

SECURITY AND DEFENCE R&D MANAGEMENT: POLICY, CONCEPTS AND MODELS OF

REPUBLIC OF MACEDONIA

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SUMMARY

A short overview given below, related to military R&D policy, but not limited only at this area, especially having in mind the item 2 and item 4 of this paper, depicts the low level of financial support as well as even low level of consideration of using developed R&D capacities advantages within the industrial process (military/civilian). A proper way ahead could be increasing of national (governmental) funds dedicated on R&D capacities, especially in the industrial process, based on the priorities mentioned in item 8 or a consolidated version of these main priorities appropriate to national industry (state or private sector), but not limited only on the relying on these funds. It will be great advantage to use also the International Organisations, Nongovernmental Organisations, multilateral cooperation projects and bilateral cooperation programs funds for this purpose i.e. supporting the industrial R&D projects as it is case with some agricultural projects, electrical power and water supply projects, clean environment (ecological) and communities confidence building projects. etc. It is to convince the projects allocation funds decision makers on the benefit of some industrial R&D and technological development projects.

1. Introduction

Macedonia's accession to the North Atlantic Treaty Organization (NATO) requires restructuring as well as modernization of the Macedonian Armed Forces in compliance with the NATO standards. Along with the outlined plan for the modernization of the Armed Forces within a timeframe that spans from 2004-2013 there is also a separate Strategic Defense Review (SDR). Its main task is to perform a thorough reassessment of the state of the armed forces and to outline the guidelines for their long-term development in conformity with the new security environment and the available defense resources.

The upgrading of the communication/information systems will be one of the main focuses of the campaign, as well as strengthening the operative capabilities of the deployable forces. The modernization of the armament/equipment of the Army, and Aviation WING, Development of Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Systems (C4ISR) is another priority.

For the sake of development of the structure and capabilities, defense assumptions should be adopted most urgently, which relate to operational capability, readiness, scale of effort and concurrency for operations. The development of the structure of forces and capabilities should be in accordance with the requirements and structure of forces and capabilities established in this political framework, especially the priorities, missions of defense and tasks of Macedonian army.

The Strategy is adopted for the management of defense at all levels of decision making, as well as in the areas that relate to personnel (including also education of civilian experts), its professionalisation, qualifications, career with equal opportunities for all, as well as adequate ethnic representation in the Macedonian army, training and education, including the civilian personnel in the ministry of defense, interoperability, modernization and procurement, logistics, standardization, as well as development of strategies for improvement and interoperability of the intelligence capabilities and crisis management.

The current Strategic Defense Review works on the basis not of a nonexistent conventional threat, but of a considerable internal terrorist and insurgent threat. Cross-border criminal activity should figure prominently in

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these calculations, as should plans to stop trafficking and organized crime networks from further eroding the authority of the Macedonian state. The lingering ethnic tension signals to NATO that Republic of Macedonia still requires significant external assistance, from both Europe and the United States, in order to embrace its original reform policies and goals and that continued international engagement and the bi-ethnic composition of the ruling coalition in Republic of Macedonia will help to reduce the threat of a return to the open conflict experienced in 2001. However, the acknowledgment of the achieved results accomplishing all NATO membership criteria (including political stability and contribution to regional and worldwide stability) given to Republic of Macedonia during NATO Summit in Bucharest 2008 presents Republic of Macedonia in another light - as more contributing country than an user of foreign assistance.

Achieving NATO interoperability and contributing to the organization's future operations are priority goals for Republic of Macedonia, even though currently the ARM's capability is limited in both of these areas. Still, Republic of Macedonia now contribute a motorized infantry company, a medical squad, an aviation detachment with two utility helicopters, and an engineering platoon for Multinational Peace Force South-East Europe (MPFSEE)/ Southeast European Brigade (SEEBRIG).

In order the deployment tasks to be accomplished more successfully some of the key priorities for defense modernization and procurement include:

- ✚ T72 tanks modernization ,
- ✚ Transport aircraft,
- ✚ More advanced helicopter gunships,
- ✚ Radio-telecommunication and surveillance equipment.

2. Strategic orientation on defence industrial transformation

The R&D issue is only generally considered within the 5th part of the SDR (strategic Defense Review) - Equipment and Modernization Plan (SDR 2 Phase, 2004).

The basic document dealing with defense industrial transformation is the SDR (Strategic Defense Review 2004), especially presumed in the third phase of this document so called - Program for Transformation of the Defence and the Army of the Republic of Macedonia. There are eight chapters:

1. Basis for the force structure, capabilities and capacities of the defence of the army
2. Personnel, current status and projections
3. Equipment
4. Training
5. Maintenance
6. Budget
7. Declared forces
8. Estate conversion

Chapter V consists of the next three paragraphs:

- The quality maintenance of equipment is an important element of combat readiness of the ARM and potential saver of funds. The maintenance system must be built as in the member states of NATO, simultaneously building a system of *integral logistics support* as envisaged in the basic documents developed in the second stage of SDR.

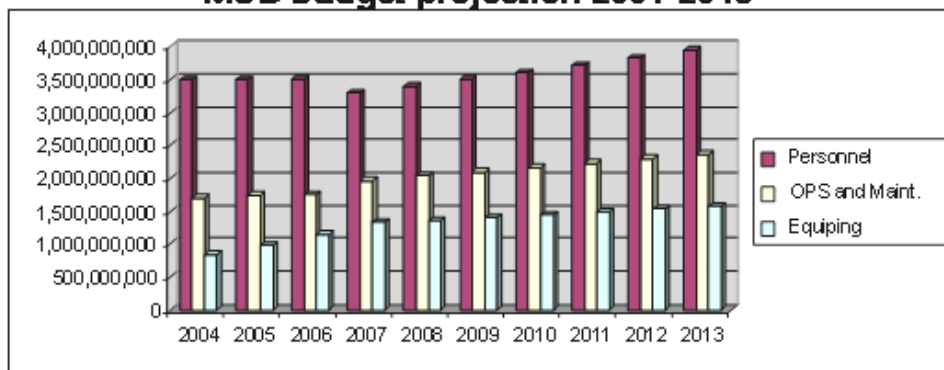
- The plans, programmes, rules, instructions, etc. that relate to maintenance, were approved by the Minister of Defence, i.e. the Chief of the General Staff of the ARM, each within his competences. For the new equipment they are to be approved immediately after its introduction in use.

- Considering the analyses in the documents relating to maintenance prepared in the framework of the second stage of the SDR process, the overall equipment which is to be maintained and the dynamics for procurement of new equipment, as well as the budget projections, the principal structure is to be observed of expenses and needed funds for maintenance of the equipment in accordance with the projection for the force structure, the capabilities and the equipment of the ARM for the period 2004-2013.

Within the chapter VI is given a table (presented below) on the MoD budget projection 2004-2013. Having in mind the presented resources distribution and percentage allocation of the categories, it is obvious that *there are no strict resources dedicated to R&D*. There is no view on the subcategories within the main categories. This issue – R&D could be matter whether in the frame of Maintaining or in the field of Equipping.

Table No1

MOD budget projection 2004-2013



MOD Budget distribution in percents 2004 - 2013

Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Budget	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Personnel expenditures	57.86	58.12	54.72	49.98	50.00	50.00	50.00	50.00	50.00	50.00
Operation & maintenance	28.14	28.04	27.33	29.78	30.00	30.00	30.00	30.00	30.00	30.00
Equiping	14.00	15.84	17.95	20.26	20.00	20.00	20.00	20.00	20.00	20.00

In accordance to have more clear depicted view on the Acquisition System in Macedonian MoD below are presented two crucial documents:

- *Defence Acquisition System Policy, December 2005*. The implementation of the Policy

implementation will be regulated with Acquisition Rulebook and Instructions for certain functional areas in acquisition. This policy formulates vision for the method of ensuring the materiel needs in defense, defines the basic principles and guidelines in the area of equipping and

procurement of material and services, establishes basis for definition of procedures and methodologies for Defense Acquisition System (DAS) of the Ministry of Defense (MoD), provides latitude for inclusion of the domestic economy in the acquisition process thus assuring more stable support to the equipment and technology transfer in the future and promotes cooperation with allied countries and organizations in the field of cooperative logistics.

- *Regulation (instruction manual) for acquisition of the materials (equipment – armament and military equipment, material – munitions, spare parts and small inventory) for the needs of the defense system of Republic of Macedonia, 2006*. This document formulates the multidisciplinary system of measures, postulates and procedures that are to be planned and performed by the responsible subjects and bodies in the MoD within the process of the defense system material acquirement.

Referring to complementary issues related to *R&D management*, SDR (Strategic Defense Review 2004) includes elaboration given in the table No 2 and No 3.

Table No.2. Different documents for implementation of SDR in connection with R&D management (Numbers remain original from the SDR document).

	Subject	Further actions
5.	Revision of the existing document and adoption of the Strategy for development of the Global communication-information system at MOD	Revision of the Strategy for development of the Global communication-information system at MOD, finalisation, amendments to it and its adoption.
9.	Elaboration of a logistic concept	The logistic concept should offer basic-widest definition on the logistic support to the defence of RM, should define the basic tasks-functions of the support, the principles of implementation of the support, the competencies and responsibilities (principal scheme of the logistic support), as well as the most general yardsticks – criteria for the success of the logistic support on each level separately
11.	Elaboration of a strategy for military education and science and training in defence and professional specialisation	According to the SDR and the Programme on transformation, the system of military education and science and training on defence and professional specialisation needs to be restructured and reorganised.
30.	Regulation for acquisition (providing equipment) of MS with ARM	The Regulation for acquisition should define the basic principles, phases and elements that are to be fulfilled for each acquisition – provision of equipment, including the procedures for procurement. The documents that would follow this regulation would be the regulation (instruction) for procurement and regulation (instruction) for integral logistic support.
31.	Regulation for procurement	The Regulation for procurement should define the classification of materials, the procurement processes (planning, reception and distribution, handling (disposal) and transfer – disuse), the principles of their implementation, competencies and responsibilities.
32.	Regulation for maintenance	The Regulation for maintenance should define the procedures, levels, competencies and the most general resources (temporary and operational) for maintenance. It should be a general frame based upon which the plans for maintenance (contents, scope and duration of the works, etc.) will be made. It should also define the most general criteria for the maintenance success.
43.	Law on determining trade companies of special importance to the defense	Legal basis for passing it is article 91 paragraph 2 of the Law on Defense. The type of act is the Bylaw which would closely define the trade companies of special importance to the defense.

Table No.3. Regulations and Programs for some R&D management

	Subject	In charge and supporting authorities & Further activities				
1.	Regulation for the kind of equipment and livestock that the citizens, trade companies, government owned companies, institutions and services are obliged allow the MOD utilize for ARM needs and Protection and Rescue Forces during war or state of emergency, as well as when executing exercises in peace time ----- Regulation on the organizational position of state government subjects as well as other subjects that continue working in wartime conditions	Civilian Defense and CM Sector	Personnel and Legal Issues Sector, MOI, Finance and Resource Manag. Sector and Rescue and Protect. Agency	6 months after adopting the Defense Law Amendments	RM Government	
2.	Program – elaborate for introduction of a Logistic Automated Information System in MOD	C-4	Logistics Sector, G-4, GS	01.10.2006.	MOD	31.12. 2007

3. Role and place of security related R&D in the national system of R&D.

The research activities are performed and organized by a network of institutions comprising of: 4 universities, several research institutes active in various fields and R&D units in industry. An important R&D organization is the Macedonian Academy of Sciences and Arts.

Within the governmental sector, the other ministries covering different aspects of R&D are: the Ministry of Agriculture, Forestry & Water Supply, and the ministries of Economy, Health, and Ecology. The Ministry of Education and Science is responsible for higher education (planning; organization; financing; development of the network of institutions; development of academic and administrative staff; verification of professions and profiles; accreditation; diploma recognition - ENIC Centre); other global issues.

Within the Parliament, a Committee for Education and Science deals with legal issues of education and science.

The National Agency for Evaluation of Higher Education and the National Accreditation Board are the main bodies responsible for quality assurance in higher education. The Ministry of Education and Science administers the distribution of the state budget for higher education jointly with the Ministry of Finance.

An important scientific organization is the Macedonian Academy of Sciences and Arts, which goal is to stimulate the development of sciences and arts.

3.1 Governmental bodies that are dealing with R&D innovation policy of the country:

- The Commission for Special Production oversees the situation and the development of the production of weapons and military equipment in peace; development and preparation of the basic and additional capacities intended for production of weapons and military equipment, as well as production of medical materials and other products, equipment and services for the needs of the defense.
- Within the Ministry of Economy - Sector for Special Production is the focal point dealing with special production and plays the coordination role for other institutions and agencies (Ministries).

3.2 Info- Security related R&D issues

In the present time of modern informational and communication societies, the administrative tasks are more and more supported by the informatics technology. Numerous working processes are electronically controlled, and huge quantities of information are stored in a digital form, electronically processed and transferred through the

computer networks. The Ministry of Defense, together with the ARM General Staff follow these trends and with the great development in this field in the last years, they inevitably start facing the fact that the success of the achieved results will depend on ability to protect the integrity, confidentiality and accessibility of data and systems which they rely on. The security of informatics implies realization of the abovementioned tasks, by undertaking preventive measures for protection of classified information that are kept, processed or transferred by informatics means, but also realization of the actions undertaken in situations when their security is violated. These problems are not regulated and at the moment, MOD and ARM General Staff come across this difficulty, which results in their *uncoordinated and incidental coping with the same*. There are huge gaps in providing appropriate protection of the communicational-informatics systems, even from the stage of their planning and implementation until the stage of their usage. There are no determined measures for protection which have to be applied, minimum security structure that should take care of their implementation, low education of the personnel, etc.

The Instructions will more closely regulate the criteria, measures and procedures for performing security checks of legal and physical entities and MOD and ARM members who are to be given a security certificate and license for access to the classified information, types of security checks for obtaining a certificate, measures and activities for establishing the working positions and appointing persons as users of classified information.

The Directorate will make the Instructions in compliance with the completion of the procedure from the preparation of sub-legal acts, according to article 30 of the Law on Classified Information upon the production of the Bylaw on Industrial Security by the Government of Republic of Macedonia.

Based upon article 9 of the Law on Classified Information and the Regulations for physical security, security of the persons and industrial security of the Government of Republic of Macedonia, and in compliance with the national concept of security and defense of RM the preparation of the assessment for threat to foreign classified information that are in use with MOD is in progress.

Table No.4 Documents for MoD Industrial Security presumed by SDR 2004 .

No.	Title of the activity – document	Prepared by	Approved by	Timeline	Reviewed by – approved by the basic steering group	Passed by	Timeline for implementat.
1.	MOD Industrial Security Manual	DBKI	Security and Intelligence Sector, C-4	February 2005	January 2005	February 2005	2005

4. Security related R&D potential:

The main own innovation potential of military science development and R&D policy of the MoD and General Staff are the Military academy, the Military Hospital and other institutions in the Army. Material and financial support is from the MoD budget funds. Responsible institution in MoD (Department for training and education and R&D policy) should make plans and programs and should held A Law for R&D policy within the Army.

The Military Academy of the Republic of Macedonia was established by Law which is in accordance with the Law on Higher Education and the Law on Research Work in the Republic of Macedonia.

The Military Academy was verified by the Ministry of Education and Science as tertiary level educational and research institution, which gives it the same status as other faculties and makes it part of the educational system of the Republic of Macedonia.

The degrees issued by the Military Academy are valid in the country and they give officers an equal education status as other graduates from civilian universities.

The Military Academy is the only tertiary-level military educational institution in the Republic of Macedonia. Its main task is to educate, train and provide further development for officer personnel for ARM, and to engage them in research in the field of defence in accordance with the law.

Section for R&D of the production of weapons and military equipment, in the frame of the Sector for Logistic in the MoD, provides: informative support to the leading authorities in the MoD in the creating of the policy for equipping of the MoD by weapon and military equipment from the domestic industrial resources, cooperation with the Sector for Special Production in the Ministry of Economy by overseeing the situation of the domestic industrial capacities and preparation of the relevant legal documents, preparing the regular analyses for technical – technological capacities and regular analyses for the personal management capacities of the production subjects that are dealing with R&D of the production of weapons and military equipment.

On the 1st of July 2003 the Law on *the Police Academy* came into effect. This law provides the Police Academy with a leading role concerning research and education in the field of policing and other areas of security.

Police academy want to enhance its educational role by delivering basic and further education of national and international acknowledged quality and by the evaluation, dissemination, production and application of scientific knowledge in the field of policing and other areas of security.

Police academy want to become a *centre of excellence* in our part of the world as well as belonging to the top five Police Academies in Europe. It considers itself responsible for remaining up-to-date in the field of research and education. Its police education is recognized on national and international level. This means that it will meet national and international quality standards. Its diplomas will be recognized all over Europe and they will facilitate participation in studies abroad. Being a centre of excellence will provide the Macedonian police and the other agencies in the field of security with state-of-the-art expertise. In this way we can serve the police and the other agencies in our field of security of our country in the best way.

Table No. 5. Human resources in R&D in Macedonia (in general)

Country	2001	2002	2003	2004
Republic of Macedonia	2909	2869	2589	n.a

In 2002, the gross HE (Higher Education) expenditure on R&D - ratio of the GDP was 0.11. Out of 100% gross expenditure for R&D, 40.9% goes to research conducted in the HE sector. Support from the National Budget: national and international research projects, grants for postgraduate and doctoral studies in the country and abroad, R&D meetings, participation of academics in the international meetings, study visits abroad, programs of the public research institutes, equipment, R&D literature etc

The Higher Education Development and Financing Council (HEDFC) was established by the Government in October 2003. The Council is responsible for development and implementation of measures and criteria for financing of HE (institutions, investments in HE, student grants and loans etc.). It prepares programs for development of HE to be submitted to the Government for adoption.

In accordance with sources for financing, R&D can be financed through:

- ✚ own resources of institutions,
- ✚ companies resources,
- ✚ state budget,
- ✚ international financed projects.

Budget contribution to R&D is limited (scarce resources) and in 2002 it was 0,44% from governmental budget. In accordance with EU suggestion and directives from Barcelona it has to be from GDP, and in case of the Republic of Macedonia it actually means only 0,11 % from GDP. On the other side funds coming from business community are 0,02%, while EU directives are 2%. It means that in the Republic of Macedonia *business sector provides 100 times less than countries from EU*. We can conclude that if continues in that way, we could not expect faster development of R&D in Macedonia.

Comment: Having not enough established R&D/innovation system in the private sector and low interest in the private sector for R&D it couldn't be possible to provide faster development of science.

5. Role of the state institutions in the formulation and execution of R&D policy;

There isn't a written innovation strategy of the country.

Laws and regulations that regulate R&D and innovation processes in the country are:

- ✚ Law on Science and R&D policy;
- ✚ Law on Macedonian Academy of Sciences and Arts;
- ✚ Law on Higher Education in The Republic of Macedonia;
- ✚ Law on Encouraging and Supporting the Technology Development;
- ✚ Law on Technical Culture;
- ✚ Law on Industrial and Intellectual Property Protection, and several regulations and instructions;

Acts of other organs of high education domain are:

- ✚ *Statute* of Inter universities conference of he Republic of Macedonia,
- ✚ *Guidance* for securing and examine the quality of high educational institutions and the academic personnel of the Republic of Macedonia (Evaluating Agency)

The laws related to research arrange the system, principles, public interest, forms of organization and management of this kind of activities as well as the ways of stimulating and supporting their development, scientific personnel and other issues related to them. The system of scientific activities involves scientific research, qualification and training of personnel for research work and research infrastructure.

Basic principles of performing scientific activities are inviolability and protection of the human personality and dignity and they are also based on the following principles: freedom of scientific creativity, autonomy and ethics of researchers during their scientific work and use and application of the results, diversity of scientific ideas and methods, international cooperation.

These laws also define the public interest of the scientific research in the field of national and cultural identity of Macedonian people and others living in the Republic of Macedonia. It also determines research as a general condition for the economic, social, cultural and environmental development of the country. Research which is in function of increasing the scientific level and transfer of knowledge as well as in the field of defense and security is defined also a five-year Program for development of these activities is being prepared.

The law related to *technology development* stimulates and supports this kind of development in the country as well as the programming of this activity and its financing. This law defines the technology development as:

- ✚ development of own technologies,
- ✚ progress of the country upon the independent economic base,
- ✚ modernization of the existing production capacities,
- ✚ establishing innovation and technology centers,
- ✚ building necessary technological infrastructure, transfer of knowledge through a continuous superstructure of the skills.

It is to be noted that the role and position of the industry has significantly decreased in the domain of research and development due to different reasons. Besides difficulties, yet the country has managed in achieving significant results in certain scientific areas, for example *seismology*.

The Ministry of Education and Science is in a final phase of assigning new regulations regarding financing the scientific research, and also, is finalizing a draft proposal for a new Law on Science and Development. The Law will bring the national legislation closer to the European regulations. Reorganizations of research activities will take place, enabling support of higher number of research projects of applied character. This will encourage university-enterprises cooperation and contribute to establishment of new R&D centers in the companies.

Table No. 6. *Scientific research and technological development laws.*

Country	Law	Remarks
Republic of Macedonia	Law on Scientific Research (“Official Gazette of the Republic of Macedonia”, no 13/96 and 29/02)	It regulates the system, the principles, the public interest, the forms of organization and management of research.
	Law on Macedonian Academy of Sciences and Arts (“Official Gazette of the Republic of Macedonia”, no. 13/96)	It defines the Academy as highest autonomous scientific and art institutions in Macedonia.
	Law on stimulation and facilitation of the Technological Development (“Official Gazette of the Republic of Macedonia“, no. 98/00)	It regulates the stimulation and facilitation of the technological development, programming and financing the related activities.

6. Perspectives and ideas for change of the R&D policies for the Republic of Macedonia

In the field of R&D in the Republic of Macedonia, the *main priorities* are as follows:

- ✚ Further development of the academic research network,
- ✚ Renovation of the research equipment,
- ✚ Stimulation of the promoting new research and development units within the economy,
- ✚ Systematic and continuous supply of foreign reference literature and providing access to electronic scientific data bases,
- ✚ Upgrading the library information system,
- ✚ Strengthening the present technology development capacities,
- ✚ Establishment of new technology transfer centres in a view of more efficient integration of research and business entities,

- ✚ Providing favorable working conditions for the research entities with unacceptable conditions.

FINANCIAL ASPECT OF SCIENCE AND TECHNOLOGY IN MACEDONIA

Budget contribution in R&D

YEAR	BUDGET	PART FOR SCIENCE	%
1998	830 million EUR	5 million EUR	0.62
1999	690 million EUR	6.1 million EUR	0.94
2000	1.05 billion EUR	4.3 million EUR	0.39
2001	910 million EUR	5.2 million EUR	0.58
2002	1.18 billion EUR	5.2 million EUR	0.44
2003	915 million EUR	5.0 million EUR	0.54
2004	923 million EUR	5.1 million EUR	0.55

R&D intensity (%) of GDP by sector of performance

TYPE OF EXPENDITURE	1998	1999	2000	2001	2002	2003	2004
GERD (Gross domestic expenditure on R&D)/GDP	0.43	0.35	0.44	0.32	0.27	0.22	0.25
BERD (Expenditure on R&D in the Business sector)/GDP	0.05	0.04	0.03	0.02	0.01	0.003	0.015
GOVERD (Government intramural expenditure on R&D)/GDP	0.15	0.16	0.15	0.16	0.15	0.14	0.12
HERD (Expenditure on R&D in the Higher Education)/GDP	0.23	0.14	0.27	0.13	0.11	0.08	0.11

The number of researchers in 2002 was 1519. For their activities in last five years were spent 0.2% of GDP per year.

7. Conclusions

Considering the fact that level of budget expenditures for R&D is still not sufficient, we can identify the need for changes and searching new sources as urgent.

Public-Private partnership should be seriously considered as a additional element of R&D Concept and Policy, that can provide funding and development of necessary capacities and support of R&D Projects in the Republic of Macedonia.

Government still shows low level of trust to private companies capacities for R&D in security sector as well as their bigger involvement and functions in security area. Full implementation of the Concept of Logistic Support for the Republic of Macedonia and ARM can provide progress in that way. It will help not only to improve the situation in security sector, but also will bring additional influence to economic development of the country.

Links:

1. www.vlada.mk/english/index_en.htm
2. www.vlada.mk/Assets/ANP_2006-2007_FINAL_PRINT.pdf
3. www.mon.gov.mk - Ministry of education and science
4. www.economy.gov.mk - Ministry of economy
5. www.morm.gov.mk - Ministry of defense
6. <http://www.kit.gov.mk/default-mk.asp> - **COMMITTEE FOR INFORMATION TECHNOLOGY**
7. www.fzf.ukim.edu.mk/en/mirovni/index.htm - Institute of Defence and peace studies.