LUDOVIKA
UNIVERSITY PRESS

AARMS

ACADEMIC AND APPLIED RESEARCH IN MILITARY AND PUBLIC MANAGEMENT SCIENCE

Volume 21 (2022)
Issue 2

ISSN 2498-5392 (print)
ISSN 2786-0744 (online)

AARMS is a peer-reviewed international scientific journal devoted to reporting original research articles and comprehensive reviews within its scope that encompasses the military, political, economic, environmental and social dimensions of security and public management.

AARMS is published in one volume of three issues per year by the University of Public Service, Budapest, Hungary, under the auspices of the Rector of the University.

All correspondence should be addressed to Prof. PADÁNYI József, PhD, Editor-in-Chief,
University of Public Service
P. O. Box 15, H-1581 Budapest 146 Hungary
aarms@uni-nke hu

AARMS
ACADEMIC AND APPLIED RESEARCH IN MILITARY AND PUBLIC MANAGEMENT SCIENCE
Volume 21
Issue 2
2022

An International Journal of Security, Strategy, Defence Studies,
Military Technology and Public Management
Published by the University of Public Service
PADÁNYI József (Chair of the Editorial Board)
SOLYMOSI József (Honorary Chair of the Editorial Board)

Publisher:

University of Public Service, Ludovika University Publishing House
Responsible for Publishing:
DELI Gergely Rector

Copy editor:

GERGELY Zsuzsánna

Typeset and print by the University of Public Service
ISSN 2498-5392 (print)
ISSN 2786-0744 (online)

Contents

AARMS Vol. 21, No. 2 (2022) 5–14.

10.32565/aarms.2022.2.1

Recommendations for Safety-Conscious Smart Device Use by Military Professionals

Marco KOLLER[1]

Security-conscious behaviour is of paramount importance, both in the field of information security and in various public institutions. Thus, in the public administration, especially in the various armed bodies, the training of personnel in this direction is of strategic importance, as a person with low security awareness can endanger the security of the entire organisation. Human security issues may even have national security or intelligence relevance.

Keywords: *information security, smart devices, awareness, SWOT analysis, game theory*

Introduction

The internet has played a major role in globalisation, with everything available at the click of a mouse. In addition to the above, smart devices are another major contributor to this process. As these devices become more widespread and become an integral part of our daily lives, service providers, companies, governments and others can extract useful information about a person or group of persons. The significance of cyberspace from a military perspective is best illustrated by the fact that NATO officially declared it an operational area at the Warsaw Summit in 2016, thus making it an area of not only security importance for the subject, but also an area of national security challenges for states.

At the intersection of the interests and the certainty of the individual and the state are the general security in cyberspace of public organisations, public administrations and, in particular, of those working in the fields of defence and law enforcement, and their presence as users in everyday life. The European Court of Human Rights has also ruled that it is now difficult to separate private and professional life, so that the monitoring of behaviour and communications in the workplace necessarily involves an intrusion into the private lives of the individuals concerned.[2] This is particularly true when a person working in a public administration carries out some of his or her private and work-related online

[1] PhD student, University of Public Service, Doctoral School of Military Sciences, e-mail: marcoakoller@gmail.com

[2] Emberi Jogok Európai Bírósága: C-222/20. sz. ügy: Az előzetes döntéshozatal iránti kérelemről a Bíróság eljárási szabályzata 98. cikkének (1) bekezdése alapján készített összefoglalás.

activities on the same smart device. Some applications, be it social networking sites, news sites, video-sharing sites, maps, ask for access to various data: the contact details of all our partners, who we communicate with, how long and how regularly, our text messages and emails, our location when using GPS. If such data is accessed by an individual or organisation with malicious intent, they can use it to map workplace relationships within an organisation, potentially gaining access to sensitive information. In addition to the above, an application that can be installed on a device may even contain a virus of some kind, allowing hackers to take control of the phone. The article will provide recommendations for military professionals (a term that will be defined later) to protect not only general user security, but also the security of their own organisation.

The aim of the research

The aim of this publication is to present, based on interviews with experts in the fields of information security, data security, security awareness and IT, the most learnable user standards that will enable people beyond the average user, and those who choose to work in the military professional world, to live their daily lives more securely, thus protecting their own organisations in the world of smart devices.

Research methodology

In addition to the international and national literature and legislation, the publication is based on an interview already published[3] in the international literature, which has been restructured to suit the author's research. The answers to the questions were evaluated through logical analysis and levelling and in a planned way, based on a SWOT analysis.

Conceptual background

SWOT analysis

The term SWOT is an acronym formed from the initials Strengths, Weakness, Opportunity and Threats. SWOT analysis is a strategic planning tool used to assess the strengths, weaknesses, opportunities and threats of a focus of study. In conducting a SWOT analysis, in addition to identifying the individual factors, it is equally important to identify the relationship between the factors and how they are interrelated.[4]

---

[3] Flynn Wolf et al.: An Empirical Study Examining the Perceptions and Behaviours of Security-Conscious Users of Mobile Authentication. *Behaviour and Information Technology,* 37, no. 4 (2018). 320–334.

[4] Pató Gáborné Dr. Szűcs Beáta et al.: Beszállító értékelés vizsgálata SWOT analízis segítségével. *Vállalkozás-fejlesztés a XXI. században,* 6 (2016). 253–270.

Military professional

For the purposes of this study, the definition of the military professional (hereinafter: professional) is best defined as a soldier in the Penal Code. For the purposes of this Act, a soldier is a member of the Hungarian Defence Forces, the police, the Parliamentary Guard, the prison service, the professional disaster management service and the civilian national security services.[5]

In other words, the group presented in the present study is the law enforcement agencies, the professional staff of the Hungarian Defence Forces and the staff of the Military National Security Service. However, given that the research presents a general security awareness recommendation based on expert interviews, the research can also be applied to other government sectors or general users. Furthermore, the advantages and disadvantages of security awareness are outlined based on the SWOT analysis.

Information security

By information security, we mean the requirements and knowledge that cover both the technical-technological background and the management systems.[6] Basically, three categories can be identified in information security:

- physical protection
- logical protection
- human security, administrative protection

For the purpose of this study, physical protection, which refers to signalling systems, live systems, mechanical protection, etc., and *logical protection*, which refers to the protection of an electronic information system by means of information technology tools and procedures, are not highlighted.[7] The *administrative protection* which includes regulations and education is the basis of my present research, this study can be included in the interpretative framework of administrative protection so to speak. In other words, the focus should be on protection by strengthening the human factor, by strengthening the 'weakest' link, so to speak, and by reflexively inculcating security-conscious behavioural elements that can contribute to a higher level of information security.

Security awareness

There is no universally accepted concept of security awareness, but several Hungarian and international studies have attempted to define its components. Some authors emphasise

---

5 Paragraph (1) of Article 127 of Act C of 2012 on the Criminal Code.

6 A Nemzeti Elektronikus Információbiztonsági Hatóság.

7 András Nemeslaki – Péter Sasvári: Az információbiztonság-tudatosság empirikus vizsgálata a magyar üzleti és közszférában. *Infokummunikáció és Jog*, 60, no. 4 (2014). 169–177.

the individual aspects of the concept.[8] Others emphasise the organisational aspects of the concept, with information security awareness being part of the culture of the organisation, a way of thinking and behaviour that ensures that employees of organisations recognise the legitimacy of security measures out of commitment, comply with them and communicate and enforce them to others.[9] According to Legárd, awareness does not follow from the knowledge of the user, but is a learned behaviour, a set of rules in which the user limits his/her own actions when using different IT systems, in this case smart devices.[10] It can be concluded from the above that training is a prerequisite for this kind of awareness.

Information security concerns of professionals

The importance of security-conscious user behaviour is almost beyond doubt. For general users, i.e. ordinary citizens, security awareness is also of explicit relevance, if only to protect their own data and values. In addition, particular attention should be paid to strengthening the security-conscious behaviour of professional staff, as defined in the study, since the various data belonging to these individuals or to representatives of other public bodies may be of extreme importance to certain public or non-public actors. Therefore, security-conscious user behaviour is important, and it is necessary to be selective about the type of access that certain applications grant. In some cases, the malicious intent behind the application is conscious, in others it is not so easy to judge, but it can be telling if a flashlight application requests access to our GPS coordinates, phone book and so on.[11] However, in many cases even realistic requests for permission can be risky, as in the case of a fitness app used for running, it is realistic if it wants to collect our real-time location data. However, it was just such an app that accidentally revealed the secret location of some U.S. military bases, as the soldiers stationed there were also using the app, so that the location of objects in 'no man's land' could be easily identified based on the running workouts they did on and around the base.[12]

The emphasis on security consciousness is also important because, although a public organisation can spend billions on securing its internal network, put in place the necessary physical and logical protection, and even within the administrative protection, put in place the regulations to ensure its own information security, if it is not accompanied by a sufficiently prepared human resource, there will always be a 'gap in the shield'. However, it is important that successful and effective security awareness programmes are put in place so that security conscious behaviour becomes a normal part of everyday life for professionals.

---

8 Ildikó Legárd: Célpont vagy! – a közszolgálat felkészítése a kiberfenyegetésekre. *Hadmérnök,* 15, no. 1 (2020). 95.

9 Legárd (2020): op. cit.

10 Legárd (2020): op. cit.

11 Péter Bányász: Az okos mobil eszközök biztonsága. *Hadmérnök,* 13, no. 2 (2018). 360–377.

12 Pál Fehér-Polgár – Pál Michelberger: A sajáttulajdonú mobil eszközök információbiztonsági kockázatai. *International Journal of Engineering and Management Sciences,* 3, no. 4 (2018). 176–185.

According to Legárd, it is also important for the government to maintain a high level of security awareness, because if citizens feel safe, they can live their lives more efficiently, pay their taxes and fulfil their obligations as a sign of satisfaction.[13] Following the above logic, a high level of security awareness among public employees, and specifically among professionals is a priority for the State.

Analysis of expert interviews

When selecting the interviewees, it was important to interview experts from several fields, due to the interdisciplinary nature of the topic, in order to get a more comprehensive picture of the safe use of smart devices by general users. Therefore, we selected experts from the fields of IT, data security and caution. Based on the above, written interviews were conducted with six experts, taking into account the pandemic situation caused by Covid-19.

- *Dr. Atilla András Péterfalfvi* – National Authority for Data Protection and Freedom of Information, President
- *Veronika Koncz* – Constitution Protection Office – Security Awareness Expert
- *Lénárd Zsákai* – Ministry of the Interior, Department of European Cooperation, Senior Specialist, Székely Family Ltd., Security Research and Proposals Coordinator
- *Zoltán Székely* – Székely Family Kft., Co-Founder, Information Security Expert
- *András József Üveges* – Defence Systems Designer (MsC), PhD in Defence Electronics
- *István Ilia* – Arxadoris Ltd., Managing Director, IT Expert

The interview questions were sent to me by Professors Flynn Wolf and Ravi Kuber, which were adapted to the specifics of this research, as I mentioned above. The questionnaire covered the following topics. In total, 23 questions were asked in the written interviews and, in addition, the experts briefly described their attachment to the topic and their professional background.

Questions about owning smart devices

All experts own some kind of smart device, the most common being the smart phone or tablet. The majority of experts (four out of six) use IOS on their smart phones, but some versions of Android were also mentioned. In the case of the other systems outlined, it seemed to me that they require a higher level of IT expertise than a simple user-friendly IOS system. The choice of those using a plain Android system tended to be based on familiarity and convenience, while the choice of those using an IOS system was mostly driven by higher security and lower vulnerability. These results suggest that for a simple user choice, it may be more appropriate to choose IOS without IT knowledge.

[13] Legárd (2020): op. cit.

Questions about security authentication

In the case of the issues raised in this topic, the answers of the experts varied, with two cases of dual authentication in addition to simple password authentication, of which two cases of preference for biometric identification were highlighted. Based on the above and the available literature, the dual authentication mechanism, which provides the highest level of security, does not impose a significant additional burden on the average user in everyday life and its everyday use may be recommended. The responses clearly indicated that experts in the field of finance, i.e. banking and financial applications, clearly use separate authentication, which is different from what is commonly used. However, in terms of security awareness, the need for separate authentication for business-related logins, i.e. separate authentication procedures and codes for private and work-related authentication, was also raised. There were experts who use separate authentication (password) for each application. In case of a potential threat such as a device security authentication being copied by another person, the majority agreed that in such a case either the access code or the device itself would be replaced.

Based on the responses and the literature, it is certainly worthwhile to distinguish between corporate and private sector passwords and authentication methods, especially for the actors (professionals) targeted in the study.

Information and data security issues

From the experts' responses, it can be concluded that trusted authentication on mobile devices is definitely necessary, but that the storage of really sensitive data on such devices should be avoided. Opinions differ as to whether it is possible to guarantee full security, but the information available so far suggests that even with full security awareness, 100% security cannot be guaranteed, but can and should be strived for.

Experts believe that they are more security-aware than the average user, as evidenced by the fact that they have not been victims of identity theft, have not lost their smart devices, and know what steps to take to protect their personal data in the event of a security incident. A remarkable circumstance is that the experts who experienced a security incident in their immediate environment received a kind of impulse that encouraged them to further learning and higher security awareness. Thus, based on the conclusions drawn from the above, the presentation of such an act in the context of a security awareness lecture or an interactive case study could have a stimulating effect on the security awareness of users.

The definition of attitudes towards new technologies has arisen in the context of information and data security, because, while they offer many new and useful opportunities, they may also present risks. There is almost a basic consensus among the experts that they seek expert help for new technologies that they are not familiar with (except, of course, for those experts who work in the IT field, who carry out their own testing). The need to seek the views of other users was also raised. Based on the above experience, the most obvious solution for the average user, as well as for professionals, seems to be to develop a concept

for a new technology, be it a device or software, by browsing through various tech forums where both technology experts and user opinions are available.

This topic asked which generation might be the most security-conscious, whether there is a generational difference, given today's digital world. In most cases, expert opinion suggests that it is entirely individual as to who is security conscious. The majority of experts believe that Generation Y is the most security conscious because they are already at home and not so lost in the digital world, but there was some expert opinion that it is precisely because of the generational advantage in technical knowledge of digital nativity that the younger Generation Z is more security conscious.

User security awareness issues

This topic investigated whether security-conscious behaviour can have disadvantages that put individual users at a disadvantage. The experts were divided on this point, with some considering that there was no disadvantage to security consciousness, while others saw freedom as the price of informality. Another cardinal theme was the issue of raising awareness of security. The basic premise of this, according to the interviews, is that the only way to address information security challenges is to reduce the risk of the 'human factor', and the only way to do this is through awareness raising and sensitisation, which can contribute to prevention. Raising awareness should start by emphasising the importance of this. People must feel the importance of information security. The aim should be to develop basic habits and to make clear why users should be concerned about certain phenomena. Starting with the right registration for data security, continuing with the right settings, and then raising awareness of the risks inherent in daily use. Effectiveness could be greatly enhanced if users/population were to be familiarised with the concepts (at their own level) from an early age. Education should possibly start in the first grade of primary school, as these children already have smart devices. The above leads to the conclusion that education, which has a huge role to play, is clearly the key to developing good habits and habits of mind. In my opinion, it is also necessary for professionals to be given training and education in how to handle their own devices in a safety-conscious way in their everyday lives.

Analysis and presentation of strategic safety-conscious behaviour

Based on a SWOT analysis of the interviews with the experts, the following can be concluded about safety-conscious behaviour.

- Strengths: minimising risks, relatively cheap
- Weaknesses: comes at the price of freedom, does not provide full security
- Opportunities: education, training
- Threats: inattention, obsession, excessive suspicion

The aim of the expert interviews was to identify, through the experts' opinions and their own safety awareness behaviour, a form of behaviour, a strategy, as it were, and its development directions, which can be used by the professional and the public institution employing him/her, and which can also be used as a guide for other users.

From the above, it can be concluded that the strength of safety-conscious behaviour is that it is cheap and effective to minimise the risks arising from the use of smart devices. Considering that it does not require the creation of special software or other physical things, security awareness as a means of protection is considered cheap and not a special skill that cannot be learned, so its strengths include learnability.

A weakness is that it does not provide full protection, as it is not possible to fully comply with the measures required by the organisation and to train the professional if he or she is attacked by software and hardware outside his or her control. Furthermore, constant vigilance can lead to a lack of freedom for the user, or even to frustration or a loss of focus over time, which can result in an information security incident due to negligence.

An opportunity has been identified in the field of security awareness to organise different security awareness training and education, and within this, to organise training that is interactive and can create a deep impression, thus contributing to the shaping of specific security awareness mechanisms into skills.

One of the risks is that security awareness can give the user a feeling of being over-protected, which can lead to a loss of self-awareness, after which an information security incident can occur. A further risk is that training that is not interactive enough is not very effective, which only consumes the time of professionals and the money of the public organisation concerned.

Based on the above analysis, it is clear that there is a need for security awareness training, but in a way that the user can interpret it in depth, and also for reminder lectures to check compliance with the mechanisms taught, and in this direction, it may be useful for professional staff to have a non-routine, non-'bloody' check, with the assistance of the Military National Security Service and the National Defence Service, to provide feedback to staff. The interviews showed that it is important to keep abreast of new technologies and to constantly improve IT knowledge at user level, which can contribute to the conscious use of certain applications and tools and to increasing knowledge in this area.

Conclusions

Safety-conscious behaviour reduces various risks, but it does not provide complete protection. The emphasis on security awareness is important because even without adequate physical or logical protection, or even administrative protection, there can be a security deficit due to low security awareness among users.

It is important that effective safety awareness programmes are put in place to make safety-conscious behaviour a normal part of everyday life for professionals. The expert interviews suggest that programmes should be proactive, so that the awareness is embedded in the memory in a more tangible way. Self-training in this area is important,

as is the organisation of regular safety awareness lectures, both for ordinary citizens and professionals, and special attention should be paid to the second category.

This is also important for the government, as maintaining a high level of security awareness among professionals is of paramount importance, as building and maintaining awareness is one of the protective lines of defence of the state's sensitive infrastructure.

Safety awareness training should be interactive, aiming to develop this behaviour to a skill level.

Using dual authentication on your own device for different applications is useful. It is recommended to use different passwords for each application, specifically for business or private use.

References

Bányász, Péter: Az okos mobil eszközök biztonsága. *Hadmérnök*, 13, no. 2 (2018). 360–377.

Fehér-Polgár, Pál – Pál Michelberger: A sajáttulajdonú mobil eszközök információbiztonsági kockázatai. *International Journal of Engineering and Management Sciences*, 3, no. 4 (2018). 176–185. Online: https://ojs.lib.unideb.hu/IJEMS/article/view/5079

Glavanits, Judit: Az állami cselekvés játékelméleti megközelítése. In Csaba Svéhlik (ed.): *Paradigma- és stratégiaváltási kényszer a gazdaságban: VI.* Mór, KHEOPS, 2011. 135–142.

Kiss, Attila – Csaba Krasznay: A felhasználói viselkedéselemzés kiberbiztonsági előnyei és adatvédelmi kihívásai. *Információs Társadalom*, 18, no. 1 (2017). 55–71. Online: https://doi.org/10.22503/inftars.XVII.2017.1.4

Legárd, Ildikó: Célpont vagy! – a közszolgálat felkészítése a kiberfenyegetésekre. *Hadmérnök*, 15, no. 1 (2020). 91–105. Online: https://doi.org/10.32567/hm.2020.1.7

Munk, Sándor: Információs szolgáltatásokat nyújtó hálózatok alapjai. *Hadmérnök*, 6, no. 2 (2011). 227–243.

Nagy, Tamás: *Játékelmélet.* Miskolc, Miskolci Egyetem, s. a. Online: www.uni-miskolc.hu/~matente/oktatasi%20tananyagok/JATEKELMELET.pdf

Nemeslaki, András – Péter Sasvári: Az információbiztonság-tudatosság empirikus vizsgálata a magyar üzleti és közszférában. *Infokummunikáció és Jog*, 60, no. 4 (2014). 169–177.

Szűcs, Beáta, Pató Gáborné, Dr. – Evelin Kopácsi – Barbara Kreiner: Beszállító értékelés vizsgálata SWOT analízis segítségével. *Vállalkozásfejlesztés a XXI. században*, 6 (2016). 253–270.

Wolf, Flynn – Ravi Kuber – Adam J. Aviv: An Empirical Study Examining the Perceptions and Behaviours of Security-Conscious Users of Mobile Authentication. *Behaviour and Information Technology*, 37, no. 4 (2018). 320–334. Online: https://doi.org/10.1080/0144929X.2018.1436591

Legal references

Act C of 2012 on the Criminal Code.

A Nemzeti Elektronikus Információbiztonsági Hatóság. Online: http://kifu.gov.hu/kifu/sites/default/files/NFM_Ibtv_NEIH_2013_12_18.pdf

Emberi Jogok Európai Bírósága: C-222/20. sz. ügy: Az előzetes döntéshozatal iránti kérelemről a Bíróság eljárási szabályzata 98. cikkének (1) bekezdése alapján készített összefoglalás. Online: https://curia.europa.eu/juris/showPdf.jsf;jsessionid=1F496C43E8E38F9528651BA20E9E028C?docid=228843&pageIndex=0&doclang=HU&mode=req&dir=&occ=first&part=1&cid=7613359

AARMS Vol. 21, No. 2 (2022) 15–40.

10.32565/aarms.2022.2.2

International Good Practices in the Activities of Fire and Disaster Management Organisations[1]

Péter PÁNTYA[2]

All over the world, different countries protect themselves, and their citizens from the effects of fires and accidents with the help of their fire and disaster management services. While executing firefighting or technical rescue and disaster relief tasks, these services use several methods and technical solutions during intervention. The aim is to find the best practices and solutions in the field of technical equipment, organisation and method. The applied methods are the analysis of international publications, papers from the previous years and the author's own domestic and international experiences. The good solutions found in this research that raise the effectiveness and the safety of the fire services (especially in Hungary) are demonstrated in this paper.

Keywords: *fire, fire protection, disaster management, intervention, technical rescue, personal protective equipment, technical equipment, organisation*

Introduction

Irrespective of continents and economic situations, each state ensures preventive and rescue fire protection and disaster response with the forces established for this purpose. The common elements of each accident, disaster management and fire brigade intervention are the limited available information, the scarcely available forces and equipment, their technical and applicability possibilities, and the issues of logistics. Based on the gained experience, countries and states protect themselves and their citizens from the effects of fires and dangers with the best and most effective methods and possible technical solutions, as well as intervene in firefighting or technical rescue and disaster relief tasks. The experience gained in each country gives birth to good practices, which can also be useful for fire brigade and disaster management organisations in other countries. The presentation of the individual adaptable international solutions, the examination of the possibilities and the application of their adoption can make firefighting in each country more efficient with little effort, equipment and cost. Adaptable fire service development solutions examined

[1] The work was implemented in the framework of project No. TKP2020-NKA-09, financed by the Thematic Excellence Program 2020 from the National Research Development and Innovation Fund.

[2] Assistant Professor, University of Public Service, e-mail: pantya.peter@uni-nke.hu

and presented in this paper can be very wide, ranging from individual special technical solutions (vehicles, special equipment) through organisational issues (such as organisational elements) to personal protective equipment and legal background regulations. The author intends to present the general fire accident situations, taking into account the international differences. The current publications and research results of international authors to be found in this field are primarily performed for international analysis. The conclusions and good practices that can be applied at international level and good solutions to the individual national needs are presented hereby. The author's own on-site, international research results will also be used in the paper. By publishing the article in an international language (English), a wide range of good practices and solutions, which can appear in the fire brigade, equipment or current research activities of each state even in a short time, will be available to professional and scientific readers.

Methods

The used methods in this paper are the analysis of international and Hungarian publications in English, and professional publications from the past years in the field of fire services and disaster management.

The author also used his own domestic (Hungarian) and international experiences in this field. The illustrations by the author were taken on-site.[3] The pictures demonstrate the solutions, equipment, etc. and the use of their possibilities for adaptation.

Results – The good experiences found in publications

A review of the international literature in recent years in the field of firefighting, fire protection, and disaster management leads to the following conclusions.

In connection with the fire protection and firefighting activities, Gergő Érces and his co-authors examined the background of each fire protection solution in the built environment, taking into account the life cycle of the buildings. As a good fire protection solution, the use and consideration of actively used passive fire protection equipment are recommended, especially in high-rise buildings or multifunctional buildings that accommodate large numbers of people.[4]

In connection with the topic of preventive fire protection and the analysis of the life cycle of buildings from the fire protection point of view, Gergő Érces and Ágoston

[3] Péter Pántya: Fire, Rescue, Disaster Management. Experiences from Different Countries. *AARMS*, 17, no. 2 (2018). 77–94; Péter Pántya: A katasztrófavédelem beavatkozó hatékonyságának fejlesztése a tűzoltósági területen. *Hadmérnök*, 13, "KÖFOP" Issue (2018). 109–144.

[4] Gergő Érces et al.: The Effects of the Actively Used Reactive and Passive Fire Protection Systems Established by Innovative Fire Protection Methods for Whole Life-Cycle of Buildings. *Műszaki Katonai Közlöny*, 28, no. 4 (2018). 47–58.

Restás emphasised the real consideration of building–man–fire factors during design.[5] In a building that has been in use for decades or more, so-called "white spots" can be detected in the fire protection area, which significantly affect safety. Using the virtual world, digital systems can detect and manage hidden defects and various situations that pose fire hazards in a timely manner.

During various fires, large amounts of heat and smoke are generated in enclosed spaces, which pose a significant direct threat to human life, also causing escape and firefighting difficulties during the intervention. Remaining in the built environment, but with the active participation of firefighters, a case study was published by Rajmund Kuti and his co-authors. In the present research, the issue of artificial, pressurised ventilation has been investigated by mobile devices compared to traditional firefighting without these devices. The significant effectiveness of mobile ventilation fans in extinguishing building fires has been established and precisely demonstrated. The extinguishing time, the air quality and temperature inside the building, the amount of extinguishing agent (water) used, and the operating time of the fire pump are all supported by the effectiveness of the pressurised ventilation during the test. If we consider the secondary damage (fire water damage), then it can be seen from the data published in the article that only 58 litres were needed to suppress the fire for pressurised ventilation compared to the 146 litres fire water use in case of a conventional fire, so about one-third of the expected secondary damage.[6]

There are also several pieces of work on the various fire brigade and disaster management organisational elements and their development in the researched period, considering the past years. In the following, I summarise their main results.

Tamás Igaz-Danszky and József Hesz examined the development possibilities of the operation control in Hungary. By exploring foreign adaptation opportunities, the various applied models and protocols can be improved during an operation, thus there is a chance to increase the life-saving effectiveness. Attention is also drawn to the fact that there is a great deal of research and publication in the field of firefighting tactics and methods, but only a few studies or other investigations have been conducted about the time period and process from the request for assistance to the arrival of the first firefighters.[7]

Ferenc Varga carried out a study about the volunteer fire brigades and their organisational–operational model in Hungary. Based on his research, the role of voluntary fire brigades is outstanding in several respects. It indicates faster arrival and intervention times, and good local knowledge. In addition, the special knowledge and skills of voluntary fire brigades and their members can be well applied in various other types of incidents, such as floods. In terms of maintenance and operation, he underlines that the volunteer fire

---

5 Gergő Érces – Ágoston Restás: The Assessment of the Buildings Life Cycle in the View of Fire Protection. *Zeszyty Naukowe SGSP*, 61, no. 1 (2017). 57–69.

6 Rajmund Kuti et al.: Assessing the Impact of Positive Pressure Ventilation on the Building Fire – A Case Study. *International Journal of Geomate*, 15, no. 48 (2018). 16–21.

7 Tamás Igaz-Danszky – József Hesz: Development of Operation Control at Hungarian Disaster Management. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference*. Budapest, Védelem Tudomány, 2021. 483.

brigade is a highly cost-effective form, given that its members are not paid and can earn their revenue from several sources.[8]

In the topic of civil emergency planning, Tomasz Zwęgliński and Chris Arculeo examined the application of risk management and its effectiveness by comparing the practices in Poland and the United Kingdom. In addition to many partial results, it was found that in general there are many common elements between the two countries, even if the way of each terminology or if certain sub-acts and activities are different. These differences originate from historical or organisational development reasons. It can be seen that great similarities could be discovered for other countries in terms of common life and property protection goals.[9]

Identifying firefighters and fire trucks on the fire scene is also a useful and important issue in the field of firefighting. Péter Pántya and Péter Tomka demonstrated the background and possibilities of this problem in cases of incidents requiring several fire units.[10]

Ferenc Kanyó and his co-author Ildikó Vásárhelyi-Nagy researched about the physical ability test method of firefighters. Their analysis turned to the so-called V4 countries. It means that experiences from similar, close and neighbouring countries can be gained, practically from Hungary, Slovakia, the Czech Republic and Poland. The reader can receive detailed information about the testing phases and the results of the participating firefighters. The authors demonstrate that increasing the effectiveness of firefighting can also be reached through the recruitment processes. A diagnostic tool is needed to test the recruits' ability to perform the special and known rescue activities with the same or similar load.[11]

Paul Grimwood is the author of a significant number of international studies, research and textbooks in the field of firefighting. Examining the past years, it is worth considering the main findings of two of his works relevant to the present topic. He examined the projections of fire spread and its intervention in larger buildings, for example office buildings.[12] In a broader analysis of firefighting tactics, he currently describes good solutions for different situations. Every firefighting and technical rescue is different, but there are still common factors, such as the design of the built environment. The interventions in similar circumstances are described by the author and the possibilities to minimise the danger and raise the effectiveness of firefighting.[13]

In the past decades, photovoltaic systems and the fire suppressions of lithium-ion batteries have attracted more attention. Shohei Namikawa collected and published last year's best practices in the field of photovoltaic systems in terms of firefighting. Good solutions

---

8 Ferenc Varga: Structural and Operational Model for Volunteer Fire Brigades. *Hadmérnök*, 13, no. 2 (2018). 345–359.

9 Tomasz Zwęgliński – Chris Arculeo: Risk Management as a Tool of the Civil Emergency Planning in the United Kingdom – Comparison with the Polish Approach. *Internal Security*, 12, no. 2 (2020). 55–82.

10 Péter Pántya – Péter Tomka: Identifying Firefighters and Vehicles on the Fire Ground. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference.* Budapest, Védelem Tudomány, 2021. 487.

11 Ferenc Kanyó – Ildikó Vásárhelyi-Nagy: Research for New Physical Ability Testing Method for Firefighters in the V4 Countries. *Műszaki Katonai Közlöny*, 29, no. 1 (2019). 161–166.

12 Paul Grimwood: *Euro Firefighter 2. Firefighting Tactics and Fire Engineer's Handbook.* Jeremy Mills Publishing, 2017.

13 Paul Grimwood: Structural Fire Engineering: Realistic 'Travelling Fires' in Large Office Compartments. Technical Perspectives. *International Fire Professional*, no. 25 (2018). 40–44.

and sources of danger have been presented.[14] Related to this, Casey C. Grant studied direct, on-site fire interventions in solar power environment, their potential and specific personal hazards. He has special and direct advice in movement of staff and executing firefighting tasks.[15]

Mohammadmahdi Ghiji et al. examined the fire protection and fire hazard of lithium-ion batteries, and also presented the best options for extinguishing a fire in these special circumstances. As we know, after physical damage or shock a fire can be ignited without any hot temperature. To suppress fire, there are a lot of obstacles and the cooling time takes extra time, hours or days.[16]

Gergő Érces et al. examined the current technical evaluation methods of the Hungarian disaster management organisation. In addition to the preventive situation, the current possibilities and basic goals were presented.[17] To find further directions of development, László Bodnár and Ágoston Restás published solutions in connection with fighting forest fires. In the special issue, the detection of forest fires and their methods of suppression are also presented, preventing them from becoming more widespread and helping to control and suppress them more easily.[18]

Also in the more specialised firefighting areas, the main related results of two works are as follows: In the first case, Mónika Szalai et al. presented an analysis of the danger of rare but severe dust explosions. They cover precisely the analysis and presentation of the whole process of explosions, the feasibility of each examination and the testing mode.[19] The powder can also be combined with firefighter foam as an extinguishing material. László Pimper presented the possibilities and background of this method considering long ranges. In several cases, especially those containing flammable fluids, the range of the firefighting powder is not enough, but using special, combined solutions the range can be extended.[20]

Special technical equipment and solutions of other countries

Different countries, regardless of continents, have technical equipment that is basically very similar to general firefighting and/or technical rescue activities. The emphasis in

---

14 Shohei Namikawa: *Photovoltaics and Firefighters' Operations: Best Practices in Selected Countries.* 2017.

15 Casey C. Grant: Fire Fighter Safety and Emergency Response for Solar Power Systems. *The Fire Protection Research Foundation,* May 2020.

16 Mohammadmahdi Ghiji et al.: A Review of Lithium-Ion Battery Fire Suppression. *Energies*, 13, no. 19 (2020).

17 Gergő Érces et al.: The Technical Evaluation Methods of Disaster Management in Hungary. In Ioan Chirilă – Rudolf Gräf – Alexandru Ozunu (eds.): *12th International Conference on Environmental Legislation, Safety Engineering and Disaster Management.* ELSEDIMA 17–18 May 2018, Cluj-Napoca, Babeș-Bolyai University, 2018. 67.

18 László Bodnár – Ágoston Restás: Examination of the Forest Fires Detection: The Relationship between the Fire and the Detection. In Domingos Xavier Viegas (ed.): *Advances in Forest Fire Research 2018.* Imprensa da Universidade de Coimbra, 2018. 995–1001.

19 Mónika Szalai et al.: Danger of Dust Explosion and Importance of Testing for Explosive Dusts. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference.* Budapest, Védelem Tudomány, 2021. 134–142.

20 László Pimper: Dry Powder-Foam Dual Agent Firefighting: If the Throw Range of Dry Powder Is too Short. In *Ipari Létesítményi Tűzoltóságok 8. Nemzetközi Konferenciája,* Százhalombatta, FER Tűzoltóság és Szolgáltató Kft., 2015. 1–11.

this section is on which individual technical devices, technical solutions and the use or standby of these solutions are not common, but can prove to be useful for fire brigades in other countries. During the adaptation of these possibilities and their integration into fire protection systems, the safety of the injured people and the interveners may also increase. The firefighting, technical rescue processes and interventions can become faster and more efficient, which result in a lower damage value and a higher saved value.

The images presented in this section were taken on the author's own research trips and illustrate existing, systematic, tested and continuously applied technical tools and solutions. The elements discussed in this subsection primarily serve to open professional and scientific thinking in this direction as worthy and promising sub-areas. The exact technical types and contents to be adapted for each equipment and solution must be preceded and supported by further targeted research.

Lighting for a long period at a large area on site

In the event of poor visibility (e.g. at night), especially in case of protracted fire intervention for at least several hours, the various lighting devices help in terms of both safety and more efficient operations. There are many international solutions from handheld and helmet lights to installable mobile reflectors to fixed solutions built on vehicles. We can find good practical experience for ambient lighting that covers a larger area and ensures the most even light distribution.

Picture 1: Exercise by a voluntary fire and rescue unit in Romania

Source: Photo taken by the author, 2016.

In the case of its application, more people should be involved and more time should be allocated for installation and later reassembly. Its operation requires no special supervision and its lighting efficiency is significant compared to Picture 1, a smaller and faster, easier-to-install mobile lighting device. Given that the use of this solution is not necessary for the majority of general fire brigade tasks, it may be sufficient to be available at a regional level to support the long-term interventions in poor visibility conditions.

Organisational form, technical operation and support of dispatch units

Examples of merged tasks can be found in several countries. In some regions of Germany, in special cases of Romania (e.g. life-threatening road accidents) or in the United States, ambulance and traditional fire brigade tasks are typically handled by one organisation. In Hungary, dispatch units of professional disaster management (fire department) and police services operate in a common location and the Ambulance Service is a different organisation.[21]

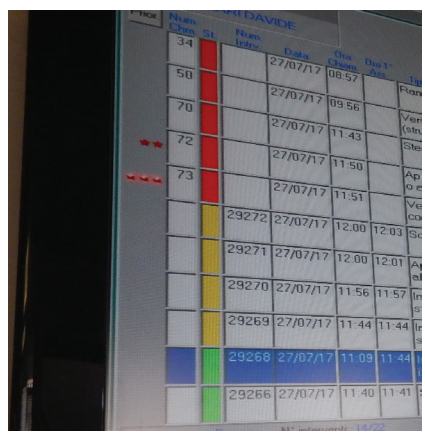
Picture 2: Dispatch unit in Romania commonly used by the fire department and the ambulance

Source: Photo taken by the author, 2016.

[21] Oszkár Cziva: Doctors in Budapest FB Are not Paramedics. *Védelem- Katasztrófa- Tűz- és Polgári Védelmi Szemle*, 2 (2010). 1–2.

In Romania, the fire department organisation uses ambulance vehicles operated by the fire department in life-threatening cases, which also require the special expertise of the firefighters. The traditional ambulance service is also present in this country. The fire department dispatch units co-operate with the ambulance dispatch units, assisting each other by the officers on duty. A good illustration of this solution is in Picture 2.

Thinking differently about dispatcher units, incidents of different types and severity naturally require the intervention of firefighters. The distinction of fire, technical rescue and lifesaving cases in terms of firefighting force demand in Hungary is defined between 1–5 levels of alarms (in more special cases with the note "Highlighted"). All countries have a similar, ascending classification. In Italy, with a much larger population and number of cases compared with Hungary, only three grades appear to determine the resource requirements for each intervention. Picture 3 illustrates a display at the communication centre in Rome, Italy.



Picture 3: Fire interventions on a display in Rome at the Central Fire Department – the alarm level is displayed on the left

Source: Photo taken by the author, 2017.

Based on a simple comparison of these two systems, a new research field may arise. A later study can analyse whether it is worth thinking about refining and reorganising the individual national fire brigade evaluation scales. Can a modification in this field make a positive effect on the daily firefighting, technical rescues, or on the individual background processes?

The issue of the internal organisational culture of the fire brigade organisation, the motivation of the staff and the strengthening of the recruitment

The fire brigades in different countries all over the world have a very long tradition. Based on my assumption, this is also proved by the display of long-used, old technical equipment,

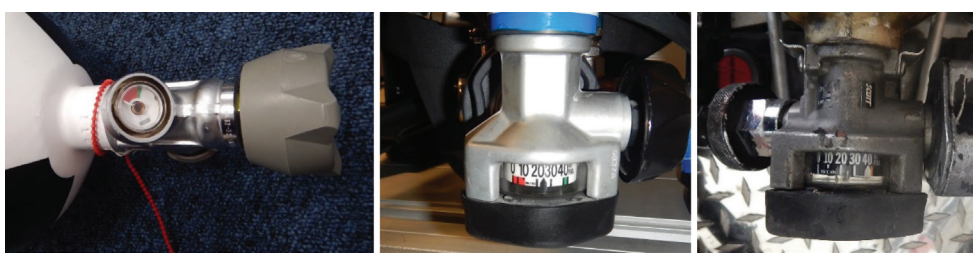
personal protective equipment and diplomas in common rooms. Ensuring organisational attachment can clearly strengthen community affiliation, which can be accompanied by some extra effort that can be deployed during individual preparations and disaster interventions in addition to retaining strength in the organisation. Organised cooperation between the fire brigade organisation and the nearby, protected population, participation in joint events, and voluntary involvement of those interested in fire brigade activities and trainings help to ensure the long-term support.

The extensive poster placement, wide public information and preparatory written publication of the Liverpool Fire Brigade in the United Kingdom to inform the public and ensure the recruitment of firefighters is a good example.

Technical development opportunities of the fire brigade field

Respiratory systems, self-contained breathing apparatuses (SCBA)

In several countries, system-held respiratory solutions can be found, where the amount of carried air is displayed in different ways. For example, on the neck of each air bottle it can be read immediately and easily; there are more solutions on Picture 4–6. Of course, this is a more costly design compared to simpler bottles, however, in the case of a planned bottle replacement at a regional or national level, a larger order may result in cost reduction. Faster and clearer cylinder pressure readability can be utilised in both routine maintenance and operation at the on-site environment, although clearly to a lesser extent in terms of efficiency gains.



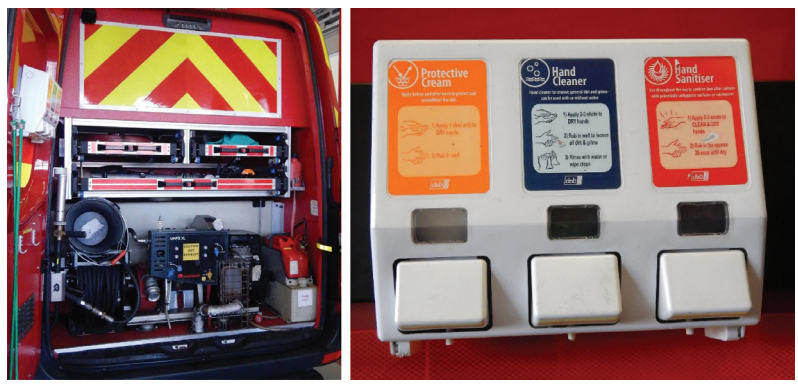
Picture 4–6: Different solutions to show the internal air pressures (the first and second pictures were taken in Europe and the third one in the United States)

Source: Photo taken by the author, 2017.

Incident environments are not sterile in all cases and in all countries, they can be contaminated in different ways. Briefly reviewing some examples: intervention due to collision and fire ignition of road vehicles, intrusion into closed rooms in an industrial area for firefighting, rescuing people from a smoke-filled high-rise building, extinguishing vegetation fires in a wooded area. Different incidents can even affect the same emergency fire brigade and, what is common, there is no guarantee of individual hygiene protection or a higher level of cleaning of firefighting equipment between different incidents. There

are several good solutions regarding ensuring personal hygiene to the minimum extent necessary, such as disinfecting hands and faces. For this purpose, there are hand-washing and sterilising units with the necessary liquids on emergency fire trucks.

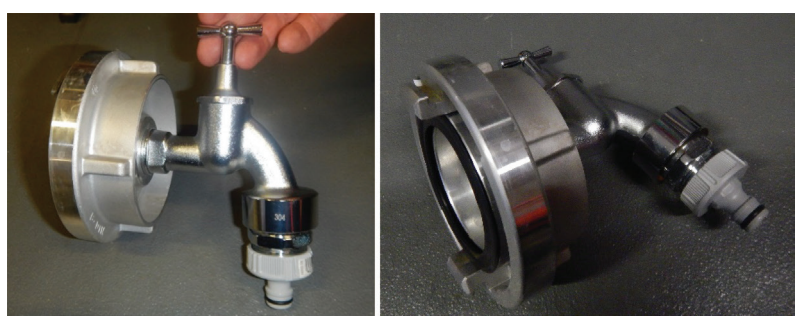
The possibility of basic cleaning at the site of the incident by providing basic cleaning this way also provides a more stable basis for subsequent fire or technical rescue, lifesaving event but also improves the eating and rest conditions of firefighters in case of protracted interventions. There are more good practices in this field in Germany or the United Kingdom, as shown in Picture 7–8.



Picture 7–8: Installed hand cleaner and sanitiser unit on a fire truck in Newcastle, United Kingdom

Source: Photo taken by the author, 2018.

In connection with this, a device was invented that can be attached to a fire hydrant, by which the available water in the fire hydrant water network – for example, near drinking water quality in Hungary – can be easily accessed, used and conveyed. This tool can be stored in fire trucks, like in Germany (Picture 9–10), but in some places, in Budapest, Hungary they are already installed in fire hydrants. In this latter case, anybody at any time can use the hydrants to have water supplies.



Picture 9–10: A hydrant faucet tool from a fire engine in Berlin, Germany

Source: Photo taken by the author, 2019.

The use of motorcycles in fire departments is another area recommended for more detailed research considering its goals and necessity. There are already examples how they are implemented. Firefighting tactics can play a role in quick arrival, reconnaissance, or minimal intervention with minimal force. As can be seen in Picture 11, we can find a past example of motorcycles for fire brigades at a fire department in the United Kingdom, which was not used during the period under my review. Based on personal consultations with the relevant U.K. professional fire chiefs, and taking past experience into account, it is justified to keep them in an appropriate environment (e.g. large cities, significant traffic, availability of adequate firefighters).

Picture 11: Fire motorcycles in the workshop in Liverpool, United Kingdom

Source: Photo taken by the author, 2017.

In a previous study, the author supported the increase in the level of multi-criteria safety and firefighting efficiency that can be achieved by providing the population with free smoke detectors. Continuous awareness of such devices, other fire protection devices and solutions, in general, can be displayed either on the fire brigades' own buildings or, as shown in the example in the following photo, Picture 12, on fire trucks that move frequently in cities and have a large display surface (such as shutters).

Picture 12: Fire engine with advertising in London, United Kingdom

Source: Photo taken by the author, 2017.

Another example, in the field of ergonomy – also from the United Kingdom – will also be displayed to promote the widest possible use of different firefighting equipment for firefighters with different physical abilities. These changing criteria may include shorter people as well the increasing number of females entering the field of firefighting. Pictures 12 and 13 illustrates different solutions to reach or handle fire tools, equipment. This issue is especially topical in view of the process of recent years, when eligibility criteria of becoming firefighters are being expanded in more and more countries, and the restrictions on admission are being reduced.

Picture 12–13: Handles and lifted/tilted shelves for easier access of the fire equipment in London, United Kingdom

Source: Photo taken by the author, 2017.

The use of telemetry has been available in the fire departments for many years. In case of firefighters wearing respiratory protective equipment, their existing air volume, and panic alarms can be monitored at an external, safe control point with the typical solutions at the incident sites. Due to the nature of the fire brigade's activity, the command and control points and locations are constantly changing, as are the people supervising firefighters wearing safety and respiratory protection equipment. There are international solutions for the permanent installation of telemetry devices on each fire truck as illustrated in Picture 14. A good practice and example is the solution of some fire brigades in the United Kingdom, where the driver of the vehicle (operator of the pump) can perform this task as well as perform his/her other activities.

Picture 14: A Draeger Merlin system installed in a fire engine in Liverpool, United Kingdom

Source: Photo taken by the author, 2017.

Picture 15: Different types of Draeger respiratory telemetric systems in Blyth, United Kingdom

Source: Photo taken by the author, 2018.

Different service, rescue and law enforcement areas and activities may require telemetry systems of different designs and sizes, for which several solutions are illustrated in Picture 15.

Education, training and further training are important areas in all areas of life, but this is especially true in the field of firefighting, which is a dangerous activity carried out to protect persons and property. In many cases, it is necessary to have a high level of skills that can be continuously applied in the standby positions of the fire brigade and disaster management areas. For those holding such positions, it is useful to create an environment as realistic as possible during the various trainings. There are different but good solutions for this field internationally.

Providing firefighters with direct intervention skills at the highest possible level in different fire and rescue incidents and their different environmental conditions have a direct and positive impact on the people to be rescued, the values to be rescued, and on the firefighters intervening in hazardous conditions themselves.

Picture 16–17: Drill building and Search and Rescue field for firefighters at the Fire Training Academy in Washington, D.C., United States

Source: Photo taken by the author, 2017.

With the durable training tools illustrated in the following pictures, the same phase (e.g. passing through closed doors, extinguishing a building fire, searching and rescuing from ruins) can be practiced multiple times without major damage or wear to the training tools.

What is common in these described training tools and facilities is that they are basically stationary, it is necessary to travel and accommodate the firefighters to be trained. Simulating real building fires or a larger ruined area requires more serious investment and in this case, it is also important to organise proper occupancy. The Main School of Fire Service in Poland has educational equipment and facilities. The images above illustrate training buildings built along similar lines of thought in other countries similarly to those in Poland.

Acquiring the skills required to perform high-altitude firefighting duties is aided by an indoor training range not exposed to the current weather. A good solution for the implementation of weather- and time-independent training is the design in the closed hall, illustrated in Picture 18 below.

Picture 18: Multiple drill installations simulating tall buildings in a closed hall at the Firefighting Academy of Hamburg, Germany

Source: Photo taken by the author, 2017.

Picture 19: Installed or transportable practice door in the Central Fire Station, Haifa, Israel

Source: Photo taken by the author, 2017.

Basically, the fire brigades of every nation need to prepare their forces for the expected and country-specific incidents. Countries with longer coastlines and busier traffic should have plans with special training in rescuing, firefighting, or rescuing other objects from water. As shown in the pictures below, they can design a variety of practice tracks, including e.g. boats, and vehicles that can be used to simulate realistic conditions.

Picture 20–21: Drill ship for simulating open water circumstances and a drill car to be saved at the Firefighting Academy of Hamburg, Germany

Source: Photo taken by the author, 2017.

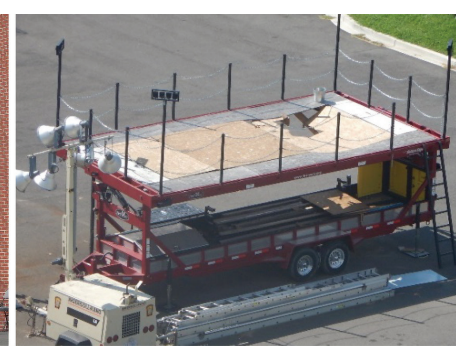
The mobile design of these training tools for application to the affected, trained or retrained firefighters can also be solved, given that generally it is sufficient to repeat specific training a few times a year for the same firefighters. Mobile practice tracks (like in Picture 22) with modifiable design and content ensure the most varied, yet close to reality incident conditions.

Picture 22: Firefighter practice track in a vehicle combination at the Firefighting Academy of Hamburg, Germany

Source: Photo taken by the author, 2017.

If a nation's fire units need more training, demonstration and practice elements or need to keep the costs lower, they do not have to travel to one central facility. Due to the fact that individual training elements can operate for days or weeks in each location, for example installed in the fire brigades to be trained, several mobile training units can be served with one tractor or other carrier vehicles, ensuring flexibility in terms of needs and lower purchasing and operating costs.

I presented already existing and proven good examples to both solutions. The following two pictures illustrate separately moveable and installable training tracks.



Picture 23–24: Different towable fire training tracks at the Fire Training Academy in Washington, D.C., United States

Source: Photo taken by the author, 2017.

A mobile exercise tool simulating the internal physical tension of fallen trees is already in use in Germany, about which another paper was published by Kersák and Pántya in 2021.

The importance of retaining knowledge and skills emerges after basic and later higher education. The author published more papers about the usefulness of further training in conditions that are as close to reality as possible, but at the same time, in safe and controllable ways. Higher education in firefighting in Poland also uses good solutions in this field that are useful at international level.

The first area is the various service and duty activities not performed directly at the incident area, but with great responsibility, short preparation time, external monitoring and high stress. Examples are dispatch units, operations management, but also the Press at the scene and disaster communication. Typically designed for this aim, there are teaching, training and further training practice rooms in Warsaw, Poland at the Main School of Fire Service, which have been used for years. The following pictures illustrate that telephone and on-call environments have been set up for students, where firefighters with several years on active duty are also trained to handle mass emergency calls. The author was personally involved in conducting a training for this purpose.

Picture 25–26: Dispatch training rooms during an exercise and a video studio to practice the tv performance for the students in Warsaw, Poland

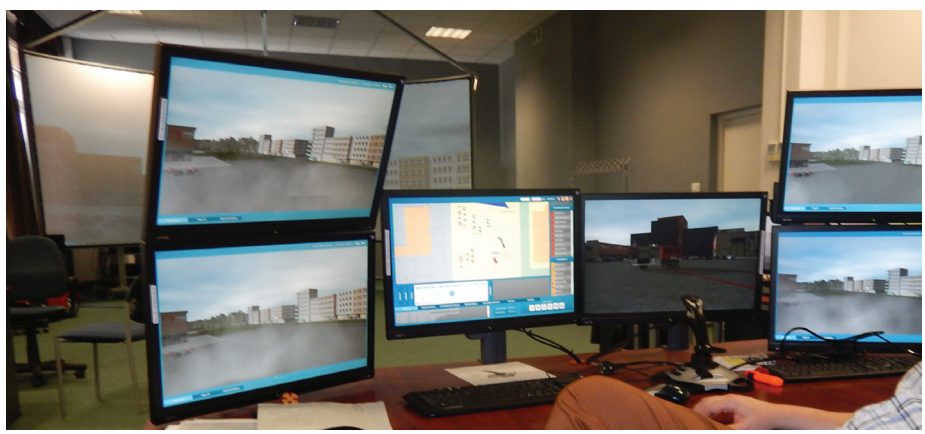
Source: Photo taken by the author, 2017.

The second area also worth considering is the training and further training method developed in Poland for firefighters, incident commanders, fire chiefs and other related command positions (e.g. background commander, security officer, etc.). Different types of computer-simulated incident environments, training in this form have been available for many years. It is important to introduce this Polish example because of the complexity of the way and infrastructure of training, and its significant efficiency. Its design is a system that works in a large room, so it can be built and operated at a relatively higher cost. The events displayed on the extra-large screen seen in the back of the following picture show the trainings in almost life-size. During the drill, the fire chief under training, the number one leader of the given and simulated incident can take a seat in front of the screen. At the tables on the left side of the picture additional commanders who play important roles in the given incident scene can sit and participate in the command activity together at the same time.

Picture 27: Training hall for incident commanders in Warsaw, Poland

Source: Photo taken by the author, 2017.

In the foreground of Picture 28, the operator's workbench is shown, where different floor plans, time periods and weather conditions, fire and rescue types can be set, and continuously modified and the simulated incident itself can be performed over time.

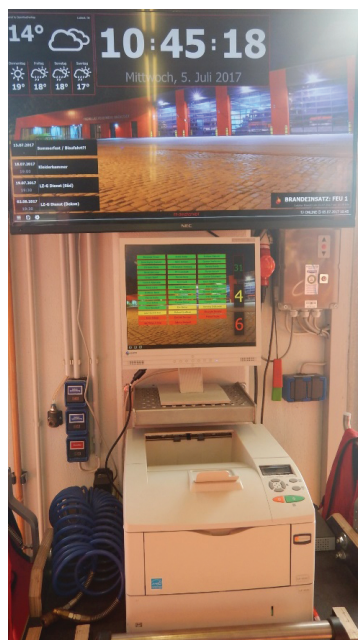


Picture 28: The operator's desk in the training hall

Source: Photo taken by the author, 2017.

Taking all this into account, it can be seen that special training of the crew command team, even with several participants, can be solved at a high level, and at any time of the year.

After reviewing current good practices in training and further training methods, the author draws the attention to the solutions that can be considered in the field of intervention firefighting. Support for voluntary fire, civil protection and disaster management organisations is paramount in all countries, as complementing and assisting professional forces with voluntary support significantly expand capabilities and reduce workload. Several articles have already dealt with the ways of IT support for voluntary organisations. The following picture shows the complete facility management software of a volunteer fire department created and operated by its own volunteer staff. For a similar purpose, the development of different activities of voluntary organisations on unified IT interfaces can also be useful in the life of the given unit and it does not divert its own resources and costs from the scarce resources.



Picture 29: Complex alarm system for a voluntary fire station without personal attendance in Lübeck, Germany

Source: Photo taken by the author, 2017.

In case of fire brigade on-site interventions, the applied firefighting equipment has a significant difference in efficiency. It has been seen for years that battery-powered solutions are available for small machines in addition to petrol power supplies (for example: rescue – tension cutters, various cutting tools). They have the advantage of a higher degree of mobility, in addition, their performance reaches or exceeds that of traditional units. Nowadays, it can be seen that in more and more countries, the proportion of battery-powered small machines on fire engines is increasing so much that they are

almost displacing petrol engine powered designs. The pictures below show the various equipment with interchangeable common system batteries in the cargo compartment of a German fire engine.

Picture 30–31: Battery powered rescue tools with their spare batteries in the charger stations in fire engines in Berlin, Germany

Source: Photo taken by the author, 2019.

Differences can also be found between different firefighting tactics, including the used firefighting equipment and methods. In German practice, the following pictures also illustrate pre-assembled quick hoses (typically type "C" nozzle with flat hoses), which are an alternative to rigid hose quick-acting systems.

Picture 32–33: Prepared "fast attack" lines, hoses in a fire engine, and a solution with a tilted shelf for the easier accessibility Berlin, Germany

Source: Photo taken by the author, 2019.

As shown in the picture on the top right (tilting shelves, Picture 33) or on the bottom left (folding steps with little space to reach the wheelhouses above the wheel, Picture 34), the design of the fire trucks themselves, and the ergonomic needs can directly contribute to faster and safer equipment handling and retrieval and for general maintenance activities. The several capabilities of the fire command vehicle shown below on the right can be used while standing next to the vehicle, it can be faster, more transparent and manageable for others during different kinds of incidents.

Picture 34–35: Using all spaces in a fire truck to install mobile steps in Berlin, Germany and outside control, display possibilities in a fire incident commander vehicle in Washington, D.C., United States

Source: Photo taken by the author, 2019 and 2017.

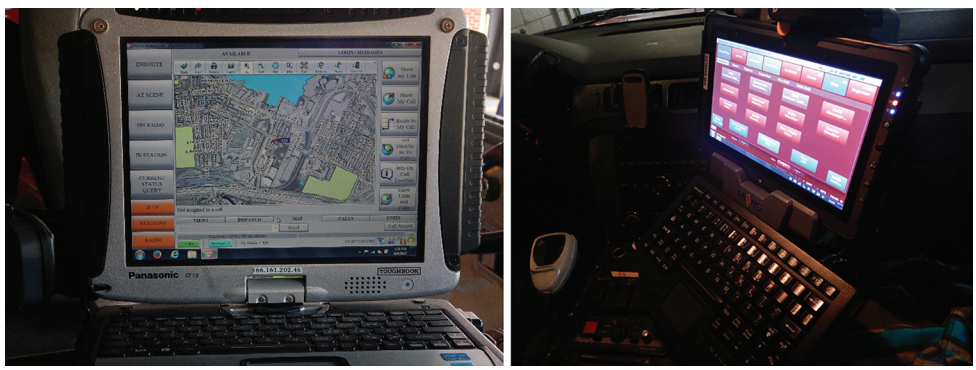
Given the incident challenges of the fire department and the limited transport capacity of fire trucks, it is important to keep multifunction equipment ready, but also to have access to special hand tools. Hand tools, mainly from Anglo–Saxon countries, that have been used successfully, easily and quickly in many situations, such as Halligan bars instead of or in addition to Ferno Norden's Force Rescue Tool, have already appeared in several countries (for example in Poland or Hungary).

The various tools that can be found in the workshop of an average family house become necessary for general firefighting, but even more so for technical rescue tasks. The good solutions shown in the pictures below are the compact, space-saving tool cases, the contents of which are well-suited to their tasks, in addition, whose continuous availability in the fire engine's storerooms is ensured.

Picture 36–37: Compact, well-equipped tool cases with space-saving in a fire engine in Berlin, Germany

Source: Photo taken by the author, 2019.

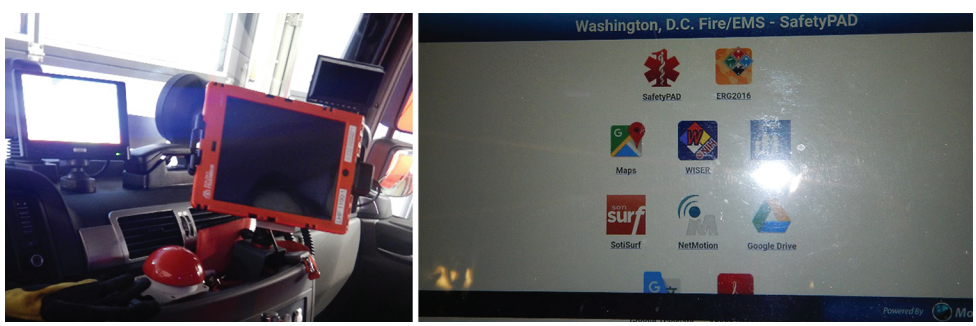
IT tools can provide useful background support for decision-makers, firefighters performing various organisational and management activities, but also for firefighters performing more specialised tasks. Good examples of such solutions are on-board computer terminals, whose software has been developed and kept up to date. These provide a detailed map database of fire alerts with background information (for example hydrants, floor plans, expected occupants, etc.) or hazardous materials or basic information on incident activities at the touch of a button (e.g. fast reports of arrival, general events, etc.). The pictures below show the solutions of several fire brigades in several countries, with different designs and data content, but serving the same purpose.



Picture 38–39: Special laptop and mobile terminal installed in fire trucks in Baltimore and Washington, D.C., United States

Source: Photo taken by the author, 2017.

Compared to the built-in on-board computers, it is a significant leap in usability if the IT unit (laptop, tablet) is mobile and can be removed from the fire truck (from its dock), thus helping the fire chief's work in various conditions. In these cases, protection against dust and water, good readability in sunlight, protection against damages are important. The solutions presented in the following examples (Picture 40–41) satisfy these conditions.



Picture 40–41: Special mobile tablets in fire trucks Berlin, Germany and Washington, D.C., United States

Source: Photo taken by the author, 2019 and 2017.

Discussion

Based on the objectives set out in this paper, additional research areas can be identified that can be considered worthwhile, taking into account existing examples and experiences.

The author considers it worthwhile to research the effect of motivation and the degree of attachment to the organisation on the effectiveness of the interventions performed by firefighters. One of the elements of this may be the presence of recent or past firefighting equipment found in the fire brigades of several countries in common rooms and offices, which can strengthen integration and attachment to the organisation, so an internal motivating force can appear during different firefighting activities, professional tasks performed at a national level. It is more of a social science issue rather than technical, engineering, though.

A good direction is increasing the usability of firefighting vehicles to design more solutions for discharging extinguishing water at multiple points from fire trucks to additional fire engines. Based on developments in recent years, there are several examples of water conveyance in the United States and in Hungary. In addition to the ergonomic improvements in fire engines described in this paper, this can have direct on-site benefits in terms of intervention capabilities.

For reasons of length and due to the limited knowledge, research on alternative propulsion firefighting equipment will only be raised and discussed at a later stage. Here the air system of fire trucks can appear as an energy and power source by designing different connecting surfaces, and the usability of air-operated tools and small machines may be the question: is it worth modifying the current solutions, what are the benefits, advantages or disadvantages?

References

Bodnár, László – Ágoston Restás: Examination of the Forest Fires Detection: The Relationship between the Fire and the Detection. In Domingos Xavier Viegas (ed.): *Advances in Forest Fire Research 2018.* Imprensa da Universidade de Coimbra, 2018. 995–1001. Online: https://doi.org/10.14195/978-989-26-16-506_109

Cziva, Oszkár: Doctors in Budapest FB Are not Paramedics. *Védelem- Katasztrófa- Tűz- és Polgári Védelmi Szemle,* 2 (2010). 1–2. Online: www.vedelem.hu/letoltes/anyagok/241-doctors-in-budapest-fb-are-not-paramedics.pdf

Érces, Gergő – Ágoston Restás: The Assessment of the Buildings Life Cycle in the View of Fire Protection. *Zeszyty Naukowe SGSP,* 61, no. 1 (2017). 57–69.

Érces, Gergő – Lajos Kátai-Urbán – Gyula Vass: The Technical Evaluation Methods of Disaster Management in Hungary. In Ioan Chirilă – Rudolf Gräf – Alexandru Ozunu (eds.): *12th International Conference on Environmental Legislation, Safety Engineering and Disaster Management.* ELSEDIMA 17–18 May 2018, Cluj-Napoca, Babeș-Bolyai University, 2018.

Érces, Gergő – László Bérczi – Sándor Rácz: The Effects of the Actively Used Reactive and Passive Fire Protection Systems Established by Innovative Fire Protection Methods for Whole Life-Cycle of Buildings. *Műszaki Katonai Közlöny,* 28, no. 4 (2018). 47–58.

Ghiji, Mohammadmahdi – Vasily Novozhilov – Khalid Moinuddin – Paul Joseph – Ian Burch – Brigitta Suendermann – Grant Gamble: A Review of Lithium-Ion Battery Fire Suppression. *Energies*, 13, no. 19 (2020). Online: https://doi.org/10.3390/en13195117

Grant, Casey C.: Fire Fighter Safety and Emergency Response for Solar Power Systems. *The Fire Protection Research Foundation*, May 2020. Online: www.solsmart.org/wp-content/uploads/FPRF_FireFitherSafety.pdf

Grimwood, Paul: *Euro Firefighter 2. Firefighting Tactics and Fire Engineer's Handbook.* Jeremy Mills Publishing, 2017.

Grimwood, Paul: Structural Fire Engineering: Realistic 'Travelling Fires' in Large Office Compartments. Technical Perspectives. *International Fire Professional*, no. 25 (2018). 44–44.

Igaz-Danszky, Tamás – József Hesz: Development of Operation Control at Hungarian Disaster Management. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference.* Budapest, Védelem Tudomány, 2021. 483.

Kanyó, Ferenc – Ildikó Vásárhelyi-Nagy: Research for New Physical Ability Testing Method for Firefighters in the V4 Countries. *Műszaki Katonai Közlöny*, 29, no. 1 (2019). 161–166. Online: https://doi.org/10.32562/mkk.2019.1.13

Kuti, Rajmund – Géza Zólyomi – Orsolya K. Kegyes-Brassai: Assessing the Impact of Positive Pressure Ventilation on the Building Fire – A Case Study. *International Journal of Geomate*, 15, no. 48 (2018). 16–21. Online: https://doi.org/10.21660/2018.48.18042

Namikawa, Shohei: *Photovoltaics and Firefighters' Operations: Best Practices in Selected Countries.* 2017. Online: https://doi.org/10.2172/1492000

Pántya, Péter – József Kersák: Technical Development Opportunity in the Field of Practical Training in Rescue Fire Protection. *Védelem Tudomány,* 6, no. 3 (2021). 224–233. Online: www.vedelemtudomany.hu/articles/VI/3/16-kersak-pantya.pdf

Pántya, Péter – Péter Tomka: Identifying Firefighters and Vehicles on the Fire Ground. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference.* Budapest, Védelem Tudomány, 2021. 487.

Pántya, Péter: A katasztrófavédelem beavatkozó hatékonyságának fejlesztése a tűzoltósági területen. *Hadmérnök*, 13, "KÖFOP" Issue (2018). 109–144.

Pántya, Péter: Fire, Rescue, Disaster Management. Experiences from Different Countries. *AARMS*, 17, no. 2 (2018). 77–94. Online: https://doi.org/10.32565/aarms.2018.2.6

Pimper, László: Dry Powder-Foam Dual Agent Firefighting: If the Throw Range of Dry Powder Is too Short. In *Ipari Létesítményi Tűzoltóságok 8. Nemzetközi Konferenciája.* Százhalombatta, FER Tűzoltóság és Szolgáltató Kft., 2015. 1–11.

Szalai, Mónika – Zsuzsanna Kerekes – Ágoston Restás: Danger of Dust Explosion and Importance of Testing for Explosive Dusts. In László Bodnár – György Heizler (eds.): *Proceedings of the Fire Engineering and Disaster Management Prerecorded International Scientific Conference.* Budapest, Védelem Tudomány, 2021. 134–142.

Varga, Ferenc: Structural and Operational Model for Volunteer Fire Brigades. *Hadmérnök*, 13, no. 2 (2018). 345–359.

Zwęgliński, Tomasz – Chris Arculeo: Risk Management as a Tool of the Civil Emergency Planning in the United Kingdom – Comparison with the Polish Approach. *Internal Security*, 12, no. 2 (2020). 55–82. Online: https://doi.org/10.5604/01.3001.0014.6675

AARMS Vol. 21, No. 2 (2022) 41–54.

10.32565/aarms.2022.2.3

Application of Artificial Intelligence in Military Operations Planning[1]

Ferenc FAZEKAS[2]

The military operations planning is one of the major functions of military staffs. The increasing complexity of the contemporary operating environment requires new approach to the understanding of the situation and realisation of a viable plan. The aim of this paper is to scrutinise the potential usage of future Artificial Intelligence tools in the process of military operations planning. The main question is whether Artificial Intelligence in its current state can be applied in military operations planning. To answer this question the paper provides a short overview of military operations planning, a summary of military-related Artificial Intelligence research and existing solutions, then identify criteria and field of application for future Artificial Intelligence-driven tools. Analysing the topic gives some insight into this possible way of increasing the effectiveness of the planning groups, thus contributes to finding more effective solutions for emerging complex and comprehensive problems.

Keywords: *operations planning, artificial intelligence, planning tools*

Introduction

A major theme of the contemporary scientific literature is the application of Artificial Intelligence (AI) in various fields of our daily activities. AI must be viewed in the context of human intelligence, as originally it was the role model the researchers tried to copy. The human intelligence can be divided into three levels, such as the computational, perceptual and cognitive intelligence.[3] In the computational and perceptual area of intelligence computers tend to be faster and more thorough due to their speed and the applied algorithms. To excel in the cognitive area is a greater challenge.

The military will not be spared from the long-standing effects of AI. Some of the very first research were funded by the military in the hope of getting the upper hand of the potential enemy. The most trivial usage of AI in the military is in the autonomous

[1] The work was implemented in the framework of project No. TKP2020-NKA-09, financed by the Thematic Excellence Program 2020 from the National Research Development and Innovation Fund.

[2] Assistant lecturer, University of Public Service, Faculty of Military Science and Officer Training, Department of Military Strategy, e-mail: fazekas.ferenc@uni-nke.hu

[3] Imre Négyesi – Péter Török: The Relationship between Human Intelligence and Artificial Intelligence I. *American Journal of Research, Education and Development,* no. 2 (2020). 7–10.

weapon systems that can detect and destroy the enemy all on their own, without human supervision. Semi-autonomous weapon systems need a human in the loop for giving orders and/or authorisations, providing supervision. One widely known example of the semi-autonomous weapon system is the Block II version of the Tomahawk cruise missile from the 1980s that used a rudimentary AI called Digital Scene Matching Area Correlator to navigate.[4] Various kinds of robots, self-driving equipment, intelligent ammunitions are only a few examples where the defence industry research and development budget goes throughout the world. Besides these, the AI has great potential to provide aid in the planning and execution phases of military operations.

From the 1960s on, the United States and the Soviet Union tirelessly worked on automation of the battlefield systems. They fielded huge computer systems to aid command and control of forces on the field. These early systems struggled and failed mostly because the expectation of the military could not be fulfilled by the actual state of technology at the time.[5] With the technological boom since the 1980s the situation has changed. The battlefield command and control systems are flourishing and the acquired know-how provides a solid basis for the introduction of new technologies.

Contemporary military operations planning is becoming more and more complex, it must take enormous amount of factors into consideration. Advanced command and control systems are providing unprecedented levels of data for the commanders and staffs. Given its ability to get the most out of the available data in a short time, AI may be the solution to lay out sound plans amidst this complexity. But can Artificial Intelligence be applied in military operations planning in its current state? The aim of this paper is to examine the impact AI has and will have on military operations planning.

In this first section of this paper I will summarise the long process of the evolution of AI research. The contemporary hype for "thinking machines" turned out to be early optimism, and research continued to reach more realistic ends. As AI algorithms and methods evolved so did the military planning methods, on which I will elaborate in the second section. In the last decades of the 20th century the holistic approach changed the operations planning processes, requiring new analyses and new ways of thinking to develop plans. As the amount of work required to make a reasonable plan increased, using sophisticated computer applications in the planning was considered. Several early AI-driven computer programs were developed to facilitate operations planning, which I will present in the third section. In the last section I will highlight the trends and possible future applications of AI in the military operations planning. As this research field is continuously progressing and the military applications are mainly considered secret, this article provides only a snapshot of the current open-source data available via document analysis method.

---

[4] Geoffrey B. Irani – James P. Chirst: Image Processing for Tomahawk Scene Matching. *Johns Hopkins APL Technical Digest*, 15, no. 3 (1994). 250–264.

[5] For more information see Elizabeth A. Stanley: *Evolutionary Technology in the Current Revolution in Military Affairs: The Army Tactical Command and Control System.* Carlisle, Strategic Studies Institute, 1998; Imre Négyesi: A csapatvezetési rendszerek automatizálásának első eredményei az USA fegyveres erőinél I. *Hadtudomány*, E-szám (2015). 139–151.

The overview of military operations planning

Planning is an indispensable task of every organisation. Before conducting any activity, thorough preparation is required which is governed by planning. Operations planning is an activity conducted by military organisations at all three levels of war.[6] Its content and tasks vary at each level, a strategic-level operations planning differs from the tactical-level operations planning mainly in the focus of the planning. At tactical level, the planning focus is on the utilisation of available troops and assets to achieve the assigned mission, while at the strategic level the primary focus is to identify military ways to achieve the political ends. The link between the strategic and tactical level is provided by the operational level, which translates the comprehensive strategic-level objectives to operational-level objectives and identifies executable tasks for the assigned tactical units. Therefore, in a planning process the strategic and operational levels, and the operational and tactical levels work closely together to devise a plan. The planning method can be sequential, parallel or collaborative depending on the time available and on the staffs executing it.[7] Besides, there are two main philosophies along which the planning processes and leadership methods developed. One is the Western-style approach, the other is the Russian-style.

In the Western-style method the commander is a central figure, but he has a staff to assist in decision-making. This method empowers the staff with the responsibility of making assessments, recommendations and developing different courses of action from which the commander will choose the most appropriate one. NATO offers a framework that provides the foundation for the operations planning. This commonly agreed and scientifically proven approach of planning is called the Operations Planning Process. It consists of seven key activities, these in sequence are: the planning initiation, the mission analysis, the course of action development, the course of action analysis, the course of action validation and comparison, the commander's decision and last, but not least the plan development. These planning activities have a lot of subordinate activities, which must be accomplished to achieve the aim of the planning activity.[8]

Planning methods on different levels of war or of different nations may vary in the actual execution, but the logic of the planning and the outcome is set by the Operations Planning Process framework. For example, the NATO Tactical Planning for Land Forces process is a ready-to-use process designed for NATO tactical headquarters. It follows the scheme of the Operations Planning Process as it has seven main steps, too: the receipt of mission, the mission analysis, the course of action development, the course of action analysis, the course of action comparison, the commander's decision and the order production, dissemination and transition. There are some differences in the names of the steps, but the governing idea behind them is the same.[9] The Military Decision-Making Process in use by the United States Army has the same number of steps with slightly different names, but the essence is the same. The NATO's operational level planning – detailed in the

6 NATO Standardization Office: *AJP-5 Allied Joint Doctrine for the Planning of Operations, Edition A, Version 2.* 2019a.

7 For more information see NATO Standardization Office (2019a): op. cit. Chapter 2.

8 NATO Standardization Office (2019a): op. cit. 4-1.

9 NATO Standardization Office: *APP-28 Tactical Planning for Land Forces, Edition A, Version 1.* 2019b. 1–7.

Comprehensive Operations Planning Directive – has different phasing and naming than the Operations Planning Process, but the main ideas are unchanged: the mission must be analysed, courses of actions must be developed and after the decision a plan must be made.

This Operational Planning Process and its implementations have several shortfalls nonetheless. First, the understanding of the superior command's task, the mission analysis is a time-consuming process in which all the staff functional experts are engaged. Failure to grasp the problem and the mission correctly may lead to wrong solutions or some time-wasting reanalysis of the situation. If the commander disapproves all courses of action, the staff has to work on new ones, which is also time-consuming and probably goes under time pressure. If any of the functional experts on the staff has deficit in their knowledge of their nominated fields, then hidden flaws may spoil the planning from very early stages on. While the teamwork approach that the Western-style planning uses tries to capitalise on the common knowledge of the planning team, the result is not always acceptable. The sum of the team members' knowledge is more than the knowledge of the commander's alone, but frictions, misunderstandings among the team and misconceptions about the mission can easily go wrong and jeopardise the effort.

We do not know the current Russian decision-making process in detail, but there are some hints about how it looks like. In the Russian-style approach the commander is the one who decides how he wants to accomplish the mission, figures out the broad course of action while the staff only helps to develop it in detail. It is a kind of commander's estimate, in which the commander devises the plan after analysing the situation, and later conducts terrain reconnaissance to verify the plan's viability. Parallel with this leader's recon, the staff begins the process to verify the plan and adjust it if possible. Once finished, the order is issued to the subordinates. Prior execution intensive preparations and reorganisations may occur. This process is pretty straightforward, concise and requires less time than the Western one.[10]

Realising the relatively short time required for the Russian-style decision-making and building on the lessons learned from the continuous engagements of the previous decades, U.S. and NATO thinkers came up with methods to shorten their planning processes. The NATO Tactical Planning for Land Forces process suggests that under time pressure the details of the courses of action should be reduced to make the analysis and comparison faster.[11] The United States Army Military Decision-Making Process proposes several solutions in time-constrained environment, one being the method when only one course of action is developed by a small team led by the commander. Conducted this way, the process unintentionally becomes very similar to the Russian one.[12]

With detailed knowledge of these planning processes one may find that there are three steps which require significant amount of time: the analysis of mission, the course of action development and the course of action analysis. These steps include several other processes that have to be conducted in order to get a sound and executable plan. The

---

[10] Roger N. McDermott – Charles K. Bartles: *The Russian Military Decision-Making Process and Automated Command and Control.* Hamburg, German Institute for Defence and Strategic Studies, 2020. 29–32.

[11] NATO Standardization Office (2019b): op. cit. F-1–F-3.

[12] Department of the Army: *FM 6-0 Commander and Staff Organization and Operations.* 2014. 9-44–9-46.

inherent part of mission analysis is the analysis of the operating environment. During this task the factors of the enemy, the terrain and the surrounding environment must be taken into consideration which requires thorough and time-consuming analyses. The course of action analysis step usually features some kind of wargaming, meaning that all the actions that must be taken during the execution should be modelled to identify possible shortfalls or collisions.

Existing AI tools in operations planning

It is well beyond the scope of this work to define what AI is. There are several approaches to grasp the very essence of AI from different points of view, such as reasoning or behaviour.[13] In terms of this work, AI is considered a branch of computer science, which deals with automation of activities such as data processing, problem-solving and decision-making. As such, AI can only be conceived in a digital environment.

The very origins of AI can be bound to military activities. In the early stages, military funding fuelled the research in the hope of achieving cutting-edge technology to maintain superiority over the enemy. As already mentioned, semi-autonomous and autonomous systems are high-visibility areas of AI research, their results can be dazzlingly demonstrated. The algorithms which support operations planning may be very similar to those of the autonomous systems, but they are less spectacular and receive less publicity. Most of the AI research fields can be connected to some military applicability.

The initial research of AI research projects ran in research labs and universities, partially funded by different governmental institutions, with the military providing a significant fraction of the sum. Funding was mostly available to projects which promised real-life applications in a reasonably short term. Expert systems emerged, which were specific applications designed to solve one specific problem, thus its AI component was limited to a well-defined problem set, and in cases even the hardware component was designed specifically for that problem. Market players joined the enthusiasm and started to fund AI driven expert systems in the hope of potential financial benefits in the long run. As the hardware requirements of a would-be universal AI became evident, efforts were made to build a new generation of computers that are able to work parallel on different problems. These new multi-processor workstation systems were built specifically for applying AI, and contributed a lot to the research. This, and breakthroughs in computer technology seemed to bring the achievement of true AI closer. The ultimate goal of AI research is a computer that could act and think at least as well as a human does. It is almost consensual that this goal is not achievable with the current possibilities.[14]

As the new era of great power competition emerges in present days, the United States, China, and the European Union invest billions of dollars in AI research.[15] While this

[13] Stuart Russel – Peter Norvig: *Artificial Intelligence.* Englewood Cliffs, Prentice Hall, 1995. 4–5.
[14] Nils J. Nilsson: *The Quest for Artificial Intelligence.* New York, Cambridge University Press, 2010.
[15] Neil Savage: The Race to the Top among the World's Leaders in Artificial Intelligence. *Nature,* 10 December 2020. S102–S104.

research contributes mainly to the industrial and economic fields, military also has a part in it. It is often a beneficiary of technologies developed for civilian usage, and AI can also be a good example for this.

The military operations planning is feeding on information which is required to make a bold and executable plan. Therefore, the main areas for utilisation of AI are the information gathering activities, the so-called Intelligence, Surveillance and Reconnaissance (ISR) and the Target Acquisition (TA). Expert systems have great use in logistic planning. When considering the actions required for the desired effects one must take into consideration the use of AI supported system in the fields of Cyberspace Operations and Information Operations. When the execution of the plan or the preparation for the execution starts, AI supported Command and Control systems may provide an invaluable contribution to the successful operation.[16]

The strengthening private sector was the new impulse AI needed. In the United States and the Western world influential players from the industry achieved new levels in research and progress that the military tried to leverage. Ethical concerns aside, some private companies cooperated with the United States military, notably Google, whose expertise was paramount in setting up the so-called Algorithmic Warfare Cross-Function Team of the Department of Defense, or shortly Project Maven in 2017. The aim of Project Maven was to develop an AI driven system that can help with the military intelligence efforts against terrorist and insurgent groups. The focal point was processing, exploiting and disseminating tactical footage and full-motion videos made by Unmanned Aerial Systems. It is able to detect and classify objects, and provide alerts for specific cases.[17]

Project Maven was a success as it helped identifying potential insurgents and terrorists during the Defeat-ISIS campaign in Iraq and Syria. Google soon abandoned the project due to the concerns of its employees regarding the ethics of AI's military use. Several major United States private companies followed suit and stated that they restrain themselves from the promoting of AI's military application. Companies in the rival powers of the United States, for example in China, are not known to have been making such vows. It is likely that the country which cares less of the ethic of AI application will gain more, at least in the military field. Face recognition algorithms engaged by China to control the population is somewhat questionable on an ethical level. Face recognition to identify potential enemy fighters on the other hand has invaluable benefits.[18]

As the new wave of AI researched started in the 1980s with the introduction of the workstation concept, the decade-long Strategic Computing Program project of the United States made a lot of contribution to the AI research. As a side project Natural Language Processing was evolved, resulting in a usable speech-recognition software.[19] The Natural Language Processing evolved via neural networks and achieved some great feats. In 2015 a Chinese, a year later a United States based private company achieved efficient speech-

---

16 Daniel S. Hoadley – Kelley M. Sayler: *Artificial Intelligence and National Security.* Washington, Congressional Research Service, 2020. 9–16.

17 Pentagon: *DoD Memorandum.* 2017.

18 Forrest E. Morgan et al.: *Military Applications of Artificial Intelligence.* Santa Monica, RAND Corporation, 2020. 25–26.

19 Nilsson (2010): op. cit. 370–371.

recognition. By now reasonably good machine translations have become available for various languages and even smartphones can be directed by voice commands. Analysing large amount of enemy radio communication and phone call recordings to get important operational information or to identify important persons is not a dream anymore. All of these applications can be exploited by the military intelligence cell of any staff that can afford them.

As for logistic planning there are already systems in the militaries that can aid in planning the maintenance periods and need of individual equipment. The United States Army and the Air Force use these kinds of expert systems to optimise the maintenance costs and times. Speaking of troop movements and operations, in the 1980s the Strategic Computing Program was the origin of the Dynamic Analysis and Replanning Tool (DART), which was a decision-support application for logistic planning using AI algorithms at its core. It was applied in the planning phase of Operation Desert Storm in 1990, and was capable of identifying the logistic requirements of moving military equipment from different locations into the theatre of operations. This application was a success and saved a large amount of money and time. Based on this success a new application was developed called Joint Assistant for Development and Execution (JADE). Its aim was to conduct make force deployment plan for conventional conflicts, including timings for deployments. Its counterpart, the Survivable Adaptive Planning Expert (SAPE) was an application designed for planning nuclear war, although the system's development was stopped after the fall of the Soviet Union.[20]

Parallel with these efforts a new project had been running in order to create a decision assistant system for operational level planners. This was called Project ARES and had several optimistic goals, such as automated terrain analysis, situational analysis and course of action generation. Due to the limits of the computers of the 1980s, this project could not fulfil the expectations and was cancelled shortly.[21] This resembled the fate of early planning algorithms. In the course of the 1970s, several algorithms were developed that could be able to devise plans for achieving objectives with the help of predefined actions. Though they were only applicable to well-defined problems, increasing complexity diminished their feasibility. Since then it became obvious that the current level of AI is incapable of generating options which can cope with the complexity of the real world.

In cyberspace operations human cognition is too slow, AI support is needed. In 2016, a so-called "Cyber Grand Challenge" was funded by the United States military to test the possibilities of AI-enabled cyber tools. The demonstration showed that AI algorithms can autonomously detect, evaluate and patch vulnerabilities before they could be exploited by an adversary with incredible speed. Besides the speed, the demonstration proved that the same tool can be a defensive or an offensive asset at the same time. AI is not only capable of processing video, photo and audio but it can also manipulate them, producing

---

[20] Theo Farrell et al.: *Transforming Military Power since the Cold War.* New York, Cambridge University Press, 2013. 51–52; Nilsson (2010): op. cit. 373.

[21] William A. Branch: *Artificial Intelligence and Operational-Level Planning: An Emergent Convergence.* Fort Leavenworth, U.S. Army Command and General Staff College, 2018. 28; Gerald M. Powell et al.: Artificial Intelligence and Operational Planning. *Army Research, Development and Acquisition Magazine,* 28, no. 1 (1987). 27–29.

fake reports, which can be a powerful asset in the informational operations. Detecting and countering these deep fakes is getting harder as the algorithms improve, thus AI must be engaged to check the validity of any source.[22]

The Russian and Chinese militaries also improve their capabilities, especially in the command and control. Speeding up the process from target identification to commence firing is a priority task for the Russian army, as demonstrated in the conflict with Ukraine during 2014. When applying even primitive AI to the targeting process, the effectiveness of indirect fires can be multiplied and sped up on a previously unconceivable scale. This kind of expert systems are confirmedly being fielded for the Russian army.[23] The Chinese military is also actively developing its AI capabilities. The Chinese concept of the future's "intelligentised warfare" requires swift decisions and precise actions, both to be achieved by applying AI assets. Several projects are ongoing in China to improve the command and control of military forces, but details are mainly kept in secret. One publicly known example is upgrading the system of nuclear submarines with AI, thus improving the decision-making ability of the commander and decreasing the cognitive load of the crew.[24]

Potential effect of AI on future operations planning

The future of operations planning is being decided today as works progress in different countries to apply AI in different sections of the planning process. In present days, the United States military is working on potential command and control support systems, such as the Joint All-Domain Command and Control (JADC2), which aims to centralise planning and execution of operations across all domains, i.e. land, air, sea, space and cyberspace. It is clear that all major military powers, i.e. the United States, China, Russia realised that the potential of AI in decision-making must be leveraged. Contemporary research, development and field testing in progress are paving the way for the near future's intelligent and upgraded decision-making.

Although the requirements of enabling AI systems may vary depending on the field of application and the country and military arm applying it, some common criteria can be identified. First, planning or planning support AI must be able to do its task in almost real-time, let it be analysing data, or even generating a course of action. Second, output information must be interchangeable with other AI systems as well as human planners, so the output must be clear, concise and understandable for planners without special knowledge in information technologies. Third, the process the AI applies must be transparent to make human planners understand the way it reached the decisions. This last criterion is arguably the most important one: the machine should be able to explain its way of thinking.

---

[22] Hoadley–Sayler (2020): op. cit. 11–12.

[23] Peter Layton: *Fighting Artificial Intelligence Battles.* Canberra, Australian Defence College, 2021. 55.

[24] Elsa B. Kania: Chinese Military Innovation in the AI Revolution. *The RUSI Journal,* 164, no. 5–6 (2019). 26–34.

The operating environment is a complex entity by its very nature, and new challenges make it successively more complex. The AI in its present state works similarly to human cognition: splits complex problems to solvable subproblems. Although the chaotic nature of the operating environment full of complex adaptive systems makes it almost impossible to predict what will happen next, but at least there are attempts. Taking the operations planning into consideration the mission analysis, course of action development and the course of action analysis are the most time-consuming steps which can be sped up and enhanced by applying AI.

During the mission analysis, no matter what level of war we are talking about, the most important step is the understanding of the operating environment. As for NATO on the operational level this process is called the joint intelligence preparation of the operating environment, on the tactical level it is the intelligence preparation of the operating environment. (For the United States these are joint intelligence preparation of the operational environment and intelligence preparation of the battlefield respectively.) This analysis provides information about the adversary and the terrain that must be taken into consideration when forming the plan. There are two factors that constrain the analysis: the information available and the time available. The amount of data retrieved in a contemporary operating environment is so large that human analysts are not able to cope with it in time. AI based expert systems will be more and more competent in translating the relevant data into information, this way facilitating timely decision-making.

Devising courses of action is a process that builds up on the information retrieved during the analysis of mission. The AI already showed its ability to process data fast and reliably, so applying an AI-driven course of action generator is a possibility. These systems will be more ready to provide different points of view based on their perception of the situation depending on the experience they gained from previous assignments. Sophisticated expert systems must select the information to avoid overloading the human planners, whose cognitive capacity must be focused elsewhere. Detailed real-life terrain information can be used to create 3D models and with AI tools they could be used to plan courses of action, providing aid in determining fields of fire and lines of sight. Applying a database of previous engagements, manoeuvers, and exercises could empower a decision-support tool to suggest courses of action depending on previous successful examples.

The analysis of courses of action consists of several tests, in which the different own and enemy courses of actions are played against each other. An accepted method for the analysis is the military wargame, a regulated process that is "a simulation of a military operation in which participants seek to achieve a specified objective, given pre-established resources and constraints".[25] Depending on the size and scope of the operation, these simulations are time-consuming. Similarly to the AI that potentially can be applied to create courses of action, the analysis, i.e. the wargaming process can be sped up by using purposefully designed AI systems.

As already highlighted, time is indisputably an important factor in planning. In the highly technologised operating environment every moment is precious, the speed of

[25] NATO Standardization Office: *AAP-06 NATO Glossary of Terms and Definitions (English and French) Edition 2021*. 137.

decisions can be the key to the success. This is the main topic of the envisaged decision-centric warfare.[26] When the information is available, the time for processing it and producing orders for subordinates is precious. Whoever can reduce the time between the steps of the Observe–Orient–Decide–Act decision loop will have advantage over the adversary. AI can help in highlighting available assets in short time, devising solutions for troop movements, fire missions, can speed up combat power calculations and can make recommendations for tasking troops. Development of branches and sequels to plans could be easier with the help of such systems mentioned before.

The United States armed forces are currently contemplating the idea of multi-domain operations. The key of the concept is multiple effects from different domains concentrated in time and space to disrupt and overload adversary command and control systems. Planning these effects and finding that very point in time when these effects must be massed against the adversary is such a delicate process that it requires assistance from decision support systems powered by AI.

Tasking troops, requesting information and processing voice reports could be achieved by the reliable speech recognition and Natural Language Processing AI. These measures can speed up the command and control of any operation on any level. Command and control of ongoing operations and the assessment function attached to it could be made quicker. If the continuous assessment function during the execution identifies decision points then automatic pre-programmed decisions could be made, identified and executed by autonomous or semi-autonomous AI. The same 3D model engaged for visualising the terrain could be used for tracking the flow of events and highlighting potential hazards.

Installing and incorporating AI decision-support systems not only helps in speeding up the decision loop, but some also see it as a way to reduce the number of personnel in the headquarters. While using AI speeds up things, specialists for maintaining and handling it are still required, which may mean a slight increase in the personnel, since a staff must be prepared to fulfil its mission without the AI, so existing specialists should not be dropped from the roster. Another requirement for the various kinds of AI is electricity. Computers running these calculation-heavy applications require large amount of electric power that is not likely to be permanently available in the field. If it is to be done, then it could increase the electromagnetic footprint of a field headquarters to an extent which may make it impracticable. In the near future operational level and higher headquarters are more likely to use AI tools than the tactical level ones due to this constraint. Further improvements in miniaturisation, accumulators and quantum technology may have the potential to remove this caveat. Another solution can be the outsourcing of data process and using AI tools deployed in a remote location, but this requires constant and reliable protected communications. Achieving this is a tough challenge.

Albeit AI has several potential uses and promises high returns in relatively low costs, there are setbacks implied. By allowing the AI to sort out data and produce relevant information no one can be sure whether important data is left out. One solution could be the explainable AI, which means that while it uses its obscure machine learning neural

[26] Bryan Clark et al.: *Mosaic Warfare: Exploiting Artificial Intelligence and Autonomous Systems to Implement Decision-Centric Operations.* Washington, Center for Strategic and Budgetary Assessments, 2020. 17–25.

networks to produce results, the operators could follow what logical reasoning led to the decisions. AI of this kind is still under development.[27] The electromagnetic output, the required space and the increased communication could give away the location of the field HQ making it an easy target.

On the other hand, there is the human factor. It is questionable whether a human staff officer or commander would willingly accept recommendations or facts from an AI if they cannot understand via which methods that recommendation was found and on what facts it was based. Current research suggests a relatively high confidence in algorithms to crowd advice when a task becomes difficult.[28] This may mean that the internal work of the Western military staff that is currently based on cooperative work may be biased when AI comes into play. Also trust in AI will most likely depend on personal experiences during trainings and operations. If there is no trust between man and AI, then it will jeopardise the mission and the lives of people.

The development and engagement of AI raises several other questions. There is currently no international legal regulation to set the limits of the AI. Without constraints imposed by regulations ethical concerns may rise, such as it happened with the Google employees already mentioned, and adherence to universal ethical values cannot be forced. Enforcing globally accepted regulations can also be a challenge in case of an AI, whose working methods and motives behind decisions are not quite clear.[29]

Conclusion

The past experiences show that there always were great expectations regarding the potential impact of the technological improvements, but the actual technology usually fell behind in meeting these expectations. Commercial players tend to hype their products and since the AI development became a profitable enterprise, hyping is overflowing the media. There is a potential risk in overestimating the capabilities of available AI assets. Current AI technologies do not involve high-level reasoning. They do not think. They are not capable of the same kind of semantic representations and inferences that humans are capable of. They are not able to reason abstractly about real-life situations. But they excel in finding patterns and processing data.[30] Leveraging their existing and proven capabilities and restraining from expecting the impossible are the key for the successful application of AI in operations planning. Operations planning has to be sped up, has to be made more

---

27 Sherrill Lingel et al.: *Joint All-Domain Command and Control for Modern Warfare*. Santa Monica, RAND Corporation, 2020. 44–45.

28 Eric Bogert et al.: Humans Rely more on Algorithms than Social Influence as a Task Becomes more Difficult. *Nature Scientific Reports*, 11, no. 8028 (2021).

29 For more on legal and ethical issues see Imre Négyesi: A mesterséges intelligencia katonai felhasználásának társadalmi kérdései. *Honvédségi Szemle*, 149, no. 1 (2021). 133–144; James Butcher – Irakli Beridze: What is the State of Artificial Intelligence Governance Globally? *The RUSI Journal*, 164, no. 5–6 (2019). 88–96.

30 Kathy Pretz: Stop Calling Everything AI, Machine-Learning Pioneer Says. *IEEE Spectrum*, 31 March 2021; Yasmin Afina: Rage Against the Algorithm: The Risks of Overestimating Military Artificial Intelligence. *Chatham House*, 27 August 2020.

thorough, and this will be able to be achieved by engaging future state-of-the-art Artificial Intelligence solutions.

As demonstrated, the AI as research field made great improvements throughout the past 70 years. These improvements are highly correlated to the improvements in computer technology. Military has always been a driver and beneficiary of AI research, and still is among the main proponents of it all over the world. Ignoring AI means giving the upper hand to the adversary whoever it may be. The leading militaries in the world, namely the United States, Russia and China are investing heavily on military AI research. One must also take into consideration the potential impact of emerging new warfighting concepts, such as the Multi-Domain Operations of the United States or the Chinese attempts to achieve a kind of "intelligentised" warfare: both of which are building heavily on the application of different Artificial Intelligence tools in terms of command and control.

The main question is whether Artificial Intelligence in its current state can be applied in military operations planning. In my point of view despite the recent advances in technology, AI is not yet capable of formulating military plans. Although it is extremely useful in speeding up various sub-processes. The operations planning applied by the NATO relies heavily on different analyses that require enormous time when planning large-scale operations. During crisis response planning even months and weeks may pass until a plan is formulated on the strategic and operational level. The steps of the operations planning processes contain several tasks that can be facilitated by the help of Artificial Intelligence based decision-support tools. Some of these tools are already in use or under tests, some are in conceptual format or under development, but their impact cannot be neglected.

In this paper I set up three criteria that are required for an AI system engaged in planning. It has to accomplish its task in almost real-time, has to use interchangeable output data and it has to be explainable regarding the way it comes to decisions. Even if these criteria are met, there will be points of friction still. Potential benefits come with concerns and possible setbacks, several factors must be taken into consideration regarding the widespread use of AI. On the material and technological side of the wide scale introduction of AI to the planning process more advanced computers, reliable and safe cloud technology and high-speed long-distance connection methods are required. The staffs must be thoroughly trained to adopt the mindset required for working with AI in the future's potential human-computer hybrid organisations.

References

Afina, Yasmin: Rage Against the Algorithm: The Risks of Overestimating Military Artificial Intelligence. *Chatham House*, 27 August 2020. Online: www.chathamhouse.org/2020/08/rage-against-algorithm-risks-overestimating-military-artificial-intelligence

Bogert, Eric – Aaron Schecter – Richard T. Watson: Humans Rely more on Algorithms than Social Influence as a Task Becomes more Difficult. *Nature Scientific Reports*, 11, no. 8028 (2021). Online: https://doi.org/10.1038/s41598-021-87480-9

Branch, William A.: *Artificial Intelligence and Operational-Level Planning: An Emergent Convergence.* Fort Leavenworth, U.S. Army Command and General Staff College, 2018.

Butcher, James – Irakli Beridze: What is the State of Artificial Intelligence Governance Globally? *The RUSI Journal,* 164, no. 5–6 (2019). 88–96. Online: https://doi.org/10.1080/03071847.2019.1694260

Clark, Bryan – Daniel Patt – Harrison Schramm: *Mosaic Warfare: Exploiting Artificial Intelligence and Autonomous Systems to Implement Decision-Centric Operations.* Washington, Center for Strategic and Budgetary Assessments, 2020.

Department of the Army: *FM 6-0 Commander and Staff Organization and Operations.* 2014.

Farrell, Theo – Sten Rynning – Terry Terriff: *Transforming Military Power since the Cold War.* New York, Cambridge University Press, 2013. Online: https://doi.org/10.1017/CBO9781107360143

Hoadley, Daniel S. – Kelley M. Sayler: *Artificial Intelligence and National Security.* Washington, Congressional Research Service, 2020.

Irani, Geoffrey B. – James P. Chirst: Image Processing for Tomahawk Scene Matching. *Johns Hopkins APL Technical Digest,* 15, no. 3 (1994). 250–264.

Kania, Elsa B.: Chinese Military Innovation in the AI Revolution. *The RUSI Journal,* 164, no. 5–6 (2019). 26–34. Online: https://doi.org/10.1080/03071847.2019.1693803

Layton, Peter: *Fighting Artificial Intelligence Battles.* Canberra, Australian Defence College, 2021. Online: https://doi.org/10.51174/JPS.004

Lingel, Sherrill – Jeff Hagen – Eric Hastings – Mary Lee – Matthew Sargent – Matthew Walsh – Li Ang Zhang – David Blancett: *Joint All-Domain Command and Control for Modern Warfare.* Santa Monica, RAND Corporation, 2020.

McDermott, Roger N. – Charles K. Bartles: *The Russian Military Decision-Making Process and Automated Command and Control.* Hamburg, German Institute for Defence and Strategic Studies, 2020.

Morgan, Forrest E. – Benjamin Boudreaux – Andrew J. Lohn – Mark Ashby – Christian Curriden – Kelly Klima – Derek Grossman: *Military Applications of Artificial Intelligence.* Santa Monica, RAND Corporation, 2020. Online: https://doi.org/10.7249/RR3139-1

NATO Standardization Office: *AJP-5 Allied Joint Doctrine for the Planning of Operations, Edition A, Version 2.* 2019a.

NATO Standardization Office: *APP-28 Tactical Planning for Land Forces, Edition A, Version 1.* 2019b.

NATO Standardization Office: *AAP-06 NATO Glossary of Terms and Definitions (English and French) Edition 2021.*

Négyesi, Imre: A csapatvezetési rendszerek automatizálásának első eredményei az USA fegyveres erőinél I. *Hadtudomány,* E-szám (2015). 139–151. Online: https://doi.org/10.17047/HADTUD.2015.25.E.139

Négyesi, Imre: A mesterséges intelligencia katonai felhasználásának társadalmi kérdései. *Honvédségi Szemle,* 149, no. 1 (2021). 133–144. Online: https://doi.org/10.35926/HSZ.2021.1.10

Négyesi, Imre – Péter Török: The Relationship between Human Intelligence and Artificial Intelligence I. *American Journal of Research, Education and Development,* no. 2 (2020). 7–10.

Nilsson, Nils J.: *The Quest for Artificial Intelligence.* New York, Cambridge University Press, 2010.

Pentagon: *DoD Memorandum.* 2017.

Powell, Gerald M. – Gary Loberg – Harlan H. Black – Martin L. Gronberg: Artificial Intelligence and Operational Planning. *Army Research, Development and Acquisition Magazine*, 28, no. 1 (1987). 27–29.

Pretz, Kathy: Stop Calling Everything AI, Machine-Learning Pioneer Says. *IEEE Spectrum*, 31 March 2021. Online: https://spectrum.ieee.org/stop-calling-everything-ai-machinelearning-pioneer-says

Russel, Stuart – Peter Norvig: *Artificial Intelligence.* Englewood Cliffs, Prentice Hall, 1995.

Savage, Neil: The Race to the Top among the World's Leaders in Artificial Intelligence. *Nature*, 10 December 2020. S102–S104. Online: https://doi.org/10.1038/d41586-020-03409-8

Stanley, Elizabeth A.: *Evolutionary Technology in the Current Revolution in Military Affairs: The Army Tactical Command and Control System.* Carlisle, Strategic Studies Institute, 1998.

AARMS Vol. 21, No. 2 (2022) 55–68.

10.32565/aarms.2022.2.4

Experience of the Krk LNG Terminal's Operation in Croatia Over the Past Year[1]

Virág TÖRÖK[2]

The PCI project in Krk was significant – since it was on a number of strategic priority lists for Croatia and the EU. The projections identified target markets for Croatian LNG in 8 countries, with an estimated combined annual gas demand of 37 billion cubic metres. The terminal on Krk was commissioned in January 2021 and has since been operating as a floating offshore storage and regasification facility. The gas taken up and regasified is fed into the Croatian national transmission network, which is interconnected with Hungary and other EU and non-EU member states. In the year of commissioning, a new complementary service was already added to the package of capabilities of the terminal, which allows for small-scale natural gas refuelling. The terminal has a number of positive benefits beyond the obvious improvement of the regional security of supply. These include the efficient integration of the North-South Gas Corridor into the regional gas market and the enhancement of market opportunities for Central and Southeast European operators and the competitiveness of the region. The aim of this presentation is to assess the one-year operation of the terminal in terms of gas supply and to present the energy future of the region.

Keywords: *natural gas, LNG, Krk, energy import, PCI project*

Introduction

Hungary and the whole European Union will face a challenging energy transition in the 2020 decade, based on the Green Deal package[3] of measures published by the European Commission in December 2019. If the ambitious targets set out in the package are met, the European Union (hereafter: EU, Union, Community) could become the most progressive and environmentally friendly organisation in the world (the declared ultimate goal of the package is to make Europe the world's first climate-neutral continent by 2050). For this to happen, Member States will have to overcome a number of legal, infrastructural and political obstacles over the next 30 years, leading to decarbonisation and thus the desired

[1] The present publication was presented in an oral form on the *II South America, South Europe International Conference* at the Ludovika – University of Public Service, Budapest, Hungary, on 3–5 March 2022.

[2] Doctoral student, University of Public Service, Doctoral School of Military Science, e-mail: torok.virag@uni-nke.hu

[3] European Commission: *The European Green Deal in a Nutshell.* 11 December 2019a.

climate neutrality. This process will, of course, involve the long-term displacement of conventional energy sources (imported and exported fossil fuels) used in the EU. Knowing the EU's energy and climate objectives, it is important to have an idea of the availability of the – temporary – options needed to achieve these objectives. Natural gas can be a good alternative to coal-fired power plants that are not generating electricity, provided that the EU can guarantee the security of supply, a properly diversified market and interoperable infrastructure needed to meet the increased demand. As the Community is highly exposed to the Russian Federation in terms of natural gas energy, it is important to support EU imports of Liquefied Natural Gas (LNG) for reasons of diversification. Although gas will continue to be transited through pipeline networks within the continent, due to import diversification, the EU's gas market diversification will be strengthened from an import perspective.

The aim of the analysis is to examine the operation of the Krk LNG terminal, which is directly relevant for our region within the European natural gas market, apropos of the terminal's operation for more than a year. The paper briefly describes the general LNG market conditions in the EU and the safety risks associated with the use of LNG technology. The main part of the thesis is the context of the implementation of the Krk Island LNG terminal, as indicated in the title, with particular reference to its position in the PCI lists, the main dates of the investment, the details of the financing and the technical data of the plant. In the end, the summary discusses the security of supply in the Balkans, the importance of small-scale capabilities and the future of LNG technology. Based on the author's preliminary perception, the operation of this terminal is useful, and its capacity should be expanded in the future. Considering the long-term operation of the terminal, it may be worthwhile to follow its position in the European gas market as the Russian–Ukrainian conflict escalates, especially with a particular focus on the imports from the Middle East and the U.S.

The LNG market of the European Union

Before getting to the specific subject of the analysis, it is worth mentioning the EU LNG market in general, with a special focus on the same periods in 2020 and 2021. This will make it possible to compare and measure the impact of the operation of the Krk terminal on the EU LNG market: the fourth quarter of 2020 was the last quarter to include data without Croatian imports – the last quarter of 2021 will be supplemented by periodic figures for almost a year of Croatian operations. I think it is particularly important to look at periods that measure the market during the heating season, when there is intensive demand.

The European Union's quarterly LNG import volume in Q4 2020 was 16.6 billion cubic metres.[4] In 2020, the total volume of LNG imported into the EU was 84 billion cubic metres.[5] In 2020 (considering the full year), the largest LNG importing countries were Spain (21.4 billion cubic metres), France (20 billion cubic metres), Italy (12 billion cubic

[4] European Commission: *Report on European Gas Market 2020 Q4.* 2021a. 14.
[5] European Commission (2021a): op. cit. 14.

metres), the Netherlands (7.8 billion cubic metres) and Belgium (7.4 billion cubic metres). The imports increased significantly in the fourth quarter of 2021[6] (22.1 billion cubic metres), up by 33% compared to the same period in 2020. It is important to note that after 2021, EU LNG purchases more than doubled in the first months of 2022 year-on-year. In the period under review, a total of 302[7] tankers arrived, which is also more than the 227[8] deliveries in 2020 Q4. In total, during 2021, Member States imported approximately 80 billion cubic metres of LNG, which is lower than the amount imported in 2020.

Trends in Croatian LNG

Croatia's imports are already included in the reports of 2021: in the second quarter of 2021, the United States was Croatia's largest supplier of LNG (82% of its total LNG imports).[9] Russia was the second largest importer of Croatian LNG with 18%. The filling up rate in the country was 29% at the end of the quarter.[10] Considering the 2021 Q3 period, Croatia purchased 0.45 billion cubic metres of LNG.[11] In this quarter, the United States was again the largest supplier to Croatia (44%), but unlike before, Qatar became the second largest supplier with a share of 34%. In Q3 2021, Russia did not deliver significant volumes of natural gas to Croatia.[12] In terms of the level of filling of the storages, at the end of Q3 2021, the average EU filling rate was 75%, with the second highest rate in Croatia reaching 91%.[13] In the fourth quarter, Croatian LNG imports amounted to 0.4 billion cubic metres, while the storage fill rate remained unchanged.[14] Also in this period, the United States was the largest supplier of LNG to Croatia, with 53% of the imported volume.[15]

Operating LNG terminals

Among LNG plants, a distinction is made between large-scale and small-scale terminals. The geographic distribution of the terminals operating in the territory of the Community is clearly concentrated on the northwest and southwest coast of the continent. The plants in Europe are almost exclusively import facilities, the only exceptions those located outside the EU (Norway and Russia).

6 European Commission (2021a): op. cit. 15.
7 European Commission (2021a): op. cit. 15.
8 European Commission (2021a): op. cit. 14.
9 European Commission: *Report on European Gas Market 2021 Q2.* 2021c. 16.
10 European Commission (2021c): op. cit. 21.
11 European Commission: *Report on European Gas Market 2021 Q3.* 2022a. 15.
12 European Commission (2022a): op. cit. 16.
13 European Commission (2022a): op. cit. 22.
14 European Commission: *Report on European Gas Market 2021 Q4.* 2022b. 15.
15 European Commission (2022b): op. cit. 17.

In 2022, 29 large-scale LNG terminals operate in Europe. Of these, 21 are located in an EU Member State, three in the U.K. (not an EU Member State since 2020), four in Turkey and one in Russia.[16] From 2021, Croatia could of course be added to the list.

With further infrastructure interconnections, a number of the terminals already operating could be capable of supplying natural gas to our narrower region, the Central and Eastern European area. One of these could be the Porto Levante terminal on the northern coast of Italy. This terminal has a direct connection to Austria, where the regional gas distribution centre is located.[17] It is also important to mention the facilities from Poland, the terminal at the port of Swinoujscie. Although the terminal itself is not geographically remote from the region under study, a fundamental shortcoming in the EU gas network can be identified when we analyse the possibilities for transporting the imported natural gas inland. Unlike in the western part the continent, the EU's overland pipeline system is not sufficiently well chiselled on the eastern side. This means that the pipeline network is mainly East-West direction defined, while North-South interoperability is not fully ensured. From and infrastructure point of view, our region is not entirely ready to receive imports from the Baltic Sea, and to ensure full interconnectivity, additional North-South interconnectors would need to be built and continuously operated.[18] Especially since, in the context of the Russian–Ukrainian conflict that started in early 2022, the EU is increasingly referring to the introduction of a solidarity clause to cover the threatened gas supply of Member States.

Security risks of LNG terminals

Special rules apply to the transport and storage of LNG. The substance itself, the liquefied natural gas, can basically maintain its liquid state when it is held at an extra-low temperature. LNG is stored at normal pressure. This change of state allows much larger quantities of natural gas to be stored in containers of a given capacity (1 cubic metre of LNG is equivalent to 625 cubic metres of gaseous natural gas).[19]

Since gaseous natural gas is processed by removing the pollutants from the mixture, "pure LNG contains no flammable source and therefore does not burn on its own. A fire or an explosion requires a combination of three factors: flammable material, oxygen and a heat source. LNG can therefore only catch fire if it is in contact with air in a closed environment producing an exactly 5–15 percent mixture and if there is a source of ignition close-by".[20] If it still happens, LNG becomes an explosive substance that spreads rapidly. It burns at about twice the speed of regular petrol, with a combustion temperature of

[16] Danielle Murphy-Cannella – Magnus Eikens: Jettyless Terminals: Accelerating Alternative LNG Import to Europe. *Econnectenergy,* 08 March 2022.

[17] Diána Blanka Blum: *Az LNG szerepe a közép- és kelet-európai gázdiverzifikációban. A régiónk ellátásbiztonságának fokozása.* Budapest, GlobeEdit, 2020. 52.

[18] At the Polish–Slovak and Slovak–Hungarian border crossing points.

[19] Jianhua Li – Zhenghua Huang: Fire and Explosion Risk Analysis and Evaluation for LNG Ships. *Procedia Engineering,* 45 (2012). 70–76.

[20] Zsuzsanna Réka Kecse: A cseppfolyós földgáz, azaz az LNG szerepe Európában. *International Relations Quarterly,* 1, no. 4 (2010). 2.

650 degrees Celsius. Another characteristic is that it is difficult to smother and there is a high risk of re-ignition.[21] Obviously, this involves safety risks, and to minimise these, a number of rules have been put in place for the construction of LNG ships and plants.[22]

Relevant PCI projects

The projects on the PCI list, as it is known in EU terminology, are a collective name for energy investments that will bring positive benefits to multiple members of the Community and help the EU achieve its energy and climate policy goals by connecting national energy systems. These investments are ranked by the EU on the basis of a common trans-European infrastructure development plan, and the projects on this list are prioritised at Community level.[23] Initiatives to extend the onshore pipeline network are the most likely to be included, as strengthening transit systems interoperability, through the construction of interconnectors and making them bidirectional, will generate added value for the Community energy sector in a more resource and time efficient way. The first PCI list was created in 2013 and the current list was published in 2021. The projects on this list have received a total EU contribution of €30 billion in the previous budget cycle, from 2014 to 2020, through the Connecting Europe Facility (CEF) programme.[24]

Four of the initiatives on the previous list published in 2019 (Shannon, Krk, Gdansk, Alexandroupolis) were aimed to support the deployment of new LNG terminals on the continent.[25] In addition to what has been previously described, these types of investments will in the long term, both strengthen competition in the gas market and contribute to securing the EU's energy supply.[26]

2021 PCI list

The fifth PCI list, currently in force, reflects the infrastructure priorities in line with the EU's climate policy objectives as set out in the Green Deal package, as it does not include any new fossil fuel infrastructure projects and focuses on supporting the implementation of decarbonisation ambitions. The number of PCIs supporting the Union's gas network was reduced from the 32 projects in 2019 to 20 projects in 2021.[27] With the 20 projects in

---

21 Li–Huang (2012): op. cit. 71.

22 Vlado Frančić et al.: *Maritime Study LNG FSRU Krk.* University of Rijeka, 2017. 53.

23 Takácsné Tóth Borbála: Közös érdekű energetikai infrastruktúra-fejlesztési projektek az Energia Közösségben. *Jelentés az energiapiacokról,* 13, 3 (2013). 9.

24 INEA: Third State of the Energy Union: EU Is on Track to Implement the Energy Union and Deliver Jobs, Growth and Investments. *INEA,* 24 November 2017.

25 Commission Delegated Regulation (EU) 2020/389 of 31 October 2019 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of projects of common interest.

26 European Commission: *Key Cross Border Infrastructure Projects.* 2020.

27 European Commission: *Questions and Answers on the Fifth List of Energy Projects of Common Interest (PCIs).* 19 November 2021d.

progress now running out, this type of investment is unlikely to be launched again – in line with the EU's decision to phase out support for fossil fuel infrastructure. Currently, only 1 LNG terminal[28] remains on the list, the rest of the LNG projects have already been completed in the previous cycle. The remaining subtasks in the 2021 list related to the Krk plant are summarised in the 6.26.1 Croatia–Slovenia cluster[29] as follows: construction of the Croatia–Slovenia connection, the 2nd phase of the modernisation of the Kidričevo compressor station and the modernisation of the Rogatec connection. As the European Commission is committed to aligning the EU energy regulation with the Green Deal, a review of the TEN-E[30] Regulation was also initiated at the end of 2020, resulting in an interim political agreement[31] between the Commission and Parliament in December 2021. In this way, the regulatory environment would not allow the construction of a fossil fuel transport network to become a project of common interest in the future. In addition, all future projects on the following PCI lists will be required to fulfil sustainability criteria.[32]

Krk

Funding

The CEF for 2014–2020 has allocated a total budget of €5.35 billion to the energy sector,[33] which has been useful for achieving the Europe 2020 energy and climate change objectives. During this period, the construction of the Krk LNG terminal was also financed from the same budget.

In the period of 2014–2020, the following titles have been called for the implementation of the Croatian LNG plant:[34]

- Studies for the LNG terminal in Krk: legal and financial advice, FEED, master plan, EPC tender documentation, energy supply system documentation
- Preparation of field and laboratory studies and reports
- Construction of Krk LNG terminal
- Construction works for the Omišalj-Zlobin LNG pipeline section
- Studies on the long-term operation of the Krk FSRU LNG terminal

---

28 6.27 LNG Gdansk (PL).

29 European Commission: Annex to Commission Delegated Regulation (EU) …/… Amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as Regards the Union List of Projects of Common Interest. 19 November 2021e. 7.

30 Trans European Network – Energy.

31 Council of the European Union: Proposal for a Regulation of the European Parliament and of the Council on Guidelines for Trans-European Energy Infrastructure and Repealing Regulation (EU) No 347/2013 – Analysis of the Final Compromise Text with a View to Agreement. 17 December 2021.

32 European Commission: *Commission Proposes New List of Projects of Common Interest for a More Integrated and Resilient Energy Market.* 19 November 2021f.

33 Davide Pernice – Frédéric Gouardères: Financing the Trans-European Networks. *European Parliament*, December 2021.

34 European Commission: *Connecting Europe Facility (CEF) – Energy Grants. Croatia. Key Facts and Figures.* June 2019c.

The total implementation cost was approximately €233.6 million, with the following breaking down:[35]

- €101.4 million contribution from the Connecting Europe Facility
- €100 million direct financial contribution from the Croatian State budget
- €32.2 million direct capital contribution from HEP Plc and Plinacro Ltd.

Preliminary perceptions

The Croatian initiative offers a number of advantages for all countries in the region, as the level of the diversification of the natural gas market in the Carpathian Basin is much lower than in the Western regions – therefore any new energy investment will significantly improve the overall security of supply in the region. The strategic location of the Krk Island terminal allows it to supply gas to the landlocked Eastern Europe, which is largely dependent on the Russian piped natural gas.[36]

The project was a significant Europe-wide construction project – beyond the PCI list, the project was included in several lists of strategic importance for Croatia and for the EU, for example in the list of *Declared Project of Strategic Importance for the Republic of Croatia*, in the CESEC[37] Action Plan and in the European Energy Security Strategy.[38] It is important to point out that, unlike other planned terminals, this project had a two-phase construction plan, the first phase of which, the construction of the terminal, has already been completed. (The second phase of the investment is included in the 2021 PCI list under point 6.26.1.)[39] The first phase involved expanding the capacity of the terminal and connecting it to the overland pipeline system, resulting in an annual increase of 2.6 billion cubic metres of resources and a direct connection of the source to Hungary.[40]

Potential target markets for the Croatian LNG have been identified in 8 countries with a combined annual gas demand of 37 billion cubic metres. Of these, Croatia (2.7 cubic metre) and Hungary (9.5 cubic metre) were the primary markets, with an overall annual demand of 12 cubic metre. In the context of immediate neighbourhood and the common gas infrastructure project,[41] Slovenia's gas demand is also worth mentioning, at 0.7 billion cubic metres per year.[42]

Although originally an overland plant was planned, in the end a floating facility was added to the project list. This could be constructed more cost-effectively by converting an LNG carrier and by building only the onshore infrastructure. The resulted FRSU has

---

35 European Commission: *State Aid: Commission Approves Public Support for Croatian LNG Terminal at Krk Island.* 31 July 2019b.

36 Ronen Lazarovitch – Adam Quigley: LNG: Regions on the Rise. *Bracewell,* 03 February 2022.

37 Central and South Eastern Europe Energy Connectivity.

38 European Commission: *European Energy Security Strategy.* 28 April 2014.

39 Sebastijan R. Maček: Slovenia and Croatia Plan Closer Nuclear, Gas Ties. *Euractive,* 30 March 2022.

40 Serbia Energy: Hungary and LNG Terminal in Croatia. *Serbia Energy News,* 12 June 2020.

41 Portfolio: Szijjártó elárulta, Magyarország és Szlovénia összekötné gázvezeték-hálózatát. *MTI,* 02 February 2019.

42 LNG Croatia Llc: LNG Terminal Krk in Croatia. *LNG Croatia Llc,* June 2021.

a smaller reception and regasification capacity than before but has the advantage of being able to be moved if necessary.[43]

The physical implementation of the terminal has been a long process, dates back to 2014 with the planning phase: the first feasibility studies were published in 2016. At the beginning of 2017, the decision of the Connecting Europe Facility to participate in the project was taken and the contract was signed at the end of 2017 (worth €101.4 million). In the first quarter of 2019, the final investment decision was made public, marking the actual start of the implementation of the project. A year later, by January 2020, the cross-border compressor station was completed, enabling reverse transports between Hungary and Croatia. The onshore works were completed by the end of the first quarter of 2020, and the floating part of the terminal was completed by the end of 2020. The facility was commissioned on 29 January 2021[44] and the first cargo ship arrived this month.[45]

Technical specifications

The terminal, which has been operational since 2021, does not have outstanding regional capacity, but it is undoubtedly the largest entry point to the national gas infrastructure in Croatia, with the capacity to supply 40% of the Croatian market with its import volumes alone.[46] The capacity of LNG carriers (LNGCs) being able to put in at the terminal ranges from 3,500 to 265,000 cubic metres. The maximum transfer capacity from the ship to the terminal is 8,000 cubic metres per hour. The nominal back-filling capacity from the LNG terminal to the cargo ship: 1,500 cubic metres per hour. The plant has a total LNG storage capacity of 140,206 cubic metres and a maximum regasification capacity of 300,000 cubic metres per hour, which equates to 2.6 billion cubic metres in a year.[47]

The year 2021

As previously described, the terminal on the island of Krk has been operating as a floating offshore storage and regasification unit (FSRU) since January 2021. This makes Croatia the 13th EU Member State to be able to import LNG directly through the Krk Island terminal.[48] In May of the year of commissioning, a new additional service was added to the terminal's package of capabilities, which – uniquely in the Mediterranean – now offers the possibility of small-scale natural gas refilling at the plant.[49] The total storage

43 Orsolya Somogyi: Csúcsra jár a Krk terminál. *Magyar Nemzet*, 01 October 2021.
44 European Commission: *First Croatian LNG Terminal Officially Inaugurated in Krk Island.* 29 January 2021g.
45 Claudia Patricolo: First LNG Carrier Arrives at Krk. *Ceenergy News*, 01 January 2021.
46 Evelin Szőke: Rewriting the Regional Gas Market: The Future of the Krk Terminal. *Ceenergy News*, 18 June 2021.
47 Barbara Doric: LNG Terminal on the Island of Krk. Status and Project Update. *Budapest LNG Summit*, December 2019.
48 European Commission: *Report on European Gas Market 2021 Q1.* 2021b. 13.
49 Adnan Bajic: LNG Croatia Completes First Small-Scale Reload at Krk. *Offshore Energy*, 24 May 2021.

capacity of the FRSU is already booked up for the next three years, and only 26% of it is still available until 2027 (84% booked).[50]

During 2021, Krk hosted a total of 16 cargo ships, of which 8 were from the USA, 2 from Nigeria and Qatar, and 1 from Belgium (Zeebrugge), France (Dunkirk), Trinidad and Tobago and Egypt.[51] The total volume of deliveries up to November 2021 is estimated at around 1.4 billion cubic metres of gas. The proportions of countries exporting LNG in 2021 to the EU for the Community as a whole were as follows: the largest supplier of LNG to the EU was the United States (22.3 billion cubic metres), followed by Qatar (16.3 billion cubic metres), Russia in third place (16 billion cubic metres), Nigeria (11.2 billion cubic metres), Algeria (8.5 billion cubic metres) and Trinidad and Tobago (2 billion cubic metres). Total imports from other, smaller suppliers amounted to 3.7 billion cubic metres.[52] It can be seen that Croatian proportions are in line with the EU trends.

The Hungarian import

The Magyar Földgázkereskedő Zrt. (a subsidiary of state-owned MVM Magyar Villamos Művek Zrt.) has successfully booked LNG capacity at the Krk LNG terminal in Croatia. Under the agreement signed in summer 2020, MFGK Croatia d. o.o. (of which Magyar Földgázkereskedő Zrt. is the parent company) will be allowed to use up to 1 billion cubic metres of capacity per year from the Krk terminal for a seven-year cycle starting in 2021.[53] In terms of the exact figures, the MVM Group has booked the following volumes for the following years: 1.409 billion cubic metres for 2020–2021, 2.072 billion cubic metres for 2021–2022 and 2022–2023, 1.534 billion cubic metres for 2023–2024 and 1.532 billion cubic metres for each of the next three gas seasons.[54] With the booking of another Hungarian-owned company, MET (a total of 1.3 billion cubic metres over the next three years), Hungary has become a major user of LNG capacity in Krk. The Hungarian contracts also ensure the long-term economic viability of the Krk LNG terminal, which has become the first operational LNG terminal in Central and Southeastern Europe. Here it is worth mentioning the declarations that concretise the sources of Hungarian supply. For instance, the announcement that Hungary will purchase 250 million cubic metres of LNG per year for six years from the Royal Dutch Shell through the Krk LNG port. The long-term contract with Shell is the first long-term deal with a Western player in Hungary's history.[55]

---

50 Sanja Pekic: Croatia's LNG Terminal Receives Its 10th Cargo. *Offshore Energy,* 27 July 2021.

51 Sanja Pekic: FSRU LNG Croatia Receives 16th Cargo and 1st One from Egypt. *Offshore Energy,* 12 November 2021.

52 European Commission (2022b): op. cit. 14.

53 Világgazdaság: Történelmi jelentőségű a szerepvállalásunk a Krk LNG terminálban. *Világgazdaság,* 09 June 2020.

54 Iskra Pavlova: MFGK Croatia Books 6.8 bcm Capacities at Krk LNG Terminal until 2027. *SeeNews,* 08 June 2020.

55 Evelin Szőke: Hungary's FM: Krk LNG Terminal Creates a New Situation for Energy Security in CEE. *Ceenergy News,* 29 January 2021.

Hungary has purchased natural gas from a dedicated LNG source for the first time, using this new transport route and ensuring its own long-term source diversification. The Croatian contracts cover about one fifth of Hungary's yearly gas import demand.[56]

Conclusion

There is no doubt that the LNG segment of the European Union's natural gas market, and the current situation of the market expansion, is constantly changing and offers many opportunities. The liquefied natural gas market is growing dramatically and is expected to increasingly allow room for U.S. export gas, in contrast to the previous dependency on Russian pipeline imports.

So, at the beginning of last year Croatia joined the list of EU LNG importing countries, too. According to the previous description, the plant, which has the capacity to regasify 2.6 billion cubic metres of natural gas per year, becomes the third terminal after Revithoussa in Greece and Marmara Ereglisi in Turkey.[57]

Looking around our southern neighbourhood, we can see that two more countries (Albania and Bulgaria) are also planning to introduce the technology of LNG. In case of Albania,[58] this type of diversification would mitigate the exposure to hydropower yields, while the indirect LNG access for Bulgaria,[59] (via a Greek terminal) would both reduce the country's dependence on Russian gas and contribute to optimising energy use by encouraging a shift from coal to natural gas.

Also an important aspect of the operation of the Krk terminal is that, in addition to the large-scale capability, a small-scale filling capability has been developed, i.e. the possibility to backfill LNG from the FSRU LNG Croatia to a smaller tanker (e.g. Avenir Accolade with a capacity of 7,000 cubic metres).[60] This service is the first in the Mediterranean basin and has made Croatia a market leader in small-scale refilling. The additional capacity established will allow the Croatian market to participate in the maritime trade of LNG. In conclusion, with the introduction of this new, additional service, the Krk Island LNG terminal has further increased its importance on the energy map of Europe.

Finally, let us mention the perspectives of environmentally friendly LNG technology in general. These efforts in the EU are clearly connected with the relevant objectives of the Green Deal package, in which the reduction of carbon dioxide emissions is a priority. Overall, even in the medium term, the use of natural gas and regasified LNG can be a more environmentally friendly solution than the combustion of heavier fossil fuels. In order to further increase the competitiveness of this energy source compared to renewables,

---

56 Embassy of Hungary Washington: Another Energy Diversification Milestone Reached by Hungary. *Embassy of Hungary Washington,* 16 June 2021.

57 Gas Strategies: Balkan Focus: Croatia, Bulgaria and Albania Bank on LNG Import Solutions. *Gas Strategies,* 14 October 2021.

58 Excelerate Energy: LNG Would Bring Reliability and Diversity to Albania's Power Supply Portfolio and the Balkans. *Excelerate Energy,* 12 March 2021.

59 Svetoslav Todorov: Bulgaria Buys Share of Greek Gas Terminal. *BalkanInshight,* 10 January 2020.

60 Avenir LNG. 24 May 2021.

the LNG industry has come up with a number of creative solutions. One of these is the introduction of a green LNG service. The purchase of the product is guaranteed to offset the carbon dioxide emissions of the tanker ships carrying natural gas, by buying emission quotas/certificates or by participating in other environmental supporting measures outside the sector (e.g. afforestation projects).[61] As green LNG is not yet widely traded, the question of who will pay the extra cost of carbon neutrality and how it will be charged to end-users is not fully resolved. The EU, among others, has also expressed doubts about the compensation strategy detailed above, which is rooted in fragmented certification processes and missing monitoring mechanisms.

According to forecasts, if gas prices are once normalised, the additional costs built in this way will not be so significant as to have a decisive impact on trade preferences. Here we need to mention the Russian–Ukrainian conflict that erupted in February 2022 and has had a significant impact on European gas trade ever since. In summary, Russian gas imports remain a key factor for (Eastern) Member States' imports in the 2020s, which means that in the current situation they are highly exposed to the Russian gas industry's revisionist actions in the aftermath of the EU sanctions policy, which, together with the high volatility after the outbreak of the war, have dramatically increased the average prices over the last three months. In terms of domestic gas prices, "the day before the war, gas prices were €80 per megawatt-hour, rising to €88 by 10 June, representing a 10 percent increase. However, the average price during this period was €111, almost 40 percent higher than the day before the war".[62]

All in all, the Krk Island LNG terminal has proven to be a good and timely decision in the short and medium term, as one of the last completed gas projects in the transition from fossil fuels. It remains to be seen to how far increasingly expensive imported gas will be a sustainable resolution. It is worth pointing out that the first measures taken by Member States to replace gas as a primary energy source may reach back to the reopening of coal and lignite mines, which were previously considered environmentally harmful. Hungary has secured access to Croatian imports until the 2030s, which has clearly made our national security of supply more stable and diversified (due to the not exclusively Russian LNG product).

References

Avenir LNG. 24 May 2021. Online: https://avenirlng.com/company-news/avenir-accolade-completes-its-first-cargo-from-croatia/

Bajic, Adnan: LNG Croatia Completes First Small-Scale Reload at Krk. *Offshore Energy,* 24 May 2021. Online: www.offshore-energy.biz/lng-croatia-completes-first-small-scale-reload-at-krk/

[61] The National Law Review: LNG in Europe 2021: Current Trends, the European LNG Landscape and Country Focus. *The National Law Review,* 12, no. 152 (2021).

[62] Világgazdaság: Egyre nagyobb a háború okozta árnyomás a gáz és az áram piacán. *Világgazdaság,* 12 June 2022.

Blum, Diána Blanka: *Az LNG szerepe a közép- és kelet-európai gázdiverzifikációban. A régiónk ellátásbiztonságának fokozása.* Budapest, GlobeEdit, 2020.

Doric, Barbara: LNG Terminal on the Island of Krk. Status and Project Update. *Budapest LNG Summit*, December 2019. Online: https://budapestlngsummit.hu/2019/download/Barbara-Doric_LNG-Croatia.pdf

Council of the European Union: *Proposal for a Regulation of the European Parliament and of the Council on Guidelines for Trans-European Energy Infrastructure and Repealing Regulation (EU) No 347/2013 – Analysis of the Final Compromise Text with a view to Agreement.* 17 December 2021. Online: https://data.consilium.europa.eu/doc/document/ST-15036-2021-INIT/en/pdf

Embassy of Hungary Washington: Another Energy Diversification Milestone Reached by Hungary. *Embassy of Hungary Washington*, 16 June 2021. Online: https://washington.mfa.gov.hu/eng/news/another-energy-diversification-milestone-reached-by-hungary

European Commission: *European Energy Security Strategy.* 28 April 2014. Online: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0330

European Commission: *The European Green Deal in a Nutshell.* 11 December 2019a. Online: https://ec.europa.eu/info/publications/factsheets-european-green-deal_en

European Commission: *State Aid: Commission Approves Public Support for Croatian LNG Terminal at Krk Island.* 31 July 2019b. Online: https://ec.europa.eu/commission/presscorner/detail/da/ip_19_4910

European Commission: *Connecting Europe Facility (CEF) – Energy Grants. Croatia. Key Facts and Figures.* June 2019c. Online: https://ec.europa.eu/inea/sites/default/files/cefpub/cef_energy_factsheet_hr.pdf

European Commission: *Key Cross Border Infrastructure Projects.* 2020. Online: https://ec.europa.eu/energy/topics/infrastructure/projects-common-interest/key-cross-border-infrastructure-projects_en

European Commission: *Report on European Gas Market 2020 Q4.* 2021a. Online: https://ec.europa.eu/energy/sites/default/files/quarterly_report_on_european_gas_markets_q4_2020_final.pdf

European Commission: *Report on European Gas Market 2021 Q1.* 2021b. Online: https://energy.ec.europa.eu/system/files/2021-07/quarterly_report_on_european_gas_markets_q1_2021_final_0.pdf

European Commission: *Report on European Gas Market 2021 Q2.* 2021c. Online: https://energy.ec.europa.eu/system/files/2021-10/quarterly_report_on_european_gas_markets_q2_2021_final.pdf

European Commission: *Questions and Answers on the Fifth List of Energy Projects of Common Interest (PCIs).* 19 November 2021d. Online: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_6093

European Commission: *Annex to Commission Delegated Regulation (EU) …/… Amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as Regards the Union List of Projects of Common Interest.* 19 November 2021e. Online: https://ec.europa.eu/energy/sites/default/files/fifth_pci_list_19_november_2021_annex.pdf

European Commission: *Commission Proposes New List of Projects of Common Interest for a More Integrated and Resilient Energy Market.* 19 November 2021f. Online: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6094

European Commission: *First Croatian LNG Terminal Officially Inaugurated in Krk Island.* 29 January 2021g. Online: https://cinea.ec.europa.eu/news-events/news/first-croatian-lng-terminal-officially-inaugurated-krk-island-2021-01-29_ro

European Commission: *Report on European Gas Market 2021 Q3.* 2022a. Online: https://energy.ec.europa.eu/system/files/2022-01/Quarterly%20report%20on%20European%20gas%20markets%20Q3_2021_FINAL.pdf

European Commission: *Report on European Gas Market 2021 Q4.* 2022b. Online: https://energy.ec.europa.eu/system/files/2022-04/Quarterly%20report%20on%20European%20gas%20markets_Q4%202021.pdf

Excelerate Energy: LNG Would Bring Reliability and Diversity to Albania's Power Supply Portfolio and the Balkans. *Excelerate Energy,* 12 March 2021. Online: https://excelerateenergy.com/news/excelerate-energy-exxonmobil-and-the-republic-of-albania-agree-to-lng-terminal-study/

Frančić, Vlado – Josip Orović – Lovro Maglić – Donatan Balog – Leo Giačić – Mario Vukelić: *Maritime Study LNG FSRU Krk.* University of Rijeka, 2017. Online: https://lng.hr/wp-content/uploads/2021/06/Maritime-study-lng-terminal-v.15-eng_with_Decision.pdf

Gas Strategies: Balkan Focus: Croatia, Bulgaria and Albania Bank on LNG Import Solutions. *Gas Strategies,* 14 October 2021. Online: https://gasstrategies.com/information-services/lng-business-review/balkan-focus-croatia-bulgaria-and-albania-bank-lng-import

INEA: Third State of the Energy Union: EU Is on Track to Implement the Energy Union and Deliver Jobs, Growth and Investments. *INEA,* 24 November 2017. Online: https://ec.europa.eu/inea/en/news-events/newsroom/third-state-energy-union-eu-track-to-implement-energy-union-and-deliver-jobs

Kecse, Zsuzsanna Réka: A cseppfolyós földgáz, azaz az LNG szerepe Európában. *International Relations Quarterly,* 1, no. 4 (2010). Online: www.southeast-europe.org/pdf/04/DKE_04_M_KECSE_LNG.pdf

Lazarovitch, Ronen – Adam Quigley: LNG: Regions on the Rise. *Bracewell,* 03 February 2022. Online: https://bracewell.com/insights/lng-regions-rise

Li, Jianhua – Zhenghua Huang: Fire and Explosion Risk Analysis and Evaluation for LNG Ships. *Procedia Engineering*, 45 (2012). 70–76. Online: https://doi.org/10.1016/j.proeng.2012.08.123

LNG Croatia Llc: LNG Terminal Krk in Croatia. *LNG Croatia Llc,* June 2021. Online: www.lng.hr/wp-content/uploads/2021/06/LNG-terminal-Krk_presentation_Open-Season.pdf

Maček, Sebastijan R.: Slovenia and Croatia Plan Closer Nuclear, Gas Ties. *Euractive,* 30 March 2022. Online: www.euractiv.com/section/politics/short_news/slovenia-and-croatia-plan-closer-nuclear-gas-ties/

Murphy-Cannella, Danielle – Eikens, Magnus: Jettyless Terminals: Accelerating Alternative LNG Import to Europe. *Econnectenergy,* 08 March 2022. Online: www.econnectenergy.com/articles/jettyless-terminals-accelerating-alternative-lng-import-to-europe

Patricolo, Claudia: First LNG Carrier Arrives at Krk. *Ceenergy News,* 01 January 2021. Online: https://ceenergynews.com/lng/first-lng-carrier-arrives-at-krk/

Pavlova, Iskra: MFGK Croatia Books 6.8 bcm Capacities at Krk LNG Terminal until 2027. *SeeNews*, 08 June 2020. Online: https://seenews.com/news/mfgk-croatia-books-68-bcm-capacities-at-krk-lng-terminal-until-2027-701776

Pekic, Sanja: Croatia's LNG Terminal Receives Its 10th Cargo. *Offshore Energy*, 27 July 2021. Online: www.offshore-energy.biz/croatias-lng-terminal-receives-its-10th-cargo/

Pekic, Sanja: FSRU LNG Croatia Receives 16th Cargo and 1st One from Egypt. *Offshore Energy*, 12 November 2021. Online: www.offshore-energy.biz/fsru-lng-croatia-receives-16th-cargo-and-1st-one-from-egypt/

Pernice, Davide – Frédéric Gouardères: Financing the Trans-European Networks. *European Parliament*, December 2021. Online: www.europarl.europa.eu/ftu/pdf/en/FTU_3.5.2.pdf

Portfolio: Szijjártó elárulta, Magyarország és Szlovénia összekötné gázvezeték-hálózatát. *MTI*, 02 February 2019. Online: www.portfolio.hu/vallalatok/energia/szijjarto-elarulta-magyarorszag-es-szlovenia-osszekotne-gazvezetek-halozatat.312711.html

Serbia Energy: Hungary and LNG Terminal in Croatia. *Serbia Energy News*, 12 June 2020. Online: https://serbia-energy.eu/hungary-and-lng-terminal-in-croatia/

Somogyi, Orsolya: Csúcsra jár a Krk terminál. *Magyar Nemzet*, 01 October 2021. Online: https://magyarnemzet.hu/gazdasag/2021/10/csucsra-jar-a-krk-terminal

Szőke, Evelin: Hungary's FM: Krk LNG Terminal Creates a New Situation for Energy Security in CEE. *Ceenergy News*, 29 January 2021. Online: https://ceenergynews.com/lng/hungarys-fm-krk-lng-terminal-creates-a-new-situation-for-energy-security-in-cee/

Szőke, Evelin: Rewriting the Regional Gas Market: The Future of the Krk Terminal. *Ceenergy News*, 18 June 2021. Online: https://ceenergynews.com/oil-gas/rewriting-the-regional-gas-market-the-future-of-the-krk-terminal/

Takácsné, Tóth Borbála: Közös érdekű energetikai infrastruktúra-fejlesztési projektek az Energia Közösségben. *Jelentés az energiapiacokról*, 13, no. 3 (2013). 9–12. Online: https://rekk.hu/downloads/publications/rekk_jelentes_2013_3.pdf#page=9

The National Law Review: LNG in Europe 2021: Current Trends, the European LNG Landscape and Country Focus. *The National Law Review*, 12, no. 152 (2021). Online: www.natlawreview.com/article/lng-europe-2021-current-trends-european-lng-landscape-and-country-focus

Todorov, Svetoslav: Bulgaria Buys Share of Greek Gas Terminal. *BalkanInshight*, 10 January 2020. Online: https://balkaninsight.com/2020/01/10/bulgaria-takes-role-in-greek-gas-terminal/

Világgazdaság: Egyre nagyobb a háború okozta árnyomás a gáz és az áram piacán. *Világgazdaság*, 12 June 2022. Online: www.vg.hu/nemzetkozi-gazdasag/2022/06/egyre-nagyobb-a-haboru-okozta-arnyomas-a-gaz-es-az-aram-piacan

Világgazdaság: Történelmi jelentőségű a szerepvállalásunk a Krk LNG terminálban. *Világgazdaság*, 09 June 2020. Online: www.vg.hu/cegvilag/2020/06/tortenelmi-jelentosegu-a-szerepvallalasunk-a-krk-lng-terminalban

AARMS Vol. 21, No. 2 (2022) 69–85.

10.32565/aarms.2022.2.5

Women's Role in the Tunisian Process of Democratisation

Zsuzsanna Xénia SIPOS[1]

The significant role of women in all fields of the Tunisian society has been decisive since the country's struggle for independence from the colonial power, France, and during the state-building process of the post-colonial period. Furthermore, the events of and after the Arab Spring brought about a more active role for women's rights activists, which resulted in a widespread debate on gender equality. However, despite the efforts of the Tunisian Government to ensure protection against the discrimination of women, the growing socioeconomic crisis, amplified by the consequences of the Covid-19 pandemic, brought to the surface the difficulties of vulnerable groups, including women. Women engaged in rural activities were more at risk of facing deteriorating circumstances. In this context, the current study examines the relationship between the process of democratisation and the role women can play in the shaping of the political field and vice versa.

In addition to applying statistical indicators, the article verifies the main theses of the research in the empirical part due to the incorporation of qualitative data collected from interviews conducted with five representatives/activists of local Tunisian NGOs.

Although international relations themselves remain strongly gendered, the mobilisation of women's rights activists can contribute to overwriting traditional masculine and feminine roles in public versus private spheres, and thus can result in a more gender-friendly environment.

Keywords: *democratisation, women's rights NGOs, gender equality, Tunisia, mobilisation, socioeconomic challenges, awareness campaign, public and private spheres*

Introduction

Tunisia occupies a special place among the MENA countries[2] concerning gender equality because of the outstanding indicators and achievements that also make the country often

[1] PhD candidate, Corvinus University of Budapest, Doctoral School of International Relations and Political Science (International Relations and Security Studies subprogram), e-mail: xeni-khali2008@live.fr

[2] Countries of the Middle East and North Africa.

regarded a pioneer in women's rights. To better understand the current discourse on women's rights, it is indispensable to evoke the major milestones from the independence of the country gained in 1956 that established a solid framework for gender equality. However, taking into account the limitations of the scope of the article, the time frame focuses on the post-Arab Spring period of Tunisia, which is also in accordance with the findings of the empirical research.

In order to better understand the evolution of women's rights in Tunisia, it must be highlighted that the modern history of the country starting from its independence is understood along the religious versus secular fault line, or the modern versus Islamist dichotomy. The Islamist side, led by the Ennahda party (previously known as Islamic Tendency Movement) at its head advocated the traditional roles of Islam and opposed the Western-type feminism in its founding years, mainly in the field of education and the question of polygamy.[3] Concerning the place of women in the Muslim society, it cannot be neglected that they are generally pictured as being vulnerable and weak whereas strength is attributed to men. As a consequence, women and men have different roles; men are regarded as breadwinners and guardians of women, while wives and mothers are responsible for household activities. This traditional division of tasks also means that in most cases men have the right to make the final decision.[4] The emphasis of traditional values is quite understandable and is seen as a counteract and a revival movement in light of the memories of the colonial period and the enforcement of Western values following the independence of Tunisia.

Contrary to the religious aspect, the modernist approach was dominant during the decolonisation and in the state-building process and served to set the country on the Western model of development. The establishment of state institutions, e.g. the Ministry of Women, Family, Children and Seniors focusing on the position of women in the society is also understood in the context of state modernisation and the outstanding role women were given by the first president of the country, Habib Bourguiba.

Following the independence of Tunisia, poor indicators of human development[5] also showed that a greater emphasis on development was inevitable. The most significant measure of President Bourguiba, was the adoption of the *Personal Status Code* (CSP)[6] in 1956 that abolished polygamy, provided women with the right to divorce and child custody, and set a minimum age for marriage.[7] In 1958, Bourguiba introduced compulsory education for young women and people living in rural areas.[8] However, despite the visibly progressive measures, the CSP did not succeed in eliminating gender inequalities in the family since women continued to inherit half of the men's inheritance,

---

3 Fatemeh Radan: 2011 Uprising and Tunisian Women's Socio-Political Situation. *The Quarterly Journal of Political Studies of Islamic World*, 6, no. 24 (2018). 22–31.

4 Muhammad Zafrulla Khan: *Women in Islam.* Islamabad, Islam International Publications Limited, 1991. 8, 11.

5 In 1956 the literacy rate only reached 15% and only one child in thirty received a high-school education (Mark A. Tessler – Mary E. Keppel: Political Generations. In Russell A. Stone – John Simmons: *Change in Tunisia. Studies in the Social Sciences.* Albany, State University of New York Press, 1976. 73–106).

6 Personal Status Code referred to as CSP in the following from the French acronym of Code du Statut Personnel.

7 République Tunisienne [Republic of Tunisia]: Code du Statut Personnel [Personal Status Code]. L'Imprimerie Officielle de la République Tunisienne [Official Printing Press of the Republic of Tunisia], 2012.

8 Ahmed Chabchoub: *Bourguiba et moi* [Bourguiba and Me]. Dubai, Al Manhal, 2014. 128.

men received greater rights to the guardianship of children, and women were required to obey their husband.[9] The promotion of the image of modern Tunisia, that is, state-controlled feminism, also determined the country's approach to the question of gender equality following the coming to power of President Ben Ali in 1987.[10] However, besides restrictions in freedom of expression, the economic marginalisation of women also remained significant during Ben Ali, since women only received three-quarters of the salary of men, though with the prospect of full retirement.[11] It was in this context that the feminist discourse intensified in the 1980s and 1990s, which is also considered the second wave of feminism in Tunisia. Due to the activism of women's rights NGOs, Tunisian women married to foreign nationals could pass their citizenship on to their children for the first time in the country's history[12] and in 2002 the citizenship law was amended.[13]

Following decades of repression of freedom of association and of expression, the post-Arab Spring era opened the way for women's rights organisations to freely embrace previously marginalised topics, including the launch of a broad discourse on equal inheritance[14] and recently the growing cases of domestic violence that culminated during the Covid-19 pandemic. With regard to the MENA region in general, it must be outlined, that while there was a wide attention on women's political mobilisation during the Arab Spring which at the same time opened some political space for women, it did not automatically grant gender equality. Stephan and Charrad argued that the events of the Arab Spring led to the destruction of Western stereotypes of Muslim women, which often depicted them as subordinated and living in a patriarchal society; however, the road to democratisation and the introduction of significant political and socioeconomic measures are still far away.[15] Despite the initial hopes, women remain victims of the rise of violence and oppression. Khalil also underlined that the Arab Spring must be understood in the paradox of visible reforms and the existence of violence against women as well as the modernisation efforts of the young generation and the remnants of the patriarchal society.[16]

Despite the emerging security threat and the growing socioeconomic tensions, up until the 2021 categorisation of Freedom House, Tunisia was often cited as the success

---

9 Mounira Charrad: *Good Practices in Family Policy Making: Family Policy Development, Monitoring and Implementation: Lessons Learnt.* Report for the United Nations, Department of Economic and Social Affairs (UNDESA), Division for Social Policy and Development, Expert Group Meeting, 2012. 5.

10 Moha Ennaji: Women's Activism in North Africa: A Historical and Socio-Political Approach. In Hanane Darhour – Drude Dahlerup (eds.): *Double-Edged Politics on Women's Rights in the MENA Region.* London, Palgrave Macmillan, 2020. 158–178.

11 Khadija Arfaoui: Women and Leadership in the Post-Arab Spring? The Case of Tunisia. In Fatima Sadiqi (ed.): *Women's Movements in Post-"Arab Spring" North Africa.* New York, Palgrave Macmillan, 2016. 223–235.

12 Charrad (2012): op. cit. 5.

13 Ennaji (2020): op. cit. 158–178.

14 It must be noted that the question of equal inheritance is contradictory to the Islamic law where the system of inheritance is strictly regulated, but a woman of any degree of kinship may inherit only half of the inheritance of a man of the same degree (Asaf Ali Asghar Fyzee: *Outlines of Muhammadan Law.* London, Oxford University Press, 1964. 380–432).

15 Rita Stephan – Mounira M. Charrad: Introduction: Advancing Women's Rights in the Arab World. In *Women Rising. In and Beyond the Arab Spring.* New York, New York University Press, 2020. 1–11.

16 Andrea Khalil: Introduction: Gender Paradoxes of the Arab Spring. In *Gender, Women and the Arab Spring.* Oxon, Routledge, 2015. 1–6.

story of the Arab Spring regarding democratisation. However, according to the theory of Comparative Political Science it is quite usual that young democracies return to authoritarian tendencies. Taking into account the current processes, Gallien and Werenfels talked about a hybrid democracy and regarded the consolidation of authoritarian practices and the deficiencies of the old regime the biggest constraints to the preservation of the country's previous achievements.[17]

The article extends most of the previous literature that did not involve a feminist approach and applied a fairly narrow, elitist understanding of democracy, such as Huntington, who associated democratic values with the Western Christian cultural space as well as with economic development.[18] The article mainly builds on Ann Tickner's gendered perceptions in IR[19] and states that the question of women's rights requires a complex analysis in which all circumstances and key players, including decision-makers and sub-state actors of the political arena, must be taken into account. The public and private sphere dichotomy of Ann Tickner is analysed with the findings of Georgina Waylen[20] who also highlighted the complexity of women's political participation and underlined that political institutions, social and economic conditions, and the main objectives of the actual leadership must be examined simultaneously. The article focuses on the question of *what impact women can have on the process of democratisation* and *whether democratisation can bring about a more gender-friendly environment.* The research uses the ratings of the Freedom House between 2010 and 2022 based on different criteria of political rights and civil liberties to be compared on an annual basis in Tunisia[21] when defining the democratic transition in the country. The conduct of interviews with eight representatives/activists of Tunisian NGOs contributes to strengthening the main statement, namely that the mobilisation of women's rights NGOs can play an important role in overwriting the traditional division between public and private spheres (masculine vs. feminine roles). However, considering the complexity of the research topic, the impact socioeconomic circumstances have on the evolution of women's rights and the transition to democracy cannot be neglected either.

The shaping of political processes in the world of gendered IR

The theoretical part considers gender inequalities as a basis for understanding and evaluating whether greater inclusion of women in politics can contribute to democratisation. Scholars themselves are divided on the outcome of women's political participation and according to certain experts of the topic, the presence of women in politics is more symbolic. On the one hand, certain representatives of women's rights NGOs saw the nomination of the first

---

17 Max Gallien – Isabelle Werenfels: Is Tunisia Really Democratising? Progress, Resistance, and an Uncertain Outlook. *German Institute for International and Security Affairs (SWP),* no. 13 (2019). 1–2, 5, 7.

18 Samuel P. Huntington: Democracy's Third Wave. *Journal of Democracy,* 2, no. 2 (1991). 12–34.

19 Ann J. Tickner: *Gender in International Relations. Feminist Perspectives on Achieving Global Security.* New York, Columbia University Press, 1992.

20 Georgina Waylen: Women and Democratization: Conceptualizing Gender Relations in Transition Politics. *World Politics,* 46, no. 3 (1994). 327–354.

21 Freedom House: *Freedom in the World Research Methodology.* s. a.

woman Prime Minister in Tunisia and in the Arab world, Najla Bouden on 30 September,[22] as a unique step from the point of gender equality. On the other hand, regarding from the point of view of the comparative politics of gender (CPG) elaborated by Waylen, institutional practices contribute to reinforcing gender equality. Therefore, the nomination of the PM does not obviously bring about a significant result, but is more like a strategic decision to shed light on the importance of feminist issues.[23] Referring to Moghadam, it is more like a clear strategy and the political establishment of the country that define the success of democratisation and the way the question of gender equality is treated,[24] thus the outcome of the prime ministership of PM Bouden will be seen in the long-run. While a homogeneous country with a Western orientated elite would be supposed to contribute to the success of democratisation, the events of the Arab Spring demonstrated the opposite. Here, the socioeconomic and political indicators and the situation of civil and political rights will have importance again and will be mentioned later when measuring the process of democratisation.

As mentioned above, the post-Arab Spring era was considered a new élan for women's rights activists to uphold the question of gender equality and give a new impetus to the transition period. However, economic development also plays a crucial role in triggering cultural changes by fostering a transition to democracy, although this process is unimaginable without real political will.[25]

Ann Tickner considered international relations male-dominated, also called deeply 'gendered'. According to her, the elimination of gender hierarchies requires more equal, approximately 50% of participation of women in all levels of decision-making, including foreign and military policy-making.[26] Joan Scott also shed light on the fact that gender relations are, in fact, power relations that derive from the traditional division of roles between the sexes (*private* versus *public* sphere), further strengthening women's inferior status in the political arena.[27] Related to the *private* versus *public sphere* dichotomy, Tickner emphasised that military and foreign policy making are those fields that have always been attributed to men, since they traditionally represent *patriotism, strength, power, autonomy,* and *rationalism* compared with the female features of *naivety* and *weakness.* She also mentioned *force, violence,* or *defence* among traditional masculine characteristics.[28]

The question that emerges is whether the aforementioned socially constructed division of gender roles can be overwritten and women could infiltrate the public sphere. Such a change would mean a more significant role in decision-making for women where their interests are also taken into account. In this regard, Randall applied a bidirectional

---

22 Aude Mazoue: Le drôle de nomination de Najla Bouden à la tête du gouvernement tunisien. *France 24,* 01 October 2021.

23 Georgina Waylen: *Engendering Transitions. Women's Mobilization, Institutions, and Gender Outcomes.* Oxford – New York, Oxford University Press, 2007. 6–7.

24 Valentine M. Moghadam: Modernising Women and Democratisation after the Arab Spring. *The Journal of North African Studies*, 19, no. 2 (2014). 139, 141.

25 Huntington (1991): op. cit. 30–34.

26 Tickner (1992): op. cit. 8–9, 96.

27 Joan W. Scott: Gender: A Useful Category of Historical Analysis. *The American Historical Review,* 91, no. 5 (1986). 1069.

28 Tickner (1992): op. cit. 8–9, 24, 38, 96.

approach from the perspective of policy making and women and analysed whether gender equality is a prerequisite to democracy for real and it proposes a more gender friendly environment. By evoking some practices and experiences around the world, Randall dealt with the analysis of the correlation between the improvement of women's political participation (percentage of women in national parliaments) and a more active role in the promotion of gender issues. Although she acknowledged the relatively low participation of women in national parliaments around the world, arguments and previous practices also shed light on the advantages and disadvantages of the introduction of a quota system in the context of political realities. The main concepts of women's attributions (e.g. peacemakers) must be examined in the specific political, social or historical circumstances of a given country. During such an examination, it must also be taken into account whether a greater interest in women issues serves to play the so-called gender card and female politicians sitting in parliament only represent a narrow scope of women, or women's interest also includes the need of lower classes.[29]

According to Moghadam, the institutional legacy of the past, the role of women's rights organisations before and after the transition and the political establishment of a country have a crucial impact on the question of women's rights. In this regard, she refers to the main findings of previous studies in the field of women and democracy (e.g. Steven Fish, Eva R. Bellin) and argues that one of the main obstacles in front of achieving gender equality in the MENA lies in the repressive political culture of these countries.[30]

Socioeconomic and political panorama of women's rights

On the one hand, as has been mentioned, state feminism in Tunisia enabled the implementation of significant reforms. However, on the other hand, the need of these reforms are clearly understood along the religious-secular and conservative-modernist fault lines explained in the introduction, the latter one of which aimed at exploiting a more educated and skilled labour force which conformed to the Western-type modernisation process. As a consequence of state modernisation, indicators in the field of education demonstrated a significant improvement for women, meaning that the average year spent in school increased from 4.9 to 15.1 years between 1971 and 2010.[31] Family planning in the 1960s and the legalisation of abortion in 1973[32] also conformed to the modernisation process of Bourguiba. However, despite Tunisia's significant achievements in women's empowerment and the more intense inclusion of women in the shaping of the question of gender equality after the Arab Spring (e.g. the drafting of the new constitution in 2014, the open debate on the controversial law on equal inheritance), these measures did not produce concrete results in all domains. Again, it is to be emphasised that while women getting

[29] Vicky Randall: *Gender and Democracy.* Institute for Democracy and Conflict Resolution, 2011. 7–10.
[30] Moghadam (2014): op. cit. 139, 141.
[31] Erica Mail: Women's Rights in Tunisia Before and After the 2011 Revolution: Progress When It Helps the People in Power. *International Immersion Program Papers* (2019). 2–4.
[32] Augustin Jomier: Secularism and State Feminism: Tunisia's Smoke and Mirrors. *Books and Ideas*, 28 November 2011. 6.

only half of the inheritance than men is based on Islamic principles, receiving a three quarters salary is purely a public administration-related issue.

Taking the latest Gender Inequality Index (GII) as a reference, with its 0.296 GII in 2019, Tunisia occupied the 65th place worldwide in the UNDP ranking of countries[33] with respect to the highest rate of gender equality. This ranking also means that five MENA countries (Bahrein, Kuwait, Qatar, Saudi Arabia and the UAE) did better than Tunisia in terms of ensuring equal opportunities for both sexes in the field of reproductive health, empowerment and labour market. As for Tunisia, the biggest gap between men and women was identified in the field of participation in the labour market: women 15 years and older only made up 23.8% of the labour market, contrary to 69.4% in the case of men. In Tunisia, the labour market showed huge disparities long before the pandemic and the growing political and social tensions from 2019. It affected graduated youth, especially women, who became long-term unemployed. The national unemployment rate was 15.3% after the outbreak of the Arab Spring, but reached 41.9% among graduated women according to data from December 2013.[34] The unemployment rate in general was 55% higher among women in 2019 and extremely high among graduated women (38.8% in 2018).[35] A report prepared by UNDP in 2020 sheds light on the feminisation of poverty that increased from 15.5% to 19.7% among women, while men only experienced an increase from 14.8% to 18.7%.[36] Regarding the marginalised regions, 61% of women worked in the most vulnerable agricultural sector, among whom only 12% had access to medical and social services.[37]

As for the political dimension of women's empowerment, in 2011 the participation of women in parliament only reached 26.27%, in 2014 it exceeded the 30% requirement set by the CEDAW. In 2019, 78 seats were occupied by women out of the 217, which is 35.9% political representation (31st place worldwide and first place among Arab countries). However, a regress occurred after the presidential elections of October 2019 and according to the latest IPU data in May 2022, only 57 seats were occupied by women, which means a 26.3% presence (84th place worldwide) in decision-making.[38]

As mentioned above, the article operates with the classification of Freedom House when defining the democratic status of the country. Freedom House elaborates a complex indicator that takes into account the situation of political rights and participation, the

---

33 Elaborated by the United Nations Development Programme (UNDP) Gender Inequality Index (GII) measures inequalities on three main dimensions: reproductive health, empowerment and labour market with different indicators in each dimension (UNDP: *Human Development Reports, Gender Inequality Index [GII]*. s. a.).

34 The World Bank: The Unfinished Revolution. Bringing Opportunity, Good Jobs and Greater Wealth to All Tunisians. *Development Policy Review on Socioeconomic Conditions in Tunisia Following the 2011 Revolution* (2014). 24–25, 39–40.

35 Institut National de la Statistique [National Institute of Statistics].

36 PNUD et République Tunisienne [UNDP and the Tunisian Republic]: *Impact économique du Covid-19 en Tunisie. Analyse en termes de vulnerabilité des ménages et des micro et très petites entreprises* [Report Regarding the Economic Impact of the Covid-19 Pandemic in Tunisia]. 16 June 2020. 12.

37 Ministère de la Femme, de la Fertilité et de l'Enfance [Ministry of Women, Fertility and Children]: Stratégie nationale pour l'autonomisation économique et sociale des femmes et des filles rural, 2017–2020 [National Strategy for the Economic and Social Empowerment of Rural Women and Girls, 2017–2020]. 2.

38 Inter-Parliamentary Union (IPU): *Monthly Ranking of Women in National Parliaments.* Parline, Global Data on National Parliaments. s. a.

electoral process, civil liberties, the functioning of the government, associational and organisational rights, and rule of law. As for Tunisia, political rights and civil liberties improved significantly after the outbreak of the Arab Spring in late December 2010. Compared with 2010 and the period before 2011 the country became partly free and from 2015 until 2021 Tunisia was regarded a free country in terms of political rights and civil liberties. However, the dissolution of the parliament in July 2021 and the political crisis that followed this measure caused a significant fallback in the country's status that was similar to the pre-Arab Spring period. In 2022 Tunisia was again classified as a partly free country exacerbated by the deepening economic crisis that reached 40.8% among the age group of 15–24 and 24.9%[39] in the case of women.

In order to return to the analysis of the key question about *the role women can play in the process of democratisation and the result of the reinforcement of democratic institutions from the point of view of women's rights*, the following chart was elaborated based on Freedom House and IPU data[40] to examine the correlation between these two variables:

Table 1: The role of women in the process of democracy building

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Status	NF*	PF**	PF	PF	PF	F***	F	F	F	F	F	F	PF
Percentage of women in the national parliament	27.6%	26.7%	26.7%	26.7%	31.3%	31.3%	31.3%	31.3%	31.3%	35.9%	24.9%	26.3%	26.3%

**NF = Not Free*
***PF = Partly Free*
****F = Free*

Source: Compiled by the author based on Freedom House and IPU data.

Note: The percentage of women in the national parliament is based on the January data of each year.

The role of women in the shaping of the political arena

The post-Arab Spring period

From the point of view of gender equality as a result of the extended rights to freedom of expression, the Arab Spring brought about a widespread debate on gender roles during the drafting of Tunisia's new constitution between 2011 and 2014. The passing of the constitution in February 2014 was the manifestation of a long but promising struggle that eliminated any reference to the Sharia and thus ensured equal rights for both sexes based

[39] Freedom House: *Freedom in the World 2022. Tunisia.*
[40] Inter-Parliamentary Union (IPU) (s. a.): op. cit.

on Western type of constitutional guarantees.[41] However, it cannot be neglected that the country's influential trade union and hidden political actor, UGTT (Union Générale Tunisienne du Travail [Tunisian General Labour Union]) played a key and active role in the mobilisation and empowerment of women since the independence of Tunisia. Due to its diversified network, the trade union succeeded in addressing women in the work force, thus being the main advocate of establishing women's financial independence. Moreover, UGTT pursued awareness campaigns for rural women and contributed to the proliferation of the network of civil societies with the members of which it closely collaborated to exercise pressure on government actors. Therefore, UGTT embodied the modernist or secular discourse of the question of gender, and it also had a significant voice in sweeping off the reference to the Sharia during the drafting of the new constitution.[42]

In addition to the promulgation of the progressive constitution, the outstanding percentage of female candidates and registered voters (51% vs. 45% compared to the legislative elections of October 2011) during the 2014 elections was a clear proof that the Arab Spring fostered the participation of women in the political field. This was further enhanced by the submission of the presidential candidacy of two women, Emna Mansour al-Karoui and Kalthoum Kennou,[43] a historical step in the effort to achieve gender equality. It is indisputable that women's rights NGOs also played a key role in promoting female candidates to legislative and municipal elections due to the elaboration of the electoral law and the pursuance of active campaigns.

From the point view of the bottom-up initiative, the year 2017 was considered a milestone. Law 58 adopted in 2017 envisaged the elimination of violence committed against women in all fields of life, including the labour market, the political sphere and domestic life.[44] In the long run, the implementation of the law against gender violence is of crucial importance and is greatly appreciated in light of the increased violence committed against women after the outbreak of the pandemic. Another key measure under President Beji Caid Essebsi was the radical amendment to the CSP in September 2017 that enabled Muslim women to marry non-Muslim men. This measure considered exceptional in the Arab world was further enhanced by President Essebsi's urge to introduce reforms to the inheritance law,[45] a quite divisive, but a progressive topic that was on the agenda since the coming to power of Essebsi in 2014. The main arguments for the reform of the law on equal inheritance included the implementation of international conventions (i.e. CEDAW), the interpretation of the constitution, the task of the committee that was set up in 2016, the pressure coming from non-state actors, and the realisation of equality between men and women. Although for now the inheritance law is removed from the political agenda, the political will during the presidency of Essebsi and the pressure coming from non-state

---

41 Nabila Hamza: Engendering Tunisia's Democratic Transition: What Challenges Face Women? In Fatima Sadiqi (ed.): *Women's Movements in Post-"Arab Spring" North Africa.* New York, Palgrave Macmillan, 2016. 214–215, 217.

42 The Solidarity Center: *Femme Tunisienne. Soutenir la lutte pour l'égalité des droits.* 2014. 2–7.

43 Hamza (2016): op. cit. 218–219.

44 Hind Ahmed Zaki: Why Did Women's Rights Expand in Post-Revolutionary Tunisia? *Middle East Brief. Crown Center for Middle East Studies,* 131 (2019). 2.

45 Zaki (2019): op. cit. 2.

actors are excellent proofs that a cooperation between the mezzo and micro levels can be viable.

However, it is to be emphasised that while the legal framework is important to understand the discourse on gender in Tunisia, the implementation of the reforms in everyday life is of crucial importance. In this regard, interviews provide a general view on the basis of which the implementation of reforms can be understood. While acknowledging the active role of women's rights NGOs, especially that of mobilisation during the pandemic with the involvement of government actors, the lack of political strategy and the presence of secular and religious dichotomy, as explained in the introduction are still regarded as constraints from the point of women's empowerment.

The re-emergence of the Islamist discourse in the post-Arab Spring period, and the role Ennahda played in the evolution of women's rights, cannot be neglected. The Islamist discourse is strictly connected to the peculiarity of the Maghrebi society from a cultural and religious perspective. In general, the ideology of Ennahda is similar to Islamic feminism, i.e. it is a progressive approach to the question of gender equality that is open to the adoption of flexible methods besides preserving traditional religious roles. However, as the harsh debates about the drafting of Tunisia's new constitution demonstrated, Tunisian Islamists cannot be regarded homogeneous, they include both moderates and radicals. An excellent example to this division between the two branches was the drafting process of the new Tunisian constitution between 2011 and January 2014 which intended to include that 'women are complementary to men' (complementarity clause).[46] Regarding the other harsh debate about equal inheritance, according to the viewpoint of one of the female members of Ennahda party, ensuring equality in labour force, in salaries and advancement for women has nothing to do with providing equality in inheritance.[47] As for political advancement, women still remain underrepresented in key posts and the political office of the party. This all proves that changes in the old roles of women after the Arab Spring should be treated with precaution and with taking into account the limits of religion, political space and socioeconomic reforms.

The consequences of the Covid-19 pandemic

The outbreak of the Covid-19 pandemic brought about new political and economic challenges from the point of view of the significant achievements from 2011 on the improvement of women's rights that required decision-makers to adapt to new strategies and reconsider the question of gender equality. Furthermore, this adaptation required women's rights activists to focus on solving problems on new scopes that also meant a kind of retreat from the presence of the public sphere. The new challenges include growing inequalities in education and in the labour market, namely the overrepresentation of women in the

[46] Mari Norbakk: The Women's Rights Champion. Tunisia's Potential for Furthering Women's Rights. *CMI Report* (2016). 8.

[47] Anca Munteanu: Les militantes du Parti de la justice et du développement au Maroc et d'Ennahda en Tunisie: formes d'engagement et d'organisation. *Égypte. Monde Arabe*, 21 (2020).

agricultural sector and in domestic work. However, the most serious impact the pandemic had on women was the increase in domestic violence resulting from the accumulated frustration among the growing socioeconomic and political tensions. In Tunisia between 23 March and 31 May 2020, the number of registered violent cases committed against women was 9 times higher than in general (2,700 cases were violent out of the 9,800) and 76% of Tunisian women experienced physical violence. Furthermore, violence also had its effect in the labour market in the form of deprivation of access to job opportunities as well as in the control of the salaries.[48] The resolution of the main challenges women had to face required different approaches from decision-makers and NGOs, which resulted in a huge mobilisation among members of the latter. In Tunisia, besides the 24/24 and 7/7 emergency line, a reception centre was also set up by the Ministry of Women, Family, Children and Seniors to provide help for asylum seekers to spend the necessary quarantine period there before moving to traditional reception centres. Moreover, in collaboration with different ministries, women's rights organisations launched several awareness campaigns for female victims of domestic violence.[49]

The evolution of women's rights and democracy making, especially in light of the outbreak of the pandemic, show that while improvements were carried out in the political, economic and educational fields and women's rights organisations were present in the public sphere, although ostensibly masculine norms in private life remained dominant.

A bottom-up approach to democratisation

The researcher conducted online interviews in French with five representatives of Tunisian women's rights NGOs between November 2021 and May 2022 to answer the research question and provide empirical verification of the theoretical findings. Interviews are of crucial importance to examine the implementation of the major reforms of the Arab Spring, regarding the fact that representatives of women's rights NGOs play a great role in shaping the process of democratisation. Based on the topics that were raised during the interviews, the chances and results of women's efforts in democracy building and the major constraints of this process can be better understood. Women's rights NGOs were selected purposely for the interviews, based on different criteria (e.g. the availability of the organisations, their location), so that judgmental sampling, a non-random sampling based on the researcher's perception of the relative importance of the chosen sample was applied. The interviews are semi-structured, thus they provide more space to additional questions. The answers were recorded in handwritten notes and analysed based on the grouping of different concepts that were later compared with the initial concepts (codes). The questions posed can be divided into three parts: 1. the way the representative sees the evolution of women's rights after the Arab Spring and in light of the Covid-19 pandemic;

[48] UN Women: *Tunisian Women in the Face of Covid-19: During and after Confinement.* 2020. 6.

[49] OCDE [OECD]: *Covid-19 dans la région MENA: impact sur les inégalités de genre et réponses apportées en soutien aux femmes* [Covid-19 in the MENA Region: Impact on Gender Inequalities and Responses Provided in Support of Women]. 2020. 20–21.

2. whether a bottom-up approach can bring about a more gender-friendly environment; and 3. the biggest constraints in front of achieving gender equality.

As for the first block of questions, from the point of view of the activities of her association, the member of the Association des Femmes Tunisiennes pour la Recherche sur le Développement (AFTURD,[50] Association of Tunisian Women for the Research on Development) regarded the suspension of field work as one of the negative consequences of the pandemic. The interviewee also approached the outcome of the Arab Spring with caution when asking about gender equality. According to her, the realities did not meet the initial expectations and the realisation of equality in the labour market and in inheritance remain those areas where further achievements are necessary. She also highlighted that without the active role of women's rights NGOs, the situation of women in Tunisia would be more catastrophic; as an example, she emphasised the crucial role and fight of NGOs during the drafting of Tunisia's new constitution between 2011 and 2014.

The representative of the Association Citoyenneté et Libertés (ACL,[51] Association for Citizenship and Liberties), based in Djerba, mentioned that the situation of women was well managed even before the Arab Spring. However, without doubt, the events of 2010 and 2011 ensured a greater extent of freedom of expression, which opened the way for NGOs to launch different training programs for women (such a training program concerned 2,000 families, including the field of artisanal jobs, too) and enabled the association to involve women in the discussion of such delicate topics like radicalisation.

The third activist, a syndicalist who collaborates with the Association Tunisienne des Femmes Démocrates (ATFD, Tunisian Association of Democratic Women), and AJEM Djerba[52] (Association Jlij pour l'Environnement Marin [Jlij Association for the Marine Environment]) saw a significant degradation in women's rights since 2011 ("en 2011 on était sur le bon chemin" [in 2011 we were on the right track]). According to her in Tunisia, we can talk about the feminisation of poverty, including the increase of the number of illiterate women as a result of the growing influence of the Islamists following the Arab Spring. Although after the Arab Spring a political setback occurred, the pandemic caused a social setback, a fight for the amelioration of socioeconomic conditions, in which the question of gender equality began to occupy a marginal position.

The member of AJEM Djerba[53] also highlighted the role of education and change in mentality as key areas for democratisation and according to the fourth representative, women are doing well in education where women have more than equal participation.

---

50 The women's rights NGO, Association des Femmes Tunisiennes pour la Recherche sur le Développement (AFTURD) is only available through the organisation's official Facebook page. The member of AFTURD was questioned on 13 November via Messenger.

51 See the official website of the Association Citoyenneté et Libertés (ACL) in the bibliography. The representative of ACL was questioned through Messenger on 24 December 2021.

52 See the official website of the Association Tunisienne des Femmes Démocrates (ATFD) and Association Jlij pour l'Environnement Marin (AJEM) Djerba in the bibliography. The interview was realised on 5 January 2022 via Messenger.

53 The interview was conducted on 14 January via Messenger.

Similarly to the third interviewee, the fifth women's rights activist, also a member of the Union Nationale de la Femme Tunisienne (UNFT, National Union of Tunisian Women),[54] AFTURD and Ligue tunisienne des droits de l'homme (LTDH, Tunisian League for Human Rights), also claimed that since 2011 there has been a significant increase in the number of school dropouts. She also linked this phenomenon to the infiltration of Islamists in the political arena.

Regarding the possible correlation between bottom-up initiatives and the improvement of women's rights, the interviewees themselves were quite divided. While generally acknowledging the crucial role of women's rights organisations in women's mobilisation, the representative of ACL shed light on the actual political crisis that slows down their mobilisation campaign. According to the member of ATFD and AJEM Djerba, the socioeconomic crisis aggravated by the pandemic overwrote the conventional role of women's rights activists that were required to adapt to the individual needs of women, especially those living in rural regions with half the salary of men. The fifth activist saw the lack of political will of actual policy makers as the biggest obstacle in the way of achieving gender equality. She also mentioned the measures related to President Bourguiba as an example of real political intention.

The absence of a clear strategic vision for the country, mentality, refusal of development, rigid cultural norms, lack of cultural integrity, as well as the right to cultural and intellectual development, lack of knowledge about individual and collective rights were mentioned by the interviewees in the third block of questions regarding the constraints to realising gender equality.

Conclusion

The article analysed the role of women in the process of democracy building from a new perspective that explained state behaviour with the conventional masculine and feminine roles in the public and private spheres. The relevance of the research is emphasised by the growing political and economic tensions in Tunisia, which also led to a setback in the classification of Tunisia from free to partly free country in 2022 according to the annual country report of Freedom House.

Based on previous findings of scholars who drew a parallel between women's political participation and democracy making, the article took women's presence in the national parliament as a reference to compare with the country ratings of Freedom House. The statistics of IPU and Freedom House clearly proved that the increase or decrease in the number of women's share in parliament had an impact on the classification of Tunisia in two to three years. A brief outlook of the main achievements of women's rights activists after the Arab Spring also proved that significant developments coincided with the increase in the political presence of women and the 'free' classification of Tunisia.

---

[54] See the official website of the Union Nationale de la Femme Tunisienne (UNFT) and Ligue tunisienne des droits de l'homme (LTDH) in the bibliography. The women's rights activist was questioned on 20 May via Messenger.

The empirical part of the article also confirmed the outstanding mobilisation of different NGOs following the Arab Spring and during the Covid-19 pandemic to the benefit of the vulnerable groups that contributed to significant developments in this regard. However, the interviews conducted with women's rights activists and the current processes proved that democratisation is a complex process that not only requires the analysis of political or historical experiences, but, as Huntington concluded, economic factors. As Moghadam highlighted, a women-friendly democracy not only depends on the institutional legacy of the past and the mobilisation of women's rights NGOs, but on the capacity of the government to carry out significant social and economic reforms.[55] On the one hand, the Covid-19 pandemic showed an exemplary cooperation between women's rights NGOs. On the other hand, it brought about new challenges that require that the socioeconomic needs of women be given priority.

References

Arfaoui, Khadija: Women and Leadership in the Post-Arab Spring? The Case of Tunisia. In Fatima Sadiqi (ed.): *Women's Movements in Post-"Arab Spring" North Africa.* New York, Palgrave Macmillan, 2016. 223–235. Online: https://doi.org/10.1057/978-1-137-50675-7_15

Association Citoyenneté et Libertés [ACL, Association for Citizenship and Liberties]. Online: http://acl.tn/

Association Jlij pour l'Environnement Marin [AJEM, Jlij Association for the Marine Environment]. Online: www.ajem.tn/

Association Tunisienne des Femmes Democrates [ATFD, Tunisian Association of Democratic Women]. Online: www.cncdh.fr/fr/ong/association-tunisienne-des-femmes-democrates

Chabchoub, Ahmed: *Bourguiba et moi* [Bourguiba and Me]. Dubai, Al Manhal, 2014.

Charrad, Mounira: *Good Practices in Family Policy Making: Family Policy Development, Monitoring and Implementation: Lessons Learnt.* Report for the United Nations, Department of Economic and Social Affairs (UNDESA), Division for Social Policy and Development, Expert Group Meeting, 2012. Online: www.un.org/esa/socdev/family/docs/egm12/PAPER-CHARRAD.pdf

Ennaji, Moha: Women's Activism in North Africa: A Historical and Socio-Political Approach. In Hanane Darhour – Drude Dahlerup (eds.): *Double-Edged Politics on Women's Rights in the MENA Region.* London, Palgrave Macmillan, 2020. 158–178. Online: https://doi.org/10.1007/978-3-030-27735-2_6

Freedom House: *Freedom in the World Research Methodology.* s. a. Online: https://freedomhouse.org/reports/freedom-world/freedom-world-research-methodology

Freedom House: *Freedom in the World 2022. Tunisia.* Online: https://freedomhouse.org/country/tunisia/freedom-world/2022

Fyzee, Asaf Ali Asghar: *Outlines of Muhammadan Law.* London, Oxford University Press, 1964.

[55] Valentine M. Moghadam: Modernising Women and Democratisation after the Arab Spring. In Andrea Khalil (ed.): *Gender, Women and the Arab Spring.* Oxon, Routledge, 2015. 7–12.

Gallien, Max – Isabelle Werenfels: Is Tunisia Really Democratising? Progress, Resistance, and an Uncertain Outlook. *German Institute for International and Security Affairs (SWP)*, no. 13 (2019). 1–8. Online: https://doi.org/10.18449/2019C13

Hamza, Nabila: Engendering Tunisia's Democratic Transition: What Challenges Face Women? In Fatima Sadiqi (ed.): *Women's Movements in Post-"Arab Spring" North Africa.* New York, Palgrave Macmillan, 2016. DOI: https://doi.org/10.1057/978-1-137-50675-7_14

Huntington, Samuel P.: Democracy's Third Wave. *Journal of Democracy*, 2, no. 2 (1991). 12–34. Online: https://doi.org/10.1353/jod.1991.0016

Institut National de la Statistique [National Institute of Statistics]. Online: www.ins.tn/

Inter-Parliamentary Union (IPU): *Monthly Ranking of Women in National Parliaments.* Parline, Global Data on National Parliaments. s. a. Online: https://data.ipu.org/women-ranking?month=5&year=2022

Jomier, Augustin: Secularism and State Feminism: Tunisia's Smoke and Mirrors. *Books and Ideas*, 28 November 2011. Online: https://booksandideas.net/IMG/pdf/20111129_Secularism.pdf

Khalil, Andrea: Introduction: Gender Paradoxes of the Arab Spring. In *Gender, Women and the Arab Spring.* Oxon, Routledge, 2015. Online: https://doi.org/10.4324/9781315746715

Khan, Muhammad Zafrulla: *Women in Islam.* Islamabad, Islam International Publications Limited, 1991.

Ligue tunisienne des droits de l'homme [LTDH, Tunisian League for Human Rights]. Online: https://euromedrights.org/fr/membres/ligue-tunisienne-des-droits-de-lhomme-ltdh-2/

Mail, Erica: Women's Rights in Tunisia Before and After the 2011 Revolution: Progress When It Helps the People in Power. *International Immersion Program Papers* (2019). Online: https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1113&context=international_immersion_program_papers

Mazoue, Aude: Le drôle de nomination de Najla Bouden à la tête du gouvernement tunisien. *France 24*, 01 October 2021. Online: www.france24.com/fr/afrique/20211001-la-dr%C3%B4le-de-nomination-de-najla-bouden-%C3%A0-la-t%C3%AAte-du-gouvernement-tunisien

Ministère de la Femme, de la Fertilité et de l'Enfance [Ministry of Women, Fertility and Children]: Stratégie nationale pour l'autonomisation économique et sociale des femmes et des filles rural, 2017–2020 [National Strategy for the Economic and Social Empowerment of Rural Women and Girls, 2017–2020]. Online: www.femmes.gov.tn/wp-content/uploads/2017/07/Presentation_Strategie_FR_2017-2020.pdf

Moghadam, Valentine M.: Modernising Women and Democratisation after the Arab Spring. *The Journal of North African Studies*, 19, no. 2 (2014). 137–142. Online: https://doi.org/10.1080/13629387.2013.875755

Moghadam, Valentine M.: Modernising Women and Democratisation after the Arab Spring. In Andrea Khalil (ed.): *Gender, Women and the Arab Spring.* Oxon, Routledge, 2015. Online: https://doi.org/10.1080/13629387.2013.875755

Munteanu, Anca: Les militantes du Parti de la justice et du développement au Maroc et d'Ennahda en Tunisie: formes d'engagement et d'organisation. *Égypte. Monde Arabe*, 21 (2020). 69–88. Online: https://doi.org/10.4000/ema.11607

Norbakk, Mari: The Women's Rights Champion. Tunisia's Potential for Furthering Women's Rights. *CMI Report* (2016). Online: www.cmi.no/publications/5973-the-womens-rights-champion

OCDE [OECD]: *Covid-19 dans la région MENA: impact sur les inégalités de genre et réponses apportées en soutien aux femmes* [Covid-19 in the MENA Region: Impact on Gender Inequalities and Responses Provided in Support of Women]. 2020. Online: www.oecd.org/coronavirus/policy-responses/covid-19-dans-la-region-mena-impact-sur-les-inegalites-de-genre-et-reponses-apportees-en-soutien-aux-femmes-f7da7585/

PNUD et République Tunisienne [UNDP and the Tunisian Republic]: *Impact économique du Covid-19 en Tunisie. Analyse en termes de vulnerabilité des ménages et des micro et très petites entreprises* [Report Regarding the Economic Impact of the Covid-19 Pandemic in Tunisia]. 16 June 2020. Online: www.tn.undp.org/content/tunisia/fr/home/library/environment_energy/etude-sur-l-impact-economique-du-covid-19-en-tunisie-.html

Radan, Fatemeh: 2011 Uprising and Tunisian Women's Socio-Political Situation. *The Quarterly Journal of Political Studies of Islamic World*, 6, no. 24 (2018). 22–31. Online: www.sid.ir/en/journal/ViewPaper.aspx?id=611377

Randall, Vicky: *Gender and Democracy.* Institute for Democracy and Conflict Resolution, 2011. Online: http://repository.essex.ac.uk/4481/1/08_11.pdf

République Tunisienne [Republic of Tunisia]: Code du Statut Personnel [Personal Status Code]. L'Imprimerie Officielle de la République Tunisienne [Official Printing Press of the Republic of Tunisia], 2012. Online: www.ilo.org/dyn/natlex/natlex4.detail?p_isn=73374&p_lang=fr

Scott, Joan W.: Gender: A Useful Category of Historical Analysis. *The American Historical Review,* 91, no. 5 (1986). 1053–1075. Online: https://doi.org/10.2307/1864376

The Solidarity Center: *Femme Tunisienne. Soutenir la lutte pour l'égalité des droits.* 2014. Online: www.solidaritycenter.org/wp-content/uploads/2014/12/Tunisia.French-Final.bug_.pdf

Stephan, Rita – Mounira M. Charrad: Introduction: Advancing Women's Rights in the Arab World. In *Women Rising. In and Beyond the Arab Spring.* New York, New York University Press, 2020. 1–11. Online: https://doi.org/10.18574/nyu/9781479846641.003.0001

Tessler, Mark A. – Mary E. Keppel: Political Generations. In Russell A. Stone – John Simmons (eds.): *Change in Tunisia. Studies in the Social Sciences.* Albany, State University of New York Press, 1976. 73–106.

Tickner, Ann J.: *Gender in International Relations. Feminist Perspectives on Achieving Global Security.* New York, Columbia University Press, 1992.

UNDP: *Human Development Reports, Gender Inequality Index (GII).* s. a. Online: https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index?c_src=CENTRAL&c_src2=GSR&gclid=CjwKCAjw14uVBhBEEiwAaufYx_xiZbizb8DZggUWzIlm4_5yw5yeTGUaOJ8Dp48akt0UdpD5DyOqIRoCo6YQAvD_BwE&utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL#/indicies/GII

Union Nationale de la Femme Tunisienne [UNFT, National Union of Tunisian Women]. Online: www.unft.org.tn/fr/page-daccueil

UN Women: *Tunisian Women in the Face of Covid-19: During and after Confinement.* 2020. Online: https://arabstates.unwomen.org/en/digital-library/publications/2020/07/policy-brief-tunisian-women-in-the-face-of-covid19

Waylen, Georgina: *Engendering Transitions. Women's Mobilization, Institutions, and Gender Outcomes.* Oxford – New York, Oxford University Press, 2007. Online: https://doi.org/10.1093/acprof:oso/9780199248032.001.0001

Waylen, Georgina: Women and Democratization: Conceptualizing Gender Relations in Transition Politics. *World Politics*, 46, no. 3 (1994). 327–354. Online: https://doi.org/10.2307/2950685

The World Bank: The Unfinished Revolution. Bringing Opportunity, Good Jobs and Greater Wealth to All Tunisians. *Development Policy Review on Socioeconomic Conditions in Tunisia Following the 2011 Revolution* (2014). Online: www.worldbank.org/en/country/tunisia/publication/unfinished-revolution

Zaki, Hind Ahmed: Why Did Women's Rights Expand in Post-Revolutionary Tunisia? *Middle East Brief. Crown Center for Middle East Studies*, 131 (2019). 1–7. Online: www.brandeis.edu/crown/publications/middle-east-briefs/pdfs/101-200/meb131.pdf

AARMS Vol. 21, No. 2 (2022) 87–97.

10.32565/aarms.2022.2.6

Johnson and Vietnam: Decision Making during Operation Rolling Thunder

József ONDRÉK[1]

The name of Lyndon Baines Johnson, 36th President of the United States, has practically been tied together with the Vietnam War, which raged on during the entirety of his presidency. The Johnson Presidency could have been remembered after the numerous and admirable domestic policy steps he took, yet it is Vietnam, which overshadows his historical legacy. Both the Gulf of Tonkin Incident and the longest campaign of the Vietnam War, Operation Rolling Thunder took place during his terms in office. This latter was harshly criticised by his peers, especially from military leadership circles, thus it is worth re-examining this period of the war using now publicly available sources. This article aims to examine how President Johnson and his inner circle of advisors made their decisions during the period in question.

Keywords: *Vietnam War, Johnson, decision making, Rolling Thunder, Southeast Asia*

Introduction

More than fifty years have passed since the President of the United States, Lyndon Baines Johnson authorised the launching of Operation Rolling Thunder. The air campaign launched on the 2nd of March 1965, became one of the largest and longest aerial operations in history. The context in which it was initiated, namely the Vietnam War, is a fascinating and really complex topic. Since the official end of hostilities in 1975, huge amounts of materials have been written about the war. It has been extensively documented, researched and reviewed since the conclusion of the war. There are libraries literally filled with books about Vietnam, and research institutes focusing on it. It is a great subject to examine precisely because of the very "grey" nature of the conflict. Nothing was black or white in Southeast Asia and due to the relative closeness of the events and because they happened at the advent of live television coverage, researchers have a wide array of materials to work with. The relative abundance of materials and the interesting, as well as controversial nature of the war are all part of the fact that there is so much research going on.

[1] PhD student, University of Public Service, Doctoral School of Military Science, e-mail: ondrek.jozsef@uni-nke.hu

Time, more specifically the passing of time, also aids this work. Although it becomes more and more difficult to research a topic as time passes and some resources fade away or get lost, in a unique way this does not happen with the Vietnam War. The passing of time seems to aid research in this case. There are probably two reasons for this contradictory phenomena. One is the fact that the dividing factors fade away. This means, that the questions and problems can be examined and answered without bias towards or pressure from certain groups. The bad side-effects of controversy fade away leaving only the fascinating topics. The second reason, why the passing of time aids research, is simply the fact that some documents have been declassified and are available now to all interested in reading them. It is natural that some documents get classified when the military operations take place and they remain so, as long as the declassification of them would harm the national security interest of countries.[2] As more than half a century has passed since the beginning of Operation Rolling Thunder, and more than forty years since the end of hostilities, the disclosing of these documents is not considered a national security threat anymore.

Although the passing of time helps in researching this topic, one would be certainly wrong to consider the Vietnam War just a colourful but bygone page in the book of history. Lessons learnt from the hard way on the soil, in the sky and around the diplomatic tables of Southeast Asia are all still relevant. In fact, with constant troubles in the Middle East, and a really Vietnam-like situation brewing in Syria, these lessons are more relevant today than they have ever been. Most of the key political figures of the Vietnam War are long gone by now, but some military policies, surprisingly even some military hardware – such as the famous B-52 bombers – still remain in use and they might be put to the test one more time in the Middle East. As the saying goes, "history repeats itself" and this also underlines the fact that studying the Vietnam War era is still very relevant these day.

Operation Rolling Thunder remains relevant and a topic worth a closer look. The analysis of the events and forces in this essay also supports the latest requirements of military science research, which finds it essential to process and incorporate the lessons of military history into both officer training and education.[3] This essay aims at taking a look at the decision making process at the lead up to and also during the period of the air campaign. To provide a balanced view of things, after the civilian decision making process is presented, some space will be allocated to the opposing ideas of the military services, especially the United States Navy. There are obviously also limitations of this work. The relatively short amount of time available and the set number of characters make it impossible to have a more detailed representation. Thus, to limit explanations, the knowledge of certain terms and figures is taken for granted.

---

[2] Good examples of current and still ongoing research on the Vietnam War are: Michael Swanson: *Why The Vietnam War? Nuclear Bombs and Nation Building in Southeast Asia, 1945–1961.* Danville, Virginia, Campania Partners LLC, 2021; Michael G. Kort: *The Vietnam War Reexamined.* Cambridge, Cambridge University Press, 2017. A highly anticipated book is also going to be published in late 2022 building on previously classified documents and little-known archives: Michael E. Weaver: *The Air War in Vietnam.* Lubbock, Texas, Texas Tech University Press, 2022.

[3] József Boda et al.: Fókusz és együttműködés. A hadtudomány kutatási feladatai. *Honvédségi Szemle,* 144, no. 3 (2016). 3–19.

President Johnson and Vietnam

Similarly to the whole Vietnam War, analysing the decision making process of Lyndon B. Johnson and his advisors is a hugely complex task[4]. Many factors have to be considered and in some cases these factors contradict each other to make matters more confusing. One has to consider the domestic political situation Johnson inherited from Kennedy. Then the foreign policy commitments already taking place at the time. The personality and knowledge of the President's advisors is a key element, too. Furthermore, there is the personality of the President himself, his leadership style and previous political experience which all have to be taken into account in solving this equation. Finally, to complicate matters even more, there are certain outside events that neither Johnson nor his advisors could anticipate or influence.

One of these is – for example – the political and propaganda savvy ways of General Vo Nguyen Giap, the North Vietnamese commander in chief of the People's Army of Vietnam. He was not only a theoretical and a practical follower of Mao Ze Dong as far as national uprising were concerned, but also understood how to use propaganda to make the greatest military gains of Operation Rolling Thunder look bad in the media.[5]

To decipher this seemingly very complicated matter, the best way is to organise the timeline of actions and influencing factors into groups. The first of such groups can be Johnson's personality and political experiences on his road to the White House. The second group can be his actions while being President and before the launch of Operation Rolling Thunder, and the third group can be the decision making process during the actual conduct of the aerial campaign.

Johnson's road to the White House

Since the focus of this essay is on the decision making process during Operation Rolling Thunder, the biography of Lyndon B. Johnson cannot and will not be discussed in detail. On the other hand, there are certain aspects of his personality, certain traits he gained during his long political career that need to be taken into consideration to understand how decisions were made. It is a section, that is lacking in many academic works about this subject. While it is absolutely understandable to analyse National Security Council meeting transcripts, the Pentagon Papers and all these materials, one cannot forget that the decisions written down in those documents were taken by a human being. In the following paragraphs only a few traits of Johnson will be mentioned, without delving into psychology.

However, one has to consider that as a southern Democrat, in the times when segregation was still part of everyday life in America, Johnson had to be a politician of

[4] Further readings on military decision making: Gregory A. Daddis: American Military Strategy in the Vietnam War, 1965–1973. In Jon Butler (ed.): *Oxford Research Encyclopedias. American History.* New York, Oxford University Press, 2014; Michael H. Hunt: *Lyndon Johnson's War. America's Cold War Crusade in Vietnam, 1945–1968.* New York, Hill & Wang, 1996.

[5] Balázs Forgács: Mao and Giap on Partisan Warfare. *AARMS*, 18, no. 2 (2019). 31–38.

compromise. Some of his actions as president mentioned in the following subsection will further support this claim. Him being a successful domestic politician of compromise, it is important to understand how those final decisions were taken during the Vietnam War years. One other factor that needs to be considered is his management style. Illustrating Johnson's management style is possible using two different approaches. One is an anecdotal style presented in many works about the American presidency, including William E. Leuchtenburg's book about the presidents. In it, he mentions about the so-called "Johnson Treatment" writing: "He moved in close, his face a scant millimeter from his target, his eyes widening and narrowing, his eyebrows rising and falling. From his pockets poured clippings, memos, statistics. Mimicry, humor, and the genius of analogy made the Treatment an almost hypnotic experience and rendered the target stunned and helpless."[6] Further on the same page, Leuchtenburg gives another very illustrative description of the "Treatment" by quoting the editor of Washington Post: "You really felt as if a St. Bernard had licked your face for an hour, had pawed you all over." It is vital to mention this phenomenon, the so-called "Johnson Treatment" to understand what and how his advisors felt during the period they worked for him. This talent was developed by Johnson probably out of necessity as a southern Democrat and it most certainly helped him in achieving so much on the front of domestic policy.

However, it is possible that – simply due to the fact that his advisors felt intimidated by him –it hindered him when he dealt with foreign policy, a topic he was not as accustomed to be dealing with than domestic policy. A different, but equally useful approach to analyse Johnson's management style is to look at the more scientific analysis of Thomas Preston. In Chapter 7 of the book entitled *Presidential Power. Forging the Presidency for the Twenty-First Century,* Preston talks about the personality and leadership styles of presidents as far as foreign policy decision making is concerned. In his theory Johnson is categorised as a "Maverick". He defines the foreign policy Maverick as "leaders characterized by both low complexity and limited prior policy experience are less sensitive, independently minded and often unorthodox".[7] During his detailed definition of a "Maverick" he also mentions that "Mavericks tend to be very aware of their shortcomings in policy experience and, as a result, are more receptive to (and often dependent upon) the advice of expert policy advisers – despite their tendency to possess relatively closed information processing-systems".[8] This definition could highlight one of the shortcomings of the advisory system of Lyndon B. Johnson. As he indeed knew of his own limited foreign policy experience, he relied on the advice of experts. However his well-educated experts, or "those Harvards" as he sometimes referred to them, were unable to tell him their own ideas as they were overwhelmed by the charismatic "treatment" or as they tried to avoid confrontation and subsequently take face saving actions.

---

6 William E. Leuchtenburg: *The American President. From Teddy Roosevelt to Bill Clinton.* New York – Oxford, Oxford University Press, 2015. 430.

7 Robert Y. Shapiro et al. (eds.): *Presidential Power. Forging the Presidency for the Twenty-First Century.* New York, Columbia University Press, 2000. 123.

8 Shapiro et al. (2000): op. cit. 124.

The pre-Rolling Thunder years

The time between Lyndon B. Johnson taking the oath of office aboard Air Force One after Kennedy's assassination and the start of Operation Rolling Thunder can be considered this period of time. There are two domestic issues to consider during this period, which both influenced his later decisions during the Vietnam War. One of these is simply the fact that he became President of the United States under unfortunate circumstances. Johnson himself did not like this, and until the election of 1964 postponed every major foreign policy decision to focus on his election campaign. This in no way means that the situation in South Vietnam was under control. In fact, it was deteriorating and rather chaotic. General Khanh, the leader of the military junta in Saigon taking over after Diem's death, started circulating the idea of "marching North" against the Democratic Republic of Vietnam.

With the deep involvement the United States already had in the region, this obviously caused concerns amongst the leadership of the U.S. As cover intelligence gathering operations were going on since President Kennedy authorised them, a critical incident appeared on the 2nd of August 1964. North Vietnamese torpedo boats attacked the American destroyer USS Maddox in the Gulf of Tonkin, 30 miles off the coast of North Vietnam. Although the destroyer did not get damaged, all American forces in the region went on alert and the Maddox was accompanied by another destroyer, the USS Turner Joy. Two days later, a supposed other attack happened by the Democratic Republic of Vietnam (DRV). Later on, it turned out to be a false claim and in reality no second attack took place. Even LBJ said that "for all I know, our Navy was shooting at whales out there". Yet, following this "attack", the President launched a punitive air campaign using aircraft of the U.S. Navy stationed aircraft carriers in the Gulf of Tonkin. The operation named Pierce Arrow was of limited scale and only against costal targets. However, only three day after the supposed second attack, the United States Congress passed the Gulf of Tonkin Resolution that authorised the President to take whatever actions necessary in Vietnam. Although large scale escalation still did not happen, due to the reasons mentioned above, this act of the Congress proved to be a turning point in American and Vietnamese relations.

The other issue in this period that needs to be considered to understand the decision making is the domestic policy of the Johnson Administration. Many studies on decision making during the Vietnam War completely neglect this, which is a major deficiency in many works. Although both foreign and domestic policies are separate entities, they do not exist in a bubble. In fact, they influence each other more than many scholars admit it. Even just thinking about the financial costs of waging a war makes one immediately connect it to domestic policies as well. In Lyndon B. Johnson's case, it was not only the fact that war had to be financed, but that this had to be done from the same budged as domestic spending. As LBJ came from humble origins, and witnessed poverty first hand, social issues played a big role in his agenda. He was also an expert in these issues and he had greater experience with them than in foreign policy. Johnson devoted his 1964 first State of the Union message in January on domestic issues. Vietnam was brewing, National Security Councils dealt with the problem and limited action was taken, yet the main focus was on matters inside the United States. In his Address in January he said: "Let

this session of Congress be known as the session which did more for civil rights than the last hundred sessions combined; as the session which enacted the most far-reaching tax cut of our time; as the session which declared all-out war on human poverty."[9] All his actions were a war waged on poverty, inequality, segregation and unemployment. It is clear to see, and in fact Johnson is said it have declared it himself, that his "true love" was his Great Society program. Leuchtenburg quotes Johnson explaining his feelings in his own colourful language, saying "I was bound to be crucified either way I moved. If I left the woman I really loved – the Great Society – in order to get involved with that bitch of a war on the other side of the world, then I would lose everything at home…"[10] All these insights into the domestic agenda, and in a way, even into the mind of Lyndon B. Johnson, help explain his decisions regarding the Vietnam War later on. Great Society was still not finished, when he had to decide whether or not to get further involved in Southeast Asia.

None of his grandiose domestic policy dreams had been fulfilled when he had to commit money, soldiers and other resources into a war on the other side of the Globe. With his Great Society program Johnson set out, in his own words, to "feed the hungry and shelter the homeless" and to "provide education and medical care to the browns and the blacks and the lame and the poor".[11] As far as concrete action is concerned, Johnson introduced some twenty major bills in this program to broaden civil rights, eliminate poverty, expand educational opportunities, improve health care for the elderly, protect consumers, as well as introducing new conservation and environmental-protection measures among others.[12] These factors must be considered, especially when discussing such a strong character as Johnson. Obviously they do not appear in any transcript of any meetings with the Joint Chiefs of Staff, or the National Security Council, but they are looming in the background and undoubtedly influence the way certain actions were decided upon.

Johnson and Operation Rolling Thunder

Having briefly mentioned the domestic plans and agenda of President Johnson, one is now able to focus on Operation Rolling Thunder. The air campaign itself was conducted between the 2nd of March 1965 and the 2nd of November 1968. Even with the frequent bombing pauses, this make it one of the longest aerial operations in the history of warfare. Objectively judged, the campaign failed to achieve the desired results and on this all scholars agree. On the other hand, when discussing the reasons why the Operation failed, there seems to be a disagreement between scholars. This is especially visible when taking a closer look at what military researchers think about the conduct of aerial operations, and when examining what political scientists or historians think about the reasons of failure. In this subsection of this work, the aim is to provide an insight into the decision making system of the Johnson Administration and how they chose the path they ended up with.

---

9 American Rhetoric: *Lyndon Baines Johnson, First State of the Union Address.* 08 January 1964.
10 Leuchtenburg (2015): op. cit. 453.
11 Doris Kearns: *Lyndon Johnson and the American Dream.* New York, Harper and Row, 1976. 251–252.
12 Hunt (1996): op. cit. 83–84.

Since the Gulf of Tonkin Resolution of 1964, the legislative ground for military escalation was placed entirely into the hands of the President. Congress approved "all necessary actions". It was the task of Johnson and his closest advisors to determine what those necessary actions are and how to manage them. It is ancient wisdom that bad decisions are better taken than no decisions at all, and good leaders are ready and able to make decisions in a timely manner.[13]

To aid President Johnson in this daunting task, his inner circle of confidential colleagues included Secretary of Defense Robert McNamara, Secretary of State Dean Rusk, National Security Advisor McGeorge Bundy (Walt Rostow after 1967), Press Secretary Bill Moyers, William Bundy and George Ball, among others. Naturally the opinion of the United States Ambassador to Vietnam was also taken into consideration as well the recommendations and needs of General Westmoreland, Deputy Commander of Military Assistance Command Vietnam (MACV) and the effective leader of ground operations in Southeast Asia. It is interesting to note that although Rolling Thunder was an aerial campaign, and the Joint Chiefs were heard in some occasions, the decision making process involved mostly civilian experts. During the process of deciding the policy, the advisors unintentionally divided themselves into two groups. One of "hawks", who preferred escalation, and one of "doves" who preferred withdrawal and cutting losses. Although initially both sides had many members, during the escalation of the war in 1965, only one "dove" was left. He was George Ball, who played the devil's advocate and consequently advised the president on withdrawal and disengagement from Indochina. Although Ball's memorandums were considered, his recommendations were not taken. It was Robert McNamara who provided options that the president could utilise the most. In Bergman's work, the three broad policy options are: "1) Get out with loss of honor and prestige – a tactical withdrawal based on the fact that US forces could not win an Asian land war."[14] This obviously was neither Johnson's style, nor in accordance with the policy of previous presidents. The next option, "2) A limited commitment with option selection to follow a summer test period – test of military effectiveness as well as public opinion acceptance".[15] This option provided the most flexibility and was recommended by the civilian advisors. Finally, the last option was "3) A military buildup to save South Vietnam from collapse and deny Hanoi a victory – based on the fact that South Vietnam was central to US strategic interests".[16]

Although this last option was later also implemented, it is clear to see that the most flexible and "Johnson-like", compromise seeking option was the second one. When it came to choosing a policy, Johnson always chose the middle way. The same can be said to the exact process of the planning of Operation Rolling Thunder. As this was a military undertaking, the Joint Chiefs of Staff were heard and presented their plan. According to Leslie H. Gelb, when confronted with the "hawkish" opinion of the Joint Chiefs, and the "dovish" opinion of the civilian advisors "LBJ rather tentatively chose the compromise

[13] József Padányi: A hadtudomány örök érvényű törvényei a vezetésről. In Éva Margit Kovács (ed.): *Ünnepi kötet a 65 éves Imre Miklós tiszteletére.* Budapest, Ludovika Egyetemi Kiadó, 2020.
[14] Larry Berman: *Planning a Tragedy. The Americanization of the War in Vietnam.* New York, Norton, 1982. 91.
[15] Berman (1982): op. cit.
[16] Berman (1982): op. cit.

course".[17] The great negotiator used his skills and tried to navigate in a way that would not alienate either of the sides from him. In a way, that would fight a war and still keep the Great Society going. The way that would make America keep its promise in fighting communism, but not going on an all-out assault and provoke either China or the Soviet Union. "For Johnson the logic of the compromise course was both politically pragmatic and intellectually pragmatic."[18] It is possible to assume that amongst many influencing factors, Johnson chose to take the middle way and play safe because as a "Maverick" he was very aware that he lacked personal expertise in foreign affairs and he was also confronted by disagreements among the experts.

The extremely complex and confusing situation in Southeast Asia at that time meant that technically both ends of the spectrum had some rights in what they were proposing. Seeing this, and choosing the middle way, Johnson was relying on his previous experience in politics. The problem with this course of action was that what sounded acceptable in the language of diplomacy and seemed like a good way to buy time was militarily not possible to implement. Due to this reason, Operation Rolling Thunder was doomed from the start as far as achieving victory was concerned. Mark Clodfelter, who analysed Rolling Thunder by looking at the limits of airpower, identified the various ways victory was meant during the campaign.

Clodfelter examines the two different ways victory can be interpreted. The positive and the negative political goals. The positive political goal is really easy to determine. This meant creating a stable, independent, non-communist South Vietnam. It was clear for Johnson and all of his advisors. "Definitions of victory were only partial definitions of the term. They defined the positive political objectives sought – those that could be achieved only by applying military force" – according to Clodfelter.[19] "Equally important, though, were the negative political goals – those achievable only by limiting military force. To achieve true victory in Vietnam, both the positive and negative objectives had to be obtained."[20] The work of Clodfelter also supports the remark previously presented on these pages that the love of the Great Society was a limiting factor in Johnson's will to get involved further in Vietnam. He identifies the Great Society as a negative goal stating that: "Achieving the Great Society became an important negative objective for Johnson, one that would prevent him from applying extensive military force. Doing so, he feared, would cause the American public to turn away from the Nation's disadvantaged…"[21] The second negative goal he identifies is one that the civilian advisors refer to in many cases, but the Joint Chiefs seem to neglect. It is the fear of intervention by either the Soviet Union or communist China. Considering the great conflict these two communist nations had with each other during this period of time, and also the fact that in supplying North Vietnam they were more of less competing with each other instead of working together,

---

17 Leslie H. Gelb – Richard K. Betts: *The Irony of Vietnam. The System Worked.* Washington, D.C., Brookings Institution Press, 2016. 109.

18 Gelb–Betts (2016): op. cit.

19 Mark Clodfelter: The Limits of Airpower of the Limits of Strategy. *Joint Forces Quarterly,* 78 (2015). 111–124.

20 Clodfelter (2015): op. cit.

21 Clodfelter (2015): op. cit.

the joint participation of these two nations cannot be taken seriously. On the other hand, the provocation of either of them was a real threat and the advisors were right in trying to avoid that. Although the Sino–Vietnamese relations were really far from friendly, and history proved this later in the end of the 1970s, foreign policy experts in the United States still remembered the lessons of the Korean War and how little was needed to provoke China there.

As Clodfelter writes, "Johnson further feared that applying too much force against North Vietnam would cause its two large allies, China and the Soviet Union, to increase their assistance to the North, possibly even with overt intervention".[22] His third and last negative goal is identified as: "Finally, Johnson was concerned about America's worldwide image, with the globe seemingly divided into camps of communism and capitalism."[23] These negative objectives and the positive goal all contributed to the gradual response nature of the air campaign. In a way, the goals themselves limited the effectiveness of the Operation. The Johnson Administration's way leading up to and during Rolling Thunder was the same: trying to find a compromise. Unfortunately it turned out to be an unsuccessful policy since when it comes to waging war, there are only two options, not three.

The other side of the argument

For the sake of completion and to present opposing ideas, the aim of this section is to provide a quick insight into the military side of Operation Rolling Thunder. As time and space constrains are both placed on this work a full presentation of the Joint Chiefs' idea about conducting the air campaign cannot be shown here. While politically speaking, one can find many reasons explaining why Rolling Thunder failed, when it comes to the military, one key concept appears over and over again. This is "Rules of Engagement" (ROE). "Johnson monitored it (Rolling Thunder) closely and tightly constrained actions that American aircrews could take over the North" writes Clodfelter on this topic. "His negative objectives led to a long list of rules of engagement that did everything from preventing flights through the airspace over Hanoi or Haiphong without his personal approval to limiting how closely aircraft could fly to the Chinese border."[24] The targets of the bombing operations were micromanaged by the White House. Johnson and his advisors met on Tuesdays, after lunch, to discuss each target. This was problematic for many reasons. First of all, this meant targets chosen by individuals many thousand miles removed from the battlefield.

Secondly, it meant that certain vital targets were not allowed to be destroyed, while other targets were hit multiple times thus exposing airmen to unnecessary danger. Finally, the third reason was that next to the targets being chosen so far removed from the action, they were entirely chosen by civilians. "Not until October 1967 – after Rolling Thunder had

[22] Clodfelter (2015): op. cit.
[23] Clodfelter (2015): op. cit.
[24] Clodfelter (2015): op. cit.

been underway for more than 2½ years – did a military officer sit in regularly on the lunch sessions, when Johnson asked Army General Earle Wheeler, the Chairman of the Joint Chiefs of Staff, to begin a steady attendance."[25] The ROE restrictions also included such fundamental violations of successful combat operations as: "no pre-strike photography was permitted", "no follow-up secondary strike could be authorized", "unexpended ordnance could not be used on a target of opportunity" and even air-to-air combat was restricted "where the rule saw laid down that enemy aircraft had to be positively identified before engaging".[26]

In a modern combat environment where the closing speeds of aircraft were in many cases over one thousand miles per hour, positive visual identification was not only problematic but outright dangerous to those airmen. Since the enemy did not play along these set of rules, they could engage American pilots sooner and have a significant advantage in aerial combat. Although many other smaller restrictions can be listed, and indeed as the Operation progressed and political leaders slowly realised that results were not coming, some of these restrictions were eliminated. However, there was one more factor, that according to the military, significantly contributed to the failure of the campaign. Those were the frequent bombing pauses. These were part of Johnson's "carrot and stick" diplomacy with which he tried to force the North Vietnamese to negotiate. However, the North Vietnamese used this mostly to buy time, repair the damaged infrastructure and strengthen the air defence.

Conclusions

When it comes to Operation Rolling Thunder, it is generally assumed by most of the scholars that the Operation failed to achieve its objectives. However, as one can see, the decision making process used by Johnson was working as intended. Indeed, the system worked throughout America's involvement in Vietnam as it was intended, yet the whole war ended in defeat.

Rolling Thunder, the longest running operation of the war, is no exception to that. Certain criticism of the Rules of Engagement is certainly right. Militarily the failure can be blamed on the rules. On the other hand, these rules might have prevented further escalation, a Chinese involvement and an even bigger quagmire. The personal characteristics of President Johnson – always trying to find the middle ground –, his domestic policy considerations and especially his unwavering love for the Great Society certainly influenced both his decision making process and eventually, the outcome of the Vietnam War. There are still questions left to answer in this topic and it can still provide a fertile ground for further research. Additionally, it is also quite relevant these days and the result gained can be and will be used in future conflicts, as well. This topic shows clearly that studying the Vietnam War is as relevant today as ever. It was a conflict where many lives were lost and by studying the war, learning from it and applying this

[25] Clodfelter (2015): op. cit.

[26] Peter B. Mersky – Norman Polmar: *The Naval Air War in Vietnam.* Annapolis, MD, Nautical and Aviation Publishing Company of America, 1981). 27.

knowledge to avoid mistakes, one can honour their death and give a meaning to their ultimate sacrifice.

References

American Rhetoric: *Lyndon Baines Johnson, First State of the Union Address.* 08 January 1964. Online: www.americanrhetoric.com/speeches/lbj1964stateoftheunion.htm

Berman, Larry: *Planning a Tragedy. The Americanization of the War in Vietnam.* New York, Norton, 1982.

Boda, József – Gábor Boldizsár – László Kovács – Zoltán Orosz – József Padányi – István Resperger – Zoltán Szenes: Fókusz és együttműködés. A hadtudomány kutatási feladatai. *Honvédségi Szemle,* 144, no. 3 (2016). 3–19.

Clodfelter, Mark: The Limits of Airpower or the Limits of Strategy. *Joint Forces Quarterly,* 78 (2015). 111–124.

Daddis, Gregory A.: American Military Strategy in the Vietnam War, 1965–1973. In Jon Butler (ed.): *Oxford Research Encyclopedias. American History.* New York, Oxford University Press, 2014.

Forgács, Balázs: Mao and Giap on Partisan Warfare. *AARMS,* 18, no. 2 (2019). 31–38. Online: https://doi.org/10.32565/aarms.2019.2.3

Gelb, Leslie H. – Richard K. Betts: *The Irony of Vietnam. The System Worked.* Washington, D.C., Brookings Institution Press, 2016.

Hunt, Michael H.: *Lyndon Johnson's War. America's Cold War Crusade in Vietnam, 1945–1968.* New York, Hill & Wang, 1996.

Kearns, Doris: *Lyndon Johnson and the American Dream.* New York, Harper and Row, 1976.

Kort, Michael G.: *The Vietnam War Reexamined.* Cambridge, Cambridge University Press, 2017. Online: https://doi.org/10.1017/9781107110199

Leuchtenburg, William E.: *The American President. From Teddy Roosevelt to Bill Clinton.* New York – Oxford, Oxford University Press, 2015.

Mersky, Peter B. – Norman Polmar: *The Naval Air War in Vietnam.* Annapolis, MD, Nautical and Aviation Publishing Company of America, 1981.

Padányi, József: A hadtudomány örök érvényű törvényei a vezetésről. In Éva Margit Kovács (ed.): *Ünnepi kötet a 65 éves Imre Miklós tiszteletére.* Budapest, Ludovika Egyetemi Kiadó, 2020.

Shapiro, Robert Y. – Martha Joynt Kumar – Lawrence R. Jacobs: *Presidential Power. Forging the Presidency for the Twenty-First Century.* New York, Columbia University Press, 2000. Online: https://doi.org/10.7312/shap10932

Swanson, Michael: *Why The Vietnam War? Nuclear Bombs and Nation Building in Southeast Asia, 1945–1961.* Danville, Virginia, Campania Partners LLC, 2021.

Weaver, Michael E.: *The Air War in Vietnam.* Lubbock, Texas, Texas Tech University Press, 2022.

AARMS Vol. 21, No. 2 (2022) 99–111.

10.32565/aarms.2022.2.7

Improving the Kosovo Innovation Ecosystem: Exploration before Exploitation

Zef DEDAJ[1] – Csaba MAKÓ[2] – Saeed NOSRATABADI[3]

Open innovation enables the circulation of knowledge among businesses in an innovation ecosystem and facilitates the innovation processes. However, there are many businesses operating in the innovation ecosystem in Kosovo that are not yet familiar with the mechanism of innovative linkages, consequently they cannot benefit from it. Therefore, the present study tried to provide a clear picture of how to implement open innovation and its requirements and ultimately the benefits of implementing innovation for them by studying the case study of two large and successful companies in implementing open innovation in Kosovo. Findings disclosed that investing in research and development is the source of innovation. Innovation is manifested in three categories of technological innovation, market innovation and product innovation. Findings revealed that companies are required new equipment and skilled workforces to successfully implement innovation. Innovation in organisations results in improving their position in global markets as well as financial benefits.

Keywords: *open innovation, innovation ecosystem, innovation process, organisational performance, Kosovo*

Introduction

Innovation has a crucial role in the performance of firms and plays a vital role in the competitiveness productivity of the firm level and national economy.[4] Many authors have recognised the importance of innovation and its role both at the firm and economic level. Innovations are new creations of economic importance typically undertaken by firms, e.g. it may be a new brand of goods or services, which is a question of what is being

[1] PhD candidate, University of Pécs, Business Administration at the Doctoral School of Business Administration, e-mail: dedajz@gmail.com

[2] Head of the research group, University of Public Service, Institute of Information Society, e-mail: Mako.Csaba@tk.hu

[3] PhD candidate in Management and Business Administration at the Hungarian University of Agriculture and Life Sciences, e-mail: Saeed.nosratabadi@phd.uni-mate.hu

[4] Alice Lam: Innovative Organizations: Structure, Learning and Adaptation. *School of Management, Royal Holloway University of London,* (2011). 163–177.

produced while process innovations can be technological, and it regards how goods and services are produced. Thus, product and process innovations are tightly interlinked to each other, whereas organisational process innovations like 'intangible' services are also essential for economic growth and jobs.[5] The pace of innovation and the emergence of new technologies has increased dramatically in recent years, so that innovative changes are happening frequently.[6] There is ample evidence that businesses that respond quickly to these innovations and keep up with them will benefit the most.[7] So today there are many businesses that have embedded innovation in their business model. This means that value creation in these businesses depends on innovation. In other words, the survival of these businesses depends on innovation, and they are always looking for innovation.[8] Such strategies always put them one step ahead of other competitors and bring them an unattainable competitive advantage.[9]

Using ideas outside the organisation can be as effective in advancing their technologies as internal ideas.[10] This concept allowed knowledge to circulate freely among all industry players, even among competitors, and leads to the development and emergence of new business models. This is how Chesbrough defines open innovation: "Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively."[11] Moreover, according to Gassmann and Enkel open innovation includes different activities, such as inbound, outbound and associated activities, which can be more or less open, meaning that firms need to open their boundaries and enable inflow of valuable knowledge to foster opportunities for collaborative innovation processes with partners, customers, competitors, suppliers and research institutions.[12] Therefore, open innovation requires managers in firms to make new decisions in developing and exploiting innovation activities.[13]

---

5 Charles Edquist: *The Systems of Innovation Approach and Innovation Policy: An Account of the State of the Art.* DRUID Conference, Aalborg, Denmark, 12–15 June 2001. 1–24.

6 Christian Hitz – Karlheinz Schwer: The Role of IT Governance in Digital Operating Models. *Journal of Eastern European and Central Asian Research,* 5, no. 2 (2018). 61–79.

7 Karim Ben-Slimane et al.: The Legitimation Strategies of Early Stage Disruptive Innovation. *Technological Forecasting and Social Change*, 158 (2020). 120–161; Vijay Victor et al.: From a Recession to the Covid-19 Pandemic: Inflation–Unemployment Comparison between the UK and India. *Economies*, 9, no. 2 (2021); Jonathan Dando – Maximilian Lebmeier: A Novel Valuation Model for Medical Intervention Development Based on Progressive Dynamic Changes that Integrates Health Technology: Assessment Outcomes with Early-Stage Innovation and Indication-Specific Clinical Success Rates. *Journal of Innovation and Entrepreneurship*, 9, no. 1 (2020). 1– 28.

8 JinHyo J. Yun et al.: The Culture for Open Innovation Dynamics. *Sustainability,* 12, no. 12 (2020).

9 Setyani D. Lestari et al.: Antecedents and Consequences of Innovation and Business Strategy on Performance and Competitive Advantage of SMEs. *The Journal of Asian Finance, Economics and Business*, 7, no. 6 (2020). 365–378.

10 Henry W. Chesbrough: *Open Innovation. The New Imperative for Creating and Profiting from Technology.* Boston, Mass., Harvard Business School Press, 2003.

11 Henry Chesbrough: *Open Business Models. How to Thrive in the New Innovation Landscape.* Boston, Mass., Harvard Business School Press, 2006.

12 Oliver Gassmann – Ellen Enkel: *Towards a Theory of Open Innovation: Three Core Process Archetypes.* Lisbon, R&D Management Conference (RADMA), 2004.

13 Eelko K.R.E. Huizingh: Open Innovation: State of the Art and Future Perspectives. *Technovation,* 31, no. 1 (2011). 2–9.

Kosovo is one of the countries that has made great efforts to grow in implementing innovation in the world. As Kosovo is increasingly developing favourable conditions and policies for innovation, e.g. significant policies and laws to support economic development are in place, but the insufficient institutional capacity of the state has hindered implementation. The agenda of the Science Technology and Innovation (STI) has recently gained political attention in the Kosovo economy. The Ministry of Education Science and Technology (MEST) and the Ministry of Trade and Industry (MTI) are the key institutions responsible for establishing a policy framework and environment for innovation, while the Ministry of Economic Development (MED) is steadily increasing its role in the innovation mechanism. The Ministry of Innovation and Entrepreneurship (MIE) was formed in 2017, and EUR 1.1 million has been allocated to laboratories and specific facilities to support the ecosystem of innovation; however, little progress has been made towards integration into the European Research Area (ERA). With the creation of the MIE, Kosovo has been able to start introducing a program that directly affects the progress of innovation and the economic growth of the country; as a result, the Innovation and Entrepreneurship Fund has been set up to help innovative companies, Non-Governmental Organisations (NGOs), and Small and Medium-sized Enterprises (SMEs) in Kosovo.[14]

Not surprisingly enough, the necessary ingredients and all relevant actors of the innovation ecosystem in Kosovo are present, but a systematic approach towards linking such components between them to make the innovation ecosystem function properly as an ecosystem that supports innovation directly has been somewhat lacking. The role of innovation in economic development is not yet fully recognised in Kosovo, and the government and business structures are gradually reflecting the importance of innovation as one of the key pillars of economic growth. The development of open innovation among economic actors is a challenge facing the innovation ecosystem in developing countries[15] and businesses are unaware of how to implement the mechanism and its benefits. Therefore, the present study was conducted to provide a clear picture of the processes, requirements and benefits of implementing open innovation, or in other words, membership in the innovation eco-system in Kosovo. Hence the main objective of this study is to answer the following re-search questions: 1. How do businesses in Kosovo implement open innovation? 2. What are their requirements for implementing open innovation? 3. What are the benefits of implementing open innovation for them?

Methodology

A core objective of the research is to pick up key players in the innovation ecosystem in Kosovo and to use a multi-case study approach to identify their policies, drivers and networks on how to enhance the company's innovation performance. A variety of essential steps are to be taken to design an interview guide for this study with in-depth interviews. In

[14] Andrew Wrobel: Towards an Innovative Kosovo. *Emerging Europe*, 16 May 2019.

[15] Maurizio Massaro et al.: Antecedents to Export Performance and How Italian and Slovenian SME's Innovate During Times of Crisis. *Journal of Eastern European and Central Asian Research*, 4, no. 1 (2017).

order to analyse innovation issues in-depth, it is decided to design and conduct a multi-case study method. In carrying out multiple case studies with an emphasis on the comparison, the so-called case study protocol is vital as it helps to direct a systematic analysis when the case study report can be evaluated on a case-by-case basis. Given this, the article follows all requirements for multiple case studies in the field of the innovation ecosystem in Kosovo and the following model has been adapted and applied.[16] Figure 1 illustrates the processes of conducting case studies and data collection.

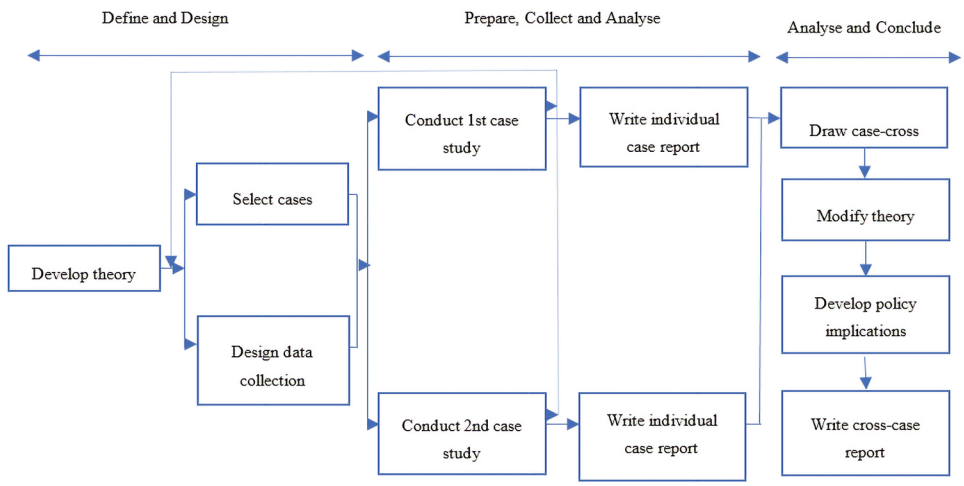


Figure 1: Multiple case study procedures

Source: Compiled by the authors based on Yin (2018): op. cit. 95.

Following the multiple case study model described above and in order to make the study more convincing in this research, a multi-case study method has been applied, and the following two different case studies have been examined:

1. *The Carriers Class Consulting & Integration Services Joint Stock Company (3CIS J.S.C), or shortly 3CIS, business service firm integrated into the global networks of knowledge intensive business service sector.*
2. *Pharmaceutical manufacturing as a knowledge intensive sector: the case of Trepharm company.*

The reasoning behind the two case studies is to map the factors that shape innovation in the institution of knowledge creation or knowledge developing and transferring institution, such as a business service firm of a manufacturing company, within the innovation ecosystem in Kosovo.

[16] Robert K. Yin: *Case Study Research and Applications. Design and Methods.* London, SAGE Publications, 2018.

Data collection

Data is collected through semi-structured interviews with 10 representatives of each case study (five representatives from the business service firm 3CIS J.S.C. and five representatives from the manufacturing case study firm Trepharm company).

The collection of primary data for case studies is carried out in three phases. The first stage of the interviews was conducted with only one participant from each case study; hence to validate the content, a simplified version of the framework conditions was discussed with them in terms of how they think about it and whether those framework conditions are applicable to their organisations to set up case studies. In order to get accurate responses, the second phase of the interviews was conducted with managerial and non-managerial people who were most important to the subject. While the third phase was repeated with selected interviews in case additional data were required to complete the case study.

Targeted people were informed on time by email, and one-on-one interviews were held as recommended by[17] and in many cases, conversations for each interview were recorded with the approval of the respondent. Innovation issues are a sensitive topic, and in many situations, businesses are unwilling to provide detailed information, especially through a quantitative questionnaire, so that data collection through interviews for this article is considered to be very useful. It is worth noting that most of the interviews were done in English. Finally, besides the primary data collection, reports related to innovation activity were also analysed in the context of innovation in the analysis of two case studies. Furthermore, for data collection to improve the trustworthiness or reliability of the innovation study we have assessed reliability through the application of several factors such as "credibility, dependability, confirmability, integrity transferability, fit standards, understating, generality and control".[18] The following Table 1 offers more detailed information on the reliability analysis of the case study data collection methodology.

Table 1: Trustworthiness of the case studies method

The criteria for trustworthiness	Methods applied in the case studies of innovation research
Credibility	Due to the pandemic situation with the Covid-19, it took us 12 months to conduct interviews with the two case studies. In addition to the collection of primary data, a wide literature on innovation was also considered. The innovation activity reports were also analysed. The case studies were also distributed to the interviewed respondents as to obtain some new knowledge from them.
Transferability	The transferability was supported by manufacturing and service firms.
Dependability	Only senior management and non-management level positions were interviewed to acquire an in-depth knowledge and professional information.
Confirmability	The final research work, in particular the fieldwork of case studies, is circulated for further analysis to a range of professional experts who have already carried out such research.

[17] Naresh K. Malhotra – Satyabushan Dash: *Marketing Research. An Applied Orientation.* London, Pearson Publishing, 2016.

[18] Daniel J. Flint et al.: Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context. *Journal of Marketing*, 66, no. 4 (2002). 102–117.

The criteria for trustworthiness	Methods applied in the case studies of innovation research
Integrity	As noted above, innovation is a sensitive issue; hence, participants have been assured of confidentiality, thus ensuring them that the data and information are only used for research purposes.
Fit criteria	Having respect to the procedures and steps referred to above, which have been carefully applied, then, as a result, a final acceptable "fit criterion" was obtained.
Understanding	For the sake of transparency, the final output is sent to them to show if their inputs are c orrectly and accurately reflected in the research.
Generality	What is considered in terms of generality is the environment or atmosphere, the time of the interview and the way of discussion with the participants.
Control	The inputs provided during the interviews by the participants have a controlling function, as the findings will possibly affect them either positively or negatively.

Source: Compiled by the authors based on criteria suggested by Flint et al. (2002).

Results and discussion

Case study 1: 3CIS

3CIS, which is at the frontier of the current technological revolution cycle in Kosovo plays a key role in the Kosovo innovation ecosystem. With a decade experience, the company aims to increase customer satisfaction by enhancing the role of Research and Development (R&D) solutions that can further improve telecommunications products and systems. The turnover of the company has gradually risen from year to year; for example, from EUR 3.75 million in 2017, it increased to EUR 4.94 million in 2018, or 24.11% higher than in 2017, which continued to rise to EUR 5.87 million for 2019, or 19% higher than in 2018, making the company a leader in the services sector in Kosovo. Since 3CIS relies solely on the international market (mainly on the U.S., the United Kingdom, Middle East, Europe and the African markets), it is distinct from other companies in Kosovo. Information and Communication Technology (ICT) in Kosovo, in particular exports of telecommunications, computer and information services, amounted to EUR 55.8 million in 2018, or EUR 9.2 million more than in 2017.[19] Given this export, EUR 55.8 million and the turnover of 3CIS for 2018 of EUR 4.94 million indicate that 3CIS share represents 8.84% of the country's overall export. In this sense, since 2008, 3CIS has been characterised by continuous growth, and the role of innovation has been in focus as it is considered valuable in business services. Since then, the organisation has established the R&D department as a specialist section dealing with innovation, and automation is the essential task of the R&D department. Moreover, automation in 3CIS focuses on improving common device configuration models, the basic Network Services Orchestrator (NSO), administration and alarm management, and compliance reporting tests. Continuous technological innovation, in particular rising automation services, has improved the front-runner role of 3CIS in the global market for business services. In this context, automation enables hardware resources to populate Unix, opens stack, and builds various types of Virtual Memories

[19] Kosovo, C. B. O.: *Statistics. Time Series Data 2018.*

(VMs) and the use of standard management and orchestration of gateway functions, policy functions and service functions. As a result, the automation function in 3CIS is higher than before, as senior engineers are well qualified and skilled in their use. It should be noted that the automation function is always built-in partnership with the projects, based on the needs of both 3CIS as project implementation and the client as project beneficiary. Therefore, the application of the automation method differs from project to project. The company invests 18% of the income generated over the years as it is considered very important and profitable for the company's growth. The analysis reveals that the investment in laboratories for 3G, 4G and 5G integration, which cost the company EUR 268,406, resulted in a return on investment of EUR 984,090 (between 2018 and 2019). As a result, 3CIS has managed to recruit 25 new engineers in the company as new workers, and the laboratories will continue to operate and generate profits for the company. The analysis shows that a 1-euro investment in R&D generates EUR 3.6 of income for the company, though this benefit is not always immediate, but it is worth investing in the long term. Besides, 3CIS also continuously invested in training, facilities and education, including participation in ICT conferences, as part of R&D. Another important aspect of 3CIS is the issue of technology, whether or not the organisation has any technology problems, and whom it looks for help. In general, the organisation recognises that there are cases where it encounters technological difficulties, most of which occur in administration, but it is worth noting that 3CIS uses two channels of the solution when coping with those issues. First, it searches for a solution inside the organisation, using the leading technology community to solve the technical problems, and there have been cases where this group is very useful in solving such problems. Furthermore, the organisation is active in organising various trainings for its employees, such as On-the-Job Training (OJT) and Outside-of-the-Job Training (Off-JT), and it has successfully combined in mixing OJT and Off-JT. The first type of OJT is linked to R&D, which focuses on emerging technologies, while the second form of OJT is linked to the recruitment process. In comparison, Off-JT is structured on working procedures specific to customers and are typically not industry standard. There have been cases where senior engineers from 3CIS have been sent to clients such as Comcast, Charter Communications, Unilever and Windstream for Off-JT and benefit in various locations such as the United States, the United Kingdom and Europe. All these efforts helped 3CIS succeed in being very well placed and integrated into the Global Value Chain (GVC) of the Knowledge Intensive Business Service (KIBS) sector and improving the role in the GVC has forced 3CIS to invest heavily in knowledge. The analysis of the case study of 3CIS discloses that the gateway for innovation in this organisation is investment in R&D. This investment brought technological innovation to the company, which resulted in automation in this company. To implement this innovation, they needed highly skilled workforce. Therefore, they adopted two strategies to supply these forces: 1. hiring new skilled workforce; and 2. raise the skills of existing employees with on-the-job training or outside-of-the-job training approaches.[20] This helped the company to

[20] Rommel P. Sergio – Maria Rylova: Employee Engagement and Empowerment as Gateway towards Retention: The Case of Volkswagen Group. *Journal of Eastern European and Central Asian Research,* 5, no. 2 (2018).

improve its position in the global markets and brought them financial benefits. A summary of how 3CIS implements innovation is given in Figure 2.

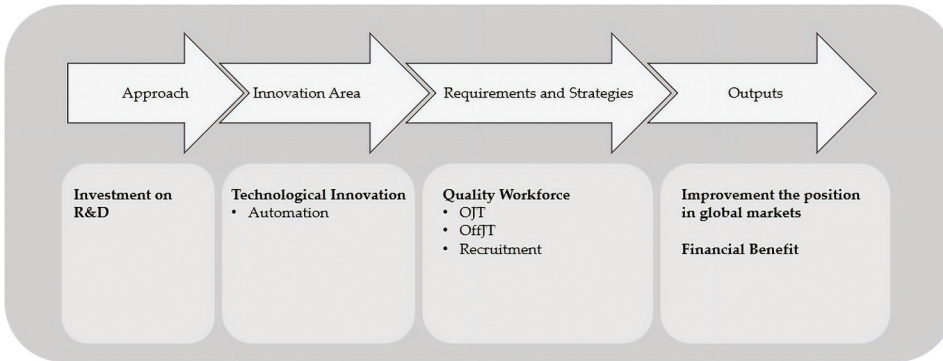


Figure 2: 3CIS Case Study Output

Source: Compiled by the authors based on qualitative analysis.

Case study 2: Trepharm

Trepharm is approaching the completion of the process to be certified by the Pharmaceutical Good Manufacturing Practices Professional Certification (CPGP), which will allow the factory to have the quality system recognised by the European Union (EU) authority and to apply for Good Manufacturing Practices (GMP) and marketing authorisation certificates in EU countries for goods that meet export requirements as well as to bring European products and manufacture in Trepharm. Sales in turnover increased marginally from year to year, resulting in a rise in export participation, from 13.60% in 2017, reaching 87.80% of the country's total exports in 2018; however, with a decrease in export participation of 1.50% in 2019. Nonetheless, consumption is dominated by imports, representing only 2.55% of the participation. In terms of GVC, from neighbouring countries, Trepharm concentrates its exports to Albania and Macedonia, while Libya has the highest export market share in foreign markets, followed recently by Turkey. This makes Trepharm playing a unique role in the Kosovo innovation ecosystem, and it is steadily increasing its integration into the GVC. As far as R&D is concerned, since Trepharm was founded, the part of the research activities has been completely non-existent, while Trepharm has performed well in adopting 140 pharmaceutical products from the British Pharmacopoeia[21] operating in the United Kingdom. Out of these total products, 94 products have been registered as trademark protection to the Industrial Property Agency (IPA) in Kosovo. Since 2020,

[21] The British Pharmacopoeia covers a broad international market. It reaches more than 100 countries around the world with a focus on protecting public health by ensuring accurate quality standards for pharmaceutical and medicinal products since 1864 and playing an essential role in the process of setting standards in Europe. The British Pharmacopoeia is a fundamental reference tool for all individuals and organisations involved in pharmaceutical, including R&D, production and quality control analysis (www.pharmacopoeia.com/what-is-the-bp).

R&D is structured as a new department but, in order to equip the R&D department, the organisation should concentrate on increasing equipment along with the number of employees (currently it has only three employees), and these people with 13% of the sales turnover budget allocated to R&D must be able to perform research activities; currently, this remains a challenge for the company.

Nevertheless, Trepharm expects to divide up to 13% of its sales turnover to the R&D department, which is a strong indication of the STI position's strengthening. In terms of trademarks, out of 94 applications, the company managed to register 50 products, and out of 2,635 registered trademarks in Kosovo, Trepharm represents 1.89% of the total participation; however, due to a lack of research activities, Trepharm has not presented any application for patents and industrial designs in the IPR office.

Technological and marketing innovations are seen as drivers of innovation for the company. In terms of the automation system, the company has an IT system in place which is connected to all the equipment in the laboratories and a manufacturing system that takes care of everything and manages all the processes ranging from raw material production to selling the finished goods. Trepharm shows capabilities in the use of various managerial techniques in the production process that supports the production system, e.g. many types of International Organization for Standardization (ISO) standards are in place that guaranteed the company to build up its credibility and increased its quality requirements as well as it played a vital role in the path of the certification process. Though Trepharm does not formally recognise the role of Just-in-Time (JIT), in fact, the case study reveals that, to some extent, the way how the production process is directed includes some characteristics of the JIT. Due to the IT system in place, the manufacturing system has provided an efficient production structure that improved efficiency and reduced waste and inefficiencies and minimised costs associated with the production system. Quality circle is also a method that is implemented periodically, and it works based on Problem Based Learning (PBL). Given the importance of marketing as non-tech innovation, it should be noted that marketing appears to have played a significant role, and two types of marketing innovation are present. The first method of marketing innovation is to promote the firm's quality products through participation in international trade fairs. This form of marketing helped Trepharm establish contacts and reaching bilateral export agreements and enter new markets in countries like Libya and Turkey. In comparison, Trepharm's second marketing plan focuses on promoting selected, manufactured products, which can be marketed without a prescription or over the counter. In such goods, the company is highly involved in innovative marketing through social networks and, in particular, television advertisements, especially in the domestic market, which have continuously resulted in a significant contribution to the turnover of the company.

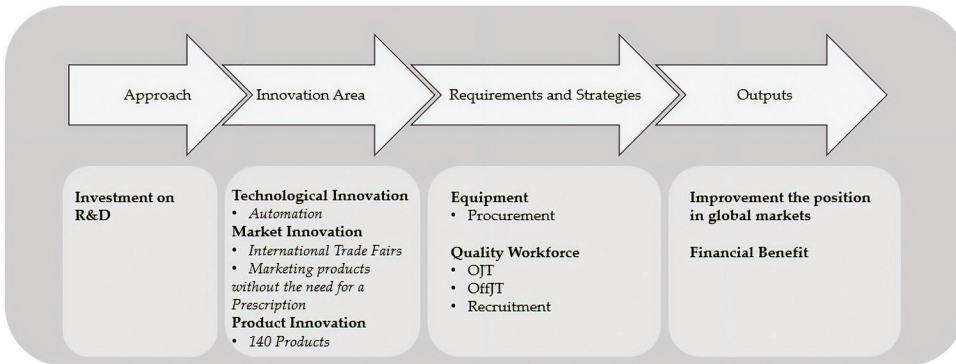


Figure 3: Trepharm Case Study Output

Source: Compiled by the authors based on qualitative analysis.

Similarly to 3CIS, even Trepharm is highly involved in organising different trainings for its employees, and it has successfully combined in house and external knowledge sources (e.g. combining OJT and Off-JT); technical training in the form of OJT and Off-JT is unavoidable in a regularly structured manner. OJT is organised on topics related to the manufacturing system, innovation topics focusing on the development of new products and current products and markets, and quality policies and procedures; furthermore, depending on the role of employees in the organisation, the Human Resource (HR) department decides the type of training. While regarding Off-JT, the company collaborates with inter-national experts and is usually organised for specific topics, e.g. experts from the Czech Republic who are responsible for Good Manufacturing Practice (GMP) and quality are invited to train some number of staff basically from engineering, operation and manufacturing departments in the company, some other experts from Poland come and provide training on product certification, as well as some experts from Slovenia very often visit Trepharm to train the company staff in the field of marketing innovation. Then in the form of the quality circle, they exchange and transfer knowledge from different departments that come together to solve any problem in the form of the Doing Using Interacting (DUI). It should be noted that innovations resulting from STI, and DUI are different. The STI innovation is related to a knowledge management system in which explicit knowledge is formed, whereas DUI innovation is the output of implicit knowledge in doing, using and interacting.[22] Technological innovation resulted in automation in this company, while market innovation has encouraged them to choose new marketing approaches to enter new markets. In addition to the skilled workforce, they needed new equipment to implement these innovations. Trepharm, like 3CIS, uses similar strategies to supply its skilled workforce. As in the case study of 3CIS, investing in innovation in Trepharm has given them a competitive advantage that has not only improved their

[22] Csaba Makó et al.: When Will Alpha and Omega Collide? In Search of the Theoretical Relevance of EU Innovation Policies. *Vezetéstudomány – Budapest Management Review,* 50, no. 11 (2019). 66–73.

position in global markets, but also brought them financial benefits. A summary of how Trepharm implements innovation is given in Figure 3.

Conclusions

The findings showed by investing in innovation, companies have been able to achieve technology innovation, market innovation and product innovation. This investment in innovation was, of course, not only financially profitable for them, but also gave them a competitive advantage by which they were able to improve their position in global markets. However, the overall governance model for research in Kosovo is rooted in a linear innovation model that focuses primarily on R&D as the primary source of innovation and underestimates the so-called non-R&D sources innovation. Returning to the firm's analysis, mixing OJT and Off-JT is successfully combined by both firms; in both cases, this increased the role of organisational innovation in enhancing knowledge creation and knowledge transfer within firms. Enhancing knowledge creation and knowledge transfer within the case studies in the form of a quality circle and problem-based learning (e.g. regular use of project type interdisciplinary work organisation) is perceived a beneficial non-technological form of innovation. The findings of this study contribute to the innovation and open innovation literature by depicting for the first time how to implement innovation in companies operating in Kosovo. While key components and actors exist as part of the innovation ecosystem in Kosovo, there are still some micro and macro-obstacles that hinder the innovation ecosystem. A major obstacle to firms getting access to financing is the risk-averse of banks, as banks need collateral amounting to 300% of the loan value, which is prohibitive for small or innovative firms. However, the Kosovo Credit Guarantee Fund (KCGF) was set up by the United States Agency for International Development (USAID), which offers partial credit guarantees to banks and other financial institutions to encourage increased lending to eligible borrowers. In addition, lack of consistent institution is the other issue of the innovation ecosystem in Kosovo. First, a separate ministry devoted directly to innovation and entrepreneurship was identified as a significant shortcoming in the functioning of the ecosystem. In 2020, this Ministry has merged with the Ministry of Education. Frequent political transition and change of institutions remain a crucial barrier. Lack of innovation skills at the firm level is the other problem of innovation ecosystem in Kosovo. The OECD survey[23] shows that about 25% of companies in Kosovo have claimed that the labour force has inadequate skills to satisfy the needs of the companies on the market, as there is a gap between skills available to the workers and the skills required by the industry. Of course, since the present study examined only two companies, the findings cannot be generalised to all businesses in the Kosovo innovation ecosystem. In addition, due to various reasons such as Kosovo's economic, political and geographical location, generalisation of the results for other countries, especially developed countries, is not feasible as well. Therefore,

[23] OECD: *Competitiveness in South East Europe. A Policy Outlook.* 2018.

the present study suggests that a similar study be conducted in developed countries and compare its findings with the present study.

References

Ben-Slimane, Karim – Cédric Diridollou – Karim Hamadache: The Legitimation Strategies of Early Stage Disruptive Innovation. *Technological Forecasting and Social Change,* 158 (2020). 120–161. Online: https://doi.org/10.1016/j.techfore.2020.120161

Chesbrough, Henry: *Open Business Models. How to Thrive in the New Innovation Landscape.* Boston, Mass., Harvard Business School Press, 2006.

Chesbrough, Henry W.: *Open Innovation. The New Imperative for Creating and Profiting from Technology.* Boston, Mass., Harvard Business School Press, 2003.

Dando, Jonathan – Maximilian Lebmeier: A Novel Valuation Model for Medical Intervention Development Based on Progressive Dynamic Changes that Integrates Health Technology: Assessment Outcomes with Early-Stage Innovation and Indication-Specific Clinical Success Rates. *Journal of Innovation and Entrepreneurship,* 9, no. 1 (2020). 1–28. Online: https://doi.org/10.1186/s13731-019-0111-1

Edquist, Charles: *The Systems of Innovation Approach and Innovation Policy: An Account of the State of the Art.* DRUID Conference, Aalborg, Denmark, 12–15 June 2001. 1–24.

Flint, Daniel J. – Robert B. Woodruff – Sarah F. Gardial: Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context. *Journal of Marketing,* 66, no. 4 (2002). 102–117. Online: https://doi.org/10.1509/jmkg.66.4.102.18517

Hitz, Christian – Karlheinz Schwer: The Role of IT Governance in Digital Operating Models. *Journal of Eastern European and Central Asian Research,* 5, no. 2 (2018). 61–79. Online: https://doi.org/10.15549/jeecar.v5i2.210

Gassmann, Oliver – Ellen Enkel: *Towards a Theory of Open Innovation: Three Core Process Archetypes.* Lisbon, R&D Management Conference (RADMA), 2004. Online: www.alexandria.unisg.ch/274/

Huizingh, Eelko K.R.E.: Open Innovation: State of the Art and Future Perspectives. *Technovation,* 31, no. 1 (2011). 2–9. Online: https://doi.org/10.1016/j.technovation.2010.10.002

Lam, Alice: Innovative Organizations: Structure, Learning and Adaptation. *School of Management, Royal Holloway University of London,* (2011). 163–177.

Lestari, Setyani D. – Farah M. Leon – Sri Widyastuti – Nora A. Brabo – Aditya H. P. K. Putra: Antecedents and Consequences of Innovation and Business Strategy on Performance and Competitive Advantage of SMEs. *The Journal of Asian Finance, Economics and Business,* 7, no. 6 (2020). 365–378. Online: https://doi.org/10.13106/jafeb.2020.vol7.no6.365

Makó, Csaba – Miklós Illéssy – Balázs Heidrich: When Will Alpha and Omega Collide? In Search of the Theoretical Relevance of EU Innovation Policies. *Vezetéstudomány – Budapest Management Review,* 50, no. 11 (2019). 66–73. Online: https://doi.org/10.14267/VEZTUD.2019.11.05

Malhotra, Naresh K. – Satyabushan Dash: *Marketing Research. An Applied Orientation.* London, Pearson Publishing, 2016.

OECD: *Competitiveness in South East Europe. A Policy Outlook.* 2018. Online: https://doi.org/10.1787/9789264298576-en

Massaro, Murizio – Arthur Rubens – Roland Bardy – Carlo Bagnoli: Antecedents to Export Performance and How Italian and Slovenian SME's Innovate During Times of Crisis. *Journal of Eastern European and Central Asian Research*, 4, no. 1 (2017). Online: https://doi.org/10.15549/jeecar.v4i1.153

Sergio, Rommel P. – Maria Rylova: Employee Engagement and Empowerment as Gateway towards Retention: The Case of Volkswagen Group. *Journal of Eastern European and Central Asian Research*, 5, no. 2 (2018). Online: https://doi.org/10.15549/jeecar.v5i2.242

Victor, Vijay – Joshy J. Karakunnel – Swetha Loganathan – Daniel F. Meyer: From a Recession to the Covid-19 Pandemic: Inflation–Unemployment Comparison between the UK and India. *Economies*, 9, no. 2 (2021). Online: https://doi.org/10.3390/economies9020073

Kosovo, C. B. O.: *Statistics. Time Series Data 2018.* Online: https://bqk-kos.org/?m=t&id=55

Wrobel, Andrew: Towards an Innovative Kosovo. *Emerging Europe*, 16 May 2019.

Yin, Robert K: *Case Study Research and Applications. Design and Methods.* London, SAGE Publications, 2018.

Yun, JinHyo J. – Xiaofei Zhao – KwangHo Jung – Tan Yigitcanlar: The Culture for Open Innovation Dynamics. Sustainability, 12, no. 12 (2020). Online: https://doi.org/10.3390/su12125076

Contents