separately. In the European Union they have been accepted together, in order to adhere to Schengen they fight together and most probably together they will enter the euro zone because the two have an apparently similar economic development itinerary. Still, many do not take into account an
important aspect and that is the population or more exactly the considerably large difference between the population of the two countries, 7,543,325 inhabitants in Bulgaria and 21,442,012 inhabitants in Romania. It is well known that the gross domestic product (GDP) is made up of private consumption, gross investment, government spending, plus exports minus imports. Moreover, private consumption is considered as having the highest proportion in the GDP. From here we can deduct that a country with a larger population will automatically have a higher GDP. For this reason the two countries mentioned cannot have the same economical level nor the same forecasted course of events of economical growth.

As foreign direct investments (FDIs) are concerned, Romania and Bulgaria are either placed neck and neck [8] or the latter outperforms the first country [9]. According to the Financial Week Newspaper, Bulgaria seems to have become a more attractive country to investors than Romania as in 2010 almost 300 companies decided to relocate their headquarters in Bulgaria [10]. Low tariffs and taxes and also the stability of fiscal legislation seem to be two of the most relevant reasons in this case. Likewise, lower workforce costs, lower prices of assets and rents and a minimum capital for setting up a company of one euro add to the list. Nevertheless, numbers show us a different situation, such as official sources argue, Romania gaining in the first eight months of the current year 1.13 billion Euros (1.55 billion dollars) of foreign investments, five times more than Bulgaria, shaking from its very foundation the myth that our neighbors are more attractive in the eyes of foreign investors [11]. Most certainly, Romania should be placed next to countries such as Poland and the Czech Republic, our country ranking third from the point of view of FDI’s evolution, such as official sources state [12].

In this context of globalization we consider necessary to show how Romania’s gross domestic product depends on the amount of foreign direct investments (FDIs), the same pattern being applied to its “twin” country, Bulgaria. Thus, we have chosen the linear regression, recording two variables between which there is a logical connection and which are made up of ten successive terms. The data used for Table 3 can be found in The World Bank Data Catalog [13].
In what concerns the methodology used, we have chosen the Microsoft Office Program Excel. The estimation of coefficients from a linear model using the method of least squares and the calculation of statistics necessary to associated statistical tests are being executed with the help of the regression procedure, one of the most complex functions of Excel. The table below has the purpose of highlighting the case of Romania following the data from Table 3.

The function \( yi = a + bx + ei \) can be written with the help of the following system of equations

\[
na + b \sum x_i = \sum y_i \\
\sum a x_i + b \sum x_i^2 = \sum x_i y_i
\]

**Table 3:** The value of foreign direct investments and the gross domestic product per capita between 2001 and 2010 (Romania)

<table>
<thead>
<tr>
<th>Years</th>
<th>GDP / capita (( y_i ))(^*)</th>
<th>FDI (( x_i ))(^**)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1,816</td>
<td>1.1570</td>
</tr>
<tr>
<td>2002</td>
<td>2,102</td>
<td>1.1440</td>
</tr>
<tr>
<td>2003</td>
<td>2,737</td>
<td>1.8440</td>
</tr>
<tr>
<td>2004</td>
<td>3,481</td>
<td>6.4430</td>
</tr>
<tr>
<td>2005</td>
<td>4,572</td>
<td>6.4822</td>
</tr>
<tr>
<td>2006</td>
<td>5,681</td>
<td>11.3934</td>
</tr>
<tr>
<td>2007</td>
<td>7,856</td>
<td>9.9250</td>
</tr>
<tr>
<td>2008</td>
<td>9,300</td>
<td>13.8830</td>
</tr>
<tr>
<td>2009</td>
<td>7,500</td>
<td>4.8460</td>
</tr>
<tr>
<td>2010</td>
<td>7,538</td>
<td>3.4530</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>52,583</strong></td>
<td><strong>60,5706</strong></td>
</tr>
</tbody>
</table>

\(^*\) The value of the GDP per capita is in dollars  
\(^**\) The value of the FDIs is in billion dollars

where \( n \) is the number of pairs \( xiy_i \) and equals with 10, \( a \) and \( b \) are the coefficients of the regression function, while \( e \) is the value of the residual variable. Once the calculations are done, we obtain the following values: \( a = 2644.871723 \), \( b = 431.468189 \). Thus, the function reveals itself as being \( yi = 2644.871723 + 431.468189xi + ei \). Because \( b > 0 \) (\( b = 431.468189 \)) we can see that
there is a direct connection between the two variables. In other words, when foreign direct investments increase with one unit, the gross domestic product per capita increases with 431.468189 dollars (or at each billion dollars of foreign investment the gross domestic product increases with 431.468189 dollars).

In order to accept the linearity hypothesis we calculate the coefficient of linear correlation: \( r = \frac{\text{cov}(x,y)}{\sigma_x \sigma_y} = 0.714774778 \). This coefficient, being defined on the interval \([-1;1]\), indicated a medium intensity connection between the two variables.

Table 4: The summary output of the regression function for Romania

| Regression Statistics |  
|-----------------------|---|
| Multiple R            | 0.714 |
| R Square              | 0.510 |
| Adjusted R Square     | 0.449 |
| Observations          | 10   |

<p>| ANOVA |<br />
|-------|---|</p>
<table>
<thead>
<tr>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regressi</td>
<td>1</td>
<td>3335313</td>
<td>3335</td>
<td>8.35</td>
</tr>
<tr>
<td>Residual</td>
<td>8</td>
<td>319295</td>
<td>3991</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>652827</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t</th>
<th>P-</th>
<th>Lower</th>
<th>Upper</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2644.1102.92</td>
<td>2.39</td>
<td>0.04</td>
<td>101.534</td>
<td>5188.0</td>
<td>101.53</td>
<td>5188.2</td>
</tr>
<tr>
<td>X</td>
<td>431.4149.256</td>
<td>2.89</td>
<td>0.02</td>
<td>87.283</td>
<td>775.6</td>
<td>87.283</td>
<td>775.65</td>
</tr>
</tbody>
</table>

The verification of the model’s credibility is done using the dispersion analysis. The Fisher-Snedecor test indicates that the results are significant for the significance threshold of 5%. Consequently, as
significance F is 0.020175, which is lower than the significance threshold, we can see that the results are significant. It can also be demonstrated that, in the case of a linear connection, the correlation ratio equals the correlation coefficient. Thus, taking into consideration that the determination coefficient \( R^2 \) is 0.510902983 and it represents the square value of the correlation coefficient, the correlation ratio becomes equal to 0.714774778, a number equivalent to the correlation coefficient.

For checking the significance of the correlation ratio we used the Fisher-Snedecor test:

\[
F_{\text{calculated}} = \left( \frac{n-k-1}{k} \right) \times \left[ \frac{R^2}{1-R^2} \right] = \frac{(n-2) \times [R^2/(1-R^2)]}{(n-k-1)/k},
\]

\( R \) being significant if \( F_{\text{calculated}} \) is greater than \( F_{\text{table}} \); \( v_1; v_2 \). In our case, \( F_{\text{calculated}} = 8.35 \gg F_{0.05; 2; 10} = 5.19 \). Because the correlation ratio is significantly different from zero, with \( \alpha = 0.05 \), we reach the following econometric model:

\[
\hat{y}_t = 2644.871723 + 431.468189x_t.
\]

In other words, the model describes correctly the dependence between the two variables, explaining 51.09% of the total variation of the dependent variable, that is the gross domestic product per capita is due to foreign direct investments in proportion of 51.09%. Last but not least, the normality hypothesis can be reviewed with the help of a graphic, having the adjusted values of \( \hat{y} \) on the abscissa and the residual values of \( e_i \) on the ordinate. According to the graphic below, it can be depicted that the empirical values of the residual value can be inscribed in a constant band \((t_0; \sqrt{v} \text{ standard error}, \text{ where } t_{0.05} = 2.31 \text{ and } se = 1997.798)\) built with a significance threshold of \( \alpha = 0.05 \), while errors’ normality hypothesis can be accepted only at this significance threshold.

![The residual value](image)

**The predictable component**
Figure 1: Verification of the normality hypothesis using the standard error

We consider interesting to do a comparison of these results with those obtained from the case of Bulgaria (Table 6). The data was taken once more from the World Bank Data Catalog (Table 5). Following the same steps as the ones used so far, we have the subsequent function: \( y_i = 3058.284 + 257.1444x_i + e_i \). As \( b=257.1444>0 \), we can see again the direct connection between the two variables. Consequently, when the foreign direct investments increase with one billion dollars the gross domestic product increases with 257.1444 dollars per capita. Moreover, the correlation coefficient (0.572142) shows a medium intensity connection, while the determination coefficient (0.327347) suggests that GDP’s variation is influenced only in proportion of 32.73% by the FDIs. This situation is created because, in Bulgaria, foreign investments have a low involvement and the economic growth cannot attract FDIs. That is why the few investors are interested in factors such as low workforce costs and nondiscriminatory and attractive legal framework.

Table 5: The value of foreign direct investments and the gross domestic product per capita between 2001 and 2010 (Bulgaria)

<table>
<thead>
<tr>
<th>Years</th>
<th>GDP / capita ((y_i)) *</th>
<th>FDI ((x_i)) **</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1,753</td>
<td>0.8129</td>
</tr>
<tr>
<td>2002</td>
<td>2,031</td>
<td>0.9046</td>
</tr>
<tr>
<td>2003</td>
<td>2,642</td>
<td>2.0967</td>
</tr>
<tr>
<td>2004</td>
<td>3,249</td>
<td>2.6622</td>
</tr>
<tr>
<td>2005</td>
<td>3,733</td>
<td>4.3124</td>
</tr>
<tr>
<td>2006</td>
<td>4,313</td>
<td>7.7576</td>
</tr>
<tr>
<td>2007</td>
<td>5,498</td>
<td>13.2145</td>
</tr>
<tr>
<td>2008</td>
<td>6,798</td>
<td>9.9791</td>
</tr>
<tr>
<td>2009</td>
<td>6,403</td>
<td>3.3892</td>
</tr>
<tr>
<td>2010</td>
<td>6,325</td>
<td>2.1675</td>
</tr>
<tr>
<td>Total</td>
<td>42,745</td>
<td>47,2970</td>
</tr>
</tbody>
</table>

* The value of the GDP per capita is in dollars
** The value of the FDIs is in billion dollars
In the end we should not forget that Merrill Lynch called Romania the most attractive country for investors in Europe [14] and the forecast is valid till 2019. Therefore, the main poles of attraction are the automobile industry, represented by Renault and Ford, and the IT sector where specialists can be found very easily, the second language at Microsoft in America being Romanian.

**Table 6:** The summary output of the regression function for Bulgaria

<table>
<thead>
<tr>
<th>SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression</strong></td>
</tr>
<tr>
<td>Multiple</td>
</tr>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>Adjusted R Square</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>df</strong></td>
</tr>
<tr>
<td>Regressi</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

| Coeffi | Standa | t | P- | Lower | Uppe | Lower | Upper |
|------------------|
| Intercept | 305.8 | 805.62 | 3.79 | 0.00 | 1200.5 | 4916. | 1200.5 | 4916.0 |
| X | 257.1 | 130.323 | 1.97 | 0.08 | - | 557.6 | - | 557.67 |

**Conclusions**

Traditionally politics has been undertaken within national political systems. National governments have been ultimately responsible for maintaining the security and economic welfare of their citizens, as well as the protection of human rights and the environment within their borders.
With global ecological changes, an ever more integrated global economy, and other global trends, political activity increasingly takes place at the global level.

Globalization is much like fire. Fire itself is neither good nor bad. Used properly, it can cook food, sterilize equipment, form iron, and heat our homes. Used carelessly, fire can destroy lives, towns and forests in an instant.

Last but not least, it can be asserted that an important environmental change in the last 15 years represents the globalization upon business. Companies try to venture beyond national barriers in the pursuit of business challenges. Government policy and even regulation reforms and growth have also encouraged the development of this trend. Thus, in the 21st century, the business environment seems to be the first emphasized on knowledge as a competitive key-element within globalization.

References


Sustainability, Management and Policy of Public Debt

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The present scientific work aims at establishing the connection between the sustainability and the management of public debt both as hot stringent issues, and as strategic components of the state public policies. The authors analyze the relationship between public debt and some macroeconomic variables, by using a model structured on two time periods. Also, the study the same relationship based on data concerning public debt as a quota of the GDP (%) and the economic growth as a quota of the GDP (%) in 2009, by applying the econometric models for several European Union members.

Therefore, the results of the present research highlight the role played by the debt management in ensuring the debt sustainability and also prove that the connection between the economic growth and the public debt is indirect and only medium strong, due to the results obtained after applying a unifactorial econometric model.
**Keywords:** sustainability, public debt management, public policies, economic growth, indebtedness level

**JEL Classification:** H6, H60, H63

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**Introduction**

In general terms, the concept of sustainability of public finances concerns the ability of a government to service the costs of all its debt – internal and external alike, contracted by both public and private subjects – without endangering its perspectives for future economic growth and development. Still, it is not easy to answer the question “What is the sustainable or optimal indebtedness level of a country?”

In our scientific effort to define the debt sustainability, we have mentioned a series of issues concerning the debt management, which involves a careful selection of debt instruments, in order to maintain the entailing interest payments and debt accumulation under control.

In the countries with high levels of indebtedness, in which the interest payments absorb a significant percentage of the state budget, reducing the interest-related costs is crucial. Also, these countries must reduce the risk that unfavourable shocks on the real performance or production growth might lead to an unsustainable indebtedness level.

As for the public debt management, the problems often start from the decision factors’ lack of attention to the benefits of a prudential strategy of debt management, to the costs of a poor macroeconomic management and to the excessive levels of public indebtedness. As a result, the public authorities should be more careful with the advantages deriving from a reasonable public debt management and from debt policies coordinated within a complete macroeconomic framework.

In a larger context, when dealing with public policies, the governments should make sure that both the level of indebtedness and the growing pace of the public debt are sustainable in time and can be maintained this way during a large array of situations in which the costs and the risk objectives are met.
The aim of the present work is to put into light the connection between the sustainability and the public debt management as „hot” issues (especially in those times of economic crises), while considering them strategic components of the public policies of a country.

The present work is structured as it follows: the first section presents the level of present knowledge in the concerned field of study. The scientific effort continues with the introduction of a simple model in which the debt management objectives ensure the stability of the public debt ratio in the GDP and contributes to the sustainability. The research goes on with the analysis of the relation between the indebtedness level and the real economic growth, by using an unifactorial econometric model. The work ends with the conclusions and the directions for further research.

**Sustainability and Public Debt Management – Components of State Public Policies**

The concept of sustainability of public debt or, in a larger context, sustainability of fiscal policies reveals its complexity and importance on both national and international level.

Defining the sustainability of public debt and, implicitly, the sustainability of fiscal policies has gained different connotations throughout time, along with the changes in the implications of these concepts on the macroeconomic level.

One of the first definitions of the sustainability of public debt was provided by Keynes (1923), who explained the necessity for the governments to take into account the budgetary constraints in order to apply sustainable fiscal and budgetary policies.

Other authors, such as Domar (1944), Buiter (1985), Blanchard, Chouraqui, Hagemann and Sartor (1990) have formulated different definitions for the sustainability of public debt, insisting on the indebtedness level, which, in their opinion, had to converge either towards a finite value, in order to avoid the progressive fiscal pressure, or to towards the initial level.
Also, according to Zee (1987), the sustainability aims at stability, a concept developed in its work on sustainability and the optimal level of public debt.

As a matter of fact, the importance and implications of the sustainability of both fiscal and public debt policies led to the intervention of the International Monetary Fund, which set up procedures to investigate the sustainability of public debt, as well as the external sustainability (Campeanu, Stoian, Miricescu and Gyorgy, 2009). The IMF procedures were put into practice following the programmes initiated between the Fund and different countries, and were therefore meant to reach an overall balance (IMF, 2002). Beside the various ways to define sustainability, one can also use sustainability indicators. These indicators do not take into account the previous periods of evolution of the public debt. As a result, studying the sustainability of public debt based on the sustainability indicators reflects how the risk of non-sustainability is calculated, depending on the probability of serving the planned public debt over a medium term. These studies are particularly useful in countries where the indebtedness level is growing fast.

There are several empirical studies proving that the external public debt and its structure (the component currencies) can influence the reduction of the public debt sustainability (Eichengreen, Hausmann and Panizza, 2003). Similarly, Detragiache and Spilimbergo (2001) have shown that, depending on the structure of the debt after its maturity date, a very high volume of debt on short term can generate crises in emergent countries in permanent need of liquidities.

As part of the state public policies, the public debt management (IMF, 2003) is the process of establishing and applying strategies to manage the government debt, to collect the necessary funds, to fix the balance between costs and risk objectives, to reach any other management objectives established by the government. Every government is confronted with strategy choices as to: the objectives of the public debt management, the preferred risk tolerance threshold, the part of the government responsible with the public debt management, how to manage the conditioned liabilities (which can be turned into financial liabilities and can
materialize in case of guarantees for loans in foreign currencies) and how to ensure a stable governance for the public debt management (IMF, 2001).

Also, a proper public debt management, oriented towards ensuring the fiscal sustainability in the long run involves the existence of a stable and effective legal and institutional framework.

**The Relation between Public Debt and Some Macroeconomic Variables**

In order to study the role of the short-term debt, as well as the role of the long-term debt, we must consider a model structured over two periods of time (Missale and Giavazzi, 2004). Thus, the accumulation of the public debt over the time horizon on which the model is structured is the following:

\[ B_{t+1} = (1 + X_{t+1} + X_t)B_{t-1} - S_t \]  

(1)

where:

- \( B_{t+1} \) represents the ratio between the debt and the GDP;
- \( S_t \) represents the primary surplus decided at the moment \( t \) for the moment \( t+1 \);
- \( X_{t+1} \) represents the real rate of the public debt profitableness minus the rate of production increase.

As a matter of fact,

\[ X_{t+1} = I_{t+1} - \pi_{dt+1} - y_{t+1} \]  

(2)

where:

- \( I_{t+1} \) represents the nominal rate of profitableness;
- \( \pi_{dt+1} \) represents the inflation rate calculated by means of the GDP deflator;
- \( y_{t+1} \) represents the growth rate of the GDP.

We consider that, in order to ensure the sustainability of the debt, the government chooses the primary surplus as an increasing function of the debt percentage:

\[ SP_t = \theta B_{t-1} + (X_t - Et_{-1}X_t)B_{t-1} \]  

(3)

As a consequence, a government reacts not only to a higher percentage of the debt (Bohn, 1998), but it also compensates for the increase
of this percentage generated by a higher real efficiency than anticipated minus the production increase. In conclusion, a government tends to correct the increase of the debt percentage resulted following unfavorable past conditions (such as a higher efficiency or the gradual decrease of production). If we replace function (3) in the equation (1), the modification of the debt percentage during the two reference periods becomes:

$$B_{t+1} - B_{t-1} = (E_t - 1X_t+1 + E_t - 1X_t - \theta)B_{t-1} + (X_t+1 - E_t - 1X_t+1)B_{t-1} \quad (4)$$

In fact, the equation (4) shows that, if we anticipate the stabilization of the debt percentage, so that $(E_t - 1X_t+1 + E_t - 1X_t - \theta)B_{t-1} < 0$, $\theta$ could not be high enough to prevent the increase of this percentage, when the real debt efficiency is extremely high or the rate of the GDP growth drops significantly. Therefore, if these unexpected changes become permanent, the debt percentage could become instable. According to Bohn (1998), a high enough value of $\theta$ “could maintain the stability of the debt/GDP ratio in the future, if the interest rate and the rate of the increase do not follow an unfavorable course.” As a consequence, the debt percentage can grow, either due to unexpected changes in the real debt rate, or because of the variations in the production increase.

Also, the role played by the debt management in ensuring the debt stability is projected on two directions, as it results from the two terms in the right side of the equation (4).

Even more, the debt instruments can be selected either to reduce the real anticipated efficiency of the public debt, or to minimize the impact of unfavorable conditions, such as a very high level of debt efficiency or a dropping percentage of the production increase.

The research goes on with the study of the connection between the public debt and the real economic growth and reveals the fact that one of the main influence factors is the level of economic development of a country or a region. Starting from these coordinates, one can aim at measuring the influence of the real economic growth on the public debt, using statistical methods and econometric models. Dealing with the interdependencies between such economic variables usually requires, among other things, having multiple year data at your disposal, expressing the empirical values
in real terms and a lot of prudence in interpreting the economic results, because of the co-linearity of the factorial variables involved in the econometric models.

The approach of the relationship between the real economic growth and the indebtedness level must take into account the fact that these indicators are expressed in percentages of the GDP, which makes their deflation unnecessary. The data related to the variables are classified according the „time“ criterion, therefore they form chronological series. Analyzing the chronological series means that the terms must meet the criterion of comparability from the perspective of prices; in our case, the variables are expressed in percentages.

In this context, we have analyzed the relationship between the public debt and some macroeconomic variables, based on data concerning the public debt as percentage of the GDP (%) and the economic growth as percentage of the GDP (%) in 2009, by applying a series of econometric models to several European Union members:

**Table 1:** The Relationship between the Public Debt as Percentage of the GDP and the Economic Growth in 2009

<table>
<thead>
<tr>
<th>Country</th>
<th>PD/GDP</th>
<th>Economic growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>96.7</td>
<td>2.2</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>14.8</td>
<td>6.2</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>35.4</td>
<td>4.9</td>
</tr>
<tr>
<td>Denmark</td>
<td>41.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Germany</td>
<td>73.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Estonia</td>
<td>7.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Ireland</td>
<td>64.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Greece</td>
<td>115.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Spain</td>
<td>53.2</td>
<td>2.3</td>
</tr>
<tr>
<td>France</td>
<td>77.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Italy</td>
<td>115.8</td>
<td>1.6</td>
</tr>
</tbody>
</table>
Using the Data Analysis module from Excel, we have studied the relationship between the two variables. Based on these data, we have built a unifactorial econometric model such as:

\[ y_i = f(x_i) + \varepsilon_i \]

The analysis of the data in the table, in relation with the described economic process, leads to the following specification of the variables:

- \( y \) – the real values of the dependent (endogenous) variables – the public debt as percentage of the GDP;
- \( x \) – the real values of the independent (exogenous) variables / the economic growth (%);
\( \varepsilon \) – the residual variable, representing the influence of other factors of the \( y \) variable, unspecified in the model and considered as arbitrary factors, having an insignificant influence over the \( y \) variable.

In case of a unifactorial model, the most used procedure to specify an econometric model is to draw a graphic representation of the two series of values by means of a correlogram.

One can notice that the distribution of the empirical points \( (x_i, y_i) \) can be approximated with a straight line → a unifactorial linear model: \( y = a + bx + \varepsilon \), where \( a \) and \( b \) represent the parameters of the model. The incline of the line is negative, which means that the linear connection between the two variables is indirect or reversed.

![Figure 1: The Graphic Representation of the Public Debt as a Percentage of the GDP and the Economic Growth in 2009](image)

*Source:* Eurostat, calculations by the authors
### Tabel 2: The Results of Regression between the Indebtedness Level and the Economic Growth

**SUMMARY OUTPUT**

<table>
<thead>
<tr>
<th>Regression Statistics</th>
<th></th>
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### Coefficients

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### RESIDUAL OUTPUT

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<tr>
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<th>Predicted PD/GDP(%)</th>
<th>Residuals</th>
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<td>67.84594719</td>
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<tr>
<td>27</td>
<td>66.76168405</td>
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<tr>
<td>28</td>
<td>70.01447348</td>
<td>-26.31447348</td>
</tr>
</tbody>
</table>
In order to determine the two parameters, we use the method of the least square:

According to the table above, the value of the coefficients is:
C(1): \( \hat{a} = 93,86 \), the free term is the point in which the regression axis intersects the OY axis, which means that, in case the economic growth is 0, the public debt as percentage of the GDP will be 93,86%.
C(2): \( \hat{b} = -10,84 < 0 \) the relationship between the two variables is indirect, which means that, when the GDP increases by 1%, the public debt calculated as percentage of the GDP will drop by 10,84%.

\[ \hat{y} = 93,86 - 10,84x \]

The estimators obtained using the method of the least square can be considered as verisimilar if the following hypotheses are accepted:
1) The observed values are not affected by errors of measurement
\[ x_i \in (\bar{x} \pm 3\sigma_x) \]
\[ \sigma_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = 1,64291 \]
\[ 3,628571-3 \times 1,64291 < x_i < 3,628571+3 \times 1,64291; x_i \in (-1,300159;8,557301); \]
\[ y_i \in (\bar{y} \pm 3\sigma_y) \]

\[ \sigma_y = \sqrt{\frac{\sum(y_i - \bar{y})^2}{n}} = 27,7489 \]

54,525-3*27,7489 < x_i < 54,525+3*27,7489; \ y_i \in (-28,7217;137,7717);

As the values of these variables belong to their specific intervals, the hypothesis is accepted without reserve;

2) The random variable \( u \) is of zero average \( \mathbb{M}(\hat{u}) = 0 \) and the dispersion \( \delta^2_u \) is constant and independent from \( X \) – the homoskedasticity hypothesis, which can lead to the conclusion that the relationship between \( Y \) and \( X \) is relatively stable.

**Table 3:** The Analysis of the Relation between the Public Debt and the Economic Growth

<table>
<thead>
<tr>
<th>Dependent Variable: PD</th>
<th>Method: Least Squares</th>
<th>Included observations: 28</th>
<th>DP=C(1)+C(2)*ECONOMIC GROWTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Error</td>
<td>t-Statistic</td>
</tr>
<tr>
<td>C(1)</td>
<td>93.86826</td>
<td>10.08560</td>
<td>9.307152</td>
</tr>
<tr>
<td>C(2)</td>
<td>-10.84263</td>
<td>2.539779</td>
<td>-4.269124</td>
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<tr>
<td>R-squared</td>
<td>0.412103</td>
<td>Mean dependent var</td>
<td>54.52500</td>
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<tr>
<td>Adjusted R-squared</td>
<td>0.389491</td>
<td>S.D. dependent var</td>
<td>27.74890</td>
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<tr>
<td>S.E. of regression</td>
<td>21.68161</td>
<td>Akaike info criterion</td>
<td>9.059555</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>12222.40</td>
<td>Schwarz criterion</td>
<td>9.154713</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-124.8338</td>
<td>Durbin-Watson stat</td>
<td>2.015815</td>
</tr>
</tbody>
</table>

*Source: calculations by the authors*

The application of the White test involves passing through the following stages:

- building an auxiliary regression, based on the assumption that there is a dependency relationship between the square of the error’s values, the exogenous variable included in the initial model and the square of its values: \( \hat{u}_i^2 = \alpha_0 + \alpha_1 x_i + \alpha_2 x_i^2 + \omega_i \)
Table 4: The Results of the Verification of Errors in the Applied Unifactorial Linear Model

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th></th>
<th>F-statistic</th>
<th>Probability</th>
<th>Obs*R-squared</th>
<th>Probability</th>
</tr>
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<tr>
<td>F-statistic</td>
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<td>0.600866</td>
<td>1.118083</td>
<td>0.571757</td>
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</table>

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Included observations: 28

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
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<td>CRESTEC^2</td>
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<tr>
<td>R-squared</td>
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<td>Adjusted R-squared</td>
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<td>S.E. of regression</td>
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<td>Durbin-Watson stat</td>
<td>2.418828</td>
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</tr>
</tbody>
</table>

Source: calculation by the authors

The Fisher - Snedecor test is based on the nullity of the parameters
Hₒ : α₀ = α₁ = α₂ = 0; the null hypothesis according to which the results of the estimation are irrelevent is accepted, the homoskedasticity hypothesis is confirmed. Fₖ = 0.519905 < F₉₀.₀₁₉₆ = 7.72 (the calculated F is taken from the White Heteroskedasticity Test).

3) The values of the residual variables of u are independent, as there is no case of self-correlation.

While using the Durbin Watson test, we obtain d = 2.015815, and for a number of observations n=28, α=0.05 and a number of independent variables k=1, we take d₁=1.33 and d₂=1.48.
\[
\sum_{i=2}^{n} (\hat{u}_i - \hat{u}_{i-1})^2
\]
\[
d = \frac{\sum_{i=1}^{n} \hat{u}_i^2}{n - 2} = 2,015815
\]
\[d_2 < d < 4 - d_2 \Rightarrow \text{the errors are independent}
\]

4) Verifying the normality hypothesis of the values of the residual variables

It is a known fact that, if the errors follow the normal rule of zero average and the root-mean square deviation \( s_\hat{u} \) (the consequence of hypotheses \( c_1, c_2, c_3 \)), then the relation becomes:

\[
P(\hat{u}_i \leq t_\alpha s_\hat{u}) = 1 - \alpha.
\]

The verification of the normality hypothesis of the errors will be made using the Jarque-Berra test, an asymptotic test (valid only in case of a high volume sample), which follows a chi-square distribution with a number of degrees of freedom equal to 2, with the form of:

\[
JB = n \left[ \frac{S^2}{6} + \frac{(K - 3)^2}{24} \right]
\]

\( n = \text{number of observations}, S = \text{skewness coefficient}, K = \text{the Pearson kurtosis coefficient}; \)

Using the EViews programme pack to calculate the Jarque-Berra test, we notice that \( JB = 3.722198 > \chi^2_{0.05;1} = 3.84 \) and \( p(JB) = 0.1555502 \). Since the calculated value of the J-B test is lower than the tabled value of \( \chi^2_{0.05;2} \), and the probability that the J-B test surpasses the tabled value is high enough, the normality hypothesis of the errors cannot be accepted.
Figure 3: Verifying the Normality Hypothesis of the Errors  
Source: calculations by the authors

5. Calculating the standard errors (Std. Error) of the estimated parameters $s_a = 10.08$ and $s_b = 2.53$. These errors are used to calculate the statistical values $t$ in order to test the significance of the parameters. The calculations appear in the column $t$-Statistic, $t_a = 9.30$, $t_b = -4.26$; as the associated p values are very close to zero (Prob.), we can conclude that the estimators are significant.

With a probability of 95%, the values of the variables fall into the following intervals:

$73.137 < \hat{\alpha} < 114.5995$
$-16.06 < \hat{\delta} < -5.62$

The intervals do not contain the value 0 => the respective parameters are significant from a statistical perspective;

6. The validity of the model for a significance threshold $\alpha = 0.05$, a number of observations $n=28$, and a number of independent variables $k=1$. The value of the critical Fisher test is $7.72$;

According the ANOVA table, the Fisher test $F=39.7411 >$ critical $F$, resulting that the regression model is correctly identified (valid);
7. The intensity of the relation between the two variables is determined by means of the correlation coefficient \( r = -0.64 \). As a result, using statistical and econometric models, we have revealed the relationship between the economic growth and the public debt and we have concluded that we are dealing with an indirect relationship, because \( r < 0 \) and of a medium strong intensity.

Conclusions

The scientific approach of the authors has highlighted the importance of the debt management in ensuring its stability. By using statistical methods and econometric models, they have proved the relationship between the economic growth and the public debt and they have concluded that this relationship is indirect and of a medium strong intensity, as a result of the values obtained by applying the unidimensional econometric model.

Therefore, the relation between the public debt and the real economic growth reveals that one of the main influence factors is the level of economic development of a certain country. A very high volume of debt on a short term can induce a series of crises in emergent countries, in permanent need of liquidities.

References