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President Farmajo's Election: A Brief Hiatus or Hype in Ethiopia's Regional Hegemonic Ambition

Ali [Sheikh] Ahmed ABDI[1]

The paper aims to identify the existing state of affairs and relationships between Somalia and Ethiopia in the era of President Mohamed Abdullahi Farmajo, and the multiplicity of other states (Middle East and Turkey) with vested interests in Somalia that might radicalize diplomatic relations following the 2017 election. Rival foreign countries present in the Horn of Africa that sought hegemonic dominance, including the USA, China, Turkey, Russia, and the Middle East, watched the political changes that took place in Somalia after the election of President Mohamed Abdullahi Farmajo. However, upon taking the presidential oath, Farmajo's leadership and foreign policy turned towards Turkey and Qatar as an alternative power to lean against in the event of pursuing his irredentist ambitions as was constantly outlined in his rhetorical speech before the election is now on the making. Nevertheless, the revolving question is, would it cause a brief hiatus or hype in Ethiopia's regional hegemonic ambition?

Keywords: *Ethiopia, Somalia, Election, Rhetoric, Relation and Hegemony*

Introduction

The socio-political and economic ties between the peoples of Somalia and Ethiopia stretch back to antiquity, and perhaps to a point of common origin. Yet the two countries have experienced centuries of transmissible conflict and violence that have blemished their international, as well as intranational relationships. Since the collapse of Siad Barre's military rule in Somalia in 1991, the nature of Ethiopia–Somalia relations has been asymmetrical, where the balance of power weighed in Ethiopia's favour inevitably resulting in a neo-hegemony that dominated the Horn region until 2017, when former Prime Minister Mohamed Abdullahi, alias "Farmajo", became the sixth president of post-1991 Somalia. President Farmajo was not Addis Ababa's preferred candidate during the Somali presidential campaign in 2017. Instead, the Ethiopian Government supported the previous head of state, Hassan Sheikh Mohamud. A widely-held hypothesis was that the new Somali president would question the hegemonic role which Ethiopia has played in the Horn region since 1991, given the country's informal and formal military presence in Somalia. Yet the desperation of Mogadishu's security issues was a concern that would leave Farmajo's government with little motivation to disavow Ethiopia. Sine qua non that reversed President

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Farmajor's pugnacious anti-Ethiopia campaign rhetoric—a fact that faltered now and lose strength or momentum to any further extent or to listen any more.

At the onset, the six regional state administrations under the Federal Government of Somalia, governed by strongmen, have developed over time and are perceived locally as more imperative and dominant than preceding Somalia Presidents. All of them seemed to prefer other candidates to Farmajo. For example, Ahmed Madobe, the President of the Jubaland Regional State favoured Sharif Sheikh Ahmed, his long-term friend from the days when the Islamic Courts Union reached its peak. Abdiweli Ali Gaas from Puntland arrived in the week prior to the presidential election race in Mogadishu with the intention of sponsoring the then sitting Prime Minister Omar Abdirashid Ali Sharmarke, his own kin. It is difficult to ascertain what lay behind this unholy alliance formed at the eleventh hour between both candidates of the 2017 Somalia presidential race. However, speculation appearing in public discourse hinted that President Abdiweli Gaas' withdrawal from the race to support Sharmarke's campaign came about through an infusion of substantially unrestricted funds. President Sharif Hassan Sheik Aden of the South-West Regional Administration affirmed his steady support behind the then sitting President of the Federal Government of Somalia Hassan Sheik Mohamud, owing to an Ethiopia-driven compromise. One would contend that Sharif Hassan's choice to help Hassan Sheikh Mohamud came after he was booted out of the race in the 4.5 voting framework. The 4.5 equation is a clan-quota power-sharing recipe created as a device for political settlement and compromise among the Somalis in Somalia. Still far expelled from the rule of one individual, one vote system, Somalian citizen voters may not have soon the chance to witness the universal suffrage—the right of almost all adults to vote in political elections. President Ali Osoble of Hirshabelle Regional State was irresolute, whether to lend his support to either Hassan Sheik Mohamud or Sharmarke. [1]

The only avenue available for any Somali politician to unite public support in his or her favour was to evoke pan-Somali irredentism, the enduring dynamics of which marred the Ethiopia–Somalia relations at the beginning of the 20th century owing to the blended involvement of cross-continental and regional actors. The legacy of European and Ethiopian imperialist invasions resulted in the partition of Somali individuals into four Horn of Africa countries, namely Somalia (including North and South territories), Ethiopia, Kenya and Djibouti.

The first phase of Somali household divisions emanated from the era of colonisation, which was marked by rapid colonial expansion of the major European powers and Ethiopia that occurred between 1875 to 1912. The major players of this exploration and conquest of the Somali hinterlands were Great Britain, France, Ethiopia, and to a lesser extent Italy, which later took the southern part of Somalia. [2] The colonial borderlines penetrated deeply into the social structures of the societies in the Horn and cut across ethnic, etymological, ancestral and, in some cases, national boundaries. Western historiographers and African elites alike perceived these boundaries as hallowed even though they laid the foundation for many contemporary African border disputes, conflict and consequent suffering.

Meanwhile**,** the post-frontier elites had a tendency to force a level of sacredness on these delineated border limits by exercising genuine control of the border fringe zones or exerting influence [3] as in the case of Ogaden and Northern Frontier Districts of Ethiopia and Kenya respectively. Thus, pan-Somali nationalism that promoted irredentism led to two major Ethiopian–Somali wars in the 20th century. The first war took place in 1963–1964 and the

most damaging conflict occurred in 1977–1978 over the Ogaden region. The two countries succumbed to the agreement of restoring diplomatic relations only relatively recently in 1988. [4] The second major event that defined the status of Ethiopian–Somali diplomatic relations in the 20th century was the Cold War and the proxy struggle of superpowers in the Horn of Africa region, owing to its strategic geopolitical position. But again, the geopolitical watershed of the Horn exerted considerable influence on the alignment of ideologies as well as the internal political dynamics defining the relationship between Ethiopia and Somalia.

Consequently, this paper aims to identify the existing state of affairs and relationships between Somalia and Ethiopia in the era of President Mohamed Abdullahi Farmajo, and the multiplicity of other states (Middle East and Turkey) with vested interests in Somalia that might radicalise diplomatic relations following the 2017 election. Rival foreign countries present in the Horn of Africa that sought hegemonic dominance, including the USA, China, Turkey, Russia, and the Middle East, watched the political changes that took place in Somalia after the election of President Mohamed Abdullahi Farmajo. Most of them, using the analysis of the political annals in the Horn region, as well as President Farmajo's variable debate speeches, assumed that his leadership would soon worsen the Ethiopian–Somali relations. However, upon taking the presidential oath, Farmajo's leadership and foreign policy turned towards Turkey and Middle East countries as alternative powers to lean against in the event of pursuing his irredentist ambitions as was constantly outlined in his rhetorical speech before the election. Nevertheless, the final candidates' debate at the polling house was a defining moment. Farmajo, who mastered the art of Somali nationalist psyche delivered a speech loaded with strong messages lashing out against foreign interference into Somalia's affairs. He also expressed such a strong Somali irredentist opinion that spread like bushfire across the Somali populace. On top of that, the Diaspora media profiled his pan-Somali campaign agendas. Likewise, leading religious clerics gave their systematic blessing to pan-Somali nationalism in their *Khutba*[2] at the polling hall, which was believed to have indoctrinated the youthful Electoral College voters in the Federal Republic of Somalia.

Right after the election, majority of the Somalis believed that President Farmajo's victory, unlike his predecessors, did not come from intrusive foreign actors and the support from local oligarchies, who ordinarily influenced the political dynamics in Somalia's presidential elections. Almost all Somalis harboured the feeling that the Ethiopian Government backed a different candidate, giving rise to speculations that Farmajo's presidency may actually become hostile to Ethiopia, a regional country with a military presence in Somalia. [5] The fact was, he was not chosen for his famous ardent love of *Somaaliweyn*—greater Somalia, but it all came following his lauded track record during his premiership in 2010–2011. During this period, he developed a thoughtful reputation in the fight against corrupt and degenerate government officials and provided prompt salaries for the army. Because of his past record, Farmajo became the favourite candidate among his competitors and his election was viewed as a total divorce from the past. Many may have hitherto been led to believe that if Mohamed Abdullahi Farmajo is elected he will implement the same if not better policies he adopted during his premiership. However, accumulative experiences of his two years of presidency signals that Farmajo pursued policies of the exact opposite.

[2] Religious narration sermons.

The other important issue was that President Mohamed Farmajo was not at all like his predecessors, who were either explicitly Islamist politicians or leaning against a certain offshoot school of thought in the Islamic jurisprudence.[3] Farmajo was a lone ranger, so to speak. For instance, Hassan Sheikh was the follower of Dam-ul-Jadid, a branch of the Al-Islah school of thought, while Sheikh Sharif Sheikh Ahmed was an ardent loyalist to *Aala Sheikh,* a small branch under the Salafi school of thought. Farmajo restricted factions based on governmental issues and focussed on the proposition of getting rid of the flawed 4.5 Somalia's power-sharing recipe that guaranteed the predominance of the four noteworthy clans. [6]

The February 8, 2017 ballot was one of the most expensive and competitive election processes and a "milestone" [7] according to United Nations officials. Rumours suggested that the candidates spent tens, if not hundreds of thousands of dollars to bribe electoral staff [8] in a bid to win their votes, which damaged the credibility of Somalia's election process once again. The newly-elected senators and members of parliament, largely dominated by youth, seemed impregnated with the feeling of pan-Somali nationalist sentiment, which offset the traditional meddling by regional countries, and thus shifted the 2017 presidential selection paradigm in Somalia. Farmajo received strong support from the diaspora's youngsters, who applied their media savvy skills in managing his political campaign with patriotic zeal centred on pan-Somali nationalism and anti-Ethiopian involvement in the Somali national affairs. The call of nationalism sent crystal clear messages to the emissaries of Addis Ababa to keep their hands-off Somalia. In the election, nearly 44% of the Members of Parliament (Lower House) and Senators (Upper House) were from the diaspora and holders of dual-citizenship. Approximately 45% of them were youth between the ages of 25–37. [9] Saturated with the then decades-old pan-Somali nationalistic emotions, these young lawmakers, who have lived most of their life abroad expedited President Farmajo's diplomatic cold shoulder approach towards the Ethiopian Government. However, in the aftermath of the election, although his administration emphasised messages of goodwill and reassurances to these countries in the Horn of Africa region, they could not assuage Ethiopia's fear of the unknown as a result of Farmajo's populist nationalist campaign rhetoric will shape his leadership style. Nonetheless, the government in Addis Ababa attempted to downplay the regional centres of power, thus, they were obliged to "wait and see" as to which direction would move President Farmajo's frail government. The heretical Somali politicians reprimanded Somalia's President, owing to his obsession with pan-Somali nationalism fearing that it would be an untimely spoiler to the fragile Ethiopian–Somali relationships as well as with other regional actors. In so doing, they felt that nothing would stop the new president from being diplomatic in handling the already precarious political situation of Somalia. Even though some of the regional political analysists depicted his extraordinary cognizance of pan-Somalism ideals as dangerous, as holding a "sharp blade" towards his ribs. However, contrary to that, the new Federal Republic of Somalia's youthful lawmakers saw Farmajo's presidential triumph as recapturing Somalia's sovereign identity.

[3] The major Sunni school of thoughts, i.e. madhhabs in the Islamic jurisprudence are Hanafi, Maliki, Shafi and Hanbali. They emerged in the ninth and tenth centuries CE and by the twelfth century almost all jurists aligned themselves with a particular madhhab.

Besides participating in the African Union Mission to Somalia (AMISOM), Ethiopia has an additional military presence on the basis of a bilateral agreement with successive Mogadishu governments. There were no sources of reliable information regarding the exact number of deployed Ethiopian armies, however, the magnitude seemed adjustable depending on the level of the threat perceived by Ethiopia. Addis Ababa's mounting scepticism concerning the continuity of the past style of diplomatic relations with Somalia took a nosedive when Farmajo won the 2017 election with an overwhelming victory over the preferred candidate, Hassan Sheikh Mohamud. What is more, former PM Farmajo expressed concern over the unconcealed support that the Ethiopian Government rendered to the incumbent president during the election. While Ethiopia backed the re-election of Hassan Sheikh Mohamud other foreign actors with a vested interest in Somalia supported different candidates. For instance, the Emirate chiefdoms and Kenya both threw their support behind the incumbent Prime Minister, Abdirashid Sharmarke. Addis Ababa's emissary presence in the polling Hall on the Election Day completely and virtually infuriated everyone (Somali) and more so the young Somali parliamentarian. Past allegations against Ethiopia on hawking Somalia's affairs gained ground and the sentiments that followed pivoted the redirection of the ballots in favour of the hardly expected presidential candidate, the former Prime Minister of Somalia. Consequently, the resulting opaque diplomatic relations between Ethiopia and Somalia were attributed to the presidential election that saw not only a change of leadership, but also a change in the status quo, as well as the transformation to the existing state of Mogadishu's foreign policy strategy.

Farmajo's first official foreign trip did not begin in Ethiopia, unlike his antecedent presidents.

Despite the fact that this move has pulled in numerous Somali individuals at home and abroad and was broadly discussed by numerous Somali analysists, President Farmajo was seen as having nothing to do with his Ethiopian neighbour. Anyway, Somali elites assumed that the president ought not to ignore the influence of the Ethiopian Government on Somalia's permeable security circumstances nor her regional hegemonic role in ensuring the security of his administration under the flagship of AMISOM. Numerous Somalis nurtured the possibility that the new president would make a fresh start to reconstruct the Federal Republic of Somalia's foreign policy options, if he seeks to formalise relationships with regional powers.

Nevertheless, the former Ethiopian Minister Mr Hailemariam Desalegn explicitly responded to the Somali allegation about Ethiopia's alleged intrusion into Somalia's affairs: "Without the approval of the Somali Federal Government, Ethiopia and any other country, they should not interfere with the independence and sovereignty of Somalia. I think this is clear. As a person I cannot accept that this country is directly involved in the affairs of my country without my permission, and in Somalia like that" [10]—said the prime minister of Ethiopia.

In an attempt to shore up the diplomatically waning relationship with Ethiopia, President Farmajo's government considered a pre-emptive step by including Yusuf Garad Omar as the Foreign Minister in the cabinet. Yusuf Garad was the BBC's Somali-dialect correspondent, and a long-time dissenter to Ethiopia's intervention in Somalia particularly in 2006. Minister Omar continually suffered the allegations of abetting the Islamic Courts Union (ICU) led by Sheik Hassan Dahir Aweys with whom he shares a direct ancestry

linkage. Such political gestures have transmitted an explicit message to Ethiopia that Somalia is committed to open a new page of frail relations with her neighbour. The regime in Addis Ababa expressed subtle worries about the dynamics of the Somali public opinion and the emerging populist politicians ever since the end of the 2017 Somali general election. The growing populist-nationalist politicians in Mogadishu and the youngsters dominated Somalia's August Houses (Senators and MPs) raised concerns about Ethiopia's hegemonic ambitions in Somalia. Such concerns accelerated the Ethiopian Prime Minister's reflective remarks in favour of the incumbent Somalia President Hassan Sheikh Mohamed in an interview he gave to Universal Television, the Somali language TV channel based abroad. [11] The pertinent observation made by Ethiopian PM was an attempt to influence voters of whom the majority considered President Hassan Sheikh an Ethiopian marionette. The PM's weighty comments sent an explicit message to the Somali public that the regime in Addis Ababa is content with Hassan Sheikh Mohamud's government and highlighted its commitment to back him in the 2017 presidential race. However, the Mogadishu populist politicians saw Ethiopia's pledge for Hassan Sheikh's re-election as one that poses riddles to Somalia's sovereignty and the supremacy of their future presidential choice. Whatever one's attitude towards President Farmajo's election, it cannot be denied that the first quarter of his leadership has provided an ideal opportunity to scupper the talks of Ethiopian de facto hegemonic dividends in the Horn region.

On the other side, the prevailing political situation in Ethiopia and budding circumstances led the youth in the Oromia region to demonstrate against the Ethiopian People's Revolutionary Democratic Front (EPRDF) regime in a push to weaken the federal government and reduce her regional affairs involvement. In turn this provided an opportunity to revitalise the pan-Somali riddle. As a result, Somali populist intellectuals in Mogadishu interpreted the event happening in Ethiopia as a withering of authority of the EPRDF Government, which they believed would automatically divert attention away from Somalia to internal issues.

In January 2017, an independent Ethiopia-based Centre for Dialogue and Research and Cooperation (CDRC) monthly publication analysed the forthcoming Somalia elections scheduled for 8 February 2017. The CDRC think-tank and self-anointed devotee to the study of political and economic integration in the Horn of Africa region issued an opinionated discourse that polarised regional stakeholders. [12] The CDRC argued that by enabling Somali clans (Darood tribe) other than Hawiye to win Somalia's presidential seat, this could permit international extremist groups, for example, Al-Shabaab to make Mogadishu a playing field which would make it impossible for government activities to operate in the capital, Mogadishu. [13] This article coincided with the interview the former Ethiopian PM had given to Universal TV favouring endorsement to the incumbent President Hassan Sheikh Mohamud from the Hawiye clan. But one thing the CDRC Digest forgot to include in their January–February Special Issue was the fact that Somalia's politics did not follow convention. Somalia's political culture is determined by pride, which influences its course resulting in the marked changes in the system, fashion, or appearance.

Thus, ethnonationalism partly entangled with irredentist quests superseded the reconstruction narrative of the Ethiopian–Somali good relations under President Hassan Sheikh. In view of the remarkable foreign stakeholders involved in the already polarised presidential election in 2017 in Somalia and the web of the conflicting interests on the

horizon, one would suggest that the Addis Ababa regime made a rash decision to unveil her staunch resolution to back the former President Hassan Sheikh. Perhaps these and other compounded factors including the populist-nationalist sentiments directed towards Ethiopia form a point of reference for the soaring instability of the relations between President Farmajo's government and the Addis Ababa regime. In the recent past, foreign actors expressed interest in Somalia's political affairs. Their meddling increases today more than ever before. Turkey's commitment to Somalia is one example among many of the rising actors in Somalia. Turkey's buy-in model of commitment is demonstrated by the speedy delivery of support projects on the ground using a Turkish workforce to regulate maximum use, which emphasises soft power attributes such as business interests and cultural affinity such as Turkey's Muslim identity. Such attitudes are dissimilar to Somalia's customary donors who are frequently blamed for being excessively bureaucratic, moderate and disengaged, either bunkered in the aeroplane terminal in Mogadishu or giving aid remotely from neighbouring nations. [14]

Since the collapse of state institutions in 1991, Somalia became a site of proxy wars among Ethiopia, Kenya, Eritrea and Djibouti. Diverse international actors backed them, all of whom have vested interests, and at times, have aligned themselves with various Somali clans, regional states administrations, or political alliances in order to subvert a rival or gain access to unprotected inland and island resources. Somalia is strategically important to all foreign actors for various reasons including securing shipping routes in the Bab al Mandab Strait, proximity to the ongoing conflict in Yemen, and the desire to avail forces in the region alongside rivals including the United States and Russia. [15] The rivalry race between the United Arab Emirates (UAE) and Turkey in the Horn of Africa has yielded blended outcomes in Somalia. Both countries have in the past injected monetary and material support into Somalia to establish their own institutions to pawn and combat Al-Shabab terrorist group threats. On top of that Turkey has exceeded expectations in terms of humanitarian aid. The Turkish aid model has fascinated Somalis in the private-public domain and the politicians, consequently receiving the highest profile intervention in Somalia, making Somalia one of the top five largest recipients of official aid from Turkey since 2011. [16] The Federal Government of Somalia (SFG) has received huge counterterrorism support from the two countries, and compassionate aid support from Turkey.

Although both countries have shared a heritage, (Islamic faith) with Somalia, their competition has of late stressed relations between the Federal Government of Somalia and Somalia's semi-autonomous regional states administrations. Recently the Dubai Ports World's (DPW) ambitious search for a strategic partnership between the Dubai Ports World conglomerate and the breakaway northern district of Somaliland led to the promise of a total pledge of $440 million to recreate the Berbera seaport. While Turkish organisations reportedly operated in the Mogadishu seaport ever since 2014, other Turkish organisations have been seen building streets, schools and healing centres (hospitals). Recent speculations indicate that Turkey, an ally of Qatar, is sanctioning a multi-billion-dollar investment in Somalia. [17] President Mohammed Abdullahi Farmajo rejected the authenticity of a 30-year United Arab Emirates contract on the port of Berbera in Somaliland. [18] This was a crucial moment, which hinted to the Chiefdoms of the United Arab Emirates that Somalia is fed up with being put down and made to feel stupid. The president explicitly shared his country's unwillingness to engage in future commitments with the Emirates.

Formerly UAE Emirati military manoeuvres in Yemen depended heavily on their base in Djibouti. Since March 2015, it was acknowledged that Emirati Chiefdoms have been part and parcel of the Saudi-led coalition that initiated the war against the Houthi rebel forces in Yemen. However, what still remains uncertain is the central impetus that led UAE to become immersed in the Yemeni war, other than merely tiptoeing into the narrative of the Gulf Council Countries solidarity. [19] The UAE's phenomenal move towards prioritsing ports in Eritrea in 2015, a longtime rival to Djibouti has caused tensions with the latter. This and the diplomatic clash between the UAE emissaries and Djibouti's head of Aviation Armed forces over the modalities of the Djibouti port rental contract expedited Djibouti's move to hastily rescind the agreement with Dubai's DP World [20] that existed for two decades. A fight for access to seaports was going on along Somalia's stretched strategic seashore. Somalia now got up to speed in a territorial battle between Saudi Arabia and the Bedouin Emirates (UAE) on one side, with Qatar supported by Turkey on the other, all in pursuit of vested interest, mainly to control the strategic seaports in Somalia.

Political Reforms and Rapprochements: A New Lexicon for the Horn Region

President Mohamed Abdullah Farmajo's selection coincided with the peak of political upheaval in Ethiopia. Since 2016 the Ethiopian Government experienced public protests of dissatisfaction with the EPRDF led government in Ethiopia. Among the major issues that triggered these protests included the controversial government plan to amalgamate eight towns in the Oromia Special Zone with Addis Ababa. [21]

This was occasioned through the leadership change that occurred in Ethiopia which brought PM Abiy Ahmed Ali to office since the 2nd of April 2018. [22] The unprecedented change in leadership that occurred in Ethiopia undoubtedly gave a new hope that enabled the Farmajo Government to imagine a new Ethiopian government, which would sustain weak central power and would improve marred Ethiopian–Somali diplomatic coordination. Upon taking the oath of office as Prime Minister, Dr Ahmed shut all windows, both internal and external that would likely cause harmful political and diplomatic consequences for his government. As luck would have it, his first step was to defrost the risky arch-foe relations of Ethiopia–Eritrea. Internally, he embarked on the journey to peace. Armed groups formerly supported by Eritrea, the Ogaden National Liberation Front (ONLF), Oromo Liberation Front (OLF), Patriotic Ginbot Sebat (PG7) and Tigray People's Democratic Movement (TPDM) all entered into peace agreements with Dr Abiy Ahmed's government. ONLF, OLF and PG7 were all removed from the Ethiopian Government's list of "terrorist" organisations.

In August and September 2018, the Government of Eritrea hosted and facilitated peace negotiations between the Government of Ethiopia and ONLF, OLF and TPDM. [23] Ever since the start of the Ethiopia–Eritrea war in 2000, Ethiopia and her archfoe enemy, Eritrea both embarked on a proxy war on Somali soil. Occasionally, Ethiopia was accused of meddling in the Federal Republic of Somalia's affairs only to institute a weakling government under its foreign policy surveillance, one in the interim, as well as the post-interim successive government in Mogadishu. By the same token, Ethiopia was suspected of allegedly taking sides in among opposition factions in Mogadishu. Conversely, Eritrea,

regularly mentioned in the UN Arms Monitoring reports, backed the Islamic militants (read Al-Shabaab), which were excessively engaged in fierce fighting intent on overthrowing the government in Mogadishu, a charge it has always denied.

Reports pointed a finger at Eritrea for covertly providing support in cash and kind to armed groups, mainly the Al-Qaeda linked Al-Shabaab militants and other destabilising forces who obliviously undermined the glowing light of stability emerging from Somalia. In addition, the Security Council reported that Eritrea refused to pull back its occupying forces following conflicts with Djibouti in June 2008. Following this in 2009, the United Nations Security Council imposed an arms embargo and targeted sanctions on Eritrea, in addition to travel restrictions on its political and military leaders [24] as well as freezing their assets. In the wake of Ethiopia's rapprochement efforts with Eritrea that was initiated under the lightning reforms under the new Prime Minister Abiy Ahmed, President Mohamed Abdullah Farmajo formed closer ties with Ethiopia's new reformist leadership. Together they began to forge a new chapter based on an improved relationship, one that supported the political independence, sovereignty, and territorial integrity of their respective countries through friendly political, economic, social, cultural as well as defence and security cooperation between the two countries. [25]

Conclusion

President Farmajo's abstract nationalist mythmaking geared towards Ethiopia during his campaign has been eclipsed by the conceptual realities he later found on the ground. The Ethiopian influence towards the Federal Republic of Somalia was beyond public perception.

One will ask whether an estimate of nearly five thousand Ethiopian troops officially present in Somalia under the auspices of the African Union Mission in Somalia (AMISOM), and the same number of troops if not more are still present within Somalia territory under the pseudo-deal of a 'bilateral agreement' with the preceding Somalia governments? If so, then to what extent can President Farmajo's nationalist rhetoric against Ethiopia be proven? Has his talk of irredentism been implemented in practice in the post-election era?

Conversely, the hard task awaiting President Farmajo's government is to strategise how to synchronise the shifting premises of his campaign propaganda from enmity to unprecedented political and diplomatic amity towards Ethiopia. Generally, the Somali public has always been cynical and any signs of a political turn towards forging closer diplomatic ties with Ethiopia under President Farmajo's reign would be considered with denigration and most likely may lead to charges of betrayal. On June 16, 2018 Ethiopia PM Abiy Ahmed visited Mogadishu to initiate an act ending the history of war and violence between the two nations. Prime Minister Abiy said his vision included: "A common trade area where people, ideas, goods and products move freely across borders. It is a future where we work to enlarge opportunities for our people and work for economic security that gives our children and grandchildren great hope." [26] However, sceptical Somalis greeted the initiative with a high degree of political reservation. It also created a negative impression resulting in a new discourse denting President Farmajo's trust and political credibility among the Somali nationalists and other elites. This expedited the mouldings of a new charge against President Farmajo for allegedly signing a dubious agreement with Ethiopia's

PM that would let freely Somalia's seaports to Ethiopia. In order to face these immense challenges, Farmajo needs to create a committed bilateral front. Although he seems to be sensitive to the necessity of forging an unconditionally closer political partnership with the government in Addis Ababa, he may fear losing popular support from the predominantly youth and diaspora parliamentarians as well as the larger Somali public. President Mohamed kept his voice distant and instead maintained a mildly curious behaviour towards forging closer ties with Ethiopia instead crying for an alternative partnership. [27]

Conversely, pan-Somali nationalist politicians believed that an Ethiopian presence in Somalia is not only part of the African peacekeeping mission to Somalia. They considered that Ethiopia has another agenda to suppress Somalis' inherent irredentist sentiment and encourage the creation of a genuinely malleable kind of government in Somalia that will never be a threat to her self-designated hegemonic role in the region. Thus, President Farmajo before smoothing relations with Ethiopia must put a roadmap in place to see Ethiopian troops off Somali soil so as to cool down anti-Ethiopian feelings expressed by the public in Somalia, otherwise he may not survive to uphold the same political credibility he gained during his campaign.

PM Abiy Ahmed Ali upon coming to power in April 2018, issued speedy reforms, one of which had a tremendous impact on Somalia's securitisation efforts, namely ending the decades-long border dispute with Eritrea, which has cost thousands of lives from both sides. This move helped the Federal Republic of Somalia to escape from being fertile ground for the Ethiopia–Eritrea intermediary war.

The unprecedented geopolitical changes occurring in the Horn region have also radically reshaped the Ethiopian–Somali relationship. The neo-Ethiopia under PM Abiy Ahmed appears to be disinterested in diving deep into Somalia's internal affairs, a gesture that could bring President Farmajo's government closer in relationship.

The political deadlock between President Mohamed Abdullah Farmajo and the federal member states, who have been vocal in demanding a more voluntarily autonomous relationship, (a kind of confederation of states) with Mogadishu continues. Somalia's federal regional states occasionally reproach President Farmajo's insatiable quest to create an autocratic central government that disobeys the establishment of the 2012 Provisional Constitution that shifted Somalia into federalism. The unlawful manipulation of the south west regional state presidential elections in Baidao following the arrest of the leading contender using Ethiopian troops on the 15th of December 2018 proved federal states leaders right. This action propelled them into a state of further anxiety and mistrust of President Farmajo's Mogadishu regime. President Farmajo obviously wanted to use the same tactic to manipulate Jubaland's election. The operation seemed to have been aborted when the state airport in Kismayu town, Jubaland vehemently denied an Ethiopian plane to land on Monday 19 August 2019. According to the Jubaland administration, the plane allegedly carried Ethiopian commandos, who could manipulate by force the election scheduled for Thursday 22 August 2019. President Mohamed Abdullah Farmajo not only swerved away from his policy objectives of capitalising on the securitisation of the country, but also abandoned his nationalist slogans of anti-Ethiopia rhetoric, par excellence that transcended Farmajo as the winner of the 2017 federal Somalia's presidential election.

A burning question remains: will the neo-Ethiopia regime discontinue its serious involvement in Somalia's affairs for ever or is it only taking a temporary pause for now up

until it stabilises its internal crisis? Only time will tell. The majority of the Somali elites criticised Mohamed Farmajo's stance on the much publicized "Horn of Africa economic integration agreement" led by Ethiopian PM Abiy Ahmed Ali as an act against Somalia's long-standing political dispute towards Ethiopia. They further added that the move is likely to damage and devalue the political character of President Farmajo. It seems as though President Mohamed Farmajo is not prepared to second guess, whether the new political reforms in Addis Ababa herald a re-definition of her past foreign policy towards the hegemonic ambition of the Horn of Africa region.

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The Implementation and Experience of Integrity Management in Public Administration

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I know, there is no perfection on earth. To accept imperfection – in a certain sense, can bring us towards perfection – in spite of everything. It is the most to reach the maximum.

János Pilinszky[2]

To achieve integrity requires continuous attention, it is not a coincidence that integrity in Hungarian is often used together in one phrase with "development". If integrity is regarded identical with the perfection in the quotation above, it gets even more manifested that its realization or at least approaching it—needs continuous actions and studies.
The study presents the appearance of integrity concept and the experience of the integrity management's implementation in Hungary.

Keywords: *public administration, integrity management, corruption-prevention, public administration development*

Introduction

In Hungary, it was in connection with anti-corruption policy that the integrity approach entered public consciousness. However, several circumstances have made us look beyond this initial viewpoint and consider integrity concept as a phenomenon necessarily pervading the whole public administration system.

In order to show this change, I would like to show the experiences of integrity management in Hungary since it was introduced in 2013. The complex approach requires the analysis of the legislation and its practice at home in the light of international results and trends.

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[2] The quotation is from an interview given by János Pilinszky in 1974.

International Outlook: Anti-Corruption, Integrity Trends and Approaches

The changes in international relations in the last decade of the 20th century as well as the anti-corruption fight coming into view have brought important results.

On the one hand, these results appeared in international conventions to which Hungary joined.[3] Though in the documents of certain international organisations (OECD, UN, EU, EC) the concept of corruption is partly differently interpreted, there is a common element: they all highlight its devastating impact on economy, business life and public service. The conventions do not consider corruption exclusively a criminal law issue, but—in this period—a privileged role is attributed to criminal law in the anti-corruption fight. [1]

Besides hard control, "soft" control is gradually gaining space in the international arena, too: manifested in guidelines, proposals and declarations.

Investigating anti-corruption policy, we must pay attention to the public administration trends. The New Public Management—adapting to the task sharing expectations of the neoliberal economy policy—focuses on the requirements of economy, effectiveness and efficiency. As an almost necessary consequence, a Good Governance model was born. Sensing the dysfunctional operation of this policy, since the millennium, the focus have shifted to value-orientation.

The framework of public service integrity interpretation is given by the society—this wide context was already mentioned in an essay carried out by the Irish–Dutch EU presidency collaboration in 2004. [2] The key statement of the study is: incorruptible behaviour in the public sector does not depend on one single instrument such as effective disciplinary legislation, the setting-up of efficient control and monitoring bodies or an attractive code of conduct, but on the existence of an overall national integrity system, a multi-pronged anti-corruption strategy, or a multi-dimensional ethics infrastructure. The main characteristic of such a multi-dimensional approach is that ethics is considered a key principle of good governance.

The main motivation of the Ethics Framework [3] published under the auspices of the European Public Administration Network in 2004: one of the major policy themes of the governments of the EU member states focuses on increased attention to society's shared standards and values. The document points to the fact that corruption is especially harmful to integrity as it has a great impact on its authority and, consequently, on the effectiveness of the administrations' actions. On the other hand, integrity encompasses much more than the absence of fraud and corruption.

The Integrity Framework of the OECD was published in 2008. [4] It points out that the public sector integrity management has been high on the agenda in many OECD countries. Underlying this evolution is a growing understanding that integrity is a keystone of good governance, a condition for all other activities of government not only to be legitimate and trusted, but also to be effective. Indeed, the pioneering work of, among others, the

[3] See the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions (1997), the Council of Europe Criminal Law Convention on Corruption and the Civil Law Convention on Corruption (1999), the European Union Convention on Fighting Corruption Involving Officials of the EU or Officials of Member States (1997), the United Nations Convention against Corruption (2003).

OECD shows that investing staff and financial resources in integrity may also increase the effectiveness of government policies.

The paper provides a comprehensive approach to review and modernise instruments, procedures and actors for fostering integrity and preventing corruption.

The authors of the OECD Framework state that the integrity management of an institute is the collection of instruments, processes and structures. In the public sector, integrity management system can be built systematically, in a comprehensive manner on three pillars. The operation system itself is dynamic and basically self-developing and self-perfecting in which the good practices worked out in different countries play an important role. The OECD Framework classifies the possible instruments of the four main functions as following:

- determining and defining integrity within the organisation;
- continuous guiding in favour of integrity;
- monitoring integrity;
- enforcing integrity. [5]

As described above, the attention has been drawn to integrity as the tool of corruption prevention. However, the international trends have gone further soon: integrity development is defined as the basis of value-oriented, effective operation.

The corruption prevention function is well outlined; the integrity brought to the fore is considered the supplementary of repressive, basically criminal law tools. It is obvious that it has become ordinary to classify corruption prevention policy by how they bear the features of the two main tool-arsenals.

Báger distinguishes: [6]

- countries applying both repression and prevention—Singapore, Lithuania and Poland;
- countries bringing repression to the fore—the United Kingdom, Hungary in 2012;
- countries preferring integrity based prevention—Holland, Belgium and Slovenia.

The Concept of Integrity and the Essential Elements of Integrity Approach

According to the Cambridge Dictionary,[4] integrity means the quality of being honest and having strong moral principles that you refuse to change. The concept refers to a status: a person acts according to legal and ethical requirements. Honesty includes the harmony of actions and thoughts meaning that the law abiding and morally correct activity comes from within. Finally, the concept also includes an active element: moral conviction makes you resist contrary, inappropriate actions and temptations. Applying this concept for public sector, all these must be interpreted beyond the individual level; at organisational level. Integrity in public administration means a mode of operation that enables public service and public sector bodies to effectively use their power and resources in order to accomplish officially accepted and certified public interest. [7]

[4] See source: https://dictionary.cambridge.org/dictionary/english/integrity

Summing up: the main theses of the application of integrity approach in public administration are the following.

On the one hand, the integrity approach in public service is a basic *criterion;* so that public service could fulfil its mission and work for the public interest and common well-being. On the other hand, integrity is an *instrument* at the same time; armouring public administration to be resistant to violations of law and risks that may endanger its operation. And finally, corruption basically fights against the principles above; it is the main threat to integrity; however, the mere absence of corruption does not mean integrity.

What we mean by integrity system may be distinct in different countries. The EU offers a possible toolbox in the publication published in 2015 *Quality of Public Administration. A Toolbox for Practitioners*. The document searches for appropriate solution suggestions to embed ethics and fight against corruption. [8]

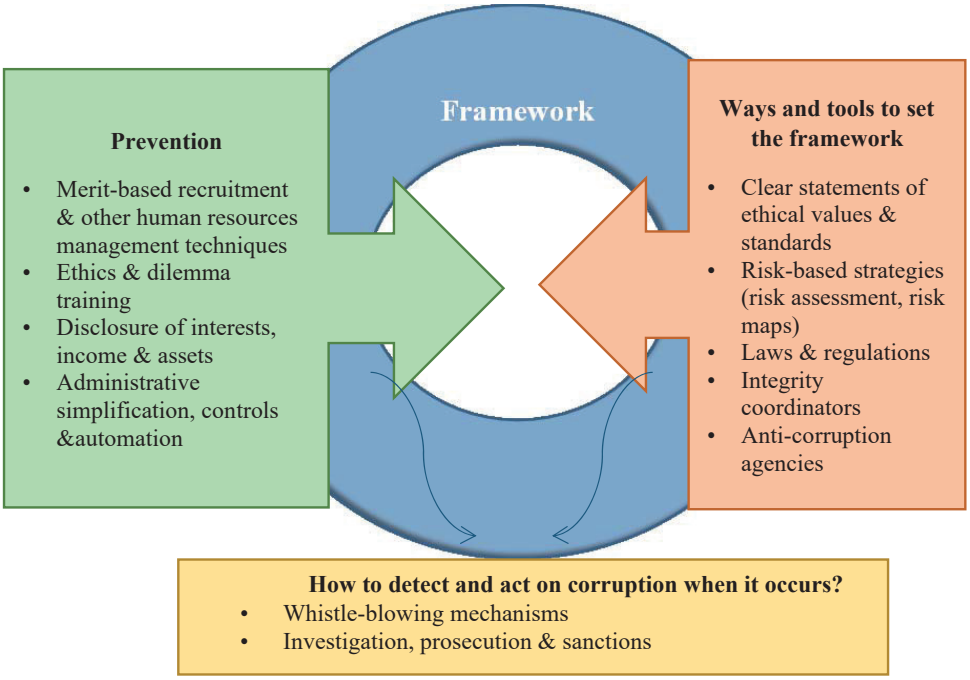

Figure 1. *The framework of integrity management.*
(Edited by the author based on [8].)

The contents of the document can be briefly summed up in the graph above. The basis of the framework is the method of prevention itself; it can be achieved by different tools, from various directions. A great majority of these tools does not exclusively serve only corruption prevention goals. For example, administrative simplification requires a total methodological change for the whole operation of public administration. The system's introduction needs a legal approach: certain tools and operation mechanisms become

obligatory. The framework also reacts to situations deriving from the inefficiency—more truly put, non-success—of the methods described.

Hereinafter, I review the main elements and the implementation experience of the Hungarian integrity management. The traditional law enforcement and criminal law tools, as well as, whistle-blowing mechanisms are entitled to solve these problems.

The Appearance and Headway of Integrity Approach in Hungary

In Hungary, the State Audit Office had a pioneering role in introducing integrity approach. In 2007 and 2008, the Hungarian Audit Office in cooperation with the Audit Office of the Kingdom of the Netherlands got acquainted with the Dutch practice of integrity based public administration operating according to the requirements of corruption assessment and analysis. The concept, as well as the operating method based on it got into the civil and professional knowledge through the Integrity Project launched by the State Audit Office in 2009.

Since 2012, the results of the Audit Office project also appeared in the governmental decision making.[5] All this was related to the fact that one of the most important focuses of governmental programs was directed to fight against corruption. Like the practice in Holland where social processes urging actions against corruption directed the attention to the importance of integrity, in Hungary integrity also emerged as a part of the anti-corruption fight. Until then, integrity was regarded the "partner", the addition to the vigorously dominant legal approach. The reason for its progress was that integrity development offered up-to date and progressive possibilities on the basis of international experience.

As for legal actions, the Public Administration Corruption Prevention Program [9] was the first milestone; it defined measures for 2012–2014. This comprehensive, strategic package of measures had a brand new approach: besides criminal law, the decreasing of corruption risks, the strengthening of organisational integrity and measures supporting ethical operation were also emphasised.

The rule of this program that entered into force on 1st February 2013, introduced integrity management for public service bodies.

The elements of the new approach were carried on, at the same time replacing the strategy earlier, by the National Anti-Corruption Program related to 2015–2018. [10] The new program's main step forward: it expands over the public administration system and involves other fields of the state operation (justice, local governments) even the business sector, and takes measures for civil awareness.

Regarding the stages of development, it is important to mention that a governmental official—responsible for the coordination of integrity management—was appointed in 2014. The National Protective Service directed by the Minister of the Interior is in charge for the development and harmonisation of integrity management, analyses and evaluates integrity and corruption risks on governmental level. The Service is basically a crime prevention and detection organisation, its scope of authority includes fight against corruption and other

[5] See Government Decision No. 1104/2012 (IV. 6.) on the adoption of the Anti-Corruption Program of the Public Administration, Magyary Zoltán Public Administration Development Program (2012).

interior violations of law by law enforcement tools. Connecting integrity measures and tasks with this organisation opens new perspectives. The settling of the corruption prevention and integrity toolbox into one organisation makes a new, modern kind of experience elaboration possible.

Thus, we could observe the appearance of integrity approach in international trends and its gradual growth between 2009–2013. The period of its stabilisation, awareness-raising and intensification in practice lasts even until today.

Analysing integrity management, we cannot ignore the investigation of its medium; public administration and its organisation. In Hungary, since 2011, the comprehensive transformation of the public administration system have started;[6] the strategic objective was to create a "Good State". Under the aegis of unification and simplification, the remaking of territorial administration, the reconstruction of county government offices and the termination of several public administration bodies was completed.

The exact definition of the processes and indicators embodied in the daily practice of Good State and Governance inspired scientific workshops, too.[7] The concept of Good State integrating the practical application of ethical norms in public service and scientific studies is closely linked to the concept of Good Governance and good public administration. [11] The requirement to develop public administration integrity inevitably fits into this frame.

Thus, integrity approach originally came into light related to corruption prevention, however, it is obvious—regardless this fact—the remaking process of the Hungarian public administration could not go without it, either. The new challenges and organisational transformation necessarily led to the integrity approach's headway.

The Elements of the Hungarian Integrity Management

As for the instruments of the Hungarian integrity management: two main approaches can be seen. The first one—meaning a narrower circle—includes only the tools accepted and named by the government act on integrity management. In a broader interpretation, each legal institution and measure can be included that is designed to ensure a legal, effective and ethical public service. In the first case, the circle of tools is quantifiable and can be identified in the legislative provision. The second one is a lot more complex and the circle of tools needs separate principle basis.

This study presents the second approach and describes the integrity developing tools listed by international trends; those ones consolidated in the Hungarian legislation and their effect on integrity is the objective of investigation and attention.

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6 See the Magyary Zoltán Public Administration Development Program (2011), Magyary Zoltán Public Administration Development Program (2012), Public Service Development Strategy 2014–2020.

7 The Institute for Research and Development on State and Governance of the National University of Public Service annually publishes the Good State and Governance Report.

Integrity Risk Analysis and Evaluation, the Practice of the Integrity Report

One of the most important elements of the prevention concept is represented in the ordinance that obligates bodies to the annual survey of integrity and corruption risks. To treat the risks identified by the survey an action plan must be prepared; its fulfilment must be published in a public integrity report.[8] [12]

The tasks adopted to the body's internal control processes must be performed in the context of the so called integrated risk management system. The internal control system as a process system also helps to achieve goals. The internal control system covers the principles, procedures, regulations which can enable the prevention, exploration and correction of obstructive events and this way supports to meet the target of the organisation. So, in this practice, integrity is one element of control environment; as to risk management—the tool of integrity management—it cannot be effective without the full knowledge of the operation process of the organisation.

In my research of action plans and reports, on the one hand I studied how the bodies satisfied the requirements, on the other hand, I analysed the content of the documents.

According to my findings, the public service bodies have been making action plans and integrity reports with increasing intensity since 2014. In 2014 the number of public administration bodies obliged to perform an integrity report was 101; 40% (40 pieces) published it. In 2015, the figures were 91 bodies, 62 out of them—68%—(62 pieces) fulfilled the task. Due to the already mentioned reforms, the number of bodies obliged to give integrity reports significantly decreased; it was 72. 57 out of them—79%—sent in the integrity account.[9] [17]

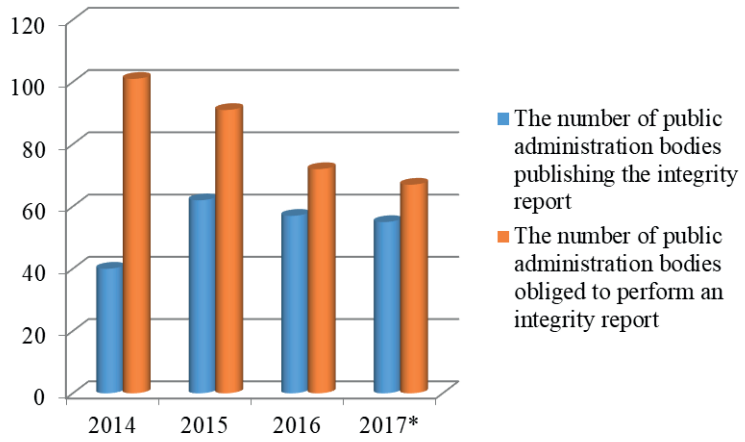

Figure 2. *The number of integrity reports.*
(Edited by the author based on [17].)

[8] The reports are published on the website http://korrupciomegelozes.kormany.hu. The risk analysis, evaluation and the preparation of the integrity report is helped by a methodological guide.

[9] Source: The statistics of the National Protective Service and website.

As for the content analysis[10] of the measures implied in the reports, I can suggest the following.

It is important to emphasise above all that the survey of risks is the "home affair" of the administration body, as well as, what measures it takes to prevent and manage the risks. On the other hand, the implementation of the measures—the integrity report—must be made public. As the report is prepared with the help of a methodological guide—it must give an itemised list of the measures and show the results in detail, so the measures involved also take air. In addition, the report is expected to justify according to what criteria the measures of the action plan have been chosen.

The public administration integrity report primarily summarises the experience of the implementation of the measures which are considered relevant in order to strengthen integrity, decrease corruption risks, and how the accomplishments can be concluded.

In the study, the measures involved in the reports, on terms of their corruption prevention and integrity effects—can be divided as below:

a) Building up an integrity management organisation

According to the law, an integrity advisor[11] must be appointed by the head official, however, the legislator does not give any further guideline how and in what frame the legislation provisions are to be implemented.

Analysing the reports from this point of view, the bodies can be divided into two groups. One group—representing the majority—includes bodies in which the appointed advisor, as a general rule does his job, the tasks given by the report on his own, without any institutional support. The other group includes bodies where under the direction of the advisor and with the approval of the head official, a coordination and some kind of organised mechanism come into being in order to attend integrity tasks.

b) Measures supporting integrity on individual level

Here, an extensive investigation of job descriptions and officials' scope of activities related to integrity approach was done, ethical and integrity training were organised by the public administration bodies, they also expressly supported the integration of the new officials getting into the organisation.

c) Procedure of complaints and public interest disclosures

The head of the body is obliged to receive and investigate the complaints related to abuses, deficiencies and corruption risks in the functioning of the body. From an organisational integrity point of view, the exploration of events and situations endangering, offending or threatening the body's operation is of high importance. The measures in the report basically are in connection with the regulation of this procedure. They clearly make efforts for the simplification of the process in order to extensively familiarise the procedure of public interest disclosures.

d) The order of receiving lobbyists

As keeping contact with lobbyists is a tender spot of promoting integrity, that is why to adhere to the law is supported by the methodological guide. [13]

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[10] The analysis included the reports of 2015 and 2016. Since 2017 the ones completed until the end of February 2017.

[11] Persons appointed to act as integrity advisors shall be officers with higher education qualification and at least three years of professional experience in public administration and shall be suitable for and ethically worthy of the position on the basis of their personal ethics and professional skills.

The bodies are obliged to discover annually the risks of this field and take the necessary measures to fight against them. In most reports, the tasks to be taken are properly defined.

e) Organisation-specific provisions

A significant proportion of the measures is connected to the issues listed above. The basis of action plans is risk surveying. We may presuppose that organisations with the same or similar scope of authority (e.g. government offices for the capital and counties) meet almost the same challenges. However, we cannot ignore situations deriving from territorial location (for example the Capital) or other circumstances (e.g. changing scope of activity of the public administration body or the transformation of an organisational unit) that can influence corruption risks. From the starting point that every organisation is created by people and the tasks delegated by legislation are performed by officials, consequently, the risk exposure of certain bodies cannot be identical even if the scope of the activity is the same. Accordingly, the organisation-specific measures must also be found in the reports. For instance, they appear in the integrity analysis of certain special official activities, or in the training of especially risk exposed employees.

Focus on the Integrity of Public Servants

Public servants are measured with higher expectations. These expectations are represented both in the employment criteria and the additional requirements for public servant workload. In addition, all these are coupled with normative standards of conduct during worktime and outside office hours.

In this respect, the appreciation of integrity can be traced in the appearance of certain specific legal institutions.

The legal institutions of unworthiness and untrustworthiness/loss of trust were introduced in the civil public service, in 2011. Unworthiness can be set if the official's conduct either at work or outside working hours severely ruins the prestige of his position/post, the credit of the employer or the trust of society in good public administration. The unworthy official's legal relationship to public service must be terminated; doing so, the legislator disciplines the violation of the public service integrity as a whole.

Untrustworthiness means the infringement of professional loyalty. Loyalty, as a commitment to public service principles, can be considered the keystone of integrity.

As for Law Enforcement Corps, impeccable lifestyle is a basic requirement for employment, the legal conditions of its control were set in 1996.[12] In 2011, however, the integrity test as a new legal institute was first introduced exclusively for law enforcement authorities.

The purpose of the integrity test is to establish whether or not the person concerned complies with the statutory requirements of their job. In order to establish this, the agency carrying out the integrity test shall create artificial situations that happen or may happen in real life in the course of doing the given job.

[12] See Act XLIII of 1996.

Since 2013, the circle of the personnel who can be tested by this integrity test has gradually been expanding.[13] It is important to note that the expansion has been made related to the public administration activity.

Namely, the law does not specify limited organisational units, but focuses on public service activities outstandingly endangered by integrity and corruption risks.[14] In this context, the conscious application and implementation of integrity approach in legislation can be found.

The integrity test goes far beyond the repression of possible violations of law; it also serves prevention purposes. Originally, it got into public knowledge through the exploration of a corruption case. However, its main point is not only limited to individual responsibility, it also involved the legality and professionalism, furthermore, the official's conduct while acting.

The increased emphasis on individual integrity can also be traced by ethical responsibility at the civil public service obtaining legal basis in 2012. Defining ethical standards and requirements is one of the keystones of integrity approach: so I am especially dealing with it below.

Strengthening Professional Ethics Awareness Raising

"Public service depends on public servants"—wrote Zoltán Magyary, Government Commissioner in a proposal to the Prime Minister regarding the economical operation and efficiency of public administration. [14] The key figure of integrity approach is the public servant; the person—who has taken an oath to serve the public good—can get into several situations that causes an ethical dilemma.

The strengthening of professional ethics awareness raising should be put into the complex system of integrity approach.

It may be explained by a number of interrelated factors:

- "good governance" and "efficient public service" have become public policy priorities;
- the economic crisis has added to the importance of ethical operations;
- pressure to respond to poorer public confidence in public offices and public administration;
- higher expectations from society and citizens towards public service;
- the continuous transformation, reform and reorganisation of the public sector;
- putting the skills of public servants to the test;
- complexity of values, conflicting values and value crisis in all fields of life;
- stronger requirements for openness, transparency and accountability;
- significance of anti-corruption efforts to public policy. [7]

The creation and implementation of professional ethical norms was put into the scope of the public bodies born in 2012: the Hungarian Government and State Officials Corps,

[13] See Act LXXXVIII of 2013.

[14] According to Act XXXIV of 1994 on the Police, the state servant who is entitled to make or prepare decisions or perform supervision in the course of a naturalisation, asylum, alien policing, expropriation, construction administration health and safety authority and supervision, property registration authority procedure.

the Hungarian Law Enforcement Corps. Based on statuary authorisation, the public bodies accepted their ethic codes the next year.

The legislation entitles the Corps to conduct the ethical procedures; the tasks are performed by the boards elected by the members: the civil servant officials and the professional staff of law enforcement corps. The possibility of having a say into the matter of creating ethical rules and the implementation by elected officials ensures a new kind of legitimacy and brings legislation closer to public service employees, thus strengthening dedication to integrity.

The author of this study has been the Vice President of the Hungarian Government and State Officials Corps since 2012, so directly participates in the processes. The public body payed outstanding attention to carrying out its Ethics Code and solving initial difficulties. Professional ethics has occupied a central position in the Corps' operation since then. Beyond conducting procedures, conferences, trainings at public administration bodies organised by the Corps also contribute to the promotion of professional ethics.

The education of integrity advisors at the National University of Public Service was launched in 2012, and extensive integrity and ethics courses started in the retraining system.[15] [15] Since 2012, the consolidation and maintaining all these have been supported by a valid legal requirement which obligates officials to carry out at least one anti-corruption course during a training cycle.

Professional ethics moving to new foundations strengthens integrity on the individual level; helps uncover and solve conflicts of values, so contributes to the elimination of corruption risks on the individual level.

Summary

In Hungary, like in many other countries—it was corruption prevention that directed the attention to integrity. An integrated public service and public servant is resistant against corruption and violations of law; however, integrity investigated in a complex way is considered more than a simple corruption prevention tool.

Integrity approach is the peculiarity of the value based public administration. Consequently, the efficiency of the comprehensive organisational transformation of the public administration launched in 2011 fundamentally needs its development. The legal foundations of a modern integrity based culture have already been established in Hungary. Presently, we are in the period of its consolidation. One of the most important basic conditions is the application of integrity culture tools at all public administration levels:

- There are promising results; risk analysis and assessment have become an integral part of the daily operation of public administration.
- The reports on measures designed to present risk prevention and the execution of the actions against them are public, it means an additional responsibility for head officials.
- On individual level, as for commitment to public service work, a new kind of approach has been added by ethical responsibility.

[15] The EU Anti-Corruption Report 2014 mentioned the modernity of the trainings.

- Public servants' awareness raising is supported by trainings, they—beyond knowledge transfer—can also be used to discuss current dilemmas at work.

Concerning the Hungarian integrity management system, two characteristics make it special: the central coordination of integrity management is the task of a law enforcement authority, the National Protective Service. The unification of preventive and law enforcement approaches within one organisation and the utilisation of the accumulated experience open new perspectives.

The Law entitles the occupation policy public bodies to create the professional ethics rules. As the public body organisations work on the border between the civil and state spheres, their involvement strengthens the legitimacy of professional ethics.

The desired goal of integrity development is to ensure the proper and effective functioning of public service enforcing public interest. The focus is on the goal. Accordingly, the experience of the initial years direct attention to the fact that the newly introduced tools of the integrity management cannot achieve results if we do not interpret them together with other long ago mechanisms on the same purpose operating for decades.

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Mao and Giap on Partisan Warfare

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According to Liddell Hart: "He [Mao] progressively developed his guerrillas into regular forces, while exploiting a combination of the two forms of warfare." [1: 363] *Mao Tse-tung is considered to be one of the most determinative of all guerrilla warfare[2] theoreticians, whose works and ideas in the field of military science had a great impact on irregular warfare during the Cold War and they still continue to do so nowadays. One of the most famous followers of the Chinese revolutionary was Vo Nguyen Giap, under whose military leadership the Vietnamese defeated both the French and the Americans. Based on primary resources, this essay summarises the most significant ideas on guerrilla/partisan warfare by the two military theoreticians. This essay was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.*

Keywords: *Mao Tse-tung, Vo Nguyen Giap, guerrilla warfare*

Introduction

The evolution of guerrilla warfare theories is characterised by the take over and adaption to the local circumstances of the theoretical—but practical experience based—works of other theoreticians. Mao Tse-tung and Vo Nguyen Giap played central roles in the development of guerrilla warfare theories: after taking over the ideas from 19th [2] and early 20th century classics, [3] they adapted and improved them according to the circumstances of the Chinese Civil War and the fighting taking place in Indochina. Their works provided a model for insurgencies in the later part of the 20th century, but their impact can also be felt even today.

At the turn of the century, the question arose whether guerrilla forces are able to achieve victory alone against regular forces. Fighting on the Arabian Peninsula highlighted the fact that irregular forces are only able to achieve complete victory when complemented by regular units. However, what can one do if there are no such units available? The answer to this question was provided by Chinese communist leader Mao Tse-tung. Vo Nguyen Giap was both a theoretical and a practical follower of Mao and in his own works of military science, he underlined the significance of indirect ways, especially that of the national and international propaganda next to military operations.

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[2] In this work, the terms guerrilla and partisan are used as synonyms.

Mao on Guerrilla Warfare

One of the most significant military and political theoretician of guerrilla warfare was Mao Tse-tung. In summarising his experiences from the civil war against the Koumintang from 1927, and from the fight against the Japanese during the Second World War, he highlighted that without the cooperation of the regular units of the Chinese Red Army and the partisan forces, war could not be fought successfully. According to the own poetic words of the Chinese party leader "Considering the revolutionary war as a whole, the operations of the people's guerrillas and those of the main forces of the Red Army complement each other like a man's right arm and left arm, and if we had only the main forces of the Red Army without the people's guerrillas, we would be like a warrior with only one arm." [4] He thought that in the war against Japan, the Chinese regular units were to play the decisive role, but the supplementary role of partisan forces was also indispensable for a successful fight. Mao saw it correctly that the struggle against the Japanese was to last for a long time, since the Chinese first had to train those armed forces, which can later successfully engage the foreign invaders. This prolonged war favoured the Chinese, who prepared thoroughly for the counterattack at their base areas.

As far as the relationship between military and the political leadership is concerned, Mao clearly stated the subordinate role of the military in achieving the political aims. The leading role of politics was drawn up in the political objectives, which had to be clearly and precisely communicated to the people, and among them the members of the military, as well.

The head of the Chinese communists further underlined that it was especially important for the officers of the armed forces to study political guidelines. This way, they may understand the connection between politics and the military, or in other words, they comprehend that military operations are used to achieve political aims. [5]

From the works of Mao, it becomes clear that he took many ideas from the classics of Marxism–Leninism, especially from the works of Lenin. In his work on partisan warfare, he quotes the thoughts of the Russian revolutionary many times, whose works in turn were significantly influenced by Carl von Clausewitz and his epic *On War.* Thus, it may be assumed that the works of Lenin played an important role and acted as a bridge between the Chinese communist and the main work of Clausewitz. Based on quotations taken from the Prussian theoretician [5] [6] it is fair to say that Mao—as a follower of Lenin—accepted the idea of Clausewitz that politics determines military affairs. Popular uprising got its own separate chapter in the work of Clausewitz, which might have been known by Mao, too. However, he could only identify himself with the Clausewitzian theory on popular uprising partially, as Clausewitz thought that such warfare was only possible under the guidance and leadership of the emperor, and that its aim was to fight against the invaders, and not for a new social order as propagated by the communists.

The role of political control can be found in the sections about organising partisan troops as well: the military commanders of Chinese insurgent units were accompanied by political commissioners, who represented the lowest rank of political control. [5] On the unit commander level, next to the leading military commander, political commissioners were also appointed, in whose subordination worked officials responsible for organising propaganda matters and mass demonstrations. Party leaders ordered the setup of committees in partisan areas of responsibility, in which the representatives of both the political and the military side

worked together. The delegates of the party were responsible for the political and ideological work on a unit level, as well. In an indirect manner, they aided the achievement of war goals with their political work among the troops, the populace and even the enemy, since [5] "clearly then the protracted revolutionary struggle in the revolutionary base areas consists mainly in peasant guerrilla warfare led by the Chinese Communist Party". [7]

Mao divided wars of national liberation into three phases, which classification he took over from Marx [8] and developed. The first phase is characterised by strategic offence of the enemy, and strategic defence by the Chinese; in the second phase the enemy settles into strategic defence, while the Chinese prepare for strategic offence; the third phase is the time for the Chinese strategic counterattack and strategic withdrawal for the enemy. Partisan forces take part in all three phases. In the first and in the final phases, they act as auxiliaries for the regular units, but their fighting is the most important during the second phase, when—operating in the rear of the enemy—they constantly attrite the Japanese forces. [6] Partisan forces also develop during the fighting, and as Mao said: "In saying this we also have in mind the strategic task of developing guerrilla warfare into mobile warfare." [6] "It is also beyond doubt that in the long course of struggle the guerrilla units and guerrilla warfare will not remain as they are but will develop to a higher stage and evolve gradually into regular units and regular warfare." [9] This change in applying violence can be found in other thoughts of Mao too, which were also highlighted by Liddell Hart: "Mao step by step converted his guerrilla troops into a regular army, while also being able to join the two ways of warfare." [1: 363]

According to Mao, irregular warfare had many advantages in the war against the Japanese: it shrank the area occupied by the enemy and in parallel widened the base areas of their own regular units; it disencumbered the regular fighting forces; provided troop replenishment for the army; helped the populace in the rear of the enemy and with this it expanded the influence of the Chinese Communist Party in parallel; lowered the moral of the Japanese and at the same time raised the moral of the Chinese. [9]

Mao summed up the strategic programme of partisan warfare as follows: "(1) the use of initiative, flexibility and planning in conducting offensives within the defensive, battles of quick decision within protracted war, and exterior-line operations within interior-line operations; (2) co-ordination with regular warfare; (3) establishment of base areas; (4) the strategic defensive and the strategic offensive; (5) the development of guerrilla warfare into mobile warfare; and (6) correct relationship of command." [10] According to him, partisan warfare is a very unique kind of belligerency: "Generally speaking, mobile warfare performs the task of annihilation, positional warfare performs the task of attrition, and guerrilla warfare performs both simultaneously." [6]

Along with the regular units, the struggle of the partisan was also aided by the populace. Furthermore, without their support, the irregular warfare of the partisan becomes impossible in the rear areas of the enemy. For this reason, it is particularly vital to gain and maintain the kindliness and support of the populace. As Mao explained with a metaphor: "Many people think it impossible for guerrillas to exist for long in the enemy's rear. Such a belief reveals lack of comprehension of the relationship that should exist between the people and the troops. The former may be likened to water the latter to the fish who inhabit it. How may it be said that these two cannot exist together? It is only undisciplined troops who make the people their enemies and who, like the fish out of its native element cannot live." [5]

When communicating with the people, clarity and brevity were the greatest advantage of Mao over his rivals. His metaphors, short examples and thoughts broken down into clear points were effective in communicating his message to every layer of society, especially to the lower classes, those the communists relied on mostly as their demographic basis. He greatly appreciated the role of propaganda: he prescribed that every bigger partisan unit shall have a mimeograph, and should print newspapers and leaflets to ensure that the population is informed and to also gain their support. [5]

The *Three Main Rules of Discipline and the Eight Points for Attention* was aimed at persuading them, and also served as a sort of "ethical codex" to prepare the staff of the Chinese Red Army, later renamed the Chinese People's Liberation Army (PLA). As early as 1928—right after the fighting broke out—Mao already published his directive in three points on how to deal with the populace: "(1) Obey orders in your actions; (2) Don't take anything from the workers and peasants; and (3) Turn in all things taken from local bullies." [11]

He further supplemented these rules with six more remarks in the summer of the same year. These were: "(1) Put back the doors you have taken down for bed-boards; (2) Put back the straw you have used for bedding; (3) Speak politely; (4) Pay fairly for what you buy; (5) Return everything you borrow; and (6) Pay for anything you damage." [11] After 1929, Mao changed some of those points. The second rule was replaced by "Don't take a single needle or piece of thread from the masses!", while the third one changed two times: first to "Turn in all money raised!", which was later made more specific by "Turn in everything captured!". The already existing six points were also expanded by two more: "Don't bathe within sight of women" and "Don't search the pockets of captives". Finally, on 10 October 1947, he sent the document below to the General Headquarters of the Chinese People's Liberation Army:

"1. Our Army's Three Main Rules of Discipline and Eight Points for Attention have been practiced for many years, but their contents vary slightly in army units in different areas. They have now been unified and are hereby reissued. It is expected that you will take this version as the standard one for thorough education and strict enforcement. As to other matters needing attention, the high command of the armed forces in different areas may lay down additional points in accordance with specific conditions and order their enforcement.

2. The Three Main Rules of Discipline are as follows:
   (1) Obey orders in all your actions.
   (2) Don't take a single needle or piece of thread from the masses.
   (3) Turn in everything captured.

3. The Eight Points for Attention are as follows:
   (1) Speak politely.
   (2) Pay fairly for what you buy.
   (3) Return everything you borrow.
   (4) Pay for anything you damage.
   (5) Don't hit or swear at people.
   (6) Don't damage crops.
   (7) Don't take liberties with women.
   (8) Don't ill-treat captives." [11]

Mao also modified the relationship between popular support and the partisans: while Marx, Engels and Lenin all thought that the poverty-stricken proletarian of the cities is going to form the popular basis of the revolutionary struggle, in China it was the populace of the countryside—the peasantry—which provided manpower for the partisans. The explanation is to be found in the different societal structures: In the less industrialised China—compared to Europe—there were only a few factories and consequently a much smaller number of industrial workers, while the number of the peasantry in the countryside proved perfectly sufficient for growing the number of partisan units.

Mao also defined the term *base area:* "What, then, are these base areas? They are the strategic bases on which the guerrilla forces rely in performing their strategic tasks and achieving the object of preserving and expanding themselves and destroying and driving out the enemy. Without such strategic bases, there will be nothing to depend on in carrying out any of our strategic tasks or achieving the aim of the war." [10] He highlighted that these were to be defended at all costs, since these lands are the showpiece examples of the new social order, and their defence provides the supporting background via which the guerrilla troops can become regular units. These difficult to access, well camouflaged, well protected—if required—and preferably as large as possible base areas served not only as starting points of offensives, but they were also the place where new units were organised, the troops rested and secured their resupply. [12] [13]

General Giap on Guerrilla Warfare

Vietnam fought for its independence for close to three decades, first against the French and later against the Americans. This struggle against the invaders was spearheaded by the leadership of the Vietnamese Communist Party—headed by Ho Chi Minh—who enjoyed the superpower support of both the Soviet Union and China. It was General Vo Nguyen Giap, the commander of the Vietnamese armed forces who analysed the Vietnamese conflict from a military scientific and theoretical point of view, while also propagating the military victories. As a follower of Mao, he applied his experiences of the Chinese Civil War and the theories of left-wing theoreticians to the Vietnamese circumstances.

According to the Vietnamese general, the war of national liberation—due to its nature, and according to the Marxist theory—was a just war. While as far as the opposing forces were concerned—in modern terms—it was also an asymmetric conflict. In his most important works of military theory, Giap took over [14] [15] many ideas of the Maoist theory: [16: 43] the armed forces, which are subordinate to the political leadership of the party must win in a protracted conflict, since in such a prolonged war, one cannot only count on the weakening of the enemy, but also on its tiring, because the armed forces of the enemy are prepared for a fast, high intensity conflict. [14: 53–54] [15: 112–113] The Vietnamese general defined guerrilla warfare as: "Guerrilla warfare is the form of fighting of the masses of people, of the people of a weak and badly equipped country who stand up against an aggressive army which possesses better equipment and technique. This is the way of fighting the revolutionary war which relies on the heroic spirit to triumph over modern weapons, avoiding the enemy when he is the stronger and attacking him when he is the weaker, now scattering, now regrouping one's forces, now wearing out, now exterminating

the enemy, determined to fight him everywhere, so that wherever the enemy goes he would be submerged in a sea of armed people who hit back at him, thus undermining his spirit and exhausting his forces." [15: 118–119] His popular support—due to the same economic reasons as in China—came from the peasantry of the countryside.

Similarly to Mao, Giap also took over from Marx the three phases of war: the first being the struggle in defence, the second being the time of balance, while the third the phase of counteroffensive. [15: 114–115] He dedicated a key role for the guerrillas in all three phases, but their role was the most significant in the first phase, as their activities provided the preconditions of the next two phases. The Vietnamese armed forces, formed under the command of Giap may be categorised into the following categories: "para-military organisations or guerrilla units, regional troops and regular units." [14: 60] The Vietnamese general considered the guerrilla forces to be the core of the revolutionary armed forces: these units launch the armed struggle, from which the two other categories of units develop later. According to him, war has to be conducted with the combined application of all these levels, but only regular units can decisively defeat the enemy.

He stressed that one of the key prerequisites of winning the war is the development of mobile warfare next to the guerrilla war. "Mobile warfare is the fighting way of, concentrated troops, of the regular army in which relatively big forces are regrouped and operating on a relatively vast battlefield, attacking the enemy where he is relatively exposed with a view to annihilating enemy manpower, advancing very deeply then withdrawing very swiftly, possessing to the extreme, dynamism, initiative, mobility and rapidity of decision in face of new situations", [15: 120–121] but this assumes the creation of regular units. He wrote on the process of these that: "People's war, long term war, guerrilla warfare developing step by step into mobile warfare, such are the most valuable lessons of the war of liberation in Viet Nam." [14: 57–58] The fall/liberation of Dien Bien Phu [17] confirmed the theory of Giap "[i]n general, our Resistance War was a guerrilla war moving gradually to regular war, from guerrilla warfare to mobile warfare combined with partial entrenched camp warfare". [15: 117] However, he also underlined that "it is necessary to develop guerrilla warfare into mobile warfare does not mean brushing aside guerrilla warfare, but that in the widely extended guerrilla activities, the units of the regular army gradually grew up and were able to wage mobile warfare and side by side with that main force there must always be numerous guerrilla troops and guerrilla activities". [15: 122–123] "From the strategic point of view, guerrilla warfare, causing many difficulties and losses to the enemy, wears him out." [15: 120] In summary of the above, it can be said that in the theory of Giap, guerrilla warfare naturally stayed as one of the forms of fighting, but its role in the last phase of war took an auxiliary role, as for the destruction of the enemy, a gradual transition among the revolutionary troops must occur towards mobile warfare. Next to indirect warfare, this shows the emergence and strengthening of direct warfare in the last phase.

Giap dedicated great roles to indirect tools next to the direct ways of employing strength, since "political activities were more important than military activities, and fighting less important than propaganda". [15: 89] About the role of national propaganda, he stressed that it has to be led by the party, and executed mostly by the national armed forces. The popular basis of the army can be setup with this, while also disrupting the enemy at the same time. The army setup in such a manner, is going to have a good relationship with the populace, as the same goals and the same enemy melts them into one. The fighting army also educates,

teaches and helps the people, who are giving the greatest support in exchange, all in order to achieve the joint goals. [14: 65] [15: 89] Propaganda however, should not only include big and rousing words: according to Giap, the party-lead nation building on communist-held areas is also providing huge moral support for the revolutionary war effort. [15: 116–117] While propaganda executed on the international scene is able to influence the world, and with it, even the public opinion of the enemy: war events broadcast by the media may turn the population of the enemy away from supporting the war, and as such impact the enemy negatively in an indirect manner.

Conclusion

The theory of guerrilla warfare was formed by historical experiences and local conditions. The works of Mao Tse-tung and Vo Nguyen Giap illustrate this process beautifully, as both theoreticians used the ideas of their forerunners, as well as the social, geographical and political peculiarities of their respective battlefields for formulating their own theories on guerrilla warfare. The theories of Mao and Giap highlighted the fact that, although no armed struggle can be started without the guerrillas, their role is not exclusive anymore, since without organising regular units, the strategic goals cannot be achieved. As a consequence of their contribution, such terms have become part of the theory on guerrilla warfare as: protracted war and its three stages, evolution of partisans into regular units, the importance of national and international support, the requirement of forming base areas, and the usage of national and international propaganda as an indirect tool. Their life-work can be identified both in South-American and African uprisings, as well as in irregular struggles fought by non-state actors nowadays. [18] [19]

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Experimental Investigation and Statistical Analysis for Spallation Characteristics of Ballistic Penetration[1]

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The paper discusses a new experimental investigation and analysis method conducted in the field of terminal ballistics based on shooting experiments. The shooting was performed with the aim of determining the geometry of the spall cone caused by the spallation on both sides of the target armour plate when a bullet is penetrating through it. During the measurement, armour plates made of different materials with different thickness were shot through using different bullets. The influence of the armour material type and its thickness on the spall generation was examined.

Keywords: *armour penetration, armour piercing bullet, spall cone geometry, experimental terminal ballistics, statistical analysis*

Introduction

A bullet penetrating through the armour plate brakes out spalls (small material fragments) from the plate. The shape, size and quantity of the spalls depend on the material and thickness of the plate, as well as the material, construction and velocity of the bullet. [1] [2] When a bullet is shot through the armour plate, a spall cone is created on both sides of the plate. (Figure 1.) This cone mainly consists of the material of the armour plate. [3] [4]

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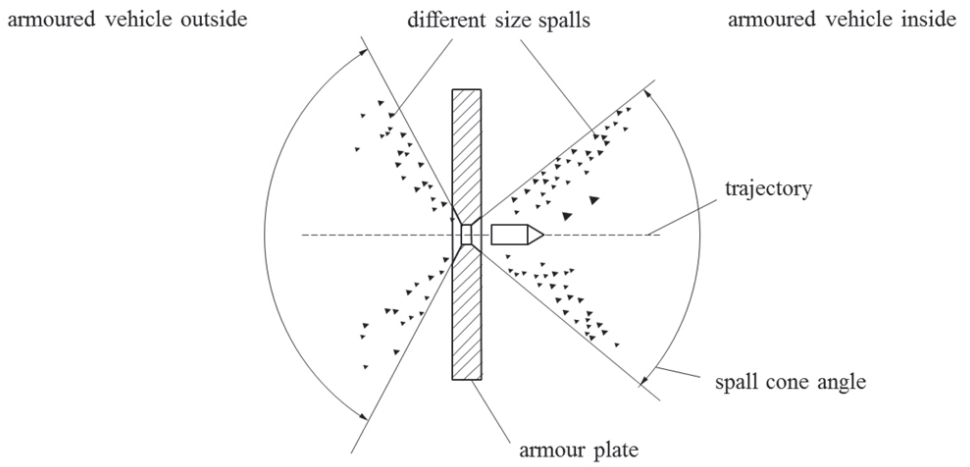

Figure 1. *Spall cone.*
[Edited by the authors.]

Spall liners are used inside some modern fighting vehicles to protect the crew or to decrease the injury caused by these spalls. [5] The spalls can injure the personnel inside the vehicle, but can also harm persons that are outside. To protect the personnel against this phenomenon, it is necessary to know the characteristics of the spall cone, including the description of the geometry and spall distribution.

This paper presents a method for determining the geometry of spall cones for two different armour plates shot with two different types of bullets. Spall cones have already been investigated with a high speed video camera [6] and X-ray [4] but a different method was chosen in this paper. With this method, the path of every spall can be determined. The basic arrangement of the test is that a cardboard box is attached to the armour plate on which the spalls pierce holes. From this, coordinates of the holes and the angles of the spall paths can be calculated.

The schematic of the setup of the experiment is illustrated in Figure 2. The principle of the test is not entirely new, paper [7] describes a similar method for determining the fragment mass distribution of an explosive charge using witness plates.

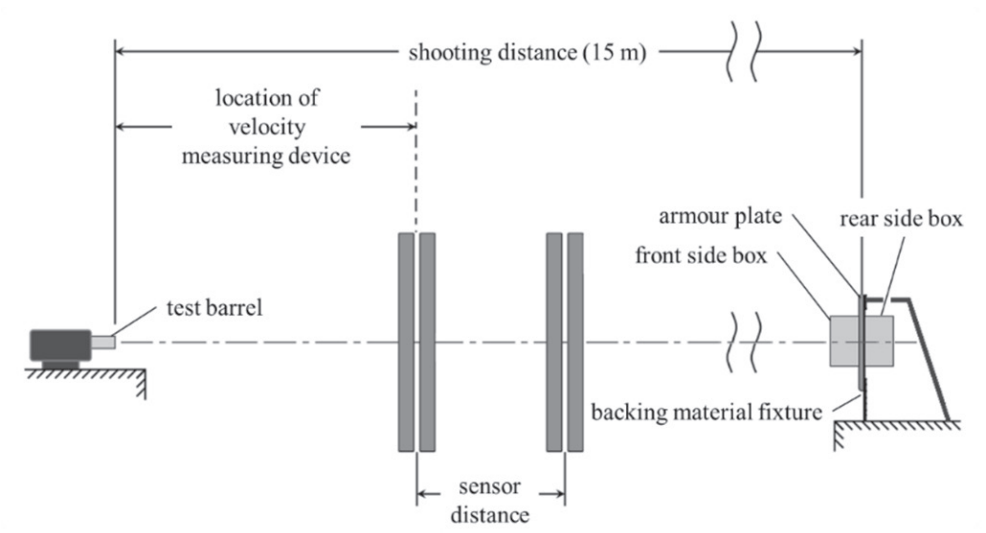

Figure 2. *Schematic setup of the experimental shooting.*
(Based on the test range configuration of the Ballistic resistance
of body armour NIJ Standard 0101.06 [8].)

The shooting was carried out in an indoor shooting range. The distance between the armour plates and the muzzle of the ballistic test barrels was constant during the whole test. The velocities of the bullets were measured by an electro-optical measuring system. During the research, the following values and distribution was measured and calculated: (according to Figure 3) the angles of spalls perpendicular to the armour *(α)* and their distribution, and the angles of spalls parallel to the armour (in the plain of the armour) *(φ)* and their distribution. The measurements were performed on both sides of the armour plate.

The shooting was performed in three, five-shot series. To measure the spall path, two cardboard boxes were attached on both sides of the armour plate.

The boxes were of uniform size. The spalls break out from both sides of the armour plate and penetrate the cardboard boxes which provides a pattern. From this pattern the dimension of the spall cone and the distribution of the spalls can be determined. (Figure 3.)

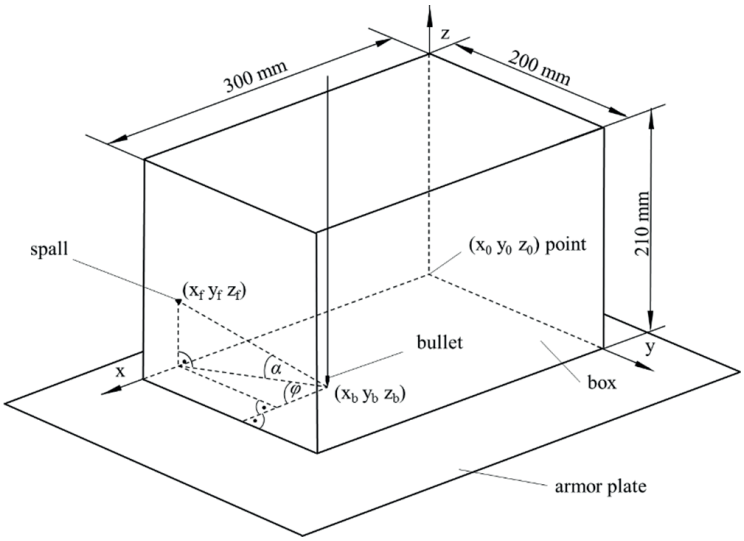

Figure 3. *The dimensions of the test-box and the interpretation of measured parameters for determining the spall cone.*
[Edited by the authors.]

In the experiment every bullet penetrated the armour plate. The data of the shooting series is shown in Table 1. Two different bullet types and two different armour plates were investigated in the test (see Table 1). In the case of the bullet: 7.62 × 39 BZ, only the thinner armour plate with less hardness and tensile strength was tested. It is due to our experience from previous tests, that this type of bullet usually does not penetrate the thicker plates having stronger mechanical properties. This experiment cannot be used with 7.62 × 54R B32 bullets because the test showed that the explosion caused by the armour-piercing bullet destroyed the cardboard boxes.

Table 1. S*ummarised data of the setup of the experiment.*
[Edited by the authors.]

Ammunition		**Number of shots**	**Plate**		
Type	**Mean velocity [m/s]**		**Thickness [mm]**	**Tensile strength [N/mm²]**	**Hardness [HB]**
5.56 AP M995[6]	1041	5	6.5	1670	410
5.56 AP M995	1039	5	11.4	1700	550
7.62 × 39 BZ[7]	737	5	6.5	1670	410

For every shot in the experiment new boxes were attached to both sides of the plate. Altogether five front- and five rear boxes were used in each shot series.

[6] Armour Piercing cartridge with tungsten core.
[7] Armour Piercing cartridge with hard steel core.

Processing the Data

Recording and processing the data

The surfaces of the boxes were digitalized and the coordinates of the holes were determined from these digitalized pictures using the coordinate system shown in Figure 3. Different sizes of the spalls were measured. From this data it was possible to represent the spall dimension distribution. Coordinates belonging to the spalls were transformed into two angle values. The values are calculated with equations (1) and (2) according to Figure 3.

$$\varphi = \arccos\left(\frac{x_f - x_b}{\sqrt{\left(x_f - x_b\right)^2 + \left(y_f - y_b\right)^2}}\right) \tag{1}$$

$$\alpha = \arccos\left(\frac{\sqrt{\left(x_f - x_b\right)^2 + \left(y_f - y_b\right)^2}}{\sqrt{\left(x_f - x_b\right)^2 + \left(y_f - y_b\right)^2 + \left(z_f - z_b\right)^2}}\right) \tag{2}$$

where:

x_f, y_f, z_f, are the coordinates of the spall impact;

x_b, y_b, z_b are the coordinates of the bullet impact.

Results of descriptive statistics

Figure 4 and Table 2 shows the box plot analysis and descriptive statistics of the α angles on the entry side of the armour (according to Figure 3). According to Table 2, the average number of spalls in a test shot are 492. The average α angle in case of the 5.56 AP bullet is higher in both armour plates (around 30°), while for the 7.62 BZ bullet this angle is much smaller (around 12°). According to Figure 4, 50% of the spalls in case of the 5.56 AP bullet fall between the angles 15° to 38°, while this value is between 5–15° in case of the 7.62 BZ bullets.

From these facts, it can be deduced that the properties of the bullets have more effect on the spall cone angles (taken perpendicular to the armour plate) than the material properties of the armour plate. There are some further differences within each test series. These differences were further evaluated with mathematical statistical methods and the results are shown in the next chapter.

Figure 5 and Table 3 show the results of the box plot analysis and the descriptive analysis of the α angles on the exit side. Comparing this value on both the entry and exit sides, it is noted that there are significantly less spalls on the exit side. According to Figure 5, differences could not be distinguished between the series. For the number of spalls, it can be established that in case of the 5.56 AP bullet shot on the 550 HB armour plate much less spalls were generated than when shot on the much softer 410 HB armour plate.

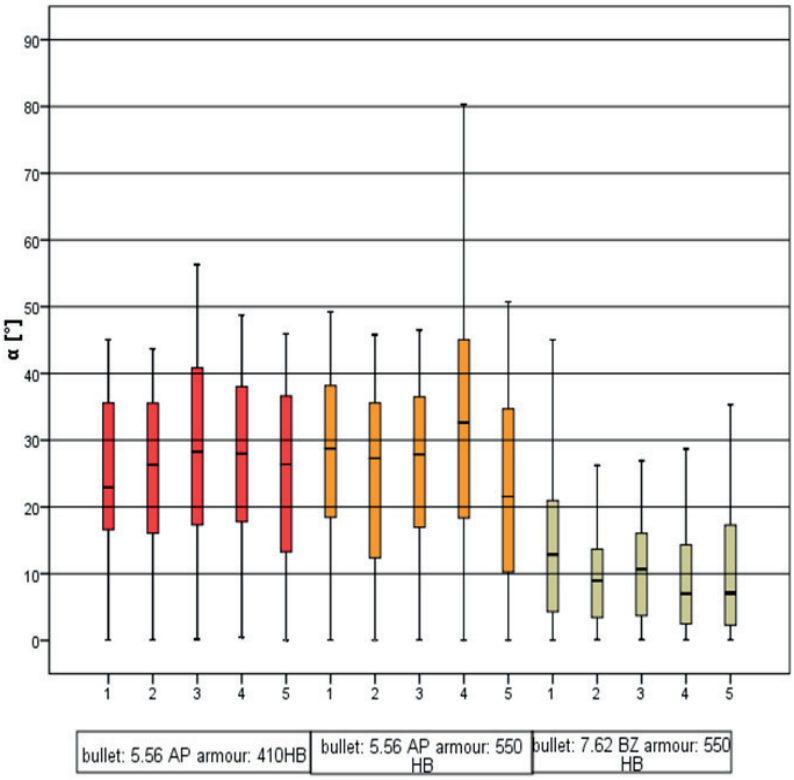

Figure 4. *The box plot analysis of α angles on the entry side of the armour plate.* [Edited by the authors.]

Table 2. *Descriptive statistics of α angles on the entry side of the armour plate.* [Edited by the authors.]

Bullet & Armour	**Shot number**	**Number of spalls**	**Mean of *α***	**Std. deviation of *α***
Bullet: 5.56 AP Armour: 410 HB	1	513	29.6655	14.95771
	2	525	29.8425	15.16661
	3	452	30.5936	16.74509
	4	496	31.1918	15.63944
	5	560	31.8773	18.66885
	Mean	509		
Bullet: 5.56 AP Armour: 550 HB	1	575	35.9743	18.72027
	2	554	31.7685	19.11498
	3	540	32.3503	18.15251
	4	425	31.9133	18.88183
	5	493	28.0345	19.79391
	Mean	517		

Bullet & Armour	Shot number	Number of spalls	Mean of α	Std. deviation of α
Bullet: 7.62 BZ Armour: 410 HB	1	425	14.6125	11.46637
	2	491	13.3671	13.03832
	3	463	12.4948	9.10137
	4	442	9.9597	8.68688
	5	430	10.9774	9.80576
	Mean	450		

Considering the type of the bullet it was found that the 7.62 BZ, when shot on the same hardness (410 HB) armour plate, tore much less spalls from the exit side of the plate than the 5.56 AP bullet. Furthermore, it can be stated that there are much bigger differences on the exit side of the plates than on the entry side within the test series. (Figure 4.) This can be explained by the fact that the entry angles of the bullet can be considered the same in all test cases, because the shots were fired on the same kind of armour plate and the fixture of the plate was identical in all cases. During penetration, this angle differs because of the inhomogeneity of the armour plate, thus effecting the large distribution of the spall cones on the exit sides.

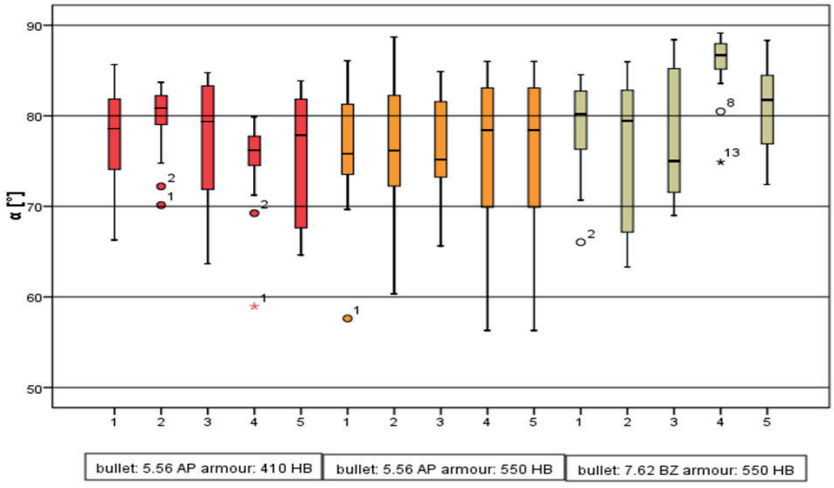

Figure 5. *The box plot analysis of α angles on the exit side of the armour plate.* [Edited by the authors.]

Table 3. *Descriptive statistic of α angles on the exit side of the armour plate.*
[Edited by the authors.]

Bullet and armour	**Shot number**	**N**	**Mean**	**Std. deviation**
Bullet 5.56 AP Armour: 410 HB	1	77	79.0453	8.09565
	2	75	79.9993	6.82374
	3	69	78.6644	7.87089
	4	71	78.9658	5.52908
	5	81	80.2616	7.03010
	Mean	75		
Bullet 5.56 AP Armour 550 HB	1	21	75.7539	5.87453
	2	23	74.4528	7.99637
	3	18	76.6151	5.45940
	4	20	74.5600	9.69881
	5	20	74.5600	9.69881
	Mean	17		
Bullet: 7.62 BZ Armour: 410 HB	1	29	77.1587	6.17503
	2	21	76.4843	7.79871
	3	39	75.9136	7.82234
	4	38	80.6118	8.20376
	5	38	78.4036	8.20540
	Mean	33		

The parallel projections to the armour plate of the outcoming spall angles were investigated with frequency diagrams because of their near uniform distribution. In Figure 6, Figure 7 and Figure 8 frequency histograms of the φ angles for the entry side are represented. Uniform distribution in a relatively long range can be seen in Figure 6. The frequency values decrease significantly in a very short range between 120° and 150°. In case of all the samples, this phenomenon can be observed almost to the same extent but in different disposition.

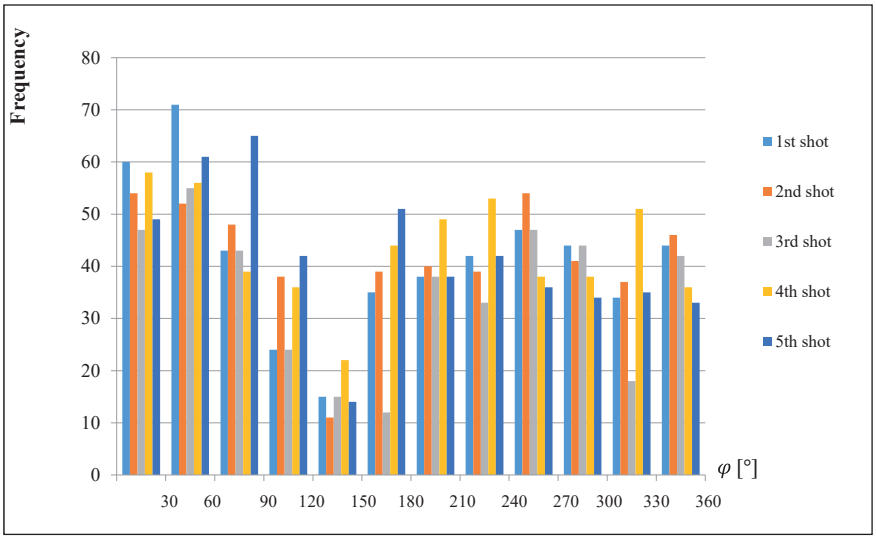

Figure 6. *Distribution of the angles φ bullet: 5.56 armour: 410 HB.*
[Edited by the authors.]

Figure 7 shows a different distribution. Within the series, the first shot differs significantly and basically shows uniform distribution, while in case of the other ones, there is no wide angle range where uniform distribution can be seen. In case of the second, third, fourth and fifth shots, the distributions show great similarity; in the short range of 0°~120° the frequency values are small and they increase significantly in the angle range of 120°~210°.

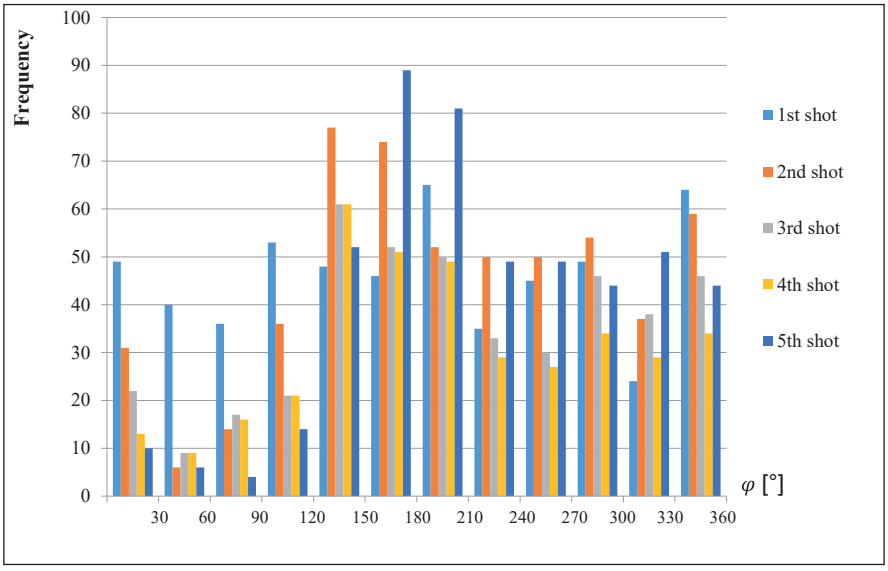

Figure 7. *Distribution of the angles φ bullet: 5.56 AP armour: 550 HB.*
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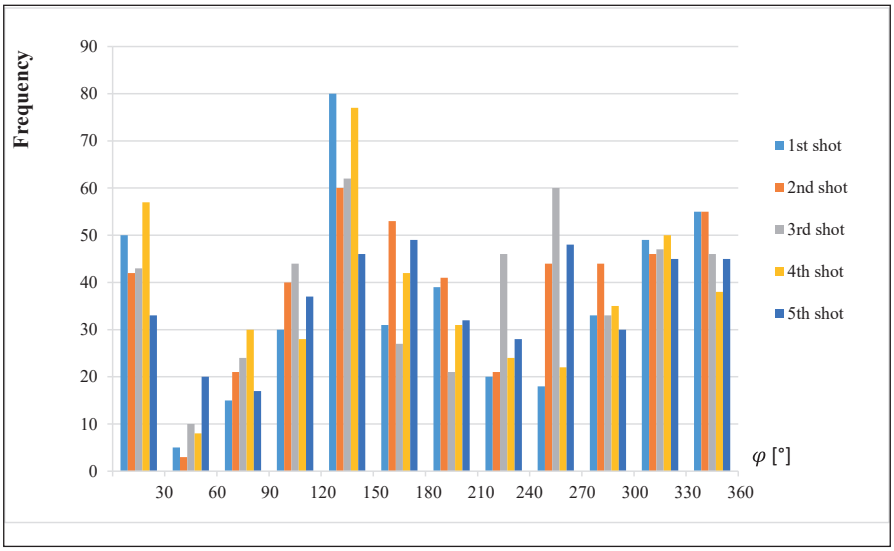

Figure 8. *Distribution of the angles φ bullet:7.62 BZ armour: 550 HB.*
[Edited by the authors.]

Angle distributions of φ in case of bullet 7.62 BZ can be seen in Figure 8. Shots inside the series show great similarity to each other. It can be stated for every series that the spall scattered in the plane of the armour plate in the entire 360° angle range. The spall distribution at this angle is non-uniform.

The similarity of the distributions of the angle φ within the series could be caused by the same impact angle because one series was shot on the same plate in an identical arrangement. It can be assumed that the uniform distribution of the angle φ for the spalls in the plane of the armour plate can be expected in case of a total perpendicular impact.

During the tests, the number of spalls formed on the exit side of the plate was too small, which was not suitable for further examination. For this reason, the distribution of the angle φ for the exit side is not presented. Although it can be stated that the distribution of the angle φ for the exit side is non-uniform, similarly to the entry side.

Figure 9 illustrates the distribution of the spall size on the entry side. Likewise, the distribution of the spall size on the exit side can be seen in Figure 10. In these figures, the imension mm^2 is related to the size, (i.e. the cross-section) of the spall piercing the box. It is easily recognizable from Figure 9 that 90% of the spalls are very small, with sizes between 0.5~2 mm^2 on the entry side. There is no significant difference in size distribution among the three plates made of different material and thickness on the entry side.

The size distribution significantly differs on the exit sides; the quantity of the spalls is much less. While approximately 500 spalls were observable on the entry side, their number was not more than 90 on the exit side. (Figure 10.) Deviations can be observed on the exit side of the three different plates. In the case of the 5.56 AP bullet and 550 HB armour, a different distribution can be observed; the number of the spalls, with a cross-section 0.5–2 mm^2 is much lower. In the cases of bullet 5.56 AP, armour 410 HB much more spalls can be observed. These deviations can be explained by the different kinds of materials and bullets.

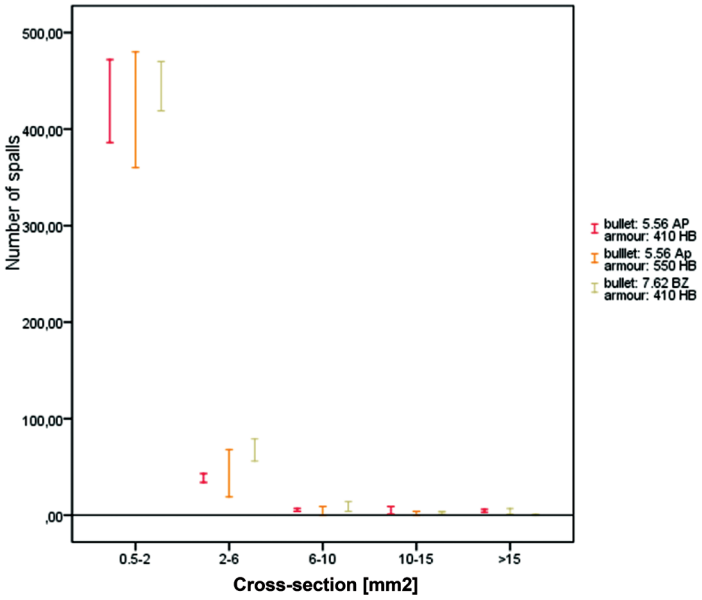

Figure 9. *Spall size distribution on the entry side.*
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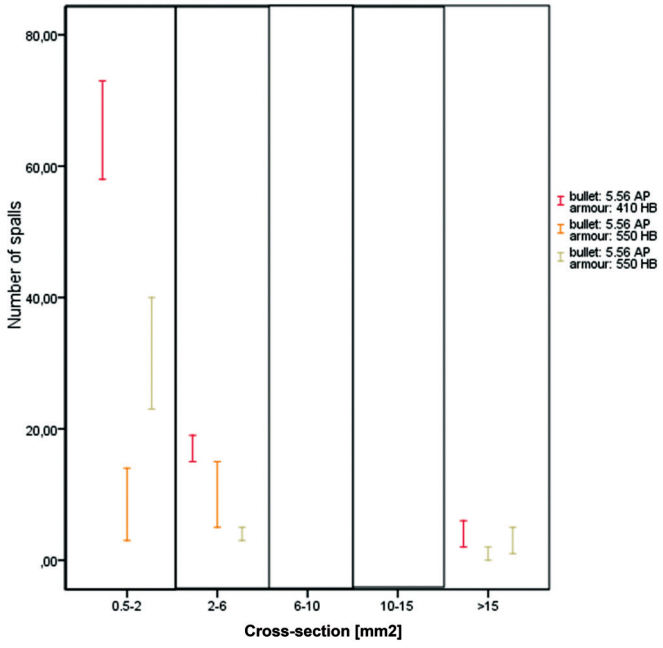

Figure 10. *Spall size distribution on the exit side.*
[Edited by the authors.]

Statistical Examinations

The first step of the analysis was the normality test. The aim of the statistics analysis was to decide whether the specimen belonging to a series may originate from the same population. In the case of normal distribution of the specimen, this can be decided with the ANOVA (Analysis of Variance) test, in the case of non-normal distribution, a non-parametric (Kruskal-Wallis) test can be used. The statistical analysis was made on the α angles of the entry side.

Analysis of the distribution was started with a normality test. The normal distribution of the sample data was checked using One-Sample Kolmogorov-Smirnov test [10] using SPSS. The null hypothesis is that the data has normal distribution. The null hypothesis had to be rejected because $p < 0.001$ was found in all cases. Consequently, the angle between the spall path and the armour plate *(α)* does not have a normal distribution.

The aim of the next statistical investigation was to examine whether the samples have the same distribution, because the same distribution implies same parameters (the expected value and the standard deviation). In the case of a population with a normal distribution, the check can be done using the ANOVA test. However, ANOVA requires a population characterized by a normal distribution, and this condition was not met here. This was the reason why the only tool for checking equality was a non-parametric test. [10]

The Kruskal-Wallis test is the non-parametric equivalent of the ANOVA test. Population having normal distribution is not a condition of its application. Using this test, it is possible to check whether the samples have the same distribution or not. The null hypothesis of the test is that the distributions of the samples are the same. The test was also carried out with SPSS. The calculated values of significances are presented in Table 4. The table shows the values of *p,* in the first series $p = 0.129$, but in other cases $p < 0.0001$, therefore, the Kruskal-Wallis test rejected the null hypothesis in case of the last two series. Within these series, unequal distribution of samples and unequal expected value and standard deviation need to be assumed.

Table 4. *Summarised data of the Kruskal-Wallis test according to the whole series.* [Edited by the authors.]

Series	Bullet: 5.56 AP Armour: 410 HB	Bullet: 5.56 AP Armour: 550 HB	Bullet: 7.62 BZ Armour: 410 HB
p	0.129	0.000	0.000

For the detailed analysis of whether the samples are belonging to the same population, the values of α were analysed in pairs with the Two-Samples Kolmogorov-Smirnov Test. Samples that had the same distributions could be selected from the five sample series according to the results of the two parameter tests. Based on this result, subgroups were selected on which the Kruskal-Wallis test was repeated. The results are shown in Table 5.

Table 5. *Summarised data of the Kruskal-Wallis test according to the parts of the series.* [Edited by the authors.]

Series	Bullet: 5.56 AP Armour: 410 HB Shots: 1, 2, 3, 4, 5	Bullet: 5.56 AP Armour: 550 HB Shots: 2, 3, 4	Bullet: 7.62 BZ Armour: 410 HB Shots: 2, 3	Bullet: 7.62 BZ Armour: 410 HB Shots: 4, 5
p	0.129	0.853	0.322	0.332

Table 5 contains the result of the statistical analysis, where all the five shots fired on the 410 HB armour plate with 5.56 AP type bullet show the same distribution in the spall angle components perpendicular to the armour plate (α angles).

In case of the identical bullet type shot on the 550 HB plate, the same distribution, however, is only valid for test series two, three and four. In case of the 7.62 BZ bullet, the distribution of the *α* angles for the second and third and also fourth and fifth shots are the same. It follows that more than one distribution can be identified in the last two series. The reason can be the dispersion of bullet velocity and the inhomogeneity of the material of the armour plate.

The distribution of alpha angles was verified with MS Excel and SPSS software. The tests excluded all of the following distributions: Normal, Uniform, Poisson, Exponential, Weibull and Lognormal.

Table 6. *Curve estimation of the relative frequency of α angles.* [Edited by the authors.]

	R^2			
Equation	Bullet: 5.56 AP Armour: 410 HB Shots: 1, 2, 3, 4, 5	Bullet: 5.56 AP Armour: 550 HB Shots: 2, 3, 4	Bullet: 7.62 BZ Armour: 410 HB Shots: 2, 3	Bullet: 7.62 BZ Armour: 410 HB Shots: 4, 5
Linear	0.581	0.539	0.693	0.645
Logarithmic	0.254	0.282	0.908	0.929
Inverse	0.044	0.106	0.813	0.938
Quadratic	0.816	0.753	0.951	0.951
Cubic	**0.956**	**0.791**	**0.968**	**0.999**
Compound	0.691	0.659	0	0
Power	0.356	0.361	0	0
S	0.114	0.141	0	0
Growth	0.691	0.659	0	0
Exponential	0.691	0.659	0	0
Logistic	0.691	0.659	0	0

Next, various functions were fitted using regression to the values of the relative frequencies of the alpha angles with the SPSS program. The results are shown in Table 6. Based on the results, it can be stated that the probability density functions of alpha angles can be best approximated by a third-degree polynomial, since in this case the correlation coefficient *(R^2)* is the largest. Furthermore, it can be stated that in case of a higher polynomial, the correlation is further increased.

The problem of multiple penetration of spalls through the pierced holes on the sides of the cardboard boxes has already been mentioned in the introduction. The theoretical

likeliness of a smaller spall flying through a hole made by a larger spall is possible and this could distort the described experienced distribution. The probability for this situation can be calculated on a geometric basis. The probability of a spall flying through a hole pierced by another spall can be calculated by the following formula:

$$p = \frac{R}{T} \tag{3}$$

where R is the mean surface area covered by the spalls calculated according to the values of Figure 9 and T is the surface of the box described in Figure 3. The expected value of the two spalls passing through the same hole is:

$$M = n \cdot p = 1.49 \tag{4}$$

where: n is the number of spalls. This means that less than two spalls will pass through a hole pierced by another spall from the average 500 spalls in a shot. The number of punctured holes on the box provides sufficient samples for the dispersion of spalls, and for determining the geometric parameters of the spall cone.

Evaluation

According to the results of our experiments (and of Figure 4), it can be stated that the spall angle on the entry side of the armour plate is near 180°. 50% of the spalls flying out of the armour plate fall into a relatively narrow zone with an angle between 10–20°. A spall free zone can also develop between the angles 60–120° (see Figure 10).

The parameters of the bullet (velocity, bullet core) had more effect on the formation of the spall cone parameters (see Figure 11) than the mechanical properties of the armour plate. Spall clouds caused by slower moving and softer core bullets have larger cone angles and concentrate the spalls in a narrower zone.

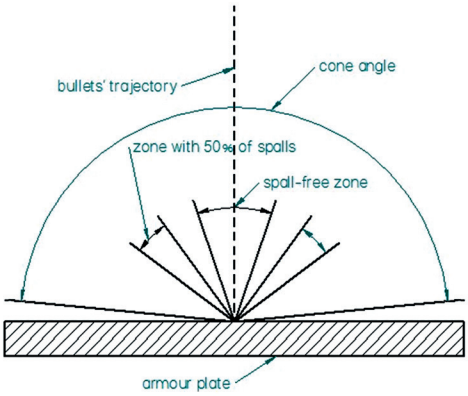

Figure 11. *Spall cone parameters on the entry side.*
[Edited by the authors.]

On the entry side, in an individual series, the distribution of the α angles (perpendicular to the armour plate, responsible for creating the spall cone angles) was identical for the five shots made by the 5.56 AP bullet on the 410 HB hardness armour plate. This cannot be stated for the other test series, but between the series shots could be identified that had the same α distribution and with it also the same expected value and dispersion. The density functions associated with the distribution of α angles can be best approximated by a polynomial of a minimum of third degree. The spall cone can be identified with this method on the entry side of the armour plate.

The spall angle projections parallel to the armour plate (φ angles) differs from the uniform distribution. (Figures 6, 7 and 8) *Spall cone parameters on the entry side.*. The difference can be caused by the slight difference from the perpendicular (90°) impact. The shots belonging to a series were fired on the same armour plate. This way, the angle between the plane of the armour plate and the tangent of the bullet trajectory were almost identical (considering the inevitable accidental small displacements). This could be the reason for the evident similarity in a series.

On the exit side, (according to Figure 5), the distribution of α angles show a great difference. The reason for the difference is that the trajectory of the bullet deviates during the penetration. The magnitude and the direction of the deviation is different from shot to shot, thus the bullet exits the armour in different directions (angles) after penetration. This is the reason the α angles have different distributions in one series. The exit spall cone angle thus cannot be identified by our method, only the extreme values of the measure values can be described. The maximal angle of the spall cone is around ~126°. (Figure 12).

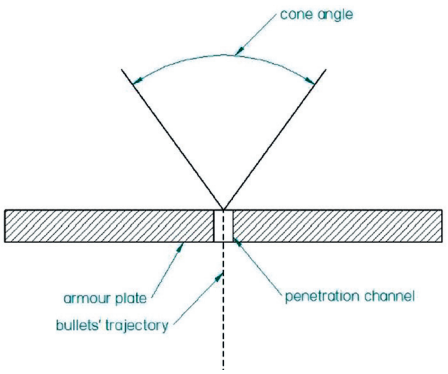

Figure 12. *Spall cone parameters on the exit side.*
[Edited by the authors.]

The number of spalls on the entry side were between 450–517 pieces, while on the exit side the number were significantly less 15–75 pieces.

Regarding the size distribution of the spalls it can be stated that there is a great similarity in both distribution and spall numbers on the entry side of the shot. 80–90% of the spalls are of small size with a cross section of 0.5–2 mm.

However, a great difference in the size distribution and the number of spalls between each series can be observed on the exit side of the armour plate. It concludes that the spall

cone is much narrower on the exit side than on the entry side of the armour plate. The spall cone angle, the size distribution and the spall number are much more sensitive on the parameters of the bullet and the armour material.

Conclusion

Based on the results of the tests, it can be concluded that the geometry of the spall cloud created by a bullet penetrating an armour plate can be determined with the method presented in this paper.

The mechanism of spallation depends on the material and the kinetic energy of the bullet core, and on the material characteristics of the armour plate (its hardness and ultimate tensile strength).

During the research, two parameters had been identified that had a significant effect on the spall cone. On the front side, it was the bullet core hardness and velocity. In this case bullets with higher speed and greater hardness caused smaller cone angles than the lowest ones considering identical armour plates. The geometry of the spall cones, the size distributions of the spalls and their numbers show a significant difference between the entry and the exit side of the armour plate. Similarities among the test series on the entry side of the armour plate can be observed, that is not specific for the exit sides.

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Reduction of Environmental Pollution Applying Decentralised Wastewater Treatment Systems in Small Communities[1]

Tamás KARCHES[2]

Small size wastewater treatment plants are widely used as a decentralised treatment solution in regions, where the access to the sewer system is not available or the connection to an existing system is not economically sound like in small communities (e.g. schools, hospitals, army camps, etc.). The local treatment of wastewater can be performed by small size units applying activated sludge or attached growth biomass. In this paper the performance and operation of a process unit applying conventional activated sludge is analysed. For this purpose, a simulation tool with mass balance modelling was used. In the model, various influent wastewater qualities were set in order to examine their effect on each process. Operational parameters were fine-tuned to increase the capacity by utilising additional aeration. As a result, it can be stated that the nominal capacity of the treatment unit is overestimated; in the Central European region, due to the wastewater characteristics, the examined treatment unit could handle 40% of the nominal capacity.

Keywords: *activated sludge, decentralised system, mass balance modelling, sewerage, wastewater treatment*

Introduction

The aim of the urban water management is to secure the quantity and quality of water provided to consumers. Public service has a high level of responsibility in ensuring water safety and sustainability. [1] When the urban water cycle is concerned, the wastewater collection and treatment system have a significant role to protect the receiving water bodies and water bases of water acquisition [2] even in extreme conditions caused by global warming. [3]

A general concept is to collect and transport wastewater to a large treatment plant (mainly situated in the outskirts of the municipalities), where physical, biological and chemical processes are responsible for the reduction of pollutants (basically organic matter

[1] The work was created in commission of the National University of Public Service under the priority project PACSDOP-2.1.2-CCHOP-15-2016-00001 entitled “Public Service Development Establishing Good Governance” in the Egyed István Postdoctoral Program.

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and nutrients) in order to reach the effluent quality requirement. This system requires large external energy investments and thus increased operational costs via application of pumps, aeration and chemicals, but the space requirement is relatively small compared to the area of natural degradation processes.

Nowadays many decentralised wastewater treatment systems (DEWATS) are available, which serve the suburban low population density residential areas or industries with specific wastewater discharges, but are also feasible for small communities, hospitals, [4] schools, hotels and army camps. In army base camps, the closed cycles are important, therefore portable wastewater systems are one of the favourite and well-known applications. [5] [6]

Furthermore, DEWATS are widely used in developing countries, where the establishment of a sewer system is not attainable. For example, in the slum of Alam Jaya[3] (Jakarta) a combination of community-sewerage sanitation system, shared septic tanks and community sanitation centres provide a basic level of sanitation. [7] [8]

Sizing a decentralised wastewater treatment unit is not a simple scale down design from a conventional plant. However, the core processes are the same, but the operation environment differs; e.g. a built-in aeration system is not always possible, the sludge management is basically reduced to the storage of the wet mass volume. A typical system combines the treatment steps in a modular manner; for primary treatment sediment ponds, settlers or septic tanks, for secondary treatment filters, facultative ponds or anaerobic baffled reactors, for post-treatment aerobic polishing ponds could be applied. [7]

The most conventional system applies a septic tank, which may handle the organic matter effectively, but the septic effluent shall be further treated if a nutrient removal is aimed. During this process a gravel filtration could reduce the nitrogen content by approximately 30% and the phosphorous content by 60%. [9] Compact small size wastewater treatment units are also applied, which are often chemically intensified. The requisites of this system is modularity, easy operation and maintenance and efficient organic matter reduction at low cost.

Among the various DEWATS options, the small size treatment units or package plants are investigated in this study. The methodology section gives an insight into the numerical mass balance calculations and simulation environment, the result and discussion section details the influent characterisation of the influent wastewater, determines the capacities of each unit and presents the possibility of operational parameter adjustment.

Materials and Methods

The capacity of a Polydox-50 small size wastewater unit was analysed. The nominal capacity was 50 PE[4] and the hydraulic load was 6.0 m^3/d. The volume of the unit was 8.4 m^3/d; 70% of the volume was considered to be aerated and had aerobic conditions, the rest was designed for settling and sludge thickening. In order to predict the actual effectiveness of the system, mass balance modelling was carried out which was an effective tool in predicting treated

[3] Industrial area with a high crime rate, low living standards, no social network and healthcare system.
[4] PE – Population Equivalent.

wastewater quality. GPS–X 6.5[5] commercial simulation environment was applied, where the biological model of ASM2d[6] was set.

This model presents the results of the processes of organic degradation and nutrient removal in municipal wastewater discharges. [10] The model is based on a set of mass transport equations and the fate of a pollutant component is determined by reaction kinetics, which can be decomposed to biokinetic processes. Each process can be taken into account by the reaction rates and stoichiometric parameters. The ASM2d model applies approximately 60 conversional and stoichiometric parameters, and yields half-saturation coefficients. [11]

The process scheme of the treatment unit can be seen in Figure 1, which presents each process and the mass flows between them (lines). Raw wastewater is discharged to an equalisation tank (EQ tank), followed by the biological processes, which is an activated sludge system (CAS).[7] The dosage of external carbon source is possible if necessary (if the carbon to nitrogen concentration ratio is lower than 5). The clarifier is responsible for settling, the settling efficiency is based on the solid loading rate, which is determined by the mixed liquor concentration in the biological basin and the hydraulic load. The sludge dewatering unit in the model is responsible for the storage of the sludge, where a small amount of leachate is directed back to the biology. The solid capture of this unit is approximately 5%.

The model layout drawn in Figure 1 does not indicate the sizes, dimensions and operating parameters; flows and the dissolved oxygen concentration in the aerated basins have to be set prior to the simulation process.

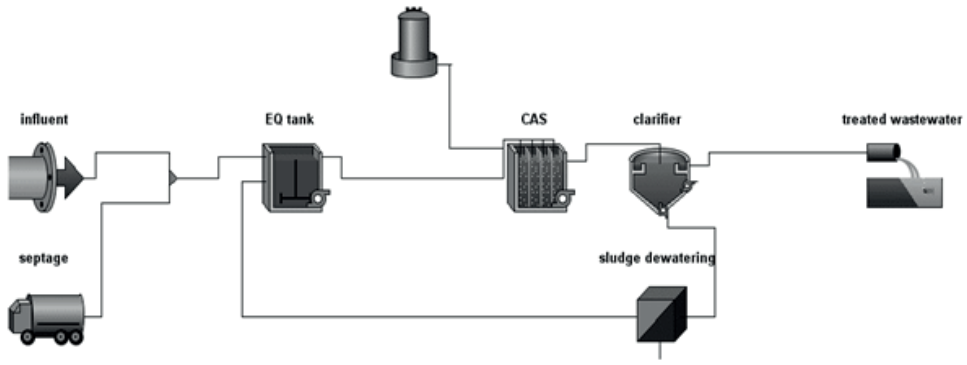

Figure 1. *Model layout of an activated sludge small size wastewater treatment unit.* [Edited by the author.]

The model approach assumes steady-state conditions and average wastewater influent constituents. Two sets of raw wastewater influent data were analysed, one with an average concentration, which is typical for Central Europe and another tier of data with elevated concentrations, which is typical to regions, where the water consumption is decreased. The composite wastewater parameters are summarised in Table 1.

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5 GPS–X 6.5 is a software released by Hydromantis and it is a simulation environment incorporating various wastewater treatment models and approaches.

6 ASM2d – Activated Sludge Model version 2 with denitrification processes.

7 CAS – Conventional Activated Sludge.

Table 1. *Influent wastewater characteristics.*
[Edited by the author.]

mg/l[8]	Average influent	Strong influent
COD	750	1200
BOD_5	310	650
TSS	400	800
TKN	80	100
TP	12	18

The simulation steps were the following: influent wastewater characterisation, determination of model parameters and initial values for model variables, transferring the physical model setup to numerical model, performing calculations and evaluation of the result. [12] First the effluent quality was determined at nominal load. Then sensitivity analysis was performed and the effluent quality was calculated in function of the varying hydraulic loads. From this the optimal load could have been seen and lastly a steady-state simulation was performed at this optimal loading condition and the actual treated wastewater quality was determined. This process was done twice; with the average and the strong influent.

Result and Discussion

Influent characterisation

Influent fractionation is a key element in process modelling, since all of the model variables (both composite and state variables) cannot be determined by a physical measurement. Among the various fractionation methods, the COD-TSS based approach was selected and the COD fractions were the following for the average influent: inert organic COD: 16 mg/l, readily biodegradable COD: 62 mg/l, particulate inert COD: 270 mg/l and slowly biodegradable COD: 402 mg/l. The substrate fraction of particulate COD was 0.6 and the organic content of TSS was 0.8. This values for the strong influent wastewater were the following: inert organic COD: 24 mg/l, readily biodegradable COD: 96 mg/l, particulate inert COD: 194 mg/l, slowly biodegradable COD: 886 mg/l. The substrate fraction of particulate COD was 0.82 and the organic content of TSS was 0.75.

In both cases, the readily biodegradable content is relatively low compared to other components, and the particulate fractions are high, resulting slower degradation processes, since the particulate matter shall undergo a hydrolysis before microorganism uptake. This may have a consequence that a certain reactor volume may have a lower capacity than it is expected.

[8] COD – Chemical Oxygen Demand; BOD_5 – Biological Oxygen Demand; TSS – Total Suspended Solid; TKN – Total Kjeldahl Nitrogen (ammonium and organic N-content); TP – Total Phosphorous.

Calculation of the treatment unit performance

Applying the influent characteristics, steady-state simulation was performed with the nominal raw wastewater discharge (6.0 m^3/d). The dissolved oxygen concentration was 2.0 mg/l in the aerated basin. As a result, the sludge production was 1.35 kgTS/d[9] at 0.78% dry solid content. The thickened and dewatered sludge quantity is 6.4 l/d. From the calculations it can be clearly seen that the nitrogen removal is not sufficient if the nominal capacity is used (COD: 50 mg/l, TSS: 24 mg/l, NH_4-N: 25 mg/l, TN: 27 mg/l). Full nitrification is achieved only if the ammonium-nitrogen is converted to an oxidised form, but in this case the nitrification is partial.

As a next step, the raw wastewater discharges were varied and the flow was determined, where the nitrification was acceptable. The result of the analysis can be seen in Figure 2, where the effluent COD (grey) and ammonium-nitrogen (black) variation can be seen in function with the actual discharge. It is demonstrated that there is a breakpoint, where the ammonium-nitrogen concentration increases sharply and the treated water effluent quality is getting far from the effluent quality requirement. This breakpoint is at about 2.5 m^3/d flow, which is less than half of the nominal capacity. The reason could be the fact that these units are designed for the treatment of weaker raw influent, assumes higher water consumptions of the households, which may be valid for Western Europe, USA, Australia, but not valid for Central Europe and regions in Asia and Africa.

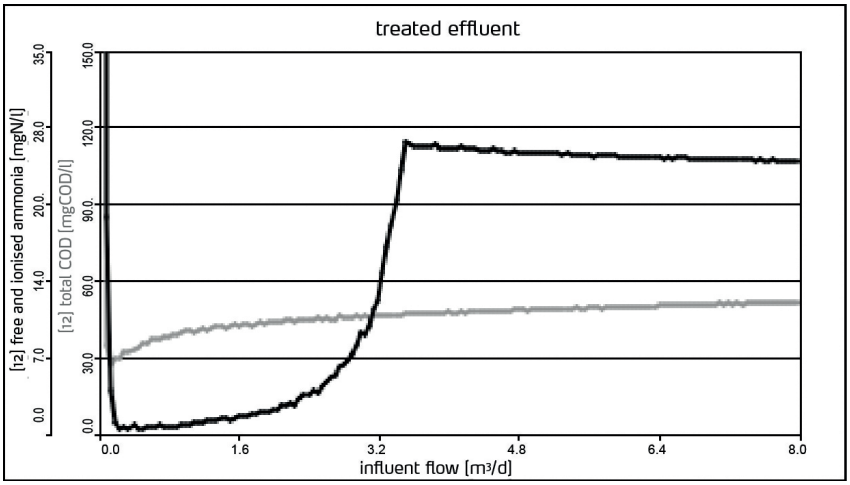

Figure 2. *Effluent total COD (mg COD/l) and free and ionised ammonia (mgN/l) concentrations in function with the influent flow.*
[Edited by the author.]

As Figure 2 shows there is no sharp increase in the COD effluent curve. The reason could be that a large proportion of COD is in particulate form. An increase of the load does not

[9] Daily Total Solid Production.

require biological capacity, just a buffer in the settling process, which is available in this system.

As a part of the calculation, the strong wastewater influent was also assumed. At this condition, full nitrification was impossible to be achieved. Instead of a further capacity reduction, the operational parameter was adjusted. If the aeration intensity is increased to reach the DO level of 3.5 mg/l, nitrification becomes acceptable. This meant a 30% increase in the aeration requirement.

Conclusion

Decentralised wastewater treatment systems are alternative solutions for sanitation. In geographies without a sewer system, it could treat wastewater locally. A wide variety of technologies and processes have been developed. The selection shall be based on the local circumstances and the wastewater quality and quantity. Small size treatment units can be applied, but before the selection, it is advisable to perform mass balance calculations to predict the actual capacities of such a system; the theoretical and actual capacity may differ significantly.

The overall conclusion of this research is that the nominal capacity of the investigated small size wastewater treatment unit is overestimated in both cases: the unit could treat 40% of the wastewater effectively, indicating that instead of the original 50 PE it could handle 20 PE if it is applied in Central Europe, and the influent comes from communal source. It was also concluded that the operation could help in capacity increase, but it requires energy and a resulting operational cost increase.

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National Cybersecurity Strategy Framework[1]

László KOVÁCS[2]

Cyberspace and its services and the digital-based processes affect all segments of our lives. These effects are felt in the economy, politics, culture, but also in individual elements of our private life and in people's relationships, as well. Accordingly, one of the biggest challenges for cyber security is that we highly depend on these services. Most of the countries have realised that today cyber security is one of the essential parts of their national security. Its reason is twofold. Firstly, the digital ecosystem is vital for a nation and this ecosystem cannot work properly without cyber security, secondly there is no alternatives to avoid the aforementioned dependence. As a result, cyberspace and its security are of decisive importance to countries with advanced information infrastructures. However, national cyber security strategies, whether they are made by big powers or small countries, have different answers to the challenges of cyberspace. At first, this paper focuses on these challenges and then tries to identify some unified elements which could be the main pillars of an effective national cyber security strategy.

Keywords: *cyber security, strategy, national security*

Introduction

One of the most important strategic documents of developed countries is the national security strategy. In its national security strategy, the country presents its ideas of achieving the protection of all values and interests that have been defined in the constitution of the state.

The strategy builds on this encompassing the security environment that defines values and interests, outlining the challenges and threats of today and the near future.

Further on, the strategy encompasses the security environment that also determines these values and interests, as well as the present and future challenges and threats to them.

Based on the analysis and assessment of these threats and challenges, the strategy gives the most important goals that could provide an adequate response to the challenges and threats identified. The strategy assigns tasks and activities to these goals and determines the necessary organisational, legislative and financial resources.

[1] The work was created in commission of the National University of Public Service under the priority project PACSDOP-2.1.2-CCHOP-15-2016-00001 entitled "Public Service Development Establishing Good Governance" in the Lőrincz Lajos Professor Program. This paper highly based on the author's main conclusions expressed in his doctoral thesis of the Hungarian Academy of Sciences.

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The national security strategy of the country is supported by sectoral strategies. Sectoral strategies reflect specific elements of security in the given sector. Accordingly, the national cyber security strategy, as one of the sectoral strategies, reflects the interests of the country and the strategic objectives for the protection of these interests in the cyberspace. The national cyber security strategy should return to address the threats and challenges identified in the national security strategy and, in parallel, support the strategic objectives set out in the national security strategy by addressing the challenges posed by cyberspace.

At first, this paper will present and briefly analyse the challenges and threats relevant to the strategic environment of cyber security. The main objective is to focus on trends that are related to the development of a cyber security strategy that fundamentally affect the content of a national cyber security strategy.

Strategic Threats to National Cyber Security

Most of the national security strategies of the European countries list and analyse the most severe strategic threats to the country and its interests. These are usually the following: cybercrime; cyber espionage; hacktivism; hybrid warfare and serious cyberattacks; proliferation of cyber weapons; serious attacks against critical infrastructures and critical information infrastructures.

Before we analyse the strategic answers to these strategic threats and challenges, it is needed to briefly examine some of these threats.

Table 1. *Strategic threats in the national cyber security strategy of Austria, the Czech Republic, Hungary and the United Kingdom.*
(Edited by author based on: Austria [11], the Czech Republic [13], Hungary [16], the United Kingdom [3].)

Country	**Strategic threats, risks and challenges**
Austria	Risks: • cybercrime • identity fraud • cyberattacks • misuse of the Internet for extremist purposes

Country	Strategic threats, risks and challenges
The Czech Republic	Challenges: • the Czech Republic as a potential test bed • lack of the public's trust in the state • increased number of Internet and ICT users and increased criticality of technology failures • increasing amount of mobile malware along with the increased number of mobile device users • possible information exfiltration through a hardware backdoor • Internet of Things • security risks related to the transition of IPv4 to IPv6 • security risks related to the electrification of public administration (eGovernment) • insufficient security of small and medium enterprises • big data, new data storage environments • protection of industrial control systems and of information systems in the health sector • smart grids • increased ICT dependence of the state's defence forces • increasingly sophisticated malware • botnets and DDoS/DoS attacks • increase in cybercrime • threats and risks related to the use of online social networks • low digital literacy of end users • shortage of cyber security experts and the need for curricula reform
Hungary	Threats: • information warfare against ICT systems of critical infrastructures • lack of properly regulated information security in ICT systems • emerging new technologies: i.e. cloud, mobile internet
The United Kingdom	Threats: • cybercriminals • states and state-sponsored threats • terrorists • hacktivists • script kiddies Vulnerabilities: • an expanding range of devices • poor cyber hygiene and compliance • insufficient training and skills • legacy and unpatched systems • availability of hacking resources

The cybercrime methods nowadays are more and more built on each other, and the cybercrime complexity is increasingly being observed. Users are targeted by identity theft and phishing attacks, as well. At the same time, these methods are combined and they are more complicated than before. Accordingly, it is more difficult to detect them and more sophisticated technical and procedural activities are needed to discover them. These attacks aim at not just the users but in many cases the real target is the users' company that could be an industrial company or even a financial institution. The offender, that is the cybercriminal, is no longer a lone perpetrator, because complex security solutions require a complex attack modus operandi. Additionally, it must be based on complex knowledge and thus multiple elements to commit a single offense. Thus, increasingly organised groups

are the perpetrators. Cybercrime, in many cases, requires serious financial investment due to these advanced and increasingly complex defence systems. Thus, often the traditional criminal circles are those who make such investments. They buy or rent the knowledge and technical background that is necessary for the realisation of the crimes. [1]

At the same time, cybercrime and those who are involved in it, for long years not only gain high technical knowledge but also receive information that can be of interest to the strategic level, as well. The data gathered from cybercrime and the conclusions drawn from their analysis can be used to influence political or economic processes in another country. [1]

Initially, cyber espionage was like industrial and economic espionage, as one of the most important goals of obtaining information that is used by or through computers and Info Communication Technology (ICT) tools was the theft of intellectual products. Today, however, we are witnessing more and more marked changes in this area. Cyber espionage is still present alongside the acquisition of economic information, but the targets of cyber espionage include public administration, governmental and nongovernmental organisations of the defence sphere. One form of cyber espionage is the Advanced Persistent Threat (APT) attack. APT is a combination of various cyberattacks. This is a complex process involving several very sophisticated malwares and attacking procedures, which are very hard to detect or discover. One of the most important attributes of APT attacks is that they are largely undiscovered for a long time and remain unnoticed. Attacks are typically characterised by the fact that they do not target accidental targets, but rather their targets are pre-selected networks and systems that handle valuable political, business, military, or administrative information valuable to the attacker. APT attacks that are well-prepared typically last for a long time from one to two weeks or up to years. APT attacks are executed by non-random targeting software robots, but by programs designed to deliberately focus targets that detect weak or vulnerable points by sophisticated procedures and then penetrate the system, the real purpose of which is to unconsciously capture the data stored there and attack the attacker. [1]

At the beginning of the 2000s, hacktivism was defined as "[…] the group of hackers and artists who coined the phrase, was intended to refer to the development and use of technology to foster human rights and the open exchange of information". [2] Today, thanks to the Anonymous group, hacktivism itself is unchanged. However, its methods and mainly its targets are much more dangerous for the governments. Therefore, many countries' national cyber security strategies deal with it as a source of threat. The UK's national cyber security strategy formulates the hacktivism and hacktivists as follow: "Hacktivist groups are decentralised and issue-orientated. They form and select their targets in response to perceived grievances, introducing a vigilante quality to many of their acts. While the majority of hacktivist cyber activity is disruptive in nature (website defacement or DDoS), more able hacktivists have been able to inflict greater and lasting damage on their victims." [3]

The importance of critical infrastructures and critical information infrastructures in our everyday life is unquestionable. Since these systems are the most important components of our digital era, and without them our everyday life is hardly imaginable, we must take into consideration their vulnerability by assessing the consequences of possible attacks. Critical infrastructures, as well as critical information infrastructures are exposed to physical hazards, so handling and preparing for them is vital. As info communication systems are also built in physical space, their total or partial physical damage will lead to system shutdowns and shorter service life. This is therefore the primary source of danger. At the same time,

these infrastructures are threatened not only by physical but also by cyber threats. This is the second most important source of threats because the features of cyberspace, such as limitlessness, openness, globality, software and hardware vulnerabilities, can be attacked by global, regional, national or even lower levels. As evidenced by the case of the Stuxnet worm virus applied to Iranian nuclear facilities, the attack of critical infrastructures is indirectly possible, including cyberattacks primarily related to critical information infrastructures, which can cause the greatest extent damage. When exploring the causes of the most serious vulnerabilities in critical infrastructures, we must conclude that these systems and components are extremely heterogeneous. This is the most commonly encountered in the parallel operation of the former and the latest technology constituents. One of the best examples is Supervisory Control and Data Acquisition (SCADA) systems. The concomitant application and daily use of old and new assets in critical infrastructures is most visible in the energy sector, as "the use of new technology in cost-effective energy production, storage and transport is increasingly at the beginning of important considerations and priorities". [1] IoT (Internet of Things) tools that appear in critical infrastructures, mainly in their control, increase the vulnerability of the systems from the point of view of the danger, since it is even more true that not only the earlier but the newest technology is present in the infrastructures simultaneously. The older technology is vulnerable through its software and hardware components; meanwhile, the new technology can be attacked through its remote connections, as well. [1]

Strategy and Its Elements to Handle the Threats on National Cyber Security

Today, the majority of countries have national cyber security strategies. These strategies are mostly static documents that do not or only partially handle the dynamism that characterises cyberspace. However, due to the nature of cyberspace, i.e. globality, border lessness, and extremely rapid technological changes, as the main characteristics, require that we define a unified model or even its elements for creating a national cyber security strategy which can really be of use. Therefore, we should identify elements of current national cyber security strategies of different countries that are either similar or identical and which can be the basis for a national cyber security strategy model. In this work, we have to take into consideration the relevant requirements and regulations of international organisations, i.e. the European Union or NATO.

Conclusions from the cyber security strategy and relevant policies of the European Union, NATO and four EU countries

Previously, I have analysed several national cyber security strategies of European countries and parallel with this work, the EU's and NATO's main policies and strategies in cyber security and cyber defence have also been analysed. [1][4] Based on those works, hereby I summarise the main elements of the different international organisations' (EU and NATO) and four of the analysed countries' cyber strategies.

My conclusions from the Cyber Security Strategy and relevant policies of the European Union are as follows:

- the EU Cyber Security Strategy[3] aims to enhance the resilience of Member States and the EU towards cyberattacks;
- the strategy defines the common security and defence policy framework for cyber defence;
- the NIS Directive[4] sets out the task of Member States to prepare the national cyber security strategy;
- based on NIS, the national cyber security strategy should also include critical infrastructure protection tasks;
- some elements of the national organisational system for cyber security, including for EU liaison, are also defined by NIS. [5]

Conclusions from the cyber security policies and regulations of NATO:

- the interpretation of cyberspace as a domain of warfare[5] has many consequences for member states (for example, delegating broader cyber defence tasks to the army, building cyberattack capabilities, setting up cyber commands);
- one of the NATO Cyber Pledge[6] is to approximate the currently different levels of cyber defence capabilities of member states;
- NATO's Cyber Operation Centre can play an important role not only in military but also in the civil defence;
- the Alliance promotes the strengthening of international cooperation between both member states and non-NATO countries. [5]

Conclusions from Austria's national security[7] and national cyber security strategy:[8]

- cyber security plays an important role in the national security strategy of Austria;
- the curbing of cybercrime and the necessary organisational background of cyber security are important goals in the national security strategy;
- the national security strategy also defines military cyber capabilities;
- the national security strategy requires the preparation of a national cyber security strategy;

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3 Its official title is *Cybersecurity Strategy of the European Union: An Open, Safe and Secure Cyberspace*. [6]

4 NIS Directive: Directive (EU) 2016/1148 of the European Parliament and of the Council of 6th July 2016 concerning measures for a high common level of security of network and information systems across the Union. The main aim of NIS "[…] lays down measures with a view to achieving a high common level of security of network and information systems within the Union so as to improve the functioning of the internal market". [7]

5 NATO has recognised cyberspace as a domain of warfare at the Warsaw Summit in 2016. The official communiqué of the Warsaw Summit formulated it as follows: "Now, in Warsaw, we reaffirm NATO's defensive mandate, and recognise cyberspace as a domain of operations in which NATO must defend itself as effectively as it does in the air, on land, and at sea. This will improve NATO's ability to protect and conduct operations across these domains and maintain our freedom of action and decision, in all circumstances. It will support NATO's broader deterrence and defence: cyber defence will continue to be integrated into operational planning and Alliance operations and missions, and we will work together to contribute to their success." [8]

6 NATO, at the Warsaw Summit, as well, declared a plan to ensure and foster the Alliance's common efforts on cyber defence that is called pledge. According to the official text, the Allied Heads of State and Government of Member States of NATO: "pledge to ensure the Alliance keeps pace with the fast-evolving cyber threat landscape and that our nations will be capable of defending themselves in cyberspace as in the air, on land and at sea." [9]

7 Austrian Security Strategy Security in a New Decade—Shaping Security. [10]

8 Austrian Cyber Security Strategy. [11]

- the national cyber security strategy also addresses the technical hazards;
- a special cyber risk matrix has been built into the cyber security strategy;
- cyber security strategy defines the most important elements of organisational background;
- it encourages R&D activities and international cooperation in cyber security;
- one of the strategic goals of Austria is to increase PPP in cyber security. [5]

Conclusions from the Czech Republic's strategies:[9]

- the country issued a forward-looking national security strategy in 2015 which contains provisions for the protection of critical infrastructures and military information systems, defines the preparation of the national cyber security strategy and describes the organisational system of cyber security in detail;
- the second edition of the national cyber security strategy is alive, along with an action plan[10] which defines the organisational background of cyber security;
- this strategy assigns tasks to critical infrastructure protection as well as enhancing cooperation between the private and public sectors;
- it encourages the R&D and increases the anti-cybercrime activity with the establishment of an effective legal environment;
- the strategy also emphasises the importance of international cooperation. [5]

Conclusions from Hungary's strategies:[11]

- Hungary's national security strategy contains important references to cyber security and the importance of cyberspace. The strategy is currently under review, inter alia, because of the changed security situation and the emerging security challenges;
- the national military strategy also counts on the dangers of cyberspace, determines the enhancement of cyber defence of the Hungarian Defence Forces and refers to the cyber warfare. At the same time, there has been no progress in the field of cyber warfare either at strategic or organisational level in Hungary. This strategy is also under review;
- the national cyber security strategy was completed more than five years ago;
- the national cyber security strategy is very sketchy, but it also has a suitable system of tasks, and also has a strategic organisational background in order to create or increase cyber security;
- the strategy provided an adequate basis for the development of cyber regulation (for example, the adoption of the Electronic Information Law)[12] and the launching of social consultations and co-operations;
- this strategy is currently under a reviewing process. [5]

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9 National Security Strategy of the Czech Republic, [12] and the National Cyber Security Strategy of the Czech Republic for the Period from 2015 to 2020. [13]

10 Action Plan for the National Cyber Security Strategy of the Czech Republic for the Period from 2015 to 2020. [14]

11 Hungary's National Security Strategy, [15] National Cyber Security Strategy of Hungary, [16] Hungary's National Military Strategy. [17]

12 Act L of 2013 on the Electronic Information Security of Central and Local Government Agencies. [18]

Conclusions from the United Kingdom's strategies:[13]

- the UK's national security strategy considers cyberspace to be of strategic importance, within which it has undergone several updates, but each one counts on the importance of information technology and indicates the United Kingdom as a cyber power;
- the national security strategy counts on cyber threats, which also address strategic goals;
- the national security strategy assigns tasks to the Army for cyberspace;
- one of the main philosophical elements of the national defence strategy is deterrence, which also focuses on cyberattacks;
- the importance of critical infrastructure protection has been included in the strategic goals;
- the second edition of the national cyber security strategy is currently in force;
- it defines responsibilities for a wide range of actors in society to create cyber security;
- the strategy assigns organisational background to the coordination of tasks;
- it also includes an implementation plan for implementing different tasks;
- the strategy also defines the formation of cyberattack capacities;
- the development of cyber security integrates cyber security awareness, development of an industry support background, and continuous monitoring of technological and policy changes and their inclusion in cyber security;
- the importance of international cooperation is highlighted. [5]

Possible Elements of a National Cyber Security Strategy

On the basis of my suggestion, the National Cyber Security Strategy should include the following elements:

- a collection of terminology which defines both cyberspace and cyber security;
- evaluation of the strategic environment: presenting the cyber threats, challenges, risks and vulnerabilities;
- identifying the strategic goals that contribute to achieving strategic national security goals by creating and continuously increasing cyber security;
- strategic ideas for implementing the organisational background of cyber security;
- definitions of critical information infrastructures and critical infrastructure protection;
- strategic support for R&D innovation in the field of cyber security;
- a cyber security education strategy that aims to develop and enhance cyber security awareness;
- strategic stimulation of mutual co-operation between public and private cyber security (PPP);
- declaring commitment to international cyber security cooperation;
- the action plan for achieving strategic goals;
- developing an evaluation system that gives indicators in the strategy and on the control of the implementation of the action plan. [5]

[13] National Security Strategy and Strategic Defence and Security Review 2015. A Secure and Prosperous United Kingdom. [19] National Cyber Security Strategy 2016–2021. [3]

In addition to this, it is important to emphasise that, depending on the country's political decision, the role of the military should be expedient in the country's defence. This may address the following issues (areas and related purposes):

- creating the military's cyber capabilities, including cyberattack capabilities;
- the tasks of the armed forces in protecting the country and possibly protecting critical infrastructures and critical information infrastructures;
- the tasks of the armed forces in a responsive cyberattack. [5]

These cyber capabilities of the armed forces with sufficiently robust state-of-the-art cyber defence organisations and their cyber defence capabilities could be deterrent. [5]

The Model of a National Cyber Security Strategy

Based on the conclusions drawn from the analysed national cyber security strategies, and also taking into account the summarised experiences of the modelling examples so far, the following general proposal has been made for building up the national cyber security strategy with the aforementioned important content elements.

The model has four phases, each corresponding to the requirements of the given phase with continuously changing activities. The proposed model can apply for 3–4 years, but sometimes longer cycles are possible. Dynamic variables at different phases of the model, such as measurement results or the assessment and adaptation of hazards and challenges, can be carried out in a 3–4-year cycle without having to change it basically, for example, by generically transforming the basic cyber security organisational background. Obviously, the current and medium-term changes in cyberspace, as well as the technical and human changes, such as the artificially intelligent technical uses and its indirect impact on the human environment will necessitate a revision of the bases of the strategy every 4–5 years. [5]

The four phases of the suggested model are the following:[14]

- Phase 1: Creating a new strategy/modifying an old strategy:
  - define the general purpose of the strategy, if necessary revise it;
  - revising of existing cyber policies and cyber related regulations;
  - plan for critical infrastructure and critical information infrastructure protection;
  - revising of information sharing policies.
- Phase 2: Introduction and implementation of the new strategy (amendment of an earlier strategy if necessary):
  - set up an effective organisational and management structure;
  - developing and clarifying cyber security emergency plans;
  - developing incident management capabilities;
  - enhance effective actions against cybercrime both domestically and internationally;
  - establish public–private partnerships;
  - increasing the efficiency of cooperation between the public sector institutions.

[14] According to the suggested model every phase followed by a feedback session where the effectiveness of certain phase is checked and if necessary the required minor adjustments could be done.

- Phase 3: Operation of a cyber security system based on the new (modified) strategy:
  - organising cyber security exercises;
  - development and encouragement of cyber-training and education programs;
  - increasing the citizens' cyber security awareness.
- Phase 4: Evaluation of the strategy and its effectiveness:
  - continuous development of the strategy;
  - adjustment of the national cyber security strategy using the results of key performance indicators;
  - processing the experiences gained during the cyber exercises and, on the basis of these, elaborating efficiency-enhancing measures. [5]

It is important to emphasise that the proposed model is not designed to produce a static document, but it can dynamically manage the most diverse challenges and threats that emerge in cyberspace, and capable of delivering cyber security for the given country.

Conclusions

Today, cyberspace and its security for countries with advanced information infrastructure are critical. This fact must be reflected in the national strategic vision of cyber security.

Analysing the context of the national security strategies and the national cyber security strategies of different countries, it can be found that cyber security is one of the most important factors to achieve the most important objectives of the national security strategy.

When we consider the strategic challenges in cyberspace, we find that there have been a number of threats such as cybercrime, hacktivism, or cyber espionage. However, a new, very serious challenge has emerged over the last half decade that can be summarised in state-aided cyberattacks. These cyberattacks use various attacking methods in systematic and very sophisticated ways. All of these cyber threats and challenges require strategic cyber defence solutions both at international and national level.

When we analyse cyber security strategies in some European countries, we can observe that although these countries follow different approaches to create valuable and robust cyber security, still many elements can be identified in these different ways that are highly resembling each other.

In this paper, these nearly same elements have been identified, and depending on their role and their effectiveness, they can be the basis for a national cyber security strategy model. Based on this, using my previous findings in relation to common elements and the effective and truly active elements revealed in the cyber security activities of the countries under investigation, I proposed a model with the key elements to create a national cyber security strategy.

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Resilience of the Territory to the Occurrence of Natural Hazards

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The article deals with the issue of increasing resilience of the territory by reducing its vulnerability to natural hazards. The present state of the issue is focused on the analysis of the United Nations' involvement in disaster response where organising World Conferences on Disaster Risk Reduction is viewed as a key moment. Subsequently, tools used for assessing the vulnerability and resilience to disasters are examined. Based on the results of the current state of knowledge and deficiencies in the concerned area, a process has been proposed to evaluate the vulnerability and risk of the territory to the occurrence of natural hazards with the aim of ensuring acceptable area safety. Applicability of the proposed process of the vulnerability and risk assessment of the territory to natural hazards is presented on an example of a municipality. Verification on the selected municipality has proven the merit of the proposed procedure.

Keywords: *disaster, municipality, resilience, risk, vulnerability assessment*

Introduction

The increasing occurrence of natural hazards has a wide range of negative impacts on the population, property, environment, economy or social system. The economic impacts and human losses caused by natural hazards are differentiated depending on the level of development of the world. Global interconnectivity raises shared responsibility and the need to prevent, solve and eliminate the consequences of hazards, hence the need for crisis management is growing.

For this reason, countries and international organisations have started to employ a holistic and multidisciplinary approach to the safety, risk management and crisis management. Ensuring environmental and human safety is one of the biggest challenges today. The main responsibility for the disaster risk management should be taken by the central government. Governments must decide what degree of risk they are willing to accept and what tools they will use for implementing risk control. [1] For this purpose, the public and the private sector create crisis management authorities at central and local levels and by means of legal regulations they set requirements for prevention, minimisation and monitoring of risks as well as preparedness and response. Next, they adopt technical, organisational, financial and information measures which ensure the resistance of the society to disasters. All these activities are supposed to contribute to the minimisation of negative impacts while strengthening the country's sustainable development.

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The Theoretical Part

In the context of historical development, a shift from a reactive to preventive approach to dealing with disasters is observed. The basic element for effective implementation of preventive measures and crisis planning is the vulnerability assessment of the territory which can be endangered by individual threats. The current situation suggests that it is essential to address the issues of increasing resilience, mitigation and adaptation of the area to the occurrence of natural hazards as necessary conditions for improving the area safety and ensuring sustainable development.

World Conferences on Disaster Risk Reduction

In the United Nations (UN), the beginnings of international coordinated aid in the aftermath of natural disasters date back to the 1960s. This was mainly about providing financial and material relief to affected countries. The first breakthrough in a coordinated approach was the decision to launch the International Decade for Natural Disaster Reduction [2] effective from 1990 to 1999. The main focus was on resource planning, preparedness and prevention of natural disasters, public education, creation of disaster scenarios, establishment or strengthening the early warning systems, land use planning to reduce vulnerability, mapping the areas with frequent occurrence of disasters, increasing the number of experts and their resources.

In 1994, the World Conference on Disaster Risk Reduction was held in Yokohama, Japan. At this conference, ten principles [3] were established representing a global integrated approach to disaster risk reduction.

The World Conference on Disaster Risk Reduction in Kobe, Japan was held a month after the devastating earthquake and the subsequent tsunami in the Indian Ocean which occurred in December 2004 and claimed 230,000 human lives. Lasting deficiencies and problems were identified. They were related to management areas; identification, assessment, risk monitoring and early warning; knowledge management and education; reduction of risk factors, preparedness for effective response and recovery. [4]

The third World Conference on Disaster Risk Reduction adopted the Sendai Framework for Disaster Risk Reduction 2015–2030. [5] This framework defines four priorities for action—understanding the risk, strengthening the disaster risk governance to manage the disaster risk, investing in disaster risk reduction for resilience, enhancing disaster preparedness for effective response, and to "Build Back Better" [5] in recovery, rehabilitation and reconstruction. These priority actions became the basis for their implementation in each of the priority areas of management (local, national, regional, global level). To reduce the damage caused by disasters, the Sendai framework [5] sets seven global targets which are supposed to contribute to the achievement of the new sustainable development goals.

The results of all the world conferences point to the necessity of implementing a comprehensive integrated hazard risk assessment as a necessary basic element for successful hazard prevention, as well as an effective tool for crisis planning.

Vulnerability and Resilience Assessment

Vulnerability is a deficiency, weakness or state of the analysed asset which can be exploited by the threat to exert its undesirable influence. Vulnerability is the asset's property and it expresses how sensitive the asset is to a given threat. Vulnerability results from an interaction between the threat and the asset. The level of vulnerability is assessed by sensitivity and criticality factors. [6] In the international concept of hazard risk reduction, vulnerability is associated with poverty, the socially disadvantaged groups, poor state of health and depletion of resources. The following factors are considered to be the powerhouse of disaster vulnerability: [7] [8] [9]

- economic factors;
- social factors;
- political factors;
- environmental factors;
- geographical factors.

Vulnerability is not static, but changes over time similarly to the population and physical changes of the environment. Currently, there is little agreement how it should be measured. [7] Vulnerability is difficult to measure objectively. Although there are activities to reduce vulnerability and increase resilience, they are very specific and relate to a certain type of danger and a population group.

Vulnerability is evaluated differentially in various areas of human activities. Examples of vulnerability measurements can be the Disaster Risk Index (DRI) [10] or the Social Vulnerability Index (SoVI). [11]

Resilience expresses the ability of a system or society to resist, mitigate, accept and recover from the impacts of disruptive events in a timely and effective manner, including preservation and restoration of its essential structure and functions. [12] According to Moench, [13] concepts of resilience take two forms—hard and soft. Hard resilience is the direct strength of structures or institutions which are under a threat. Soft resilience is the ability of systems to absorb and recover from the impact of disruptive events without fundamental changes in function or structure.

Methods

Various methods were used to develop a vulnerability and risk assessment proposal. In default of suitable indicators, the brainstorming method [14] [15] with selected experts was used. The Delphi method was used to gain the opinion of experts on the significance of factors and proposed vulnerability indicators. The Pearson correlation coefficient and the Spearman correlation coefficient [16] were used to investigate dependencies between individual factors of vulnerability. For each indicator of the vulnerability factors, the Wilcoxon pair test [16] was used to compare pairs of individual indicators of the vulnerability factors and to identify differences between the indicators. The purpose of the local investigation was to verify the functionality of the proposed methodological process of the vulnerability assessment and a proposal of measures to mitigate the hazard impacts.

Proposal for Vulnerability and Risk Assessment of the Territory

Based on the current situation, it was found that a comprehensive vulnerability assessment is a time and data consuming issue. In accordance with the UN approaches, physical, social, economic and environmental factors were chosen as the main factors influencing the extent of vulnerability.

For these factors, indicators were suggested and characterised. It is a new innovative approach to the vulnerability assessment in the Czech Republic. At the same time, it is the first proposal of a comprehensive risk assessment of natural hazards for the needs of increasing the resilience of the territory. The indicators were chosen in order to gain a complete picture about the assessed territory and the possibility of re-evaluation. The indicators represent a set of information which characterises the territory and potential impacts of a hazard. Coefficients are assigned to the indicators. Each indicator has values in the interval of 1–5 and is complemented by a verbal characteristic of each level of the interval. The numerical and verbal characteristics of individual indicators were set on the basis of information from public databases as well as the qualified assessment after a discussion with experts.

In the first step, the characterisation of the territory was done with respect to the implementation of the risk assessment. In the second step, the risk analysis was as follows:

the frequency of natural hazards occurring per one year assuming values 1–5;

vulnerability of the territory based on individual factors and vulnerability indicators. Overall vulnerability is derived from the sum of the physical, environmental, social and economic vulnerability factors. The vulnerability calculation is performed as a sum of these factors, where each factor is multiplied by the weight allocated to it based on the Delphi method results.

$$V_{z,j}(\tau)=(v_{fyz} \times V_{fyz,j}(\tau))+ (v_{env} \times V_{env,j}(\tau)) +(v_{soc} \times V_{soc,j}(\tau))+(v_{eko} \times V_{eko,j}(\tau)) \quad (1)$$

where:

$V_{z,j}$ – overall vulnerability of the territory for the *j*-th source of danger in time;

v_{fyz} – weight of the physical vulnerability of the territory;

$V_{fyz,j}(\tau)$ – factor of the physical vulnerability of the territory for the *j*-th source of danger in time;

v_{env} – weight of the environmental vulnerability of the territory;

$V_{env,j}(\tau)$ – factor of the environmental vulnerability of the territory for the *j*-th source of danger in time;

v_{soc} – weight of the social vulnerability of the territory;

$V_{soc,j}(\tau)$ – factor of the social vulnerability of the territory for the *j*-th source of danger in time;

v_{eko} – weight of the economic vulnerability of the territory;

$V_{eko,j}(\tau)$ – factor of the economic vulnerability of the territory for the *j*-th source of danger in time;

(τ) – time.

For the physical vulnerability factor, these indicators were set:

- vulnerability of the road network (V_{sil});
- vulnerability of the railway network ($V_{žel}$);

- vulnerability of the energy infrastructure (V_{ene});
- vulnerability of the water management infrastructure (V_{vod});
- vulnerability of the information and communication infrastructure (V_{iko});
- size of the affected territory (V_{zas});
- character of the built-up area (V_{zst});
- sufficiency of the Integrated Rescue System forces and resources, as well as coordination in dealing with an emergency situation (V_{nas});
- recovery of the territory by ensuring the basic functions of the territory (V_{obn}).

To assess the factor of the environmental vulnerability of the territory, these indicators were proposed:

- vegetation cover (V_{vkr});
- slope of the terrain (V_{skl});
- specially protected areas ($V_{zchú}$);
- water erosion (V_{ver});
- slope instability (V_{svn});
- saturation (V_{nsy});
- rate of stream flow (V_{vot});
- water level in boreholes and capacity of springs (V_{hld}).

To assess the factor of the social vulnerability of the territory, these indicators were proposed:

- number of people at risk (V_{pos});
- population density (V_{hob});
- number of injured people and victims of an emergency or crisis situation (V_{pob});
- prediction of occurrence of natural hazards (V_{pv}).

To assess the factor of the economic vulnerability of the territory, these indicators were proposed:

- unemployment rate (V_{nez});
- damage caused by natural hazards ($V_{ško}$).

In the third step, a risk assessment is carried out. On the basis of the discovered frequency and vulnerability, the risk for the *j*-th hazard source is calculated. The risk level *R* for the *j*-th hazard source is the product of the index value of probability P_j of activation of the *j*-th hazard source and the value of the overall vulnerability of the territory for the *j*-th hazard source $V_{z,j}$ in time (τ) expressed by this formula (2):

$$R_j(\tau) = P_j(\tau) \times V_{z,j}(\tau) \tag{2}$$

where:
$R_j(\tau)$ – risk level for the *j*-th hazard source;
$P_j(\tau)$ – frequency of action of the *j*-th hazard source;
$V_{z,j}(\tau)$ – overall vulnerability of the territory for the *j*-th hazard source in time;
(τ) – time.

The calculated risk level $R_j(\tau)$ is in the interval $\langle 0; 25\rangle$. Individual values of the risk level were characterised and they are indicated in Table 1. The division of the risk level and its characterisation was performed on the basis of brainstorming.

Table 1. *Characterisation of the risk level $R_j(\tau)$ in relation to the risk of the j-th hazard.* [Edited by the author.]

Risk level $R_j(\tau)$	**Characterisation of the risk**
$(0; 3.5\rangle$	Insignificant risk. There is no need to introduce countermeasures. The risk is monitored.
$(3.5; 10\rangle$	Acceptable risk. There is no need to introduce countermeasures. The countermeasures are introduced in case of low costs compared with the benefits. The risk must be monitored.
$(10; 19\rangle$	Unwanted risk. It is necessary to introduce countermeasures in order to reduce the risk to an acceptable level. The reduction costs should be proportional to the value of the protected assets. To evaluate the effectiveness of the proposed countermeasures, single-criterion and multi-criteria project evaluation methods are applied.
$(19; 25\rangle$	Unacceptable risk. It is necessary to introduce countermeasures immediately in order to reduce the risk to an acceptable level.

Based on the findings, it is necessary to decide on the scope and method of the implementation of preventive, mitigation and adaptation measures, sources of funding for the proposed countermeasures as well as the risk monitoring process.

The procedure allows to reassess the findings at regular intervals and perform their evaluation, which facilitates the interpretation, simplicity and complexity of the output. In the long-term and repeated assessment of the risk and vulnerability of the territory, they can be used for evaluation of the success of implemented measures in the territory, monitoring trends in achieving resilience and sustainable development of the territory.

Validation of the Vulnerability and Risk Assessment Proposal

In order to verify the suitability and applicability of the vulnerability and risk assessment procedure by selected natural hazards, municipalities of different types were approached according to their administrative structure.

In the first step, the territory of the municipality was characterised regarding general data and natural conditions as well as management of crisis situations and experience with crisis management in the territory. Subsequently, the frequency of the occurrence was determined for selected hazards and the vulnerability assessment of the territory was carried out using proposed indicators. Finally, the risk was calculated.

In the municipality, the risk assessment was performed for all the dangers for which an alert is issued through the Integrated Warning Service System of the Czech Hydrometeorological Institute. Characterisation of individual hazards and their frequency is seen in Table 2.

Table 2. *Hazard characterisation.*
[Edited by the author.]

Phenomenon	**Danger**	**Characterisation**	**Value $P_j(\tau)$**	**Impact**
Flooding	Extreme flood threat	Flood level 3, Q_{100}	3	moderate
Snow	Extreme snow cover	New snow > 30 cm/24hrs	3	moderate
Temperature	Extremely high temperatures	T_{max} > 37 °C	2	low
	Extreme frost	T_{min} < –24 °C	3	moderate
Rain	Heavy rainfall	precipitation > 60 mm.24hrs^{-1}	5	very high
Wind	Extremely strong wind	gusts > 40 m.s^{1} (140 km.h^{-1})	4	high
Freezing rain	Very thick glaze ice	precipitation > 7 mm of freezing rain	4	high
Storm	Extremely strong thunderstorm	precipitation ≥ 30 mm and gusts > 30 m.s^{-1} (110 km.h^{-1})	3	moderate
Fire	High fire hazard	fire hazard index = 5, forecast period ≥ 3 days, occurrence in forest vegetation	2	low

The vulnerability assessment of the territory was performed for individual hazards. Each indicator in individual vulnerability factors was assigned a value of 1–5 which was multiplied by the weight of the indicator. The assigned values of indicators as well as the overall results of the vulnerability assessment of the municipality are presented in Table 3.

Table 3. *The vulnerability assessment of the municipal territory.*
[Edited by the author.]

	Flooding	**Snow**	**Temperature – extreme frost**	**Temperature – extremely high**	**Rain**	**Wind**	**Freezing rain**	**Storm**	**Fire**
$V_{síl,j}$	4	4	1	1	3	4	3	2	3
$V_{žel,j}$	1	1	3	3	0	2	2	2	4
$V_{ene,j}$	2	3	4	4	1	3	3	3	3
$V_{vod,j}$	2	0	3	2	1	0	0	1	0
$V_{iko,j}$	1	1	2	1	0	1	2	1	0
$V_{zas,j}$	3	3	3	3	3	3	3	3	3
$V_{zst,j}$	2	2	2	2	2	2	2	2	1
$V_{nas,j}$	4	2	2	2	1	3	2	1	3
$V_{obn,j}$	3	2	3	3	1	2	2	1	1
$(v_{fyz} \times V_{fyz,j}(\tau))$	**2.3895**	**1.9589**	**2.6905**	**2.4005**	**1.244**	**2.13**	**2.0719**	**1.7913**	**1.854**
V_{vkr}	2	2	2	2	2	2	2	2	2
V_{skl}	1	1	1	1	1	1	1	1	1
$V_{zchú}$	2	2	2	2	2	2	2	2	2
V_{ver}	2	2	2	2	2	2	2	2	2
V_{svn}	2	2	2	2	2	2	2	2	2
V_{nsy}	2	2	2	2	2	2	0	2	2

	Flooding	**Snow**	**Temperature – extreme frost**	**Temperature – extremely high**	**Rain**	**Wind**	**Freezing rain**	**Storm**	**Fire**
V_{vot}	2	2	2	2	2	0	0	2	2
V_{hld}	5	4	4	5	5	0	0	5	5
$(v_{env} \times V_{env}(\tau))$	**2.2656**	**2.1393**	**2.1393**	**2.2656**	**2.2656**	**1.2643**	**1.0531**	**2.2656**	**2.2656**
$V_{poo,j}$	3	2	2	2	1	2	3	2	1
V_{hob}	2	2	2	2	2	2	2	2	1
$V_{pob,j}$	1	1	2	2	0	2	1	2	0
$V_{pv,j}$	2	2	2	2	2	2	3	2	1
$(v_{soc} \times V_{soc,j}(\tau))$	**2.0613**	**1.7469**	**2**	**2**	**1.1793**	**2**	**2.2481**	**2**	**0.7469**
V_{nez}	1	1	1	1	1	1	1	1	1
$V_{sko,j}$	4	1	1	1	3	2	1	1	1
$(v_{eko} \times V_{eko,j}(\tau))$	**2.8375**	**1**	**1**	**1**	**2.225**	**1.6125**	**1**	**1**	**1**
$V_{z,j}(\tau)$	**2.3542**	**1.7482**	**1.9972**	**1.9609**	**1.6984**	**1.7563**	**1.6317**	**1.8144**	**1.4683**

In the municipality, the highest coefficients were assigned to the road network and energy infrastructure indicators for all hazards. The highest factor of the physical vulnerability was calculated for the hazard of extreme frost, extremely high temperatures and extreme flood threat. When assessing the factor of the environmental vulnerability of the territory, the highest coefficients were obtained by the indicator of water level in boreholes and capacity of springs which reflects the deepening hydrological drought. Extreme flood hazard, extremely high temperatures, heavy rainfall, extremely strong storms and high fire hazard have the same level of the factor of the environmental vulnerability. The highest factor of the social vulnerability of the territory was calculated for the very thick ice glaze, extreme flood threat and extreme snow cover. Extreme flood threat, heavy rainfall and extremely strong wind received the highest coefficient of damage caused by natural hazards. The placings remained unaltered for the factor of the economical vulnerability of the territory. The highest value of the vulnerability was found in extreme flood threat, extreme frost, extremely high temperatures and extremely strong storms. The lowest value of vulnerability was determined for the high fire hazard.

In the third step, the risk was calculated according to the proposed formula (2). The risks of disasters following the resilience of the assessed territory of the municipality 1 are presented in Table 4.

Table 4. *Risk assessment of the territory in the municipality.*
[Edited by the author.]

Hazard	$R_j(\tau)$	**Risk characteristics**
Flooding – extreme flood threat	7.06	Acceptable risk
Snow – extreme snow cover	5.24	Acceptable risk
Temperatures – extreme frost	3.99	Acceptable risk
Temperatures – extremely high	5.88	Acceptable risk

Hazard	$R_j(\tau)$	Risk characteristics
Rain – heavy rainfall	8.49	Acceptable risk
Wind – extremely strong wind	7.02	Acceptable risk
Freezing rain – very thick glaze ice	6.52	Acceptable risk
Storm – extremely strong storm	5.44	Acceptable risk
Fire – high fire hazard	2.94	Insignificant risk

In the municipality, no danger was assessed as unwanted or unacceptable. The hazards of heavy rainfall, extreme flood threat and extremely strong wind are among the considerable risks. It is unnecessary for the local authorities to introduce countermeasures. However, it would be appropriate to implement environmental and technical measures to mitigate their impact. In cooperation with watercourse managers, the bottom of the watercourses must be cleaned and it is necessary to remove mud from ponds. Since the geological subsoil causes rapid outflow of water from the countryside, it is suitable to build drainage equipment on paved areas and equipment to reduce the outflow. It is important to complete the warning system in the municipality and provide the inhabitants with information regarding crisis management, population protection and behaviour in case of an emergency or crisis situation because the website of the municipality lacks such information. Besides implementing the alert system, the municipality, as the elementary school authority, must educate children and other groups of the population through local newspapers or web pages. Also, cross-border cooperation must be strengthened in case of flooding. It is necessary to improve the emergency staff facilities and acquire backup power sources.

Conclusion

Local authorities must implement disaster risk management as a necessary tool to ensure the safety of the territory. Determination of the vulnerability serves not only as a support of risk management and assessment of the ability of the territory to be resistant to natural hazards but it will promote the sustainable development and implementation of local disaster risk reduction strategies in compliance with the Sendai Framework. [5]

Achieving resilience at the local level requires communication with owners and users of individual plots of land in the municipality. The role of stakeholders in achieving resilience must differentiate the local level depending on their status and availability of resources. Achieving resilience is impossible unless all the stakeholders become aware of their responsibility for preventing emergency and crisis situations, preparedness, response and recovery.

The suggested vulnerability and risk assessment process has verified its applicability. It was the first experience with risk assessment for the municipality. The risk assessment also verified the fulfilment of the crisis legislation requirements at the municipal level as well as the actual approach to the crisis management in the municipality. Although there were no unacceptable risks, the municipality can use the results for updating the emergency documentation, improving preparedness, informing the population and creating mitigation and adaptation measures. In case of regular reassessment of individual risks, the proposed process contributes to increasing resilience and reducing the vulnerability of the territory.

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Is Turkey Still a Reliable Ally? The Case of the Black Sea[1]

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The study examines Turkish foreign policy in the Black Sea region after the Russian annexation of Crimea. It focuses on two main issues: Turkey's policies within NATO and its balancing actions vis-à-vis Russia. The paper concludes that in spite of the sporadic Western criticism Ankara is still committed to NATO. Nonetheless, Turkey has taken only limited balancing actions to counter the Russian threat. Ankara evaluates and prioritizes threats often very differently from its Western partners, and considers certain balancing steps ineffective or too costly at a specific moment.

Keywords: *Turkey, Black Sea, NATO, Russia*

Introduction

In the past few years, Turkey has often been accused of being an unreliable ally and siding with Russia rather than its Western partners. The increasingly authoritarian Turkish domestic politics, the bilateral disputes within NATO, the disagreements on the Syrian war and Ankara's plan to procure Russian-made S–400 surface-to-air missile systems have strengthened the perception that Turkey's turning away from the West.

In this paper, the Black Sea was selected as a case study to see if this argument holds any merit. After drawing up the theoretical framework and explaining the reasons of the selection of the case study, we will examine the Turkish reactions to the Russian annexation of Crimea. The study attempts to answer two questions: 1. Is Turkey still a reliable ally considering its policies in the Black Sea region? 2. What are the reasons of Turkey's limited balancing actions against Russia in the Black Sea region?

Theoretical Framework: Balancing

As per Kai He, the concept of balancing is operationalized here as "state strategies that a state employs to change its relative power vs. its rival's to its advantage for pursuing security under anarchy". [1: 161] Balancing can take four different forms: it can be either positive balancing (by increasing a state's own power versus its rival) or negative balancing

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(by undermining the rival's relative power versus itself); and either military balancing or non-military balancing. [1]

Stephen Walt argues that states tend to balance against the most threatening country. Walt identifies four factors that will affect the level of threat that states may pose: aggregate power, proximity, offensive capability and offensive intentions. [2: 9]

Given the increased Russian offensive capabilities, Moscow's demonstrated offensive intentions, the two countries' geographical proximity and their shared history (they fought not less than twelve wars against one another), one would expect Turkey to take serious measures to counter Russia. Nonetheless, Turkey's threat perceptions regarding Russia seem to be aligned more closely with Hungary and Bulgaria among the Eastern Flank countries than with the threat perceptions of Poland, Romania and the Baltic states. The yearly survey of the Kadir Has University of the Turkish security perceptions reinforces this argument: in 2018 Turks saw Russia only the seventh most threatening country to Turkey (after the U.S., Israel, the EU countries, Syria, Armenia and Greece). However, this perception is volatile. In 2016, during the jet crisis, Russia suddenly became the second most threatening country to Turkey in the eyes of the Turkish people. [3]

The only time when Ankara had asked for additional troop deployment, was the period when the Turkish–Russian relations were strained (November 2015–June 2016) due to the downing of the Russian Su–24 aircraft. Turkish President Recep Tayyip Erdogan reportedly told NATO Secretary General Jens Stoltenberg before the July 2016 Warsaw Summit that: "The Black Sea has almost become a Russian lake. If we don't take action, history will not forgive us." [4] This request has however not been repeated after the normalization of ties with Moscow.

The Importance of the Black Sea

The Black Sea region is usually not in the centre of debates when it comes to countering Russia. It is usually the Baltics, although, the aggressive Russian intentions have manifested so far almost exclusively around the Black Sea. The first one happened in 2008 with the war in Georgia then with the illegal annexation of Crimea in 2014. The so called "frozen conflicts" of Moldova and Nagorno–Karabakh are also located in this area.

Nevertheless, the Black Sea plays an important role for several international actors. The region is part of Moscow's traditional "near abroad", where Russia perceives any enhanced Western presence as a direct threat to its state's survival. For Moscow, the Black Sea is a crucial buffer zone against the West. This is one of the main reasons why even the theoretical accession of Georgia and Ukraine to NATO is under no circumstances acceptable for Moscow. Furthermore, the Black Sea is an important window for accessing the warm waters of the Mediterranean and projecting power into the surrounding regions.

NATO's eastern and southern flank intersect at the Black Sea. The Alliance has three littoral members (Romania, Bulgaria and Turkey), whose defence it is responsible for, and two partner countries (Ukraine, Georgia) around the Black Sea.

For Turkey, the region has a historical significance. Between 1475 and 1774 the Black Sea was regarded as an inner Ottoman lake. Today Turkey is still one of the most dominant

Black Sea powers. Additionally, the 1936 Montreux Convention[3] makes Turkey the gatekeeper of the Black Sea, thus provides a special status and responsibility for Ankara. The Black Sea (and Georgia) are important buffer zones for Turkey vis-à-vis the historic rival Russia. Besides, there are several Turkic-origin people (Crimean Tatars, Meskhetian Turks, Gagauz) living around the Black Sea, whose protection is also a priority for Ankara. The Turkish Naval Forces (TNF) Command adopted a new Naval Forces Strategy [5] in 2015, which was published for the first time ever. This decision implies both the growing importance of the maritime domain in general for Turkey, and the large extent of the perceived change in the country's maritime security environment.

From an economic point of view, the Black Sea is a key transit corridor for energy resources, which makes it more significant for every actor. The stability around the Black Sea is necessary to ensure the security of the sea lines of communications (SLOCs) between the several regions it intersects: the Balkans, Eastern Europe, the Caucasus and the Middle East.

The Changing Security Environment around the Black Sea

After the Cold War a peaceful environment and various forms of regional cooperation (Black Sea Economic Cooperation since 1992, BLACKSEAFOR since 2001, Black Sea Harmony since 2004) dominated the region, however the wars in Georgia, Ukraine and Syria have remilitarized the Black Sea. Besides the different interests of the coastline countries, the conflicts gained a bipolar frame. The West and Russia are facing each other again, in terms of both their different integration schemes they have offered to the states in the region and their physical force presence.

After the annexation of Crimea, the military balance has dramatically changed in favour of Russia and created a new security environment. Now, Russia's Black Sea coastline (1171 km) is almost as long as Turkey's (1329 km). Although the modernization plan of Russia's Black Sea Fleet outlined in the 2011–2020 State Armament Program has not been fulfilled as originally thought (Moscow plans to deploy 30 new warships in addition to the existing 47 by 2020), it has achieved remarkable results. Russia has introduced new ships (including three Admiral Grigorovich class frigates), submarines (including six new Project 636.3 diesel submarines) and aircraft (including 12 new Su–30SM). Since 2014, Crimea has also been completely militarized: among others, four battalions of S–400 air defence system, Bastion and Bal missiles and Nebo–M radars have been deployed on the peninsula. Moscow has established an anti-access/area-denial (A2/AD) zone covering almost the whole Black Sea, particularly when it comes to air defence. [6]

[3] The Montreux Convention regulates international naval access to the Black Sea. The treaty gives Turkey sovereign rights over the Bosporus and Dardanelles straits (Turkish Straits) in wartime.

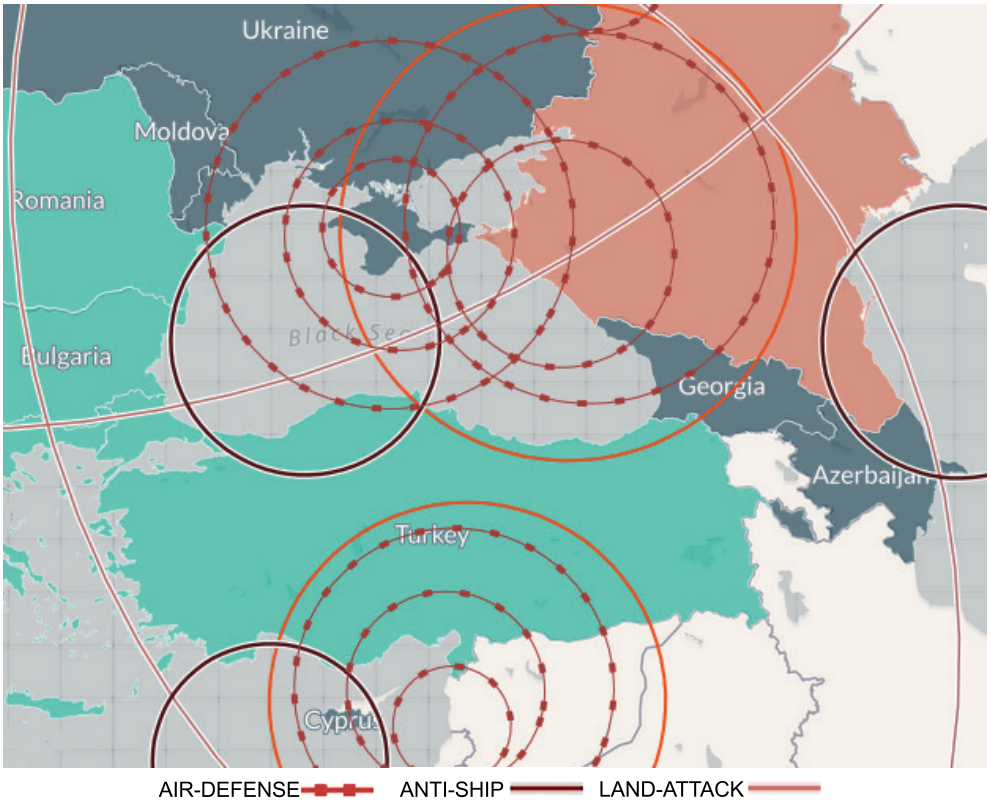

Figure 1. *Russia's anti-access area denial (A2/AD) capabilities in November 2018: Air Defence: S–300 and S–400 systems; Naval strike: SS–N–27 Sizzler anti-ship missiles, SS–N–30 (Kalibr) LACM; Land-based strike: Iskander–M SRBM.* [7]

Russia is militarily active around the Black Sea as well. An additional S–300 missile system was deployed in Abkhazia in 2017. Russia delivered Iskander–E systems to Armenia in 2016 and S–300 systems to the Syrian regime in 2018. Additionally, Moscow secured its military presence in Syria. In 2017 Russia extended the lease of its naval base in Tartus and its Khmeimim Air Base by a further 49 years. Among others, S–400 systems, Pantsir–S1 and Pantsir–S2 systems, and Iskander–M systems have been deployed to the country. The majority of Russian armaments and ammunition used in Syria has been delivered from the Russian Black Sea port in Novorossiysk to Tartus through the Turkish Straits (this route is often referred to as the Syrian Express).

As a result, Turkey is practically encircled by Russia. The changes in the region and the altered power balance are not in Turkey's favour. In spite of this, Ankara has given only a muted response to the Russian expansion. What is more, in April 2017 the Turkish Navy conducted a bilateral exercise with the Russian Navy. [8]

How Have NATO And Turkey Responded to the Russian Annexation of Crimea?

Regarding their political rhetoric both NATO and Turkey condemned the Russian aggression in Ukraine. NATO considers the annexation of Crimea "illegal and illegitimate", which the member states "do not and will not recognize". [9] [10] [11] The Alliance condemned "Russia's ongoing and wide-ranging military build-up in Crimea" and is "concerned by Russia's efforts and stated plans for further military build-up in the Black Sea region". [10] Without Turkey's consent, these declarations could not have been accepted. Turkish politicians have rhetorically made their view on the war in Ukraine clear several times in line with NATO's official position. Erdogan, for example stated in November 2018 at a joint press conference with his Ukrainian counterpart Petro Poroshenko, that "we strongly reiterated the stance with regard to the preservation of Ukraine's sovereignty, territorial integrity and political unity. We once again stressed that we do not, and will not, recognize the illegal annexation of Crimea." [12]

On the other hand, Turkey is the only NATO member that has not joined Western sanctions against Russia. Among the EU candidates, besides Turkey, Serbia and Macedonia are the only ones who have rejected to join the sanctions. [13] Ankara did not expel any Russian diplomat either, in retaliation for the poisoning of former intelligence operative Sergei Skripal. Although, even the EU was not unified in this latter case: only 19 EU member states did. [14]

After the Wales Summit, NATO focused mainly on the northern part of the eastern flank, but after the 2016 Summit in Warsaw, the Alliance has also stepped up its activity in the Black Sea and agreed to develop a tailored forward presence there. The tailored forward presence encompasses air, land, and maritime components. [15] The core of the land presence is the multinational brigade deployed in Romania. Allies have contributed to the protection of the airspace of Romania and Bulgaria. Standing NATO maritime forces are present with more ships and more naval exercises in the region. Besides, the cooperation with Georgia and Ukraine has also intensified after 2014.

Ankara did not veto any of the proposed measures. Turkey has continued participating in multinational military exercises even after the Russian annexation of Crimea, including the Romanian-led yearly Sea Shield and the U.S. and Ukrainian co-hosted yearly Sea Breeze naval exercises. Turkey also maintained its participation in NATO's Standing Maritime Group (SNMG2).

However, there are certain limitations for NATO in enhancing its military presence. The 1936 Montreux Convention limits the presence of non-littoral powers in the Black Sea. The treaty establishes tonnage restrictions (15,000 tons) on vessels of war that seek passage through the Turkish Straits. The 2008 war in Georgia has already demonstrated what this restriction can imply in practice. During the war, Turkey barred two U.S. hospital vessels from crossing through the Bosporus in line with the treaty's tonnage limit. Furthermore, according to the Convention: "Vessels of war belonging to non-Black Sea Powers shall not remain in the Black Sea more than twenty-one days, whatever be the object of their presence there". [16] This is why non-littoral NATO states are forced to maintain rotational rather than permanent presence.

Consequently, the littoral NATO members' maritime development is needed for a more significant permanent presence. The idea of reflagging non-littoral NATO ships may also arise but given the historical experiences, it will be very difficult to convince Turkey about it. [17] The Ottoman Empire was dragged into the first World War thanks to two reflagged German ships (Goeben and Breslau, renamed to Yavuz Sultan Selim and Midilli), which, having escaped the British and entered the Straits, attacked Russian ports ordered by their German commander. [18: 348–349] One must also take into account that Russia would surely react very sensitively to any reflagging.

Among the littoral NATO members, Romania is the one who has been pushing for a bigger NATO, and if that is not possible then American military presence actively, while Bulgaria and Turkey are very lukewarm about it. In 2016, Bucharest proposed a permanent NATO Black Sea Fleet. Bulgaria did not support the idea and declared it would not join. Thus, the proposal was taken off the agenda. The Turkish position on the initiative has never been clearly articulated. [19]

In parallel with developments in NATO, Turkey has been modernizing its naval forces. In July 2017, Turkey inaugurated the corvette Kınalıada, equipped to fight submarines. In the same year, Turkey received two Bayraktar class Landing Ship Tanks (LSTs) and started the construction of a new class (Istanbul class) of frigates. [20] In December 2018, the Turkish Ministry of National Defence announced the construction of a new naval base on the Black Sea coast in Trabzon province. The Turkish Navy currently has a total of eight bases in the four seas, this will be the ninth one. [21]

However, this modernization project shows a continuity rather being an adaptation of Ankara's maritime strategy as a response to the annexation of Crimea. [22] The Turkish Undersecretariat for Defence Industries (SSM) published its Defence Industry Sectoral Strategy Document in 2009 for the period of 2009−2016. The document envisaged ambitious development plans for the maritime sector, focusing mostly on indigenous production. [23] The next sectoral strategy (2018−2022) only continued this line. [44]

Considering our first research question, we cannot state that Turkey has done significantly less than other NATO member countries. Ankara has not raised unilateral vetoes, and contributed to the common actions. The improvement of NATO capabilities in general is in Turkey's interest. For Ankara, it is even better, if it is directed against no one specifically. The new Turkish Naval Forces Strategy refers to NATO several times, and highlights the importance of „participation in and contribution to NATO-initiated miscellaneous activities concerning security related issues". [5: 11]

Examining Turkey's Balancing Choices

As for balancing, Turkey has taken positive military and non-military balancing actions. Besides investing in its military, Turkey has intensified cooperation with Ukraine [24] and Moldova, [25] and the Azerbaijan–Georgia–Turkey trilateral formation has remained active as well. [26] On the other hand, limited, if any, negative balancing measures can be observed by Turkey. Ankara's balancing actions through the West (positive external military balancing) have remained limited as well. On the rhetorical/normative side, Turkey sided with NATO and condemned certain Russian actions. Yet, Ankara has not joined

Western sanctions and does not ask for additional NATO presence, even if the Russian military build-up is alarming. Furthermore, Ankara has also continued its cooperation with Moscow in other areas, for example in the settlement process in Syria and the procurement of the S–400 system. This way we cannot talk about strategic non-cooperation as a negative balancing tool, either.

In this section we will examine Ankara's balancing choices. We are taking a Western perspective, and looking for answers for two questions: why Turkey 1.) does not balance negatively, namely that it does not join the sanctions and does not challenge Russia in the Black Sea; and 2.) does not balance externally against Russia through the West, that it does not ask for additional NATO deployment, and is lukewarm about the enhanced Western presence.

In choosing different balancing strategies, threat perception is the most decisive factor. Additionally, states consider at least two issues: the effectiveness and the cost of balancing. [1] In line with this, we divide the possible arguments into three groups.

Issues of Threat Perceptions

Different Threat Prioritization

Ankara simply prioritizes threats differently than the West. The threat posed by Kurdish separatism and a West versus Russia collision is more imminent and threatening for Ankara right now than the Russian expansion. Syria is the main focus of the Turkish leaders, which also means that they concentrate all of their resources in that direction instead of the Black Sea. If Ankara wants to achieve results and secure its interests in Syria, it has no chance but to accommodate either Washington or Moscow. And since the normalization of bilateral ties in 2016, Russia seems to be more open to take into consideration the Turkish concerns, than the country's traditional Western allies—even if Ankara understands that it can be abandoned by Moscow any time.[4]

This point does not necessarily imply that Turkey does not fear Russia at all. To put it differently, based on the model of Steven R. David called omnibalancing, [27] it can be argued that Turkey is collaborating with "the second most important" threat in order to fight more effectively the perceived "number one" threat, namely the Kurds. The fight against Kurdish "terrorism" is important from a political perspective as well. Nationalist sentiments have been helping the Turkish governing elite to stay in power.

Sticking to the (Mis)Perceived Status Quo and the Montreux Convention

With the Russian military build-up following the annexation of Crimea, Turkey lost its clear lead as the largest military power in the region. According to many, Ankara is sticking to a status quo that no longer exists, thus the Turkish argument of maintaining the power

[4] The analysis of the war in Syria is beyond the scope of this case study. Nonetheless, the importance of the Syrian conflict in the context of the Turkish–Russian–American relations cannot be exaggerated. For a more detailed overview, see e.g. [30].

balance is based on a "reality-denying position". [28] On the other hand, as a study of the Stockholm International Peace Research Institute points out, "the Turkish Navy as a whole (which is in or near the Black Sea) remains larger than the Russian Black Sea Fleet". [29]

The Montreux Convention is another reason why Turkey is sticking to the status quo. The Turkish maritime strategy also underlines that "Turkey has given utmost importance to the preservation of the Montreux Regime". [5: 10] Ankara is against any amendment of the treaty which grants Turkey sovereignty over the Straits. The abolition of the Convention could be perceived as a bigger threat to Turkey than the current Russian deployment.

Regional Ownership Approach

The regional ownership approach is considered the traditional Turkish position in the region. In the words of the former foreign minister and prime minister Ahmet Davutoglu, this approach suggests finding "regional solutions to the regional problems, rather than waiting for other actors from outside the region to impose their own solutions". [31] This principle can be observed in the Turkish behaviour after the Cold War. This motivated the creation of regional organizations and initiatives, such as BLACKSEAFOR and Black Sea Harmony, which was supposed to send the message that there is no need for the destabilizing presence of the United States in the region. The Turkish Naval Forces Strategy also refers to the principle of regional ownership: "Turkey continues to show sensitivity to the maintenance of the 'sense of regional ownership' and the regional security initiatives established in this context." [5: 10]

Framing the Ongoing Conflict as a Conflict Between Russia and the West

Gülnur Aybet, a senior adviser to Erdogan said about the conflict in Ukraine that "Turkey knows this is something between Russia and the West […] and it will keep quiet and let them work it out". [32] Turkey tries to stay impartial and does not want to take a side in a conflict that is seen as a conflict between Russia and the West. Erdogan has made it clear already at the time of the Georgian war. In September 2008 he stated: "It would not be right for Turkey to be pushed toward any side. Certain circles want to push Turkey into a corner either with the United States or Russia after the Georgian incident. One of the sides is our closest ally, the United States. The other side is Russia, with which we have an important trade volume. We would act in line with what Turkey's national interests require." [33] Turkey fears the possible escalation of conflict in the Black Sea region. The presence of more NATO troops in the region would threaten with even the unintended escalation of tensions, which is something Turkey intends to avoid. In such a scenario Ankara would be forced to clearly take a side, and could not maintain its current balancing stance.

Assessment of NATO Guarantees

Opinions differ on the assessment of NATO guarantees. Paradoxically, Turkey's unwillingness to bolster its military presence could be a sign of trust in NATO guarantees.

Turkey is not afraid of a Russian military attack because of the ensured collective defence. The contrary is also possible. Ankara perceives a lack of credibility from its allies and doubts the Western commitment to the region. As Dimitar Bechev puts it: "In a worst-case scenario, Ankara would be left to fend alone against resurgent Russia. Therefore, it chose to bandwagon with Moscow." [33]

Issues of Effectiveness

Avoiding the Security Dilemma

As John Herz puts it, the security dilemma is: "A structural notion in which the self-help attempts of states to look after their security needs tend, regardless of intention, to lead to rising insecurity for others as each interprets its own measures as defensive and measures of others as potentially threatening." [34] Turkey does not see external balancing measures effective in the de-escalation of the conflict. As Mustafa Aydın, "the doyen of Black Sea studies in Turkey" [20] explains: "Turkey opposed moves to counter Russia openly in the region, mainly fearing that a cornered Russia might destabilize the region and create further security challenges." [35] This view is in line with those opinions which see the Russian aggression as a response to the enlargement of NATO and the aggressive intentions of the West perceived by Moscow. [36]

Protecting the Turkic Minorities

It is often stated that Ankara should be more confrontative with Russia for the sake of the Turkic minorities, especially (but not exclusively) for the Crimean Tatars.[5] From another perspective, however, Ankara needs to maintain good relations with Moscow precisely in order to engage the Russian leadership on the status and rights of the Turkic minorities. [37] A less visible Turkish support may be favourable for the Tatars, thus this way they will not be treated with suspicion by the locals and so avoid being regarded as a potential "fifth column". [43]

Issues of Costs

Buck-Passing

Buck-passing is a situation where states avoid balancing by "counting on third parties to bear the costs of stopping" the aggressor. [38: 138] This behaviour stems from the collective action problem. In case of the security of the Black Sea, Romania is slowly becoming

[5] Tatars are not the only Turkic minority around the Sea. There are for example the Gagauz in Moldova and the Ahiska/Meskhetian Turks in Ukraine and Georgia. Because of the war in Ukraine about 3,000 Meskhetian Turks was settled in Turkey from Ukraine part of an official program. [41]

the most important ally for the United States against Russia, which goes "with periodic threats of annihilation for hosting American ballistic missile defence, exercises simulating Romania's invasion, and repeated violations of air space". [39] Turkey benefits from the additional American deployment but takes no such direct negative consequences.

Buck-passing also gives an answer to the question why Turkey has not joined the Western sanctions: it provides Ankara economic benefits. In spite of the clear rhetoric on supporting the territorial integrity of Georgia and Ukraine, and despite the Western sanctions, Turkish ships have been trading with Abkhazia and Crimea. Turkey has been attempting to build close relationship with every actor in the region, including Russia and Ukraine simultaneously, and this way minimize the costs of the war. From a definitional point of view, it could even be questioned, whether sanctions can be considered as real balancing actions, because the introduction of sanctions would probably result in not an increase but a decrease in Turkey's relative power versus Russia: considering the effects of the expected Russian counter-sanctions, the Turkish economy would likely suffer more strikingly.[6]

Energy Dependency

In 2008, Turkey emphasized its energy dependence on Russia. It was the main argument of its unwillingness in taking a harsh stance against Moscow. Today the situation is different. Turkey is facing a new energy environment. In the words of Chris Miller, "the era of the West and Russia clashing over pipeline projects is being supplanted by a new, more flexible energy regime. Russia's energy leverage is declining. […] Turkey was in the past dependent on Russian gas, but it is increasingly Gazprom that will depend on Turkish transit." [40] Turkey hopes to become an energy hub. It may decrease the extent of asymmetry and its dependence on Russia. It is also worth noting that the Russian "energy weapon" has its own limits. After the downing of the Russian fighter jet by a Turkish pilot is 2015, Moscow introduced several serious sanctions against Ankara, but the issue of stopping the gas transit to Turkey did not even emerge as an option. These are the reasons why we do not consider energy dependency the decisive factor here.

Conclusion

In spite of the several disputes between Turkey and other NATO members it cannot be stated that Turkey is turning away from the West in strategic terms. Ankara has contributed to NATO actions after 2014 which helped preserve its credibility within the Alliance.
Yet, Turkey has given only limited balancing responses to the increased Russian threat in the Black Sea region, though the Russian activity is contrary to its interests. Turkey has taken positive military and non-military balancing actions but limited, if any, negative

[6] After the shooting down of the Russian Su–24 aircraft by Turkey, Moscow introduced harsh sanctions in response. Turkish–Russian bilateral trade contracted by a third from USD 23.9 billion in 2015 to USD 16.8 billion in 2016. Turkey lost over 1% of GDP. [42]

balancing measures can be identified. Ankara is traditionally very cautious of balancing against Moscow openly through the West and prefers regional options instead.

There are several reasons of choosing this balancing mix. First, Turkey's threat perceptions differ from other NATO countries' to a large extent. It is important to understand these perceptions since a more effective cooperation within the Alliance is achievable only this way. The threat posed by Kurdish separatism, the possible amendment of the Montreux Convention, or a direct military clash between the West and Russia, in the case of which it would be forced to clearly take a side, seem to be more serious threats for Ankara at the moment. Secondly, the Turkish government sees certain balancing actions ineffective, sometimes even counterproductive. Accordingly, they could lead to an arms race, a new act of 'defensive aggression' from Moscow, increased risks of military accidents between the two sides and as a result they would destabilize the region even further. Thirdly, Ankara finds balancing disproportionately costly, and seeks economic advantages while avoiding sanctions.

In the short run Turkey will likely continue its current strategy. In case of a direct bilateral conflict with Russia, however, we can expect Turkey's turning more closely toward its Western allies, as it happened after the Su–24 incident. This forecast is also supported by the above cited survey of the Kadir Has University: the jet crisis suddenly made Russia the second most threatening country to Turkey—though only temporarily. [3] Time will tell how it will work out in the long run. According to realist theories, Turkey as a rational actor must balance against Russia's growing military posture in the Black Sea, if it does not want to put its state's survival at risk.

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Sentiment Analysis of Customers[1]

Gábor SZŰCS[2]

There is an economic and political need to learn and know more and more information about customers, and the social media has recently become the most powerful tool for interaction with people. Customers became users in the social media, who express their opinion and share it with not only companies but also other users. Since a huge amount of reviews, opinions and comments appeared, there is a necessity to extract, aggregate, and analyse them; these are the aims of sentiment analysis. In this paper the technological details of sentiment analysis are presented. The problem types and their solution with text mining are described. Text mining is based on data mining, but steps of text preprocessing with tokenisation, stemming, filtering is an additional important phase before the data mining procedure. The correctness of sentiment analysis solutions can be measured by different validation methods. At the end of the paper the final conclusion is presented.

Keywords: *sentiment analysis, text preprocessing, social media, text mining*

Introduction

There is an economic and political (or governmental) need to learn and know more and more information about customers (citizens), but in most of the cases, the available information is unstructured, such as text. The governance and economy-developed enterprises were obliged to store terabytes of data, and to handle lots of text documents, so the information sources are available. Companies have to maintain either a lot of employees tasked by maintaining this document mass, or a complex system providing assistance to the workers; not only the maintenance requires lots of resources, but also their analysis. State organisations and enterprises may be interested in reviews, opinions of customers; that is why the concept of sentiment analysis (also called opinion mining, review mining or attitude analysis) [1] as an important type in text document analysis and in social media analysis [2] was born.

Social media has recently become the most powerful tool for businesses to advertise, to communicate towards customers and the most important is to interact with their customers. With the appearance of web 2.0 one-sided communication became two-sided; and customers became users who have the social media tools to express their opinion and

[1] The work was created in commission of the National University of Public Service under the priority project PACSDOP-2.1.2-CCHOP-15-2016-00001 entitled “Public Service Development Establishing Good Governance” in the Workshop for Science of Public Governance 2017/162 BME-VIK “Smart City – Smart Government”.

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to share it with not only companies but also other users. Since huge amount of reviews, opinions, comments and clicks appeared, there is a need to aggregate them to statistics and to analyse them. This enormous volume of data can be a source of a lot of useful information if managed well, which could lead to advantage against competitors or higher profit at the companies and this can give also a large advantage for state organisations, as well; so the automatic analysis of this user-generated feedback can have a large impact.

In this paper, we try to present the importance of written feedbacks and their emotional impression, which has influence on the decision of other customers and citizens, let it be positive, negative or even neutral. It can be stated that the research is highly intense in this area, so the methods and the developed algorithms or even the mode they are used within business decisions are getting more precise and accurate every day. Based on this, decision-makers realise the importance and power of this topic, thus it gets a higher attention.

After introducing this topic, there is an overview into the details of text mining (types of text analytics) and sentiment analysis (sources and steps of sentiment analysis); after that the different opinion types, possible solutions are presented. Cross-industry standard process for data mining (CRISP-DM) procedure as a possible way is described in details, and there is text specific preprocessing before this procedure. Finally modelling, validation and evaluation are presented before the conclusion of this paper.

Types of Text Analytics

During the past years, the need of easy and flexible access to the constantly increasing amount of text documents in digital form is growing rapidly each day. Due to this demand, the content-based document management [3] tasks have gained an outstanding position in the information systems field. One of such tasks is text classification (as a subset of text mining), as the process of labelling natural language texts with thematic categories from a predefined set.

Text mining [4] refers to the process of identifying, deriving and analysing high-quality information from text. Data mining deals with data stored in databases in a structured form; contrary texts definitely are not structured. So for processing text documents, the files automatically need to be transferred into databases, and this has a transaction cost. Because of unstructured data, the source of the problem is that natural languages are for human communication and not for computer processing. Text mining aims at the combination of the human linguistic knowledge with the large processing capacity of computers. The goal of text mining is to gain useful information from unstructured data, to extract meaningful numeric metrics from the text, and to modify the information accessible to data mining algorithms.

The main purposes of text classification are: *spam detection (spam filtering),* [5] where a spam filter program is used to detect unsolicited and unwanted email and prevent those messages from getting to a user's inbox; *plagiarism detection,* [6] where the aim is to locate instances of plagiarism within a work or document (typically essays or reports, but, plagiarism can be found in any field, including novels, scientific papers, art designs and source code); *language identification* [7] (or language detection) as the problem of determining which natural language the given content is in; classification of news sets

(or advertisements); *age/gender identification;* [8] and *sentiment analysis*. [9] Sentiment analysis is the task of detecting, extracting and classifying opinions, sentiments and attitudes concerning different topics, as expressed in a textual input. [10]

Sentiment analysis [11] is also a field of study, which attempts to analyse people's opinions, attitudes, sentiments, and emotions on entities such as products, services and organisations. These organisations can be an enterprise, or state organisation, such as a council or public administration. The holders of opinions are clients (in the first case), or citizens (in the latter case), we can say—in a common word—they are customers. Sentiment analysis is an application of text analytics (text mining as one of the hot topics of data mining). Text analytics contains information extraction from unstructured data and the process of structuring the input text to derive patterns and evaluating or interpreting the output data. In text analytics, there is a process to convert unstructured text data into meaningful data analysis to measure customer opinions, product reviews, feedback, to provide search facility and sentimental analysis to support fact based decision-making. Besides sentiment analysis, text mining also involves categorisation, clustering, pattern recognition, information extraction, link analysis, visualisation, predictive analytics and relation modelling.

Sources and Steps of Sentiment Analysis

Sentiment analysis is one of the text analysis types, where data is contained in a natural language text. This gives possibility for an organisation to derive potentially valuable business insights from text-based content such as emails and posts on social media streams like Facebook, Twitter and LinkedIn, and this can be applied in business decisions and strategy. Sentiment analysis helps to monitor attitudes and feelings across the Internet on various topics by building a system that collects and examines product or service reviews in blog posts, comments, reviews, or tweets. To collect these text type data, there is a need to use an application that automatically processes the contents of web pages by visiting a web site and begins to "crawl" the links that are found in the investigated pages. This way, the list of terms and documents available on the site can be derived automatically and can quickly determine the most important terms and features that pages and linked pages describe. So we can track products, brands and people, and determine their positive or negative opinions.

The typical output of the sentiment analysis task is a pair, i.e. the extracted opinion consists of two parts: a product (or target) "g", and a sentiment "s" on the target, where at the binary case the polarity of the sentiment can be positive (like good, great, fast, nice, and so on), or negative (bad, ugly, worse, etc.). Let us present an example: "I got the iPhone as a present for Christmas, and I like it very much." The extracted result of this sentence: (g = iPhone, s = positive).

An opinion can be described not only by a pair, but also by a more complex structure, for example by a quintuple (e; a; s; h; t), where "e" is entity, "a" is aspect, "s" is sentiment, "h" is holder, and "t" is time. The next paragraph presents an example review.

"I purchased the Kindle Fire hd7 for my wife's birthday, and she likes it. It was processed and shipped quickly by amazon. I think though the price of the hd7 is a bit high. Because the resolution of the camera is low." December 11, 2017, Joe.

In this example the extracted attributes and the quintuples are the following:

e: entity – the product, Kindle Fire HD7;

a: aspect of the product – price/camera of Kindle Fire HD7;

s: sentiment – positive or negative;

h: opinion holder – Joe, Joe's wife;

t: time of the opinion – December 11, 2017.

Quintuples:

1. sentence: (Kindle Fire HD7; product; positive; Joe's wife; December 11, 2017);
2. sentence: (amazon; positive; Joe; December 11, 2017);
3. sentence: (Kindle Fire HD7; price; negative; Joe; December 11, 2017);
4. sentence: (Kindle Fire HD7; resolution of the camera; negative; Joe; December 11, 2017).

The steps of this opinion extraction can be enumerated in five stages:

1. entity, aspect and opinion holder extraction and categorisation;
2. time extraction and standardisation;
3. aspect sentiment classification (determine whether the sentiment for a given aspect is positive or negative);
4. generation of the opinion quintuple;
5. summarisation of opinions.

Opinion Types

Regular or Comparative Opinions

In the sentiment analysis, opinions can be divided into different types: regular and comparative opinions. [12] A comparative opinion expresses a relation of similarities or differences between two entities or a preference of the opinion holder based on some shared aspects of the entities; for example: "Google search engine is better than Bing." A comparative opinion is usually expressed using the comparative or superlative form of an adjective or adverb, although not always (e.g. prefer). Regular opinions do not possess comparison. There are lots of typical sentences in this category, like: "Google search engine is good."

Explicit and Implicit Opinions

Explicit opinion is a regular or comparison opinion that is expressed in a subjective statement. [13] Example: "The design of the Gmail Service is very nice." Implicit opinion is an objective statement, like: "Image search in Bing is two times faster than in Google."

It is a factual statement about measurable/comparable quantities, and it implies a positive sentiment towards Bing search and a negative towards Google search. Implicit opinion cannot be only a comparative one, but regular, as well; e.g. “a battery is very small”. The computers do not know that small is a good or bad attribute. A word that is considered to be positive in a situation may be considered negative in another situation. For example the word “long” is positive if a customer says about the battery life of a laptop. If the customer said that the start-up time of this laptop was long, then this is a negative opinion. It is a challenge to detect this kind of situations; additional challenges and difficulties are described at the end of this paper.

Direct and Indirect Opinions

Opinions can be further categorised into direct and indirect opinions. [14] Direct opinion is a statement expressed directly on an entity or an entity aspect, like: “The battery life is good.” With indirect opinion, the opinion is hidden in the relation of two entities, for example in the next sentence: “After the upgrade of the ADSL modem, the Internet access became even slower.” In this opinion the entity is the ADSL modem, its aspect is the speed, and it gives indirectly negative sentiment. Explicit and direct opinions are easier to detect by computers than the indirect and implicit types.

Although sentiment words and phrases can be collected into a dictionary for positive and negative sentiments, however this will give only a poor accuracy in the results of the sentiment analysis; additionally, these are only the two poles of the polarity and sometimes the end user needs more sophisticated solutions between the two extremes. Instead of dictionary based methods, data mining algorithms give better solutions. In the next session CRISP-DM [15] is described, as the one of the most frequently used data mining methodology.

CRISP-DM Methodology

During the solution of the sentiment analysis problem, we can use a standard process of data mining, the well-known CRISP-DM procedure (methodology) that describes commonly used approaches for data mining with the steps of the procedure. These steps are the following: business understanding, data understanding and preparation, modelling, evaluation and deployment.

Business Understanding

The first phase is understanding the targets and requirements of the task, then converting this knowledge into a data mining problem, and designing a preliminary plan to achieve the objectives. In our case the goal is to predict reviews, which can be positive or negative (so-called sentiments).

Data Understanding and Preparation

The second phase is collecting the initial dataset, getting familiar with them, and identifying data quality problems to avoid the loss of the later parts of the process. It is closely related to business understanding, therefore going back and forth between the two phases is frequent. Then the next step is the preparation of the final dataset by transformation, integration and cleaning from the initial raw data. Tasks include table, record, and attribute selection, as well.

Modelling

In this step various modelling techniques can be selected and applied, and their parameters are adjusting to optimal values. Some techniques have specific requirements on the form of data, in these cases stepping back to the data preparation phase is required.

Evaluation

The utility of the built model(s) can be evaluated, and the models can be tested whether they fulfil the initial requirements and give back proper values. The aim is to determine whether there is some important business issue that has not been sufficiently considered. At the end of this phase, a decision on the use of the data mining results should be reached.

Deployment

At the end, the conclusion of the whole procedure will need to be organised and presented in a way that is useful to the customers. The deployment phase can be as simple as generating a report or as complex as implementing a repeatable data scoring. It is important for the customer to understand the obtained knowledge and conclusion.

Data Mining Procedure for Sentiment Analysis

Sentiment analysis is a problem in data mining, more precisely in text mining, which is concerned about classifying natural language sentences based on their negative or positive overtone. In order to predict the sentiments in an unknown text document, we can use CRISP-DM, so we need to learn from the text document, where are the known sentiments (this is the label). During this learning we build a model based on train data set (i.e. known text documents with label information). Two data subsets are required, one of them involves sentences labelled with positive sentiments and the other involves negative sentiments about reviews. The built machine learning model will be able to predict sentiments in test data sets (i.e. in unknown text documents). So the input data is a disjoint set of two different types of data:

- training data – a baseline data, which consists of sentences and the assigned sentiment labels 1 or 0, meaning a positive or negative sentiment of the sentence, and these labels come from humans' decisions;
- test data – a validation data, which contains sentences, but not the corresponding assigned labels. The goal is to classify these sentences, based on the insights and logical relations learnt from the training data set. Later, the predictions will be tested by humans.

In order to create a corpus for sentiment analysis, we need a large set of documents, but the collection of documents is sometimes not as trivial as it seems. Social websites are well protected from crawling because they are aware of the value of the data, and they do not give it to companies or to business owners in an easy or cheap way. Another problem is the constantly growing number of online reviews, posts. This phenomenon suggests the implementation of an automatized method, which grabs the new post and reviews without human interaction from time to time.

Software Possibilities

In order to be able to solve the task presented above, there is a need for an analysis application, capable of predicting and assigning labels to sentences. There are several data analysis software on the market, like RapidMiner, [16] SAS [17] and of course also programming languages, which are designed for statistical analysis, or feature external modules, which support these algorithms. A typical example for the first case is language R, while for the latter Python is a good example. These platforms and programming languages have their pros and cons. Platforms provide an easy-to-use, user-friendly graphical interface to carry out complex analysis processes. It is an easy solution for those, who are beginners in this field of data science; it enables these users to get familiar with these methods. However, the usage is quite rigid, the flexibility is limited. The user can only use the previously implemented processes, which are available in a predefined manner. On the other hand, programming languages offer a wide range of possible solutions, one can be creative during the implementation, and there is no limitation included by a predesigned system. However, it must be mentioned, that the greater freedom comes with a cost, the implementation is harder, error-prone and requires deep knowledge of the used algorithms alongside with programming skills. The needed external data analysis python modules within the confines of opinion mining task are Natural Language Toolkit (NLTK) [18] and Scikit-learn. NLTK is a leading platform for building Python programs, which can process and work with human language data. It features several corpora alongside with different text processing methods such as stemming, tokenisation, classification, etc. Scikit-learn is a Python toolkit (besides the well-known python modules Numpy and Scipy) for efficient data mining and analysis, containing several data analysis models, methods, such as classifiers, regression classes, as well as the needed helper procedures for preprocessing and data cleaning.

For the machine learning models pre-processing is needed to get structured information from the continuous (unstructured) text. This pre-processing consists of many processes, as transforming letters to lower case, tokenising the words, stemming the words into

root words, filtering the stop-words, which are described below. The tokenisation phase is responsible for splitting the continuous text documents into character series, so called tokens. The stemming phase is liable for reducing a token to its stem or root. The usage of the stop-word filtering can be useful, because it removes those words that do not affect the classification task. The details are described later.

Levels of Sentiment Analysis

Most of the documents consist of several hierarchical elements, which have significant contribution to the reader to facilitate interpretation. For example, in a book, the volumes, chapters, paragraphs, sentences can be the hierarchy levels. It is worth mentioning, of course, that individual documents may have different structures within the same types. In general, the sentences can be a proper hierarchy level; however, dividing the continuous text into sentences is not a trivial task. The idea is to segment the text based on sentence terminals, as these indicate the end of the sentences; nevertheless, these punctuation marks are widely used and have many other meanings, so they not necessarily sign the end of the sentences.

Not only documents consist of several hierarchical elements, but sentiment analysis task can be executed in different levels, as well, similarly to general hierarchical levels. Since this task is a classification of the polarity of a given text, this investigated text will give the appropriate level: this can be a document, or paragraph, or sentence, or another aspect level. The polarity can be binary (positive or negative), or can have three classes (positive, negative, or neutral). At advanced sentiment analysis, the classification of sentiments can be at emotional states such as nervous, sad and happy, etc.

If a review has both positive and negative sentences, then this will be a mixed expressed opinion at the level of the review. But we can drill down to sentence level: if each sentence in the review possesses a clear polarity, then this review can be summarised by the positive and negative sentences. However, some people combine different opinions in the same sentence, which is hard to understand for computers, because of ambiguity, for example “it was great even though I dislike this genre of movies” or “the movie was good, but some parts were quite boring” as mixed expressed opinions.

Text Preprocessing

During preprocessing the unstructured texts are brought to numerical objects focusing on the aim of the task and bringing data to a format that is suitable for storage according to the nature of the text. The main role of preprocessing [20] is to analyse more effectively by unification, formatting and normalisation of data. This involves tokenisation, the stemming of words, filtering of stopwords and so on.

Tokenisation

There is a lower level in the hierarchy described above, and we can get this level by tokenisation, as the first phase of pre-processing in text mining. Strings (character series) with a self-contained meaning are called tokens, which can be separated from other character series in some form. One of the most appropriate solutions to this task is that the document should be broken off along all punctuation marks and spaces. However, there is still a problem with punctuation in some cases, where it is not necessary to separate two strings, because it is separated by a punctuation mark. This kind of drawback is especially true in the IT field (with URL, IP-addresses, etc.), and these marks are usually used after abbreviations, or when using serial numbers and dates. Additional problems can occur at other marks, e.g. in case of a hyphen mark, it is not clear that there are two interlinked, but distinct words (they are hyphened or separated). Similarly, it may be true for spaces, as well, that a space-separated word may be associated, but you can even talk about triples, as well (e.g. family names and first names). Considering these problems, it can be seen that tokenisation is not an easy and clear subtask in the whole process. [21]

Stemming

The next step in the preparation is the word process, in which we try to reach the stem (like dictionary format) of the words. In general, all languages use some kind of tags like prefixes and suffixes in order to get modified words. The Hungarian language contains lots of such tags, it has a very rich morphology. Stemming [22] differs from word lemmatisation, because the output of the latter one is the dictionary format. But from an informatics point of view, we use stemming to get the root of the word, the so called stem; because it is quite enough for words of the same meaning to be in the same form, while different words are different. This task can also be solved by cutting off suffixes, called truncation; but truncation is only a simplified version of stemming, and we can get pure results with this.

Stop-Word Filtering

Token is an occurrence of the character series; we can define term (as a token type), because the same words (tokens) are repeated in a document many times, so we collect them into one type, so called term; and these terms constitute the raw dictionary. The raw dictionary contains representative words and less representative ones; the latter ones occur in every document (or even multiple times), they are considered superfluous, since they will not change the final result in the classification and in the analysis. These words are called stop-words. [23] The next step in the process is to filter out these words from the whole set. Typical examples are articles, prepositions, expletives, e.g. *the, a, an, whether, in,* etc. If we leave these words, we will not change the final result, but we can significantly reduce the number of tokens, which will change the result with a simpler and faster computing task.

Document Vectors

At the end of the preprocessing, vectors are created for each document. Different types of document vectors can be formed with different values for term weights; tf-idf, tf, term occurrences or binary term occurrences are possibilities. The tf-idf weight system [24] is short for the term frequency—inversed document frequency, where term frequency stands for the ratio of a term in a document (i.e. the number of times that a term occurs in a document divided by all the terms in the investigated document). Inversed document frequency stands for the logarithmically scaled inverse fraction of the documents that contain a given word. Tf-idf multiplies these values to obtain term weights. The tf weight system stands for term frequency, the number of times that a term occurs in a document divided by all the terms in the investigated document. This is simply used to obtain term weights. As the name implies, the term occurrences method simply uses the amount of times a term occurs in a document as weight. Binary term occurrences: this is highly similar to the term occurrences method except that it uses binary values, so there is a 1 if the document contains the token and a 0 if it does not. These vectors can be used for machine learning models. [25]

Modelling, Validation and Evaluation

There was a sentiment analysis problem that was solved by methods described in this paper. The steps of own solution are the following.

- Initialisation.
- Input data file processing.
- Transforming the input data to the desired format (each model requires a specific input data format, usually a list of tuples, with two members containing the tokenised, stemmed words and the assigned label for this sentence).
- Splitting the input data set to train set and validation set.
- Model training.
- Model validating, performance measurement.
- Prediction based on the previously trained model.
- Output data file writing, this will be the original test file enrichment with the predicted labels.

The step of splitting the input data set to train set and validation set is required to be able to approximate the results of the classifier. As during the development, the test data labels are not available, the only way to validate the accuracy of the training is to use only a subset of the training data to actually train a data analysis model and use a smaller subset of the training data to validate the results. Note that with this approach, the training data set will be stripped partially, with the cost of providing a smaller set for the model to learn on, however being able to measure the performance of the model. Without this approach, there would be no logical basis to select the best performing model. During the implementation 75% of the training data was actually used for training and 25% for validating. This parameter can be

fine-tuned. Possible validation methods discussed below can be used for splitting the data set in order to train and validate classifiers.

- *Bootstrapping validation*
  Bootstrapping validation [26] is sampling with replacement. In sampling with replacement, at every step all examples have an equal probability of being selected. Once an example has been selected for the sample, it remains candidate for selection and it can be selected again in any other next step. Thus a sample with replacement can have the same example multiple number of times. (The remain set, i.e. the non-selected examples can constitute the test set.) More importantly, a sample with replacement can be used to generate a sample that is greater in size than the original sample set.
- *Split validation*
  In split validation, the input sample set is partitioned into two subsets. One subset is used as the training set and the other one is used as the test set. The model is learned on the training set and is then applied on the test set. This is done in a single iteration, which can cause large variance in the results; therefore, it might not be very suitable in this case.
- *Cross-validation (X-validation)*
  Cross-validation [27] is highly similar to split validation, except that it is repeated for several iterations. The input sample set is partitioned into k subsets of equal size. A single subset of the k subsets is retained as the testing data set and the remaining k – 1 subsets are used as training data. The cross-validation process is then repeated k times, with each of the k subsets used exactly once as the testing data. The k results from the k iterations then can be averaged, so variance in the results is smaller than in split validation; therefore, it is likely to use the most suitable on the relatively small training dataset provided, moreover on other general training datasets, as well.

As written above, the ratio of the splitting was 75%–25% for validating, but instead of split validation the cross-validation was used with k = 4 parameter.

Results

In order to test the developed solution described above two data sets were selected. These contain sentences labelled with positive or negative sentiment (neutral sentences were filtered out), extracted from reviews of restaurants (Yelp dataset with 1,000 opinions) and general products (Amazon dataset with 1,000 opinions). The accuracy, as a result of the binary classification of opinions can be seen in the next table.

Table 1. *The accuracy, as a result of the binary classification of opinions.*
[Edited by the author.]

k^{th} subset in the cross-validation	**Yelp**	**Amazon**
1^{st} subset	78.2%	90.2%
2^{nd} subset	72.4%	89.8%
3^{rd} subset	74.9%	90.0%

4th subset	68.6%	90.9%
Average	**73.5%**	**90.2%**

It was more difficult to learn the sentiments in the Yelp dataset as can be seen in the table (the professionalism of Amazon is better); the variance of the results was larger in the Yelp dataset. As can be seen, the results depend on the characteristics of the training set used.

Application Possibilities and Difficulties

Opinion mining helps in achieving various goals like observing public mood regarding political movements, market intelligence, the measurement of customer satisfaction, movie sales prediction and many more. Such application possibilities are collected and described below.

At high traffic customer service centres automatic processing of user feedback, like messages, emails, opinions is crucial. Such automatic systems for classifying electronic messages can also be useful in applications where messages need to be routed automatically to the most appropriate department or agency; for instance email messages with complaints or petitions to a municipal authority are automatically routed to the appropriate departments; at the same time the emails are screened for inappropriate or obscene messages, which are automatically returned to the sender with a request to remove the offending words or content, and also filed into a predefined folder on the appropriate server. The solution described in this paper is able to filter out automatically the most undesirable "spam emails" [28] based on certain terms or words that are not likely to appear in legitimate messages. This way such messages can automatically be discarded. Some subtasks can also be simplified in order to save time for the management of personal or work-related e-mails.

Similarly to sentiment analysis, text mining can also be used in order to fight violent (e.g. crime or terror) activities on the internet (instant messenger or internet relay chat). Information extractive and text analysing methods are applied on the examination of the huge quantity of the document. This is the most effective way to get names, location, and relations between them and the sentiments, and to detect crime or similar (violent) activities on the dark web forum. [29]

Customer feedback is an important measurement of success at enterprises that sell products or services. [30] It is not only important to develop but also to improve business strategy and of course to increase the income and the profit by getting more customers and make them more loyal. To reach this aim it is important to know what are their opinions about the products and services, and this information can be measured by analysing qualitative interviews, so customer preferences will be much clearer.

The opinion holders do not always express own opinions the same way. The traditional text mining relies on the fact that small differences between two pieces of text do not change the meaning very much. However in sentiment analysis this is not true, because there is a large difference between the semantics of a sentence "the service was great" and another sentence "the service was not great". This challenge can be partially solved by sentiment shifters [31] (sentiment shifters are words that change the meaning of the sentiment to its opposite: like *not good*). Another technique to solve this problem is

generating n-grams, [32] in sentiment analysis bigrams would be most suitable because we can take the preceding word into consideration this way. For instance, “good” might have a strong positive sentiment, but “not good” has a negative sentiment even though the sentence contains the word “good”. Bigram generation would give us the tokens “not, not_good, good”, where “not_good” will get a negative weight during classifier training. Where with unigrams just the sentiment of “good” would be slightly reduced.

Another aspect is that sentiment analysis can be hard to process in certain corpus because it may contain ambiguities and sometimes syntax and semantics are not too easily understandable. Slang, language specifics to age groups, irony, professional jargons and sarcasm belong to these kind of challenges. [33] Syntactic dependency (dependency tree) method can help with this problem.

Sometimes it is difficult to understand what the opinion holder thought based on a short piece of text because it lacks context. For example: “That service was as good as in the last year” is entirely dependent on what was the client’s opinion in the previous year. This kind of challenge can be solved by the revealing of cross-references among sentences.

Conclusion

In public administration there are lots of documents (particularly text document), and a document management system should handle them by an intelligent process (the attribute “intelligent” is important for smart city, smart public administration). A text document can be of a wide variety of types, a document can be written in Word (Office), or as a blog post on the Internet or an e-mail. First, the task is to find a general representation in which each document can be described and the preprocessing of text mining is able to create this kind of general representation.

Sentiment analysis, or opinion mining, refers to the use of natural language processing, data mining and text analysis to identify and extract subjective information in source materials. Sentiment analysis is widely applied to reviews and social media for a variety of applications, ranging from marketing to customer service. In this paper the sources (like Facebook, Twitter and LinkedIn), steps and types of sentiment analysis were presented. In the sentiment analysis, the opinions can be divided into different types, regular and comparative opinions as explained above. Explicit opinion is a regular or comparison opinion that is expressed in a subjective statement; and the opposite of this, the implicit opinion is an objective statement. The opinions can be further classified into direct and indirect opinions; the direct opinion is a statement expressed directly on an entity, while the indirect one is hidden in the relation of entities.

In sentiment analysis, the hierarchical levels are also described from sentence level (as a low level) to document level (highest level). The polarity of opinions in each level can be binary (positive or negative), or can have three classes (positive, negative, or neutral). The preprocessing of opinion mining involves tokenisation, the stemming of words, filtering of stopwords and so on. At the end of the paper we can conclude that sentiment analysis is a difficult task, the larger complexity of opinion is the most difficult in this task. The difficulty of this problem also depends on the number of polarity classes and the number of aspects and products. Although there are some appropriate techniques, but policy

discussions, indirect, implicit expressions of opinions are still more difficult to reveal in the text.

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Soft Factors of Economic Security[1]

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The importance of economic security has increased considerably in the last decades. It can be separated into the following two parts: security of ordinary operation and security of long-term development. In this article we are going to be dealing with the latter, especially the so-called soft factors which make up the basis of it. These factors are the human capital, social capital and territorial capital. With the assistance of the tree model of competitiveness, we are going to demonstrate how important these factors are from the aspect of long-term economic development and social stability. Since the means of altering them is quite difficult and slow, developing them requires a continuous, well-considered, conscious strategy.

Keywords: *economic security, competitiveness, human capital, social capital, territorial capital*

Introduction—The Complexity of Security

Approaching security from different dimensions comes as no surprise to anyone these days, since security itself is not a unidimensional concept, but a multidimensional system and state with a complex character, which can only be defined by taking into account the interaction of every challenge, risk and threat that potentially or actually endangers the standard operation or sustainable development of either the individual or the social existence. This is why, the profound and professional examination of all dimensions is of vital importance since this is the only way we can ensure the future of our country and nation.

Regarding the most common version of complex definition of security, we can talk about political, military, social, economic, environmental and information security.

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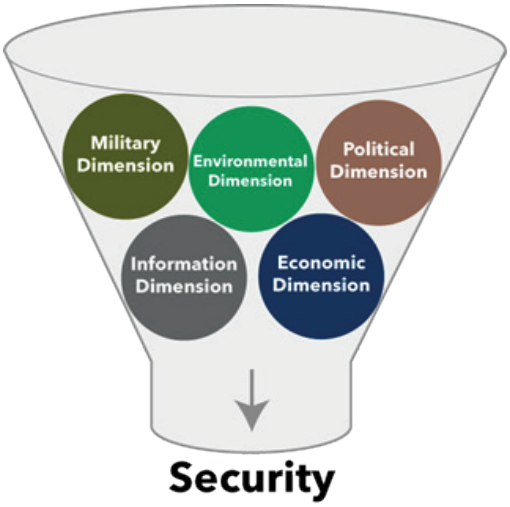

Figure 1. *Dimensions of security.*
[Edited by the authors.]

It is important to emphasise that linkages between certain dimensions of security are characterised by circular causality. That is to say, the sudden fall in any dimension of the security level will cause instability in other dimensions as well, which as a reaction, will decrease the security level of the previous dimension even more, causing a spill-over effect boosting itself and the entire system. In other words, if the risk in a certain dimension of security rises or activates, then in consequence, we are going to experience the activation of risks in other dimensions, as well. Because of this circular causality, new emerging risks will increase or activate in the first subsystem, which is the main reason why it is often very hard to decide from which dimension of security did the cascades of failures erupt in the first place. For instance, it can be a question whether we see general dissatisfaction, violent manifestations and a hotbed for terrorism due to the bad economic conditions and lack of opportunities for the younger generation—i.e. the youth cannot see a clear vision of their future in which they see themselves getting opportunities to improve the quality of their lives—in a certain country. Or is it the other way around? Are there bad general economic conditions and missing future visions because the capital will not go to countries infested with violent manifestations and terrorist groups? This might be a "chicken and egg" type of dilemma. Since both cause and effect are reciprocal, and also react upon one another, it is very hard to find the starting point of the process. We just simply experience the general deterioration of security.

It follows from the abovementioned circular causality that every single dimension of security needs to be dealt with equal importance. As given from such interactions, the level of political security cannot be raised higher without developing military-, economic-, social-, or environmental security as well. The same way, social security cannot be maintained without the right level of political-, economic-, or environmental security, and so on. That is to say, if the government (or international community) wishes to set the country on a path of development, the joint improvement of all dimensions is of vital

importance, as the abovementioned spill-over effect of circular causality is positive, and it is true to mutual correction and strengthening, as well. However, in order to achieve this goal, people working in different fields with different methods and attitude, such as politicians, architects, economists, scientists, social experts, entrepreneurs, logisticians, armed forces, public administrators, and volunteers of civil organisations, need to work together in coordination. This can be an incredibly huge challenge.

In this article we are dealing with the economic dimension of security, more exactly, its factors defining its long-term condition, taking the so-called "soft-factors" (e.g. human capital, social capital, etc.) into special consideration, which make up the basis of long-term development, and which are always difficult to examine or analyse (compared to hard factors). Therefore, our research team has taken up the task of studying their conditions in Hungary. In this article, we are going to present the roles of soft factors in economic security, and also outline the most important challenges and risks we have to take into account in this field.

Economic Security

Economic security can be interpreted as the condition, where the risks for activation of factors and processes threatening the normal economic operation and sustainable growth is not higher than the normal range. Consequently, the economic policy assets and organisations can perform their tasks using normal algorithms and methods and a higher level of state (economic policy) intervention is not required. Furthermore, the economy is able to fulfil the demands on economic operations when countering a threat, danger or risk emerging in any other dimensions of security. [1]

Building on this definition, economic security basically has an aspect dealing with operations and another one dealing with development. The previous one, called operation security, studies to what degree risks and threats endanger the everyday operations and the capability to fulfil the basic functions of the economy. Furthermore, it studies the way economy is able to meet the demands in case any other security challenge emerges in a given period of time. Development security deals with the conditions ensuring the quality of continuous development in the domains of the economy and society and the way a country is able to retain or improve its taken position in the global economy.

Of course there is a strong relation between the two aspects since economy uses up resources for both daily operation and long-term development, therefore the existence or non-existence, as well as the quality of these resources determine both the present operation and the future development. However, both of these factors are typified by different risks and can be exposed to different threats, as well.

In this article we are going to focus on development security. The importance of studying development security is supported by the common definition of security, saying: security ensures future welfare.

The Factors of Development Security

The concept of development security has been explored by several researchers. At the beginning of our prolonged research, we summed up the factors ensuring development security in the following figure: [2]

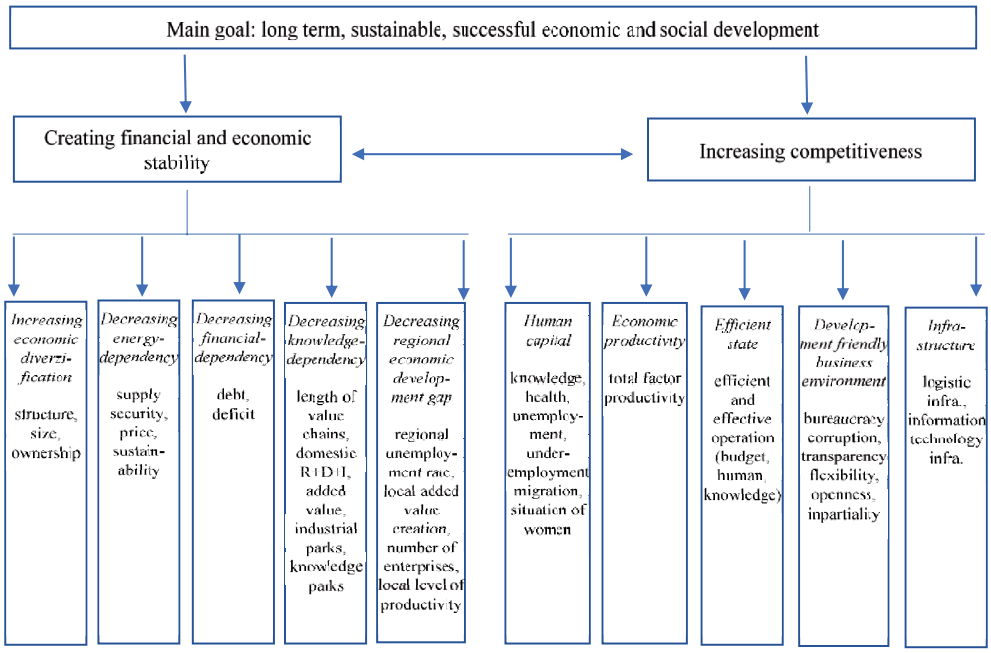

Figure 2. *Development security elements.* [11]

It is well-seen in Figure 2 that from the aspect of ensuring long-term development, it is important to decrease the degree of any exterior dependency of our economy (e.g. financial, knowledge, technology, information, energy, etc.). Naturally, in our globalised world today—which is best described by the interdependence of national economies—there is no country, which would be able to overcome exterior dependency. However, in economic relations, it is important to mitigate the dependency as much as possible—by becoming the less-dependent superior participant, instead of the inferior more-dependent—since this is what ensures the higher state of development in the long run. [3]

On the other hand, it is important to establish and improve those economic and non-economic factors which increase the competitiveness of the country, and through this, also its potential for improvement and expansion. Experts all agree that the higher state of competitiveness leads to better quality of life, higher social satisfaction and greater happiness. However, there is a difference among the opinions about how necessary it is in the society to make short-term sacrifices causing a huge drop in the standard of living or in happiness, in order to increase competitiveness. According to most opinions, such sacrifice is necessary to a certain degree. To mention a few examples of sacrifice: in order to decrease exterior financial dependence and to finance research, development and innovation—which

gives the basis of competitiveness, and related investments—a high internal saving rate is needed. [4] This means, in order to improve long-term competitiveness, people have to give up some portion of their consumptions, which will decrease their satisfaction and their level of happiness consequently. The same way, improving competitiveness and quality of life requires environmentally aware and more resource-economical lifestyle from economic participants (from all households, enterprises and governmental organisations) [5] which means short-term discomfort, and giving up or changing accustomed ways of behaviour. This is an equivalent case when a change of national or organisational culture is required in order to enhance competitiveness.[8]

Although the previously mentioned relations were only given as examples, it can already be seen from these that competitiveness has a significant background of social factors. From the numerous existing models, we would like to present the complex system of competitiveness based on the competitiveness tree model. It was created by the Ecorys research team run by Jan Maarten de Vet. [6] Edited and extended with the results of our research team, the tree will look in the following way:

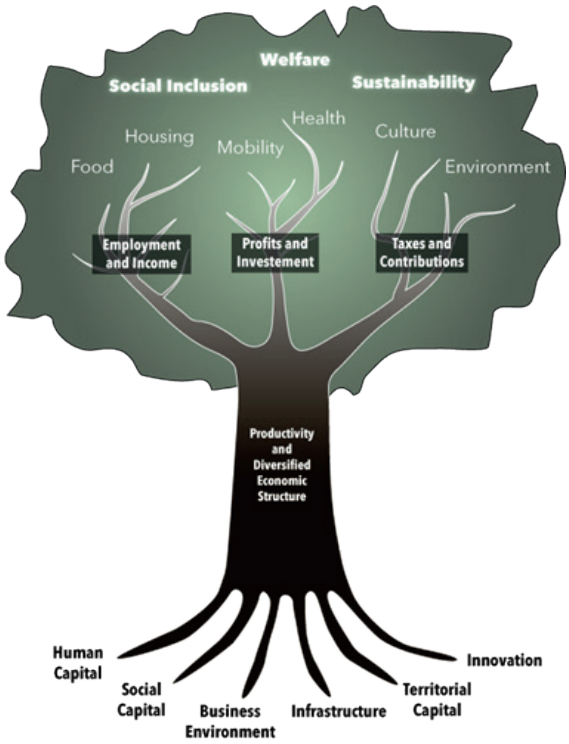

Figure 3. *Competitiveness tree.*
(Modification of [6].)

[8] The bigger the requirement for changes, the bigger the inconvenience and dissatisfaction resulted by these changes in the short term. We can think about famous historical examples: the reforms of the Russian Tsar Peter the Great or the whole cultural changes lead by Kemal Ataturk and the big social dissatisfaction they caused.

The competitiveness tree presents the logical connection between the elements of competitiveness on the one hand, and on the other hand, it shows that competitiveness is not a one-way process, but—as nature itself—it exists within a continuous cycle.

The roots of the tree symbolise the factors a country's competitiveness relies on. These are the factors which have been extended throughout our research compared to the original figure of the Ecorys research team. A competitive economy—just like a tree—can only grow with strong and healthy roots, which, in our case, means a good social and business basis.

So, what does "healthy roots" mean, in our case—from the aspect of competitiveness? The main factors are: human capital, innovation, infrastructure, business environment, social capital, territorial capital. Only in the case of existence and well-operation of these factors can a healthy, strong trunk develop, which makes up the frame of competitiveness: diversified economic structure with a high level of productivity.

As branches derive from the trunk and make up the foliage on which the fruits grow, the same applies to competitiveness: the highly productive, diversified economic structure will result a high level of employment, high income, profit, high investment rate, and adequate governmental tax income. These factors will create possibilities for better health conditions, fulfilling other biological needs (food and housing), cultural life, natural environment, mobility, which will eventually result in the most important fruits of the competitiveness tree: prosperity, environmental-, economic-, social sustainability and social inclusion. In case of a competitive economy, economic development, social inclusion and cohesion are more sustainable. It is easier to adapt using environment-friendly, smart and clean technologies, as well as in a competitive economy. [5] [7] Just as the soil and roots require the foliage and fruits to be recycled by falling on the ground and keeping the cycle in operation by renewing the soil, something similar is necessary to operate the competitiveness tree: just like in nature, the factors in the roots of our tree are nourished by its foliage and fruits.

The model presenting the cycle above explains very well, why it is impossible to form a competitive economy out of nothing. In order to rise, develop and turn a tree or an orchard productive, time and constant care is required. The same thing applies to creating public welfare, since it cannot be done from one day to another, either. This is what politicians and social leaders often do not understand—how the cycle works: growing roots, a strengthening trunk, more and more branches, expanding foliage, more fruits, more leaves and fruits falling onto the ground, which will then help the expansion of the root and its ability to nourish the whole tree. Competitiveness grows in such an integrated cycle. However, as a tree can dry out or wilt any time, the same way can the process of competitiveness and welfare development stall or dissolve. Also, as in the case of the death or weakening of a tree, the most frequent and dangerous cause is the weakening of the root, behind the failure of competitiveness, we can usually find having aggravating problems with some basic factors, as well. This is why it is vitally important to search the roots of competitiveness and this is the reason why our research team has been focusing on these factors for so long.

The Roots of Competitiveness

As an analogy, the primary roots of a tree, which consist of numerous secondary roots and root hairs, the factors described here as the root of competitiveness are also collective concepts. The quality of these concepts depends on their ability of supporting competitiveness and the elements belonging to them. These concepts include but are not limited to the following factors:

- human capital: knowledge and skill, health, business (entrepreneur) knowledge, willingness for lifelong learning;
- social capital: equality and social integration, regional cohesion, entrepreneur attitude, openness, trust and cooperation, resiliency, willingness to save, long-term (strategic) thinking, honesty;
- business environment: access to resources and technology, fair and strong competition, effective and supportive state (good governance), predictable legal environment, low level of bureaucracy, internalisation;
- infrastructure: transportation and logistics infrastructure, information technologic infrastructure, energetic infrastructure;
- territorial capital: natural environment and natural resources, local social and economic network, local institutional system and services, local culture and entity, attraction, network capital;
- innovation: research + development + innovation, property rights, technological knowledge, know-how.

After examining the root of the competitiveness tree, the cycle of the system becomes clear since the standards of the above factors can only be maintained by the constant investment of business and government spheres. Besides, it can be seen that in order to establish and maintain the basics of competitiveness, appropriate social, educational, environmental and cultural policy is necessary. The following is an important statement: the security of economic development is not an independent economic policy matter. (It does not belong to only one policy area, and there is not a single policy area which has to deal with it. Competitiveness tasks involve a great deal of responsibility and effort for the whole government.) Therefore, planning and implementation need to be handled at strategic level, since without a high degree of coordination, independent activities of certain policy areas can extinguish or weaken the activities of other policy areas intending to strengthen competitiveness.

Our research team has modified the original figure of the competitiveness tree in order to make it possible for the so-called soft and hard factors to be shown separately. On the root section of the model created by our team, the infrastructure is the only part which can be considered classically a “hard factor”. (Maybe innovation also belongs to this category.) All the other groups belong to the so-called “soft-factors”. We can establish an important statement based on the model: the security of long-term economic development relies on the factors of competitiveness which are quite elusive, hard to interpret and measure, therefore they are hard to improve, as well.

Although the mapping of these factors might belong to the hardest parts of understanding competitiveness, the members of our research team have been working on them for a long

time. The development and competitiveness analysis which was the professional basis for separating Pest County from Budapest and making it an independent region of the European Union was done by the principal investigator of the team, Magdolna Csath, and a team member, Balázs Nagy in 2015. A measurement model, similar to the structure of the competitiveness tree was created for this task, which has put a huge emphasis on measuring the factors building up the basics (the root) of competitiveness. [8] [9][9] We have applied a similar model with the logic of layers relying on one another, to measure how much is the competitiveness of a region supported by the (quantity and quality of) the logistical infrastructure in certain regions of Hungary. [10] Physical infrastructure also belongs to the root of the tree. As the next step, between 2016 and 2017, our team did a research regarding the quality of business environment in Hungary, in which we were focusing on the role of the Hungarian state and have also looked at its preventive or supportive nature. As part of our research, we asked for the opinion of approximately 1,500 enterprises through surveys and personal interviews. The sizes of these enterprises range from one-person businesses to multinational companies located in Hungary. This huge work was completed by interviewing family-owned enterprises in the Czech Republic and Slovakia, asking questions on the same topic. The 300 pages long report was handed to the State Reform Committee in June 2017. [11] In the second half of 2017 we have continued our research with exploring the other two soft factors, namely human capital and social capital.

The Role of Social Capital, Human Capital and Territorial Capital in Competitiveness

The alternation of the original competitiveness tree—especially having the factors presented at the root re-structured—is the result of many years of research done by us. Therefore, we included such summarising concepts as human capital, social capital and territorial capital.

Human capital means the contribution of people to economic activity. Contribution, in this case, can be anything created with work, creativity, imagination, emotions or senses. It is called capital, because it is made by investment in human resources. The more skilled and the healthier are the citizens, the more can human resources contribute to economic activity. The level of skills and knowledge is provided by the educational system and its health is created and ensured by the means of the health care system. The sustainment of these systems requires capital investment (from the part of society and/or individuals).

Human capital is the key to economic activity. This is why it became represented in the figure of the competitiveness tree. Creating and sustaining research-development, innovation and highly complex technologies requires human knowledge, skills and abilities. Besides, for a considerable part of production and service procedures, human labour is required. Therefore, the higher level human capital skill and knowledge is in a country, the higher the level of economic security will be, and the more ensured the possibility of long-term development will be. [12]

Social capital consists of the basic norms, set of values, attitude and other characteristics. [13] From the perspective of competitiveness there are some kinds of social

[9] The cited papers are the summaries of the research.

attitudes which support economic development even more. If society is open towards new ideas, the level of trust and cooperation is high among its members, they do not expect the government to solve all their problems, they have entrepreneur spirit, they are prone for initiatives, and if all these pair up with a long-term oriented mindset, development security will be on a higher level.

The basis of economic activity is entrepreneurship and cooperation. The higher the level of technology we use and the more complex are the activities we do, the more cooperation we need. And the basis of cooperation is trust. If there is a higher level of trust between participants, we share information easier. Which means, in a society, in which trust is stronger between the members and participants of economy (households, enterprises, financial institutes, governmental and non-profit organisations), will reach a higher level of cooperation and faster economic development. In case of having strong social capital, making and maintaining business contacts is also less expensive. If there is less need for risk averse contracting techniques and administrative measures, this can also lower the burden of the red tape. In countries with strong social capital, there are many cooperative efforts built from the ground up, which weakens hierarchic, dependent relations and as a result will strengthen democracy. [14]

Resiliency is also a key element of social capital and long-term economic development. Resiliency means first of all that an economy is being ready for the possible long-term threats. [15] On the other hand, it means that a resilient system is one that can recover to some workable points despite changes and hardships. In terms of an economy, it is suggested that diversified economies are more resilient. Resiliency can also be analysed regionally, in order to examine how sustainable local communities are.

Unlike human capital, social capital cannot be increased or improved by investing money into it, since strengthening social capital requires strong common norms, honesty, loyalty and reliability. [16] However, having certain individuals possessing such qualities is not enough. These norms have to become universal, for which social and political leaders are required to set a consequent example. Since social capital can be understood as the force which keeps society together, cohesion becomes a component of it, between both the social classes and the geographical regions. This means that from the aspect of competitiveness and long-term development, it is very important to avoid serious inequalities in property and income. The reason for this is that huge social inequality will not only cause problems (social tension, crime, tendency for religious or political extremism, etc.) in the short run, but it will also decrease the pace of long-term economic development, since—as generally admitted by economists [17]—it worsens the condition of economic development. On the one hand, on the supply side, because sooner or later there will be a huge lack of well-trained, skilled and healthy manpower on the labour market. On the other hand, on the demand side since the most part of society does not have the purchasing power which would enable them to consume products of high added value. The disruption on both sides of the market will become an obstacle for innovation. Therefore, the keyword is inclusiveness. It means, that each member of society can have a part in the results of economic development and can have an opportunity to contribute to it, too. [18] It can be realised by equally ensuring security, social engagement, and access to high level of education and medical care. [17] [18] Otherwise, the country loses human capital. The contribution of lost and wasted human capital will be missing in economic accomplishment. [17]

It can be seen, that high standard of education and public health (and the access to these) appears in connection with both human and social capital. That is why these two areas can be considered the key for long-term economic development.

Territorial capital includes all physical and non-physical, tangible and intangible —immaterial—local values. [19] As OECD described it, territorial capital refers to the stock of assets which form the basis for endogenous development in each city and region, as well as to the institutions, modes of decision-making and professional skills to make best use of those assets. [20] It includes the area's geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, but also includes its business incubators and industrial districts or other business networks that reduce transaction costs. Other factors may be "untraded interdependencies" such as understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector. Lastly, there is an intangible factor, "something in the air", called the "environment", which is the outcome of a combination of local institutions, rules, practices, producers, researchers and policy-makers, that make a certain creativity and innovation possible. [20]

The connection between territorial capital and social capital is that strong social capital and cooperation attracts creative and innovative people, who will then strengthen local, social and cultural connections even further. [14] And in reverse, for possessing strong social capital, it is important not to have big differences among the level and quality of territorial capital in different regions of the given country.

From the description of these soft factors, it will again become understandable, that improving competitiveness and establishing development security is an ongoing cycle which can be well-presented with a natural comparison, the competitiveness tree. These soft factors require constant care and improvement. It also requires fostering care by helping to revitalise the soil by its falling fruits of competitiveness and welfare.

It is very important to see, that human, social and territorial capital are all such factors, which can only be improved in the long run. The level of people's qualification and health cannot be improved in the short run. Society's set of values and social norms cannot be changed from one day to another. The attractiveness and immaterial values of a region cannot be established within a short period. This means, that the root's healthy development on the competitiveness tree is a long-term process. Therefore, if development security falters in a country, it is very hard to change these conditions. This is why tending all soft factors carefully and continuously (which requires both extensive intellectual and financial investment) is of high priority, otherwise the country and the country's economy can easily be exposed to such damage which is possibly beyond repair.

Main Challenges

Throughout our research, we certainly considered and analysed the challenges and risks constituting the greatest danger to the developing dimension of economic security. We paid special attention to those in connection with the soft factors analysed in the previous

chapters. If we would like to brief the most important ones, we can list the followings: 1. globalisation and trans-nationalisation; 2. automation and robotization; 3. natural resource depletion, climate change and green competitiveness.

In addition to the numerous advantages of globalisation, it also has many potential risks towards competitiveness and its soft factors. One of the most important ones is the fact that there is a shift in income-share, from the employee towards the capital owner in the world, and also—if the government does not interfere—that globalisation increases social differences. Automation and robotization—being a new industrial revolution—gives a strong push to economic improvement; however, it will incredibly expand the labour market in the next decades, as it might as well extend the whole global society.

Finally, the natural resource depletion and climate change—sooner or later (there are debates about the possible datum)—will totally change our globe and the presence of mankind on it.

The study of these challenges exceeds the cadre of this article, however, we can affirm that these processes and phenomena will be and are already changing the fundaments of the social structure and economic activity. We are clearly facing delays in the preparation, and those nations who have fallen behind will definitely face an extreme damage in every dimension of the quality of life (living standards, social inclusion, environmental quality etc.).

As every fundamental change, the preparation for these challenges also starts with the roots. Which means in this case the soft factors of the economy, the soft factors of the development security. Among others, we have to redefine the role of the education system, change the labour market and social policy instruments, the social network elements, the taxation system, rethink the role of the state in the redistribution system and certainly totally modify all of our production processes and consumption behaviours.

Summary

Economic security has a key importance in our globalised world today. We can find economic issues, economic background behind every conflict, every security risk. So, it is very important to be able to understand the complexity of the economic security system and to analyse the roots of it.

Economic security can be divided into operation security and development security. In order to be able to reach long-term security and defence goals, we have to deal with development security questions for creating sustainably prospering economic environment. It is hard to write a short summary of the field of development security, as the system is extremely complex and facing at least as complex challenges as it is. Our research group further developed the already existing model of the competitiveness tree, which shows the circular system of interactions. If its root is not nourished continuously with its fruits, growth will stop. In other words, if we do not return the results of economic development to social, economic and natural environmental factors, which assure long-term economic development, it will hamper or might as well show a downward tendency. Without a healthy root system, we cannot develop a strong and resilient trunk, which means in economic terms

high productivity and diversified economic structure. For decreasing economic dependency and economic security risks, diversified economic structure is indispensable.

Therefore, it is vitally important to deal with the basics of economic development, which we have grouped in the following way: innovation, human capital, social capital, business environment, infrastructure and territorial capital. In this article, we referred to the soft factors, as human, social, and territorial capital. We presented their components and stated them critical elements because they can only be edited in the long run. That is to say, their development requires continuous, well-thought and conscious strategy. If we neglect this, the competitiveness of the country will weaken, and it is not possible to be changed back quickly, in a short period, even if all the politicians of the country wished it together. In addition, we need to discover, learn and prepare for challenges and risks which occur regarding long-term economic development.

And finally, if we are able to create a resilient and competitive environment, we can control the activation of the economic security risks, and the stability of the national economy will also contribute to an improving security in the political and military dimension.

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- in the online version of the journal the publication of coloured illustrations and figures is possible; *nevertheless* the printed journal is exclusively black and white with a B5 format, so the coloured illustrations and figures must also have a grayscale version;
- the illustrations and figures must be given in a minimum 300 dpi definition in JPG or BMP format;
- in case the author does not use his/her own illustrations (pictures, photographs, figures, graphs, maps, tables etc.) *the precise source (in a verbatim citation!)* of the illustration must be provided; it is the duty and responsibility of the author to find out the owner of the copyright and, in case it is not freely applicable, purchase the authorisation for publication;
- the illustrations are to be placed in their appropriate places in the text;
- when applying mathematical graphs please use *MathType*.

References and literature used (the Harvard system)

Basic rules

No single name (source document) should appear in the main body of the text that is not present in the references and vice versa: no single name (source document) should appear in the references that is not present in the main body of the text!

References are given at the end of the publication in an alphabetical order, footnotes should only contain indications to the references at most.

References in the text: (author, year of publication); e.g. (Weber, 1978); or (Boss et al., 2015); in case of a verbatim citation (author, year of publication: page number[s]); e.g. (Weber, 1978: 16.); or (Boss et al., 2015: 33–35.) When there are references to author(s) with the same year of publication, then the differentiation is made by putting a, b, c, etc. after the given year of the publication; e.g. (Weber, 1958a) and (Weber, 1958b).

The name of the referenced institution or person (last name and the first letter of the first name) is to be given at the first occurrence. In references please give the DOI (Digital Object Identifier) code of the cited publication, as well as its Internet link, if available. In case the cited publication found on the Internet does not have an author or title, etc. its referenced form in the text should be (URL1), (URL2), etc. In the list of references this is to be given in the following form:

URL1: World Justice Project. worldjusticeproject.org/what-rule-law (Downloaded: 07.02.2018)

URL2: *Useful Tips for Social Media Security.* https://staysafeonline.org/stay-safe-online/securing-key-accounts-devices/social-media/ (Downloaded: 25.09.2016)

The URL sources are to be placed at the end of the list of references, and not at their customary places in the alphabetical order.

Formal requirements for references

DESCRIPTION		EXAMPLE	
Main types of referenced works	**Formal contents of the reference**	**A work included in the references**	**References in the text (in parentheses)**
Monograph	Author's Name (year of publication): *Title*. Place of publication, Publisher.	Weber, M. (1978): *Economy and Society.* Berkley, University of California Press.	(Weber, 1978) in case of verbatim citations: (Weber, 1978: 103.) or (Weber, 1978: 14–19.)
Study/ collection of studies	Author's Name (year of publication): Title. In Editor's Name (ed.): *Title of the volume.* Place of publication, Publisher. initial page–last page. [by languages: szerk./ ed., eds./Hrsg.]	Young, E. A. (2006): Taming the Most Dangerous Branch: The Scope and Accountability of Executive Power in the United States. In Craig, P. – Tomkins, A. eds.: *The Executive and Public Law. Power and Accountability in Comparative Perspective.* Oxford, Oxford University Press. 136–198.	(Young, 2006) in case of verbatim citations: (Young, 2006: 144.)
Article/ periodical	Author's Name (year of publication): Title. *Name of the journal,* Volume, Number. initial page–last page. DOI.	Howard, M. – Wilson, A. J. (1974): Military Science in an Age of Peace. *The RUSI Journal,* Vol. 119, No. 1. 3–11. https://doi.org/10.1080/03071847409421160	(Howard–Wilson, 1974)
More than one author for one work	every Author's Name (year of publication): Title. *Name of the journal,* Volume, Number. initial page–last page.	Boss, S. R. – Galletta, D. F. – Lowry, P. B. – Moody, G. D. – Polak, P. (2015): What Do Systems Users Have to Fear? Using Fear Appeals to Engender Threats and Fear that Motivate Protective Security Behaviours. *MIS Quarterly,* Vol. 39, No. 4. 837–864.	In the main body of the text: (Boss et al., 2015)
Other (e.g. manuscript)	Author's Name (year of publication): *Title*. Place of the publication. (The type of the document.)	Ürmösné Simon, G. (2017): *Technical English for Officers.* Budapest. (Manuscript.)	(Ürmösné Simon, 2017)
Internet content	Author's Name (year of publication): *Title*. website address (Access date) s. a. = sine anno (without year)	Lesch, A. M. (s. a.): Egypt's Spring: Causes of the Revolution. www.mepc.org/egypts-spring-causes-revolution (Downloaded: 03.06.2017)	(Lesch, s. a.)
Identical year of publication of the same author	Author's Name (year of publicationa): *Title*. Place of publication, Publisher. Author's Name (year of publicationb): *Title*. Place of publication, Publisher.	*We differentiate the works by putting Latin letters without space after the year of publication.* Weber, M. (1958a): The Three Types of Legitimate Rule. *Berkeley Publications in Society and Institutions,* Vol. 4, No. 1. 1–11. Weber, M. (1958b): *The Rational and Social Foundations of Music.* Carbondale, Southern Illinois University Press.	(Weber, 1958a: 1–11.) (Weber, 1958b)

Main abbreviations

(s. a.)	=	sine anno	– without year
(s. l.)	=	sine loco	– without place
(s. n.)	=	sine nomine	– without publisher's name
et al.	=	et alia	– and others. (In case of more than three authors this abbreviation should [only!] be used in intra-text references. However, in the list of references the names of all the authors should be given in full!)
Vol.	=	volume	
No.	=	number	

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