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

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Reducing the Outflow of CBRN Soldiers from the Perspective of Motivation

Attila CSÓKA¹ 

Outflow itself and the turnover of personnel are natural phenomena and occur in any organisation. The motivational factors influencing outflow can be classified as financial, medical and psychological factors. Compared with the two other factors, the psychological factor is the most complex one. In the research, the author examined these psychological factors among the soldiers of the HDF 93rd CBRN Battalion in 2008 and in 2018 and compared the differences. The author also analysed the relationship between salary-motivated outflow and age, defining a key amount that should be taken into consideration in order to prevent the mass outflow.

Keywords: *outflow, motivation, CBRN soldiers, psychological factors*

The outflow and turnover of personnel is a natural phenomenon in any military organisation and results in the loss of personnel, expertise, knowledge and experience. Replacement of the lost person with a trained one takes a long time.

We have to examine what motivates soldiers' decisions when their contract expires. I will mention the financial factor although, in contrast with the motivational factors, it cannot be changed without investing a significant amount of money.

Contract servicemen and women join up voluntarily. The cohesion of the unit, the camaraderie and teamwork are more and more important. Over a long time in service, good personal relationships can be built both on duty and off duty – even with family members. These good relationships enhance the cohesion of the subunit.

Training system

A CBRN subunit that is able to execute the orders of its commander with a high level of professionalism requires long and complex specialised training. The summary of a training cycle is as follows.

First, the civilian applicant has to decide whether he/she wants to join up or not. If the answer is yes, and the application form has been filled in and handed over, the applicant is

¹ PhD student, University of Public Service Doctoral School of Military Sciences; e-mail: csoka.attila@yahoo.com

sent for a medical examination and a psychological assessment to establish whether he/she is suitable for military service.

If the applicant is found suitable, he/she is issued with equipment and completes basic training, where he/she learns the basic military skills.

Specialised training follows basic training.² During this training, soldiers acquire the theoretical and practical knowledge that is necessary for their daily work.

After basic training, the new CBRN soldiers know how to use their individual protective equipment and they have basic theoretical knowledge of weapons of mass destruction.

As the first step of their specialised training for their planned assignment, they attend lectures on the CBRN reconnaissance and decontamination equipment that are available in the CBRN battalion. Using this equipment comes with huge responsibility and requires profound knowledge because it includes, for example, the HAPSITE ER person-portable Gas Chromatograph/Mass Spectrometer, the remote chemical reconnaissance equipment and the Decontamination Container, which in this order respectively cost approximately 250 times, 400 times and 1,200 times more than their monthly salary.

The next step is the acquisition of squad-level CBRN tactics in a tactical situation, cooperating with the other members of the squad while following the squad leader's orders.

During the discussion of platoon level training, which is the next step, we have to discuss separately the areas of CBRN reconnaissance and CBRN decontamination. The specialised CBRN work in a decontamination station – set up by a decontamination platoon – is led by the platoon leader. The platoon leader sets up his/her mobile command post in the area of the decontamination station and is able to check directly the execution of his/her orders. CBRN decontamination requires teamwork, so in case of facing problems, the individual has the possibility to ask for help from several levels: his/her teammates, the squad leader and even the platoon leader, following the chain of command.

Self-sufficiency is a requirement for CBRN reconnaissance soldiers. They work separately from the platoon leader and, depending on the task organisation, one or two CBRN operators handle the CBRN reconnaissance devices.

The complexity of their task does not make it acceptable for the CBRN reconnaissance soldier and the driver of the APC, who also needs to know the procedures and be able to handle the assets, to be uncertain in the performance of their specialised task.

One of the basic missions of CBRN soldiers is to take part in the Defence Disaster Management System and therefore they must be prepared by training in consequence management after a nuclear accident, and by training in aerial radiological survey.³ After training courses and exercises at home, CBRN specialists receive international individual training using live chemical warfare agents followed by squad and platoon level training.

Ideally, at the end of the specialised training, the soldier is ready to act with full effectiveness, but in reality, this never happens. They need to turn the theoretical knowledge into practical skills, they need to practise every part of their task in every

² MH 93. Petőfi Sándor Vegyvédelmi Zászlóalj 2019. évi munkaterve [213/2019 HDF 93rd CBRN BN Work Programme for 2019].

³ MH 93. Petőfi Sándor Vegyvédelmi Zászlóalj Katasztrófavédelmi Alkalmazási Terv [4/853 HDF 93rd CBRN BN Disaster Management Response Plan].

season several times, working together with other soldiers and they need to understand the orders of the squad/platoon leader. This process enables the subunit to accomplish its task without any complication.

The acquired knowledge and experience make the soldier capable of conducting real CBRN tasks both in Hungary and abroad. The training cycle takes approximately 18 months.

In order to be able to meet national interests and international commitments, the outflow of soldiers must be minimised.

Outflow and the factors affecting it

Outflow itself and the turnover of personnel are natural phenomena and occur in any organisation. Both unmotivated and medically unsuitable persons leave the system, as well as soldiers who feel there is more opportunity in the civilian sector.

Attrition results in the following three types of deficiency:

- His/her appointment becomes vacant and those who remain have to work more and consequently become overburdened.
- The leaving soldier takes his/her knowledge, expertise and experience with him/her. It takes a long time for his/her replacement to acquire the same knowledge on the job.
- A member of a cohesive unit leaves and it takes time for a new soldier to build similarly deep relationships.

In most of the cases, soldiers do not terminate their existing contract but those whose contract has expired do not sign up again. An old soldier has influence on the others. If there are soldiers whose contracts expire at the same time and there is at least one among them who wants to leave, then that soldier usually tries to persuade the others to do the same.

I also saw this kind of behaviour while on an operational tour in Iraq. A CBRN soldier who had been injured by an IED was about to be repatriated and he tried to persuade the others to terminate their tour.

In the background of this behaviour, there is a human feeling: doubt. The soldier is not sure about leaving and would like to find reassurance and the confirmation of his/her intention in the decision of the persuaded mate. He/she does not want to go through the process of secession from the organisation and the camaraderie alone. Therefore, sometimes in a subunit there is a surge of soldiers who want to quit, enhancing the above mentioned 3 negative effects of attrition. In a unit that requires special training – like CBRN units – these negative effects have severe consequences.

However, new soldiers bring their own perspectives and new ideas, which sometimes have a good effect on the subunit. If an unmotivated soldier is replaced by an ambitious and motivated newcomer, the turnover will be beneficial to some extent. The impact of the ‘new blood’ is much more important if it is injected in the chain of command, where the new approach is complemented with the possibility to act.

Based on the above, we can say that turnover, decreased to the level where there is a place for ambitious newcomers and the outflow of unmotivated soldiers causes neither professional nor emotional crisis in the life of even one CBRN subunit, is a precondition of the effective functioning of any organisation.

Outflow can be reduced by creating conditions, which make the soldier stay. If the soldier loses his/her interest in leaving, if he/she is motivated to stay and to sign up again, we are close to the solution of the problem.

The motivational factors influencing outflow can be classified as:

- financial
- medical
- psychological factors

They will be discussed below.

Financial factors

Practically, the most important factor is the salary and other financial allowances. Everyone needs money, everyone has to pay the bills and support their family. If a job is well paid, the importance of the other factors may decrease.

Since the financial resources of the armed forces are not infinite and the allowances are limited, it is necessary to place emphasis on the other factors.

A possible way of financial motivation is the possibility to do operational tours of duty abroad, where the reward of the more dangerous task and being away from the family is the higher salary.

Medical factors

Commanders and subunit leaders do not have the power to change or affect the medical motivational factor. This factor can be seen as an 'only negative' factor.

The ability to pass the physical and medical tests in itself is not enough motivation for a soldier to sign a new contract. On the other hand, if the health of the soldier deteriorates and he/she finds it hard to pass or is unable to pass the tests and/or is not able to wear the individual protective equipment, after a while he/she will have to be discharged.

If the soldier involved is a respected member of the unit or he/she got injured while carrying out his/her duty, the medical factor can become a psychological factor in case of the others, having an increased negative psychological effect on them: they may see their own possible future and think the same may happen to them.

Psychological factors

Compared with the two other factors, the psychological factor is the most complex one. There is no pattern that applies to each and every soldier in any situation. In my research, I examined these psychological factors among the soldiers of the HDF 93rd CBRN Battalion in 2008 and 2018. They were asked what factors other than the financial and medical factors (due to their unchangeable nature) motivated their decisions to sign up again or to sign off. When I compared the findings of the two surveys, I realised that over these 10 years, their opinions changed.

In 2008, the following six factors were mentioned:

- soldier-to-soldier relations
- commander-to-subordinate relations
- social recognition
- elite consciousness
 - physical training
 - professional recognition
 - courses
 - successful community
- career
 - rank and promotion
 - transition from NCO to officer
 - transition from contract to career status
- maximisation of the length of contractual service

Since the maximisation of the length of contractual military service was rescinded, this factor could not be included in the 2018 survey and it was replaced by questions about the effect of being within their comfort zone.

Some factors include several components but because of their relatedness they can be dealt with together.

Soldier-to-soldier relations

The atmosphere and personal relations play an important role in the functioning and the effectiveness of a subunit.

The lack of good camaraderie is an impediment to mission execution and damages efficiency and effectiveness. A bad atmosphere can lead to insubordination, making it difficult for the commander to lead the unit and consequently undermining commander-to-soldier relations.

In case of a good atmosphere, the soldiers feel responsible for each other. They do their work well, knowing that if they do not, the others will have to do it. If a problem occurs, they willingly try to solve it among themselves. It is common for them and even for their families to meet after working hours.

If the atmosphere is good, a soldier whose contract is about to expire will take into account the loss of these relationships.

Both the soldiers themselves and the subunit commander are responsible for creating good soldier-to-soldier relations. If the commander does not show favouritism, if everyone takes part in both the popular and the unpopular tasks, if the commander ‘takes care’ of undisciplined soldiers, then he/she protects the unit from avoidable sources of conflict.

Commander-to-subordinate relations

Commander-to-subordinate relations are determined by the commander’s leadership style.

Leadership psychology and leadership theory literature discusses the various styles of leadership and among others mentions the autocratic, democratic and laissez faire styles identified by Lewin,⁴ the Tannenbaum-Schmidt Leadership Continuum and Blake-Mouton’s⁵ or Fiedler’s person-centred models.⁶

There are four extreme styles of leadership:

1. The commander’s leadership style is consistent and dogmatic. He rarely or never accepts the suggestions of his/her subordinates. The subunit is under continuous control through the platoon and squad leaders. The tasks of the subunit are always accomplished. The soldiers know what to expect, there is no uncertainty and everyone knows what to do. Under the command of this kind of leader, soldiers may still feel that they miss something because their well-being and needs are pushed into the background.
2. The commander is a consistent and strong-handed leader, but also listens to the soldiers’ suggestions and pays attention to their problems. The soldiers can work under predictable conditions and at the same time, their well-being is also looked after.
3. The commander is primarily concerned with the well-being of the soldiers and maintains friendly relations with them even at the cost of task accomplishment and effectiveness. This kind of commander will sooner or later lose the respect of his/her subordinates and the recognition of his/her superiors due to the inadequate quality of their work. Typically, the soldiers will become unmanageable.
4. The ‘commander’ has no interest either in the task or the well-being of his/her subordinates. He/she is only interested in his/her own comfort. The soldiers do not know what they are supposed to do, and they are even likely to become aggressive.

The list above includes the four most extreme leadership styles. The last two styles do not work in an organisation where the chain of command is rigorously followed. In reality,

⁴ Katalin Fehér, ‘Nevelési stílusok’, s. a.

⁵ András Karácsonyi, *A leadership, a szervezeti kultúra és kapcsolatuk jellegzetességei a magyar szervezetek esetében* (PhD thesis, Corvinus University of Budapest, 2006), 17, 19.

⁶ Eryn Travis, ‘Fiedler’s Contingency Theory of Leadership’, *Bizfluent*, 02 November 2018.

there is no commander with only one typical leadership style. They usually carry a mix of different styles and fall between the extremes.

Apparently, the difference between two commanders depends on how much each of the above styles characterises their behaviour.

In the long-term, soldiers appreciate the consistent and caring leadership style out of the 4 styles. In the short term, it is convenient for the soldiers to have a friendly but unmotivated 'leader', but after a while due to the accumulation of unaccomplished tasks, the commander and the whole unit will be disgraced. Last but not least, a leader unworthy of the respect of his/her subordinates is repugnant in the eyes of some soldiers.

Social recognition

When people talk about what their job is, it does matter a lot how they talk about it. Are they proud of their work or are they ashamed of it?

If the social recognition of the military career is high in any country, then there is no lack of new recruits, and serving soldiers think twice before leaving the service.

Being appreciated as a soldier is a fragile status. World politics can change the opinion of the civilians. Taking part in a dangerous mission and doing a good job has a positive effect on social recognition, while the same activity can negatively affect it in case of well-organised counterpropaganda.

During peacetime and when no disasters happen, many civilians regard the armed forces as a waste of money. In order for society to appreciate the military more, in my opinion, soldiers should have a much stricter work routine than ordinary people, who have a 9 to 5 job. In case of a natural or industrial disaster, the activity of the soldiers is welcomed by the public. For example, after the red sludge disaster in 2010, CBRN soldiers worked in the affected area conducting road clearance and vehicle operational decontamination for 3 months, during which time more than 31,000 vehicles⁷ were washed down by CBRN soldiers.

If PT were done early every morning, every subunit would be able to conduct its specialised training during working hours without the pressure to try to include physical training in their daily schedule. If the behaviour of the soldiers was exemplary, it would result in a positive change in the public perception of the military. If the soldiers rigorously adhered to the military regulations while they wore the uniform, it would be a great leap forward in any armed forces. If their off-duty lifestyle served as a pattern, it would help the military gain higher social recognition.

⁷ Zoltán Szombati and László Földi, 'Az MH 93. Petőfi Sándor Vegyvédelmi Zászlóalj katasztrófa-elhárítási feladatban való részvételének tapasztalatai', *Hadmérnök* 6, no 1 (2011), 254.

Elite consciousness

Elite consciousness, to my mind, is the consciousness of being highly qualified to do one's job, which is the self-confidence that soldiers have when they know that they are good at what they are doing, when they can answer any CBRN-related question, they can solve most of the technical problems and their mental and physical condition is better than that of an average civilian.

Obviously, people enjoy doing what they are good at. They know that they are capable of overcoming the difficulties and meeting the challenges and they regularly have a sense of achievement from their work.

In addition, completing other military courses and training (CBRN EOD, SO CBRN, and so on) enriches soldiers' professional knowledge and enhances their elite consciousness.

Elite consciousness has four components:

- professional recognition
- physical training
- courses
- successful community

Professional recognition

If workers do their jobs well, they need to be praised. If soldiers have learned their trade well and they are able to accomplish their tasks, their superiors have to find a way to recognise their accomplishments.

It is extremely important to give soldiers military tasks and only on very rare occasions other supplementary tasks like cleaning barracks or weeding the parade ground, which decreases their motivation and is both a waste of their time and a waste of their special CBRN knowledge that they acquired at the expense of the armed forces. A rocket scientist should not be made to dust the rocket and similarly a trained CBRN decontamination/reconnaissance soldier should not be made to weed the parade ground.

Challenge is needed to maintain the interest of the soldiers on the required level. They did not join the armed forces to get bored. Every branch in the armed forces should establish norms and set requirements to measure the performance of the soldiers. In the same way as paratroopers are awarded different levels of jump wings based on the number and type of jumps they have completed, a method should be worked out to recognise accomplishments in every area of military life. The performance of CBRN soldiers could be recognised by awarding badges (1st class, 2nd class, 3rd class CBRN decontamination/reconnaissance soldier).

In my opinion, wearing the badge of achievement on the uniform would enhance soldiers' pride in their work and elite consciousness.

Physical training (PT)

Ranking the soldiers based on the result of their PT test has a positive effect on their elite consciousness or their desire to prove themselves. I disagree with the conclusion that being ranked in the bottom tier would lead to soldiers losing their motivation. On the contrary: since there is a healthy level of rivalry among service members, it would actually motivate soldiers to make more effort and do better.

PT improves the physical, medical and mental condition of the soldiers and facilitates unit cohesion. Good physical condition is a prerequisite to wearing the CBRN individual protective equipment while doing time-consuming CBRN reconnaissance and decontamination tasks.

In my opinion, as discussed above, a daily early-morning PT – even including a unit/subunit run in a civilian area – would improve the social recognition of the military.

Courses

After graduation from a course, soldiers should be awarded a badge. Wearing this badge on the uniform would have a double effect: everyone would know what qualifications the soldier has and it would make it possible for the wearer to inform others about who they are, which, in turn, would enhance their pride.

Successful community

The result of good soldier-to-soldier relations is a collaborative community. If the members of this community are highly trained and have a good leader, every accomplishment will be perceived as the collective success of the subunit, improving the atmosphere and both the commander-to-soldier and the soldier-to-soldier relations.

Sports competitions between subunits can be sources of success. For example, winning a soccer cup can make the feeling of togetherness stronger and can be a positive experience for every member of the subunit, even for those who were not on the team.

Career

Rank and promotion

Career and rank have almost the same importance for contract and career NCOs and officers, and it should be understood correctly. Promotion to the next rank without merit within a short period of time will lead to the rank losing its value and becoming a mere mode of address, an empty title without any content at all. If soldiers need to work for the

next rank and earn it through several years of service, work and experience, the value of the rank will be preserved. A soldier with a lower rank respects it, knowing it was earned. If it takes longer for a soldier to be promoted to the next rank, it will never happen that two soldiers – one with two years and the other twelve years in service – have the same rank.

Transition from NCO to officer

There is a logical connection between rank/promotion and transition from NCO to officer. Soldiers need the opportunity to be promoted to a higher rank and be given a higher military appointment if they earn it through their abilities and good performance at work.

Choosing and grooming the new subunit leaders from among the suitable serving soldiers is a good and effective method. If the method of selection is appropriate, the new leader knows the abilities of his/her subordinates and the subordinates, his/her former buddies, also know and respect the leader.

The respect and acknowledgement of the subordinates are not automatic accompaniments of the stars on the rank insignia but have to be earned.

With this method, leadership positions will be filled by the right person and everyone will have the chance to achieve a higher rank and get a higher appointment and consequently transition from NCO to officer.

Transition from contract to career status

Career status provides more opportunities and more advantages to any soldier than contract status. One of the important advantages is the housing lease support, which is available for entitled career personnel. However, the most important advantage in 2008 was that the length of service for career military personnel was not limited to 15 years, which was the maximum length of service for contract personnel. Career service members could stay in the military until retirement.

Maximisation of the length of contractual service

This regulation was a very important negative motivating factor. Even for young career entrants without experience it is not easy to find a job in the civilian sector. For a 40-year-old contract soldier with fifteen years in service who cannot extend his/her contract due to this regulation, it is almost impossible to find a civilian job even if he/she has civilian qualifications but no actual job experience.

In 2018, this limitation was not in effect anymore, that is why in 2018 this factor was replaced by the zone of comfort.

The zone of comfort

It is the result of a well-functioning daily routine. The comfortable sense of the predictability of the coming days, weeks and months in the company of well-known colleagues and of not having to meet new challenges.

The importance of the psychological factors

A survey was made among 50 contract soldiers from the HDF 93rd CBRN Battalion on the importance of the psychological motivating factors discussed above. Respondents were asked to rank the psychological motivating factors affecting their decision when their contract is up from very important to not relevant (1 = very important, 6 = not relevant). Table 1 shows the result of the 2008 questionnaire: the number of soldiers ranking the factors as 1, 2, 3, 4, 5 and 6 for importance in their decision-making. The survey was anonymous.

Table 1: The importance of motivating factors in 2008

	Importance						Σ
	1	2	3	4	5	6	
Maximisation of the length of contractual service	30 x 1	4 x 2	4 x 3	9 x 4	2 x 5	1 x 6	102
Commander-to-soldier relations	10	14	20	4	2	0	124
Career	4	24	4	8	4	6	152
Soldier-to-soldier relations	4	6	18	13	2	7	174
Elite consciousness	2	1	2	10	14	21	246
Social recognition	0	1	2	6	26	15	252

Source: Compiled by the author.

The result of the 2008 survey shows that the most important factor for the soldiers was the maximisation of the length of service, because of which most of the soldiers considered military service as a temporary way to earn money and intended to leave the army before they became too old to find a job in the civilian sector. Fortunately, this factor does not matter anymore since the maximisation of the length of contractual service has been rescinded.

Commander-to-soldier relations were more important than career because these relations determined their daily work. However, career was more important than soldier-to-soldier relations, which confirmed the appropriateness of the new practice of selecting squad leaders from among the soldiers.

Elite consciousness was ranked at the bottom, which can be explained by the lack of an evaluation system. Elite consciousness has a positive effect only if it exists. If it does not, there is no fear of losing it.

Social recognition was ranked 6, due to the neutral perception of the military career. If there was a shift in the public perception of the military in either direction (positive

or negative), it would have a motivating effect. If society respected the military, this effect would be positive, and if society despised soldiers, it would have a negative effect. Consequently, the factor would be viewed as more important.

Table 2 shows the result of the 2018 questionnaire in the same manner and Table 3 compares the results of the two surveys.

Table 2: The importance of motivating factors in 2018

	Importance						Σ
	1	2	3	4	5	6	
Soldier-to-soldier relations	22	14	8	3	2	0	101
Cmdr-to-soldier relations	17	18	7	3	3	2	115
Elite consciousness	2	6	11	10	15	6	198
Career	4	2	9	15	11	9	204
Zone of comfort	5	7	6	6	9	17	208
Social recognition	0	3	9	13	11	14	224

Source: Compiled by the author.

Table 3: Comparison of the results of the two surveys

	2008	2018
Cmdr-to-soldier relations	124	115
Soldier-to-soldier relations	174	101
Social recognition	252	224
Elite consciousness	246	198
Career	152	204
Maximisation of the length of contractual service	102	–
Zone of comfort	–	208

Source: Compiled by the author.

The fact that only one of the 50 soldiers in the 2018 survey was also a respondent in 2008 is proof of the high outflow of soldiers. Their attitude over the years changed.

Elite consciousness became more important. New equipment, service in the NATO Response Force and multinational training opportunities are signs of the enhanced CBRN life, which could cause an increased self-confidence. This is the road that we have to follow.

Despite the increasing self-confidence, the career factor lost its importance even though it was still ranked 4th in the 2018 survey. Selecting the good leaders from the soldiers and the possibility to select the leaders from among the soldiers and to appoint them squad leaders was a new procedure in 2008 and many soldiers saw the new opportunity and it filled them with enthusiasm. Although in 2018 it was common practice, the speed of the selection was slower than it had been 10 years before. In 2018, its novelty had already worn off and this was the reason why soldiers’ enthusiasm also faded.

While in 2008 commander-to-soldier relations were more important than soldier-to-soldier relations, in 2018 it was the other way around. Personal relations had a more important role, coming before official interactions. A couple of things may have caused it.

Relationships between soldiers are stronger as a result of the time they spend together, for example, on CBRN exercises abroad, even working with live chemical agents (travelling abroad with a CBRN subunit was not common in the 2000s), or while serving along and defending the southern border of the country. As a secondary effect, relationships formed off duty, outside the barracks further strengthen this factor. The other side of the coin must also be examined: the decreasing importance of commander-to-soldier relations. How could this be? The answer is very similar to the explanation of the decreased importance of elite consciousness in 2008: something is important when it has a major positive or a negative connotation, something is important when it counts. In 2008 it counted (124) and in 2018 it counted even more (115).

In the course of the survey, just out of curiosity, I decided to ask the sample group one more question: for how much extra money would they consider leaving the army when their contract was about to expire and they gathered information about salaries in the civilian sector? They were also asked to give their age. Figure 1 shows the relationship between salary-motivated outflow and age.

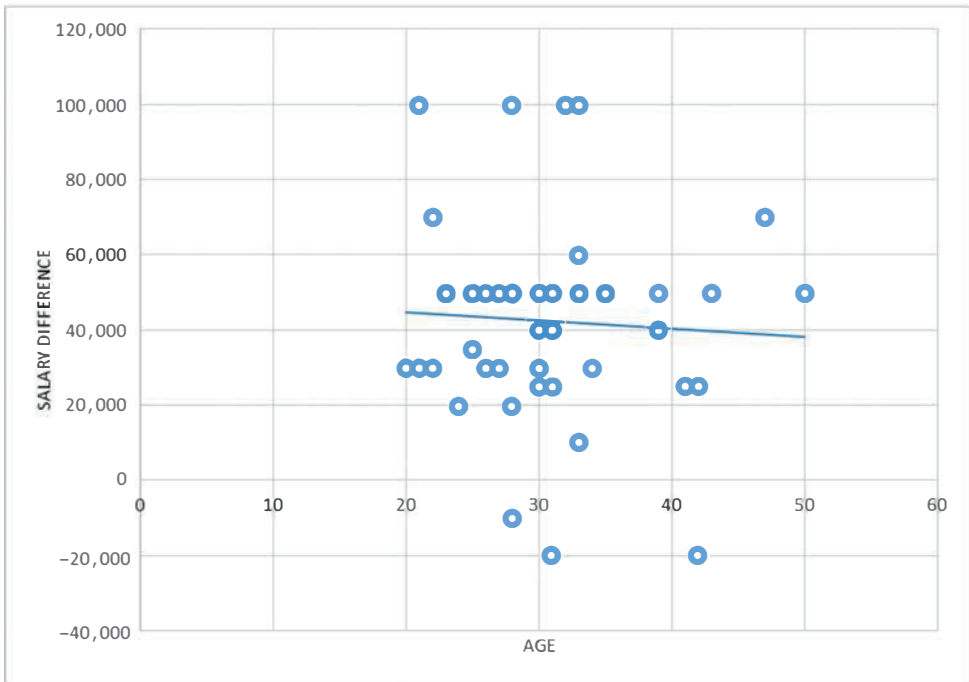


Figure 1: Relationship between salary-motivated outflow and age in the HDF 93rd CBRN Battalion

Source: Compiled by the author.

The figure above shows that 3 out of the 50 soldiers would leave the CBRN battalion even for a lower salary when their contracts expired. Consequently, they did not get from the

military what they expected. 2 out of these 3, who were not in the youngest age-group, ranked career as number one, so it was obvious that they were disappointed by the lack of predictable career prospects.

Fortunately, most soldiers stay in the CBRN battalion for even less pay than in the civilian sector. Most of the respondents said they would leave the army for an extra 40,000–50,000 Forints and there were a few ‘extremists’ who would only leave if they were offered 100,000 Forints more than their salary in the army. The average salary increase that would cause leaving the army is slightly decreasing with age but, as it can be seen, the three soldiers over 42 would quit only for a higher than average amount of money. Logically, they are afraid of starting afresh in a new workplace.

Conclusion

The key amount is 50,000 Forints, which has to be kept in mind. As this survey shows, if in 2018 civilian employers were able to offer a salary 50,000 Forints higher than what a soldier earned in the army, the majority of contract CBRN soldiers would leave.

Those soldiers who do not want to work hard and cannot follow the military regulations usually drop out but those who are suitable for service should not be forced to leave the army because of conditions that can actually be changed.

In conclusion, the main message of this work is that commander-to-soldier relations have a huge effect on soldiers’ lives, which cannot be ignored. It is an enormous responsibility for every leader/commander – they are the ones who can do the most for their soldiers. They can influence relations among their subordinates, and they shape the morale of the unit. Their most important task is to find the golden mean between consistency and empathy. When a leader is selected, his/her leadership style should be examined. The commander/leader at any level is responsible for the cohesion of the unit/subunit and is a role model for the younger officers. Officers who are not able to lead a unit/subunit by example should not have subordinates.

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Conflict Dynamics between Two Neighbours: Looking Beyond Federalism

Takele Bekele BAYU¹

Ethiopia is a multicultural and multilingual country. The Oromo and Somali communities are found in the same linguistic community, that is, the Cushitic language. Historically, Somalis and Oromo have a long tradition of co-existence and strong socio-cultural interactions, as well as antagonistic relationships and intermittent conflicts. Traditionally, the major sources of conflict between the two communities were competition over scarce resources, territorial expansion, livestock raids and counter raids, kidnapping for marriage purposes and the revenge tradition. However, this time the conflict took a different nature, form and bigger scale causing devastation never seen in the history of communal conflict in the country. The study has utilised primary and secondary data collection and employed narration and content analysis to realise the objective of the paper. The findings of this study reveal that the causes of the Oromo–Somali conflict are complex and dynamic. This urges the need to carry out a deeper investigation beyond the federal arrangement. Thus, fundamental and triggering factors including the involvement of internal and external forces, the collapse of social norms and prevalence of moral anarchism, socio-economic issues, competing interests among public and military officials, poor leadership and governance system, competing interests over resources, aspects of local cultural institutions in regulating inter-ethnic relationships are identified in fuelling ethnic conflict in the studied area. Since the conflict in the region is much more complex than the dominant narrative of resource scarcity and ethnic politicisation, open democratic dialogue, genuine consultation and negotiation at a different level with various interest groups, stakeholders and community representatives, militant groups operating in the area is of paramount importance to ease the increasing ethnic tension and political crisis in order to build sustainable peace in the region.

Keywords: Ethiopia, Oromo, Somali, ethnic conflict, ethnic relation and federalism

¹ PhD student, University of Public Service; e-mail: takeb21983@gmail.com

Introduction

Background of the Oromo–Somali conflict dynamics – Coexistence and ethnic tension

Ethiopia is a country situated in the Horn of Africa; it is the second-most populous nation in Africa after Nigeria, with a population of 108 million in 2018.² The country is bordered by Eritrea to the north, Djibouti to the northeast, Somalia to the southeast, Kenya to the south, Sudan and South Sudan to the west. Despite the fact that the country is rich in minerals, natural resources and vast fertile land, it happens to be one of the poorest countries in the world in Gross Domestic Product (GDP) per capita term, \$767.56.³ Ethiopia is very diverse with more than 80 ethnic groups, and to name a few among them are Somalis and Oromo.

Following the 1994 constitution, the country is divided into nine regions and two city administrations. The Oromia and Somali regional states are the two largest regions in the Ethiopian federation. The Oromo and Somali communities are members of the Eastern Cushitic linguistic group of the Horn of Africa. Historically, Somalis and Oromo have a long tradition of co-existence and strong socio-cultural interactions. They relate to each other in terms of language, religion and culture. Though the Somali communities live in the state of Somalia, they also live in different countries in the Horn of Africa including Ethiopia, Kenya and Djibouti. They all share the same identity (the Somali identity) and religion. However, they do have various clan systems which are indeed considered a point of difference among the Somali community. The Ethiopian Somalis have genealogical and kinship relations with the Somalis living in other parts of the Horn of Africa like in Somalia, Djibouti and Kenya. For instance, the dominant Somali clan living in the state of Djibouti categorised under the same clan along their Ethiopian counterparts called Issa Somali and ruled under the same clan leadership called Ugaas (title of Somali traditional leader). There is sometimes cooperation and other time disputes among and between the various Somali clans in the Horn of Africa. The Somalis practice Islam almost exclusively and are largely engaged in nomadic pastoralism. In contrast, the Oromo practice Islam, Christianity and traditional religions. However, large numbers of the Oromo population who live along the shared border with the Ethiopian Somali follow the Islamic faith and are predominantly engaged in pastoralism. The Somali and the Oromo ethnic communities represent the dominant pastoral groups in Ethiopia.

There are similarities and differences between the two groups when it comes to their relationship with the Ethiopian Government. The Somali community is cornered at the geographic and political periphery in the history of Ethiopian politics. However, the Oromo had played a key role in Ethiopian politics particularly since the beginning of the

² Worldometer, Department of Economic and Social Affairs, Population Division, World Population Prospects, 2017.

³ The World Bank Group, GDP per capita (current US\$), 2018.

20th century.⁴ Under the new ethnic based federal⁵ restructuring, the Oromo and Somali regional states share the longest internal boundary in the Ethiopian federation (more than 1,000 km).

As an adjacent community, the Somali and Oromo share common values and traditions.⁶ These include close linguistic affinity, shared Islamic faith, economic interdependence and shared cultural practices including flow of individuals across ethnic boundaries through intermarriage. In effect, they developed strong interethnic solidarity and alliances. For instance, historically the two communities had stood together against the Christian highland domination. Particularly, people around the shared border areas identify themselves with dual identity (Somali–Oromo identity). Here it is important to quote Kelkelachew Ali:

There existed generations-old cultural and linguistic transactions and widespread affiance relationships between the two ethnic groups. This phenomenon has resulted in the cross-cultural fertilization and acculturation whereby similarity of many cultural traits, including bilingualism of the overwhelming majority of the people from both groups took place.⁷

Despite the aforementioned communalities and close relationship, the Somali and Oromo had experienced and still experience antagonistic relationships and intermittent conflicts.⁸ Historically, there were intra- and inter-ethnic group conflicts in the region due to factors like climate variability, recurrent droughts and endemic poverty, fierce competition over scarce land and water sources, territorial expansion, livestock raids and counter raids.⁹ Although conflict in the region is as old as the community, the nature, behaviours and trends of conflict have become complex, dynamic and the result of the interplay of factors resulting in huge repercussion. Particularly the newly introduced political and structural changes in the country since 1991 have politicised the existing conflicts over natural resources.¹⁰

In the pre-federal state, the two ethnic groups along the shared border dealt with non-ethnic based administrative province and in effect, disagreements were settled through a common approach to shared resources, culture and governance systems. For

⁴ Christopher Clapham, *Transformation and Continuity in Revolutionary Ethiopia* (Cambridge: Cambridge University Press, 1988), 217.

⁵ Ethnic federalism includes ethnically defined national citizenship, self-determination on an ethno-linguistic basis as enshrined in the constitution, ethnically defined political representation and decision-making at all administrative levels and related policies.

⁶ Mohammad Abdulahi, *The changing nature of pastoral conflicts in south-eastern Ethiopia: The case of the Boran and Digodi pastoralists* (Africa Peace Forum, Pastoralist Concern Association Ethiopia, Interafrica Group, Saferworld, 2005), 7–17; Kelkelachew Ali, *Conflict and Conflict Resolution in Somali Regional State* (Final consultancy report for GTZ, Capacity Building in Governance Conflict Prevention 1 Transformation CPT, under the Ministry of Federal Affairs (MFA), Addis Ababa, 2005), 39.

⁷ Ali, *Conflict and Conflict Resolution*, 39.

⁸ Abdulahi, *The changing nature of pastoral conflicts*, 7–17.

⁹ Mesfin Getachew, 'Ethnicity and Ethnic-Conflict in Post-Federal Ethiopia: A case of Ma'eso District Conflict between Oromos and Somalis', *EPU Research Papers* no 03/06 (2006); Personal Interviews, 'Displaced ethnic Oromo and Somali', *Dire Dawa*, 19 July – 18 August 2018.

¹⁰ Getachew, 'Ethnicity and Ethnic-Conflict.'

instance, the Ma'eso and Babile districts, which are now contested districts between the two regions, were administered under the same administration called Hararge provincial administration. Similarly, the currently contested town Moyale and its surrounding were administered under the Sidamo provincial administration. Consequently, reports of violent conflicts between Somali and Oromo people along the shared border in the pre-federal state were rare and easily arrested through common formal and informal institutions.

However, the 1991 decentralisation system restructured the aforementioned districts along ethnic lines. Consequently, residents living in those districts were put under Somali and Oromo regional administrations with no clearly demarcated border between them.¹¹ The new system introduced in 1991 is wrapped up with the creation and implementation of boundaries to distinguish ethnic based limits. For instance, the 1991 decentralisation system restructured the aforementioned districts along ethnic lines and in effect, residents living along those districts were put either in the Somali region or the Oromo regional administration with no clearly demarcated border between them.¹² This situation has transformed the nature of conflicts in the area from one caused dominantly by resource competition into a kind of conflict in which boundary issues play an increasingly significant role.¹³ Further, the conflict in the region has been complicated by the involvement of multiple actors and forces from federal, regional, local governments to external state and non-state actors.¹⁴

Since 1992, inter-regional boundaries that divide the Somali region from its neighbour Oromia have been ill-defined and in effect, there have been violent conflicts along the commonly shared borders. The two regional administrations through the federal government mediation had sought for political and legal solution to their border problem and staged various consultation platforms. But all efforts had ended fruitless and failed to address contested territories between the two regions. For instance, in 2004–2005 the federal government has intervened as per to the constitutional provisions and carried out a referendum on contested areas. The result of the referendum has conferred 80 per cent of the disputed territories to the Oromia regional state.¹⁵ This has disappointed their Somali counterparts. Consequently, violent conflicts have erupted in the various districts and towns along the shared borders of the two regions, that is, Mullu, Asabot, Bardode, Moyale, Iften and Bable among others, with devastating outcomes – large-scale destruction of livelihoods, loss of lives and massive displacement of people. A case in this discussion includes that the Issa Somali were displaced from Bordede of Oromia region and were settled in Mullu district (the Hawiya clan) and the Ittu Oromo were also displaced from

¹¹ Ibid; Ahmed Shide, *Conflicts along Oromia–Somali States Boundaries: The case study of Babile district* (First national conference on federalism, conflict, and peace building, organized by the Ethio–German co-operation (GTZ) of the Federal Governance Development Project in collaboration with the Ministry of Federal Affairs, Addis Ababa, 2004).

¹² Shide, *Conflicts along Oromia–Somali States Boundaries*.

¹³ Personal Interviews, 'Displaced ethnic Oromo and Somali'.

¹⁴ Abdulahi, *The changing nature of pastoral conflicts*, 7–17.

¹⁵ Faisal Roble, 'Roots to the Somali Massacre: Challenging False Narrative', *Wardheer News*, 27 September 2017; Salem Solomon, 'What's Driving Clashes Between Ethiopia's Somali, Oromia Regions?', *Voice of America*, 29 September 2017.

Bike of Somali region and were settled in Me'aso district.¹⁶ The federal government has restrained from enforcing the result of the referendum due to fear of further escalation of conflicts along the shared border areas. Since then, therefore, full demarcation has never occurred between the two regions, which thought to have contributed to the ongoing border crisis in the region.

However, the federal government has orchestrated consecutive meetings between the officials of the two regions at federal, regional and district levels with the view to minimise the hatred sentiments and animosity between the local elites and communities of the two regions. Various joint conferences were held between communities and administrations along the disputed border. Furthermore, in 2005 the two regions have established 'joint peace committees' (JPCs) at regional, zonal and district levels. They also agreed to formulate 'joint development and security co-operation programs and law enforcement' to prosecute the unlawful practices and human right violations committed in the disputed border areas. Though all these efforts have contributed to de-escalate conflicts, they did not bring significant and sustainable results to the problem.¹⁷

Consequently, since early September 2017 an ethnic based crisis that has never been seen in the history of the country erupted along the shared border of the two regions. The conflict has displaced nearly 857,000 people from both communities. Nearly all districts along the shared border were affected by the conflict. The conflict drastically changed its shape, course and nature over time from local level territorial conflict to intra-federal boundary dispute with the involvement of multiple actors and forces and from a simple confrontation by using traditional weapons to war-like scenarios with modern and more sophisticated weaponry resulting in mass death and displacement. This has increased the complexity and intractability of the conflict between the Oromo and Somali communities. Ethnic conflicts in Ethiopia in general and ethnic based conflict between the Oromo and Somali communities in particular are domestic affairs and must be treated under non-international armed conflict. Accordingly, the 1949 Geneva Conventions and Additional Protocol II of 1977 that calls for the need to ensure a better protection for the victims of those under armed conflicts would have much relevance in dealing with domestic conflicts like the Somali–Oromo case.¹⁸ However, the Oromo–Somali conflict would have regional implications given the Somali kinship adherence in the Horn of Africa (hereafter: HoA). In effect, regional organisations like the Intergovernmental Authority on Drought and Development (IGADD) can play a positive role in the development of security regionalism in close collaboration with member states since its top priorities are conflict prevention and resolution concerns in the HoA.¹⁹ Therefore, this particular paper has attempted to

¹⁶ Zigale Tamir Tenaw, 'Indigenous institutions as an alternative conflict resolution mechanism in eastern Ethiopia: The case of the Ittu Oromo and Issa Somali clans', *African Journal on Conflict Resolution* 16, no 2 (2016), 85–95.

¹⁷ Muhyadin Odowa Liban, Local conflicts between Somali and Oromo people in the context of political decentralization in Ethiopia. Comparative case study on Ma'eso and Babile Districts (Unpublished MA thesis, Institute of Social Studies, Kortenaerkade 12 2518 AX, The Hague, 2006), 21–31.

¹⁸ United Nations, Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), of 8 June 1977.

¹⁹ Katja L Jacobsen and Johannes R Nordby, *Danish Interests in Regional Security Institutions in East Africa* (Copenhagen: Danish Institute for International Studies, 2013).

examine ethnic conflict dynamics along the shared border of the Somali and Oromia regional states in the Ethiopian federation and recommend the way forward.

Statement of the problem

Various research studies conducted in the study area tend to generalise that ethnic conflict in the study area is solely the result of ethnic federalism and its associated politicisation. Although the adoption of ethnic federalism as a diagnosis and response to Ethiopia's century-long divisions between nationalities and history of exploitation has created further challenges at various levels in the country, attributing the federal system for the entire crisis that Ethiopia is facing is wrong and fatal. The truth in the above explanation is that the new political and administrative arrangements has politicised the existing resource based conflict and thereby transformed local resource based incidences into an inter-regional state boundary dispute which in turn created hostility and mistrust between the Somali and Oromo ethnic communities. However, the explanation and analysis of conflict in Ethiopia including the Oromo–Somali conflict goes beyond the federal arrangement. Ethnic conflict in the study area is the result of combinations of forces including socio-cultural, historical, economic, political and environmental factors. This urges the need to carry out a comprehensive investigation and analysis on the dynamic nature of ethnic conflict in the study area. Therefore, this particular study is tasked with investigating conflict dynamics between the two neighbours (Somali and Oromo communities) while looking the issue beyond the federal centred analysis.

Research objective

The purpose of this study is to investigate and analyse forces responsible for the Oromo–Somali conflict beyond the federal arrangement.

Research questions

What are the major sources of ethnic conflict in the study area? How do you explain those factors? Who are the actors in the conflict in the study area?

Methodology

The study employed qualitative research approach.

Types, sources and instruments of data collection

To realise the purpose of this study, primary and secondary data types were used.

Primary qualitative data was gathered using tools like personal interview, thereby enabling the capture and discovery of experience, perceptions, feelings, or emotions regarding factors of ethnic conflict from internally displaced individuals/groups (Somali and Oromo ethnic members displaced due to the conflict and settled as refugees at the Dire Dawa city administration). The study has also intensively utilised secondary data sources that include books, legal and policy documents, internet articles, research articles by other researchers (journals), databases and other sources.

Methods of data analysis

The study employed qualitative data analysis, particularly content and narrative based analysis. Further, desk based analysis was also utilised to analyse relevant documents related to the issue.

Result and discussion

Various studies on conflict analysis in the region rushed to blame federalism and associated politicisation of ethnicity as well as traditional sources like competition over scarce resources for all of the problems and crisis related to ethnic conflict along the shared border of the two regions. The aforementioned factors play a significant role in instigating ethnic conflict in the study area but limiting conflict analysis to merely those factors would be shallow and fundamentally flawed. In the real world, there is no single conceptualisation of conflict that can capture the variety of variables, including cultural, historical, political and economic motivations and multiple interests of the various parties involved in the conflict. Explaining the roots of contemporary conflicts in the study area requires deeper investigation and analysis. Therefore, forces that drive communities along the shared border of the two regions into ethnic conflict are complex, dynamic and multidimensional that cannot be examined in a simplistic term. Broader forces, that is, historical, institutional/structural/political, economic, socio-cultural and environmental factors must be taken into account in explaining the ethnic conflict in the study area. Therefore, the recurrent and dynamic nature of the Somali–Oromo conflict must be seen as a nexus between interplay of factors including changing political and administrative dynamics at macro and micro level, emerging identity construction and/or reconstruction, the collapse of social norms, and prevalence of moral anarchism, socio-economic dynamics, competing interests among public and military officials, leadership and governance system, internal and external forces, competing interests over resources, aspects of local cultural institutions in regulating inter-ethnic relationship in fuelling the conflict. A broader discussion and analysis on the results of the personal interview and document analysis are presented here below.

The involvement of multi-layered actors with competing interests

In the past, conflicts in the region were limited in scope, nature, impact and participants. As a result, the conflict attracts only local actors and its impact is limited to local districts as revealed in the personal interview.²⁰ However, the conflict that erupted since September 2017 is violent and destructive causing mass death, displacement, violations of human rights and destructions of property that has never been seen in the country's long history of conflict.²¹ This is largely attributed to the presence and active involvement of various internal and external actors in the conflict. There are claims, reports and evidence that show the involvement of the following bodies in the local conflict: top regional and federal government officials, top military personnel, paramilitary and militia forces, rebelled armed groups, as well as forces from the state of Somalia.

In the past, it was common to see federal and local officials trying to work together to find common grounds so as to arrest the conflict and minimise its impact. However, in the new wave of conflict, severe political confrontation, suspicions and accusations have occurred among regional and federal government public figures as well as high rank military personnel that has further complicated the conflict. On top of this, the active involvement of paramilitary and militia forces and armed rebel groups siding their ethnic groups has fuelled the conflict on the ground which is unprecedented in contemporary Ethiopian history.²² Personal interviews conducted with both groups reflect that the Ogaden National Liberation Front (ONLF) siding the Somali community and the Oromo Liberation Front (OLF) siding the Oromo community have been actively involved in the conflict by providing small-scale weapons and ammunition to their respective ethnic group.²³ There is accusation and counter accusation between the top leadership of the two regional governments, the one blaming the other for secretly working with and covering the hidden hands of the two formerly labelled terrorist organisations, that is, ONLF and OLF in the local conflict.²⁴ Public figure finger pointing would not only affect political trust at the top leadership level but also would impact interethnic relationship since public opinion is largely shaped by the political elites. The quote here below is evidently underlining this:

In both regions – Oromia and Somali – regional officials at all levels neither behave as part of the federal system nor take responsibility to protect the welfare of all Ethiopians particularly the lives and properties of peoples of the neighboring regions. They rather consider themselves as “good” ethnic/clan leaders and “defenders” of their ethnic territories”.²⁵

²⁰ Personal Interview, ‘Displaced ethnic Oromo and Somali’.

²¹ Ibid.

²² BBC, ‘What is behind clashes in Ethiopia’s Oromia and Somali regions?’, 18 September 2017; Dawit Endeshaw, ‘Federal forces intervene in Somali–Oromia conflict’, *The Reporter*, 16 September 2017; Solomon, ‘What’s Driving Clashes’.

²³ Personal Interview, ‘Displaced ethnic Oromo and Somali’.

²⁴ BBC, ‘What is behind clashes?’

²⁵ Asnake Kefale, *Federalism and Ethnic Conflict in Ethiopia. A Comparative Regional Study* (Routledge, 2013).

Parallel to this, the personal interviews conducted with displaced respondents from the Oromia region have revealed that the ‘Liyu police’, a special police force based in the Somali region has played an active role in igniting the conflict and aggravating the situation. The ‘Liyu police’ as a paramilitary force was officially organised under the Somali regional government and has been receiving military training and equipment from the Ethiopian People’s Revolutionary Democratic Front (EPRDF) with the presumption that it is battling the then terrorist organisation, the Ogaden National Liberation Front (ONLF), a separatist faction that demands self-rule for Somalis, but now are pardoned by the government and cancelled from the national terrorist list. Though it has contributed in the fight against terrorist groups like Al-Shabaab in the region, the ‘Liyu police’ was accused of working for and protecting the interest of the corrupt leadership at the regional level led by the former president Abdi Mohammed Omar – and the TPLF corrupt leadership at the federal level who were actively engaged in illicit trade and contraband business along the Ethiopian Somali and Djibouti border. Furthermore, the Oromo activists as well as the Oromia regional state’s higher officials were accusing the ‘Liyu police’ for its alleged involvement in mass killings and displacements of ethnic Oromo along the shared border of the two regions. According to Mr Addisu Arega, the then Oromia regional government’s spokesperson, ‘in February and March of 2017 hundreds were reported to have been killed in the southern Oromia district of Negele Borena after an incursion by a paramilitary force called the Liyu Police’.²⁶ Mr Addisu has further accused the Somali regional administration and its security apparatus of secretly working with and inviting the national army of the Federal Republic of Somalia into the conflict.²⁷

The Somali regional government on its part was accused by the Oromia regional state’s high ranking official of providing home base for the OLF from where they carried out an attack against ethnic Somalis. The Somali regional government held the Oromia regional state and the OLF responsible for the killings of ethnic Somalis in the Oromia town of Awaday on 11 September 2017 where more than 50 Somalis were killed although the figures are disputed by the Oromia regional government.²⁸ Moreover, the personal interview conducted with displaced ethnic Somalis demonstrates that ‘the Oromia Police was irresponsible and failed to protect the Somalis, including mass killings, lootings and displacement of ethnic Somalis’.²⁹ Apart from this, the Oromo and Somali activists and neutral observers are accusing the TPLF dominated Ethiopian People’s Revolutionary Democratic Front (EPRDF) in aggravating the conflict in the study area. The party and its officials, specifically the TPL, were deliberately siding with the Somalis, which was not only geopolitically important but also provided vital sources of illegal income for the top leadership.³⁰

Moreover, the geopolitical and economic interests of the state over the borderland have made the conflict between the two groups complex. Because of the economic and political interests of government authorities at the centre, the state playing an impartial

²⁶ BBC, ‘What is behind clashes?’; Solomon, ‘What’s Driving Clashes’.

²⁷ Endeshaw, ‘Federal forces’.

²⁸ Ibid.

²⁹ Personal Interview, ‘Displaced ethnic Somali’, *Dire Dawa*, 15–18 August 2018.

³⁰ BBC, ‘What is behind clashes?’; Endeshaw, ‘Federal forces’; Solomon, ‘What’s Driving Clashes’.

role in the conflict made conflict resolution and peace building difficult in the region.³¹ Consistent with this view, various scholars have recognised the active role of the state in igniting conflict in the different parts of the world.³² The federal government plays a more strategic manipulative role when it comes to its economic and security interest.³³ The other important point that has to be made here is that the federal government is not proactive, it rather reacts once the conflict has erupted. On top of this, instead of securing the peace and security of its people, the federal government seems more concerned with its economic and political interests.³⁴ Therefore, because of the aforementioned factors, the contemporary Somali–Oromo conflict is complex and dynamic involving various internal and external forces.

Lack of good governance at different levels

Among others, the new state restructuring aimed at granting nations, nationalities and people of Ethiopia the right to self-administration, protect their distinctive socio-cultural and linguistic identity and bring government closer to the people through decentralisation to ease the provision of goods and services. Consistent with this, various legal and other programs of reforms have been designed to enhance good governance and democracy at the grassroots level. However, one party domination in the political system and the notion of ‘democratic centralism’ in the last three decades not only paralysed the political landscape but also made citizens develop a kind of attitude that their vote has no power to bring any difference since the political culture has made elected government to be accountable for the party channels, instead of ensuring accountability for their constituencies. The existence of political and economic marginalisation, rampant youth unemployment and resource competition continues to spark conflicts negatively impacting peace and security, and economic development across the country. Due to lack of democratic culture, the erosion of the rule of law, party monopolisation of the economy, as well as the politicisation of the civil service, the incidence of grand and petty corruption continued to be major sources of bad governance, which constitute a major explanation of ethnic conflict in the country. It is common to find in different government reports that bad governance and mass unemployment are the two main forces challenging the country’s positive economic growth and accelerating poverty reduction. The situation is more complex and challenging as one moves to the lower levels of administration.

The Somali–Oromo conflict needs to be understood and analysed within the framework of good governance. Like laws and provisions at the federal level, the Somali and Oromia regional states have their constitutions and other relevant instruments designed to ensure components of good governance like accountability, transparency, participation, effectiveness and equity, and the rule of law in their respective territories.

³¹ Nancy Peluso and Michael Watts eds, *The Violent Environments* (Cornell: Cornell University Press, 2001).

³² Raymond Bryant and Sinéad Bailey, *Third World Political Ecology* (London – New York: Routledge, 1997); Norman Long, *Development Sociology. Actor Perspectives* (London: Routledge, 2001).

³³ Kefale, *Federalism and Ethnic Conflict*.

³⁴ Personal Interview, ‘Displaced ethnic Oromo and Somali’.

However, both regions have failed to address the needs of their citizens, and in effect, lack of good governance has become the dominant source of ethnic conflict in both regions. The following manifestation of bad governance played a major role in igniting conflict between the two communities.

Weak law enforcement

Weak control and regulation of the federal government over the region's use and mobilisation of funds in the peripheral regions including the Somali state has created a breeding ground for corruption and misuse of funds for unintended purposes in the name of peace and security. Further, poor control of the movements of light and heavy arms and weapons along Ethiopia's border with neighbouring states such as Kenya and Somalia as well as weak internal control along the shared border between the two regions has created easy access to military equipment.³⁵ In this regard, conflicts in the past in the area were indeed less devastating as they mainly involved the use of traditional weapons such as bows, arrows and spears. However, the widespread availability of small arms and light weapons has significantly increased devastation in the region. That is why the recent conflict virtually looks like warfare when we look at the number of casualties from both sides.

Weak law enforcement has been observed at both level of government. The federal government has failed to protect the constitutional rights of citizens; the right of people's movement across the nation. Eviction and displacement of the so-called 'non-indigenous citizens' by local and regional government officials and even sometimes in conspiracy with top federal officials is common in Ethiopia. A case to mention is the Oromo eviction from the Ethiopian Somali regional state and vice versa before the eruption of the all-out conflict between the two ethnic groups. And surprisingly no one has been held responsible. The federal government has also failed to enforce the results of the 2004 political referendum on border demarcation. This failure, whatever the reason behind it might be, has resulted in the eruption of violent conflict that has never been seen between the two ethnic groups.³⁶ Hence, weak institutional enforcement as well as lack of political commitment at the federal government can be mentioned worthwhile in igniting the recent conflict between the two groups.

At the regional government level, officials from both sides failed to collaborate with the federal government in implementing the referendum result. Regional leadership has also failed to enforce the various peace and security agreements signed between the two regions. For instance, the two regions have signed a peace pact in April 2017 with the view to calm down the situation and bringing peace along the shared border. During the agreement, the two leaders (Lema Megersa of Oromia and Abdi Mohammed of Somalia)

³⁵ Kassa Getachew, 'An overview of root causes of problems that currently affect Boi'ana pastoralists of southern Ethiopia', in *Resource Alienation, Militarisation and Development: Case Studies from East African Drylands*, ed. by Mustafa Babiker (Khartoum – Addis Ababa: Proceedings of the regional workshops on east African drylands, 2002), 67–76.

³⁶ Personal Interview, 'Displaced ethnic Oromo and Somali'.

displayed a historic gesture of unity where the two regions appeared to have resolved their issues and were said to have reached an agreement to complete the border demarcation process pursuant of the 2004–2005 referendum. However, they failed to respect the terms of the pact. Instead of finding common solution to the problem, regional leaderships engaged in political confrontation and trading blames and accusation and counter accusation one against the other. This has worsened the situation on the ground. Therefore, if the regional leadership had showed good will, political commitment and leadership skills then it would have been easy to manage the conflict and minimise its impacts.

Lack of accountability and transparency

Local governments in Ethiopia are not functioning well to meet good governance demands though they are designed to promote efficient and equitable governance through transparency, accountability, grassroots participation and the rule of law.

The personal interview conducted with both groups reveals that ethnic based recruitment of servants and partiality in the distributions of goods and services are the main drivers of conflict between the Oromo and Somali communities along with the shared areas of the two regions.³⁷ For instance, the following disappointments have been expressed in the discussion:

Public officials in both administrations along the shared border areas employ discriminatory rules and regulations to benefit their ethnic base and recruit human personnel to different sectors based on ethnic identity though people along the shared border speak both Oromo and Somali language as well as have mixed identity and identify themselves with a dual identity. There are differences in treatment when it comes to access to public goods and services, resources and employment since public institutions are ethnicized and made to serve their kinship.³⁸

Social and mainstream media pressure

Media is a double-edged sword. On the one hand, in a country like Ethiopia responsible media (both traditional and social media) can play a huge role in democratising society and can serve as a system of checks and balances in regulating government behaviour and actions. Social and mainstream media can inculcate democratic values and norms in the minds of citizens thereby play an irreplaceable role in the creation of responsible citizenry. To execute these golden societal duties, media must operate within the legal framework and according to professional principles and values. When they do this, media can be a verification force and a place platform for rational discussion paving the way in building a democratic society and ensuring an accountable and responsible government. On the

³⁷ Personal Interview, 'Displaced ethnic Oromo and Somali'.

³⁸ Ibid.

other hand, given the consciousness of the mass and the lack of policy and legal framework, unchecked media particularly social media would be catastrophic pushing the country toward ethnic violence, political instability and even greater calamity.

In Ethiopia, both public and privately owned media are not committed to society's coexistence. Instead of advancing values like trust and tolerance to prevail between groups, they rather engage in political propaganda as the government mouthpiece and spread bad old narrations and memories that happened once in history but actually have no value for coexistence and are rather used to separate groups. Social media is also used irresponsibly to portray hate speech, bad memories to agitate one group over the other. Getachew Dinku, Head of the School of Journalism and Communication at Addis Ababa University (AU), has indicated that offensive messages, fake news, hate speeches, irrational arguments, messages that are intended to instigate chaos and conflicts and identity theft or violation of privacy are some of the problems that prevail in social media in Ethiopia. As a result, 'we need to create our ways of crafting the ethics of the public to avoid the side effects of these media'.³⁹ Here it is worth to mention and quote the comments on social media of Lidetu Ayele, founder of the opposition Ethiopia Democratic Party: 'The problem is a lot of things people view as gossip if heard by mouth, when they read about it on social media they take as fact.'⁴⁰ The personal interview with both groups demonstrates that mainstream medias owned by both the regional government and some private medias and people on social medias have conflict of interest in the situation and all acted irresponsibly by portraying bad images, spreading fake news, mistrust and intolerance to prevail adding fuel to the conflict between the two ethnic groups, Oromo and Somali.⁴¹

The weaponisation of social media by various entities paved the way in spreading false and manipulative narratives with phenomenal cases. For instance, in the 2016 Irreecha festival celebrated by the Oromo community. During the festival, a clash occurred between the police and protestors, which left more than 100 people crushed or stamped to death. Surprisingly, people on social media buzzed with claims that a police helicopter had fired into the panicking crowd. However, the truth is that the police helicopters dropped leaflets, not live fire or bombs, wishing participants a happy festival. The misinformation and fake news has ignited emotions among the youth and led to the destruction of foreign-owned factories, the privately owned flower industry, government buildings and tourist lodges across the Oromia region, which led the government to declare a six-month state of emergency.

The other point worthy of mentioning here is that the public takes for granted the news and reports of diaspora owned satellite television broadcasted from the United States, such as the Oromia Media Network and the Ethiopian Satellite Television. Indeed, they do produce decent original reporting, but they are not neutral and are often one-sidedly portraying only the bad image of the ruling party. The effect here is that their viewers take the stories for granted and propagate it on social media.

³⁹ Henok Tibebu, 'Crafting Social Media for Better Tomorrow', 23 November 2017.

⁴⁰ James Jeffrey, 'Ethnic Violence in Ethiopia Stoked by Social Media from U.S.', *IPS News Agency*, 11 February 2018.

⁴¹ Personal Interview, 'Displaced ethnic Oromo and Somali'.

Therefore, media (traditional, modern, mainstream and social media) can play a major role in peacebuilding by advancing values that are of paramount importance for coexistence or conflict by spreading hatred, mistrust and intolerance between communities. Indeed, responsible media work for the creation of a free and responsible society. However, irresponsible media work for the separation of communities by spreading hatred and fake news. This calls for coordinated effort amongst all stakeholders to come up with a sound public policy paving the way for social media to contribute to the nation's socio-economic and political progress. There is also a need to balance and address the tension between repressive media and media freedom in the country by designing appropriate proclamation through active participation from all stakeholders. Though the western liberal style of free media is not possible, yet a media code of conduct and core obligation is needed in Ethiopia to make media individuals and entities operate within the constitutional framework and other laws of the land to guarantee the democratisation of society and its system.

Mass youth unemployment

As indicated above, mass unemployment and bad governance are the two main forces challenging the country's positive economic growth and accelerating poverty reduction. Indeed, these are the forces responsible for the violent – sometimes peaceful – protests that rocked the country since 2015. The economy in general is not as effective as it is thought when it comes to job creation. This is primarily due to the prevalence of corruption and rent seeking political economy. In effect, mass youth unemployment is common in every part of the country. This has created a fertile ground for conflict entrepreneurs to mobilise the youth for their private benefits. In this regard, EPRDF old guards, a group who lost power at the federal level in the recent political shake up and reform, and corrupted regional and local officials, who feel discomfort with the new political dynamics, were accused of organising the unemployed youth from their respective ethnic groups and by funding them of destabilising the country. In effect, ethnic based conflict and political instability is common in every parts of the country. Due to years of EPRDF governance policy, which primarily focused on ethnic division and differences, made the young generation intolerant to one another. In both regions, irresponsible and corrupt officials have organised the unemployed youth and it is through them that these officials satisfy their economic and political needs. Organised youth taking the agenda of corrupt officials and driven by emotional claims and counter claims have played a major role in initiating and fuelling the Somali–Oromo conflict.⁴² Although respective religious and clan leaders have attempted to calm down the youth, all are too late to contain the emotional claims.

⁴² Personal Interview, 'Displaced ethnic Oromo and Somali'.

The new political dynamics at the federal level

When the political economy of a given country is dominantly controlled by certain ethnic groups, then others would actually suffer from injustice and unequal access to state power. This situation unavoidably creates conflicts within the ruling power and in the wider public. This is what happened in the Ethiopian context. The domination of one ethnic group within the EPRDF coalition government has led to the development of mistrust, disagreement and conflict between member parties. Further, the domination of certain ethnic groups in the political economy coupled with the prevalence of corruption has led to the dissatisfaction of the mass, particularly the younger generation. In effect, for the last three years the country has been rocked by mass violent protests, which first occurred in the two largest ethnic group regions, Amhara and Oromo but later on spread across the nation threatening the very existence of the state. Indeed, after the death of then Prime Minister Meles Zenawi, the central government is shaky and unstable due to the lack of a strong leadership that can absolutely control the party, as the government and the state witnessed during the Meles Era. Then, owing to the structural weakness of the federal government, various protests and conflicts erupted in the country. Particularly, the unstable federal government is unable to command effective control over the peripheries including the Somali and Oromia shared border areas. Indeed, after the death of Meles Zenawi, insecurity and incidence of conflict has increased in their region as if there is no government or change in government in the country. It is this time that the violent conflict has erupted between the Somali and Oromo ethnic communities along the shared border.⁴³ It is thought that since the epicentre of mass protest is the Oromia region, conflict entrepreneurs at the federal and Ethiopian Somali region level have instigated conflict along the already tense and volatile Somali–Oromia shared border with the view to divert public attention and the protesters agenda as well as to keep the Oromia region weak and unstable.

As the mass protests and political instability across the nation show no sign of stop, Prime Minister Hailemariam Dessalegn resigned from power claiming to be part of the solution to the country's political instability and deadlock. This is unprecedented causing a huge crack within the coalition. The mass protests and the split within the coalition have forced the EPRDF government to introduce major political and economic reforms, which is now under implementation in most parts of the country. However, those who lost power at the federal level, particularly the EPRDF old guards, that is, the founders of TPLF and ANDM and corrupted political elites at region and local level who feel insecure by the reform are instigating conflict between ethnic groups as it harms some groups and benefits others, while cramming bad image and meaning to the ongoing reform. Hence, these groups have been accused of destabilising the country including fuelling the Ethiopian Somali–Oromo conflict.

⁴³ Ibid.

Weak indigenous social and cultural institutions

As it is well known in pastoral areas, there are long established cultural based institutions responsible in establishing rules and regulation on the utilisation and management of common resource areas. It is also common to observe resources based conflict in pastoral areas. Nevertheless, through this institution, conflict easily gets controlled before it erupts into violence. In the post-1991 political system, Ethiopia was arranged in 9 regions along ethnic lines and two administrative cities.⁴⁴ In effect, common resource areas, which were in the past mutually utilised, have been territorialised in the same pattern creating problems to customary resource bases. In this regard, traditional resource based conflict has been politicised since territorial control enhances political power and economic interest of rival groups.⁴⁵ With this, one can see the shift of power from traditional institution to the decentralised formal political system. This is justified by the fact that traditional leaders are representatives of their respective ethnic groups and possess decision-making powers over all aspects of their society. In contrast, government officials and the ethnic based elite actually possessed the state power and claim to have the same decision-making power over the society. Consequently, the political elites with the view to own more political and economic control and decision-making power over the areas purposefully worked to make traditional institutions including mechanisms for resolving conflicts either loyal to the political system or undermine their authority within the society. Hence, local politics has weakened traditional institutions as a means of conflict resolution and management.

Here, I find important to present and quote the works of the African Centre for the Constructive Resolution of Disputes (ACCORD) on conflict resolution in the area as follows:

Since the last few decades, these traditional institutions have taken ethnic lines in creating dichotomies rather than playing the negotiator role, building on common values and practices. The political background for the divergence of traditional institutions from the role of negotiating for social harmony to that of igniting inter-group animosity and differences is closely connected to the post-1991 political order in the country.⁴⁶

Cultural institutions are politicised by the system and have poor public acceptance, trust and communicative power and above all, they stay with politicians as if they forgot what our society had in common with others. In effect, the politicised traditional institutions as well as their leaders have lost their decision-making legitimacy and moral authority because they are not making decisions on behalf of their respective ethnic groups, they rather serve the mere interest of the political system. Further, religious leaders and traditional elders are not committed as used to be. They are pursuing their economic interest, looking after the payment made by the government, to put literally per diem, for their assumed role in

⁴⁴ FDRE, 'Constitution of the Federal Democratic Republic of Ethiopia', *Federal Negarit Gazeta*, 1994.

⁴⁵ Getachew, 'An overview of root causes', 67–76.

⁴⁶ Tenaw, 'Indigenous institutions as an alternative conflict resolution mechanism'.

conflict management and peace building process.⁴⁷ Hence, it is in their interest to prolong the conflict and create a vicious circle of conflict between communities in so far as they are obtaining their per diem, as revealed in the discussion. Others, loyal institutions as well as religious leaders and traditional elders who promote the needs and interest of the society have been overlooked and actively undermined by the newly emerging ethnic elites or local government officials with their own agendas. In effect, they are weak in capacity to regulate society's problems. Therefore, the illegitimacy and impotence of traditional institutions as well as their corrupt leaders and the incompatibility of the federal structuring with customary institutions have contributed to the current large-scale violent conflict to erupt.

The collapse of social norms and prevalence of moral anarchism

In the last two decades, the gradual deterioration of the moral fabric and foundation of the society can be observed in Ethiopia. Knowingly or unknowingly, it is common to see people's violation of moral values. Individuals as well as groups of individuals have failed to differentiate what is good from what is bad which presented a challenge in the creation of good and responsible citizenry. It is common to see citizens perusing values that go against toleration and coexistence. Mass killing, displacement and looting is currently a day-to-day activity in many parts of the country. Instead of working hard, people prefer to take a short path including killing others as a way to the creation of wealth which has never been seen in the history of the Ethiopian society. Religions and cultural institutions have failed to execute their natural and societal duties in the creation of responsible and good citizens not helping them uphold and practice ethics, morality and values of coexistence like respect, tolerance, open and civic mindedness. Today one can observe citizen's alienation from social, moral and religious norms and principles and in effect, citizens are not tolerant with each other. Indeed, respected local traditional and religious leaders advised the youth to be peaceful, respect long held values of coexistence, and ordered the youth not to attack fellow citizens who lived with them for years. However, the youth did not pay any attention to the leaders' advice, rather they threaten to attack them first and later on move to other neighbouring ethnic groups.⁴⁸ Hence, old age values of tolerance and coexistence are now collapsing causing the prevalence of moral anarchism in the society.

Concluding remarks

The Oromo and Somali communities, due to their centuries-old interactions, have developed great common traditions and shared socio-cultural values. In the same token, the two ethnic groups have experienced antagonistic relationships and intermittent

⁴⁷ Personal Interview, 'Displaced ethnic Oromo and Somali'.

⁴⁸ Personal Interview, 'Displaced ethnic Oromo and Somali'.

conflicts throughout their history of existence, though the nature, behaviours and trends of conflict varied from time to time taking new forms and dynamics with huge repercussions. Traditionally, the main sources of conflict amongst clans in the region are identified as competition over scarce resources, territorial expansion, livestock raids and counter raids, kidnap for marriage purposes and the revenge tradition. However, after the newly introduced political and structural changes in the country (Ethnic Federalism), the existing conflicts over natural resources have been transformed into inter-regional boundary disputes and conflicts involving multiple driving factors and forces. This has increased the complexity and intractability of the conflict between the Oromo and the Somali communities. Particularly the ongoing violent conflict, which is believed to be started in September 2017 in the strategic town called ‘Chamuk’ close to the Moyale district has never been seen in the history of the country’s ethnic based conflict in terms of its magnitude, affecting nearly all districts along the shared borders and casualties, displacing nearly 857,000 people from both ethnic communities. Initially, the conflict erupted between the Borana, a dominant Oromo clan and Gerri, Somali clan, but later on the Gujji, the other Oromo clan, came as an alliance to support the Borana and fought the Garri. Traditionally, the Oromo consider the Borana their elder clan that deserves respect. In this regard, whenever the Borana were attacked by anyone, usually the attack came from the Somali, all other clans of the Oromo considered the attack as if it was conducted on all the Oromo community and fought in support of the Borana against the Somali. This is the way the conflict has started and became violent as well as spilled over across the shared border affecting thousands of people from both sides. Hence, this time the conflict took a bigger scale involving revenge and counter revenge as well as different actors and interest groups from local, regional, federal government and armed groups to external powers. With various efforts, the federal government tried to minimise and end the conflict between the two groups from deploying both the federal police and the national military forces to the area to organising post conflict peace building conferences involving responsible federal, regional and local authorities, religious and community leaders and the youth at large. Though such efforts are able to halt large-scale conflict in the area temporarily, small-scale conflict in the shared border area is persistent and above all, sustainable solution to the problem is far from being achieved. Therefore, the current Somali–Oromo conflict must be seen beyond ethnic federalism urging the government and stakeholders to consider other fundamental factors including the involvement of internal and external forces, the collapse of social norms and prevalence of moral anarchism, socio-economic dynamics, competing interests among public and military officials, poor leadership and governance system, competing interests over resources, aspects of local cultural institutions in regulating inter-ethnic relationship in fuelling the conflict.

Recommendations

Given the complex and dynamic nature of the conflict, open democratic dialogue, genuine consultation and negotiation at different levels with various interest groups, stakeholders, community representatives, militant groups operating in the area is of paramount

importance to ease the increasing ethnic tension and political crisis and to establish sustainable peace in the region.

Federalism alone cannot bring peace and stability if not implemented along with democracy and good governance. In this regard, both qualities lack in the Ethiopian federalism and in effect, the government must work hard in ensuring democracy and good governance and in democratising societal culture. Hence, this paper urges the need to establish legitimate, capable, accountable and democratic authorities and leadership particularly at the local level where the challenge of good governance is immense.

The current federal arrangement merely takes into account ethnic lines while overlooking the commonly shared value system and crosscutting variables. Since the problem is structural, the political structure and economy of the state has to be restructured in accordance with realities on the ground, long-term societal security and development needs in the manner that would reduce ethnic tension and troubles in the country. Communities like Somali and Oromo share more common values than issues that separate them and in effect, reorganising the administrative territory taking into account crosscutting values and variables is necessary, where people along the shared border often identify themselves with a dual identity.

In order to minimise the recurrent nature of the Oromo–Somali conflict, the federal government in close consultation with the two regions must implement the results of the 2004–2005 border dispute referendum. Regional leaders should cooperate with the federal government for the full implementation of the agreed issues instead of accusing one another. The federal government instead of deploying the federal military should work hard to create trust between the two parties to take care with full responsibility of the issues of peace and security.

The current percentage of the population under 15 is 46.3 per cent and the percentage of the population between 15 and 64 years old is 51 per cent, which means that the Ethiopian population is young with most of them almost unemployed, that is, the youth dependency ratio is at 75.8. In effect, there is a huge youth unemployment rate in the country, which indeed causes ethnic violence and political instability across the nation. If the growing youth population is managed well through a sound policy, then it would create a huge opportunity for the entire economic development, otherwise it would be a curse and would present an enormous challenge and threat to peace and security. Hence, this paper urges the government and relevant stakeholders to take coordinated actions in reducing the youth unemployment rate by increasing production and productivity as well as promoting the culture of hard work while designing and implementing various job schemes and programs.

The current political dynamics in the country has brought great hopes and confusion at home. Abiy Ahmed's government has taken groundbreaking reforms. However, his reform vision is challenged by old guards of the former ruling party (EPRDF), patron-client corrupt leadership and unprecedented ethnic rivalry and violence. To set the reform on the track, priority must be given to national dialogue with political parties, to the rule of law, democratising institutional and societal values, setting the economy on the right direction and minimising the huge youth unemployment, reaching out and convincing various interest groups and communities of the fact that the reform benefits all.

The current ethnic rivalry and violence is largely the result of the EPRDF's theory of governance which encourages ethnic competition over cooperation. This coupled with the politicisation of religious and cultural institutions has bred mistrust and hostility among and between various groups which in turn led to the collapse of social norms, the rule of law and prevalence of moral anarchism in the society. Hence, the government along with various state and non-state actors as well as community based cultural and religious institutions should work hard in establishing social harmony and tolerance as well as common interests and shared needs through increased cooperation and improved communication between various groups and communities to realise peaceful coexistence and a prosperous society in the country.

The absence of a decree, though currently under way, to hold Medias and individuals accountable for their behaviour and actions has worsened the conflict situation in Ethiopia. There is a need to have a sound media policy and policies related to hate speech and false information. This would increase the accountabilities and responsibilities of media entities and individuals while minimising the negative impacts. Apart from the government's efforts in the creation of responsible Medias and professionalism, regional organisations like IGADD in collaboration with international institutions and donor agencies should play their part in empowering Ethiopian journalists and media professionals on the role of the media in political violence.

Communities in the region have endogenous systems of promoting social cohesion and healing. Hence, as an active constitutive of state power, the government should empower traditional institutions and respect their values and autonomy so that they might practice conflict resolution to complement the state's peace building practices. Since traditional mechanisms alone cannot be enough for the management of the new challenges and changes in the region, it must be complemented with a modern way of conflict resolution and peace building. Since the region is the most volatile in terms of conflict and in effect, home for more fragile states like Somalia, Sudan and South Sudan, Ethiopia's political instability will have a spillover effect causing further political instability in the region. Furthermore, since Ethiopia has a historical role in the region in stabilising and fighting terrorism particularly in the state of Somalia, genuine support from the West and their multi-lateral institutions in building a robust state is of paramount importance not only to avoid the appearance of another failed and fragile state in the region but also for the fight against international terrorism. In effect, the West in general, the USA in particular should help build the institutional capacity and capabilities of the state thereby Ethiopia can realise its democratic transition.

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The Possibility of Peace between Hamas and Israel

Faisal WARIKAT¹ 

This paper investigates the possibility of establishing peace between Hamas and Israel, based on the politicisation model of armed groups that leads eventually to change the violent character of armed groups. The main question is: Can Israel and Hamas have a long-lasting peace to end the conflict in the Gaza Strip?

The main pillars of politicisation are the willingness of warring parties to conclude peace, the existence of a ‘hurting stalemate’, the narrowness of objectives and the ability to guarantee public support. The primary conclusion of this paper is that comprehensive peace is difficult to achieve, but a unique long-term truce ‘Hudna’ is attainable.

Keywords: *Hamas, politicisation, terrorism, Gaza, resistance group, armed group*

Introduction

Revolutions rarely compromise; compromises are made only to further the strategic design. Negotiation, then, is undertaken for the dual purpose of gaining time to buttress a position (military, political, social, economic) and to wear down, frustrate and harass the opponent. Few, if any, necessary concessions are expected from the revolutionary side, whose aim is only to create conditions that will preserve the unity of the strategic line and guarantee the development of a ‘victorious situation’.²

Tensions between Israel and Hamas started even before the establishment of Hamas in 1987, Sheikh Ahmad Yassin, one of the principal founders of the group, was imprisoned in 1983 for stockpiling small arms illegally; he was sentenced to 13 years; in 1985 was released as a part of the Popular Front – General Command agreement with Israel. Throughout its existence, Hamas suffered from loss of its leaders through leadership targeting, large-scale military operations and various economic sanctions; nevertheless, that did not compromise its survival.

Hamas started as a resistance movement in 1987 by taking part in the First Intifada and the Second Intifada; in 2006, it held a landslide victory in the parliamentary elections against its archrival Fatah. That victory entitled Hamas to form the first democratic government

¹ PhD student, researcher, University of Public Service; e-mail: faisal.warikat@uni-nke.hu

² Samuel B Griffith (trans.), *Mao Tse-Tung on Guerilla Warfare* (Washington: Department of the Navy, 1989).

within the Palestinian Authority (PA). However, Israel and the U.S. administration rejected those results; interestingly, pundits believe that victory was a result of the Palestinians dissatisfaction by the performance of the PLO. According to Hroub, it was not only the strength of Hamas but also the weakness of Fatah that attributed to that victory.³

The purpose of this article is to discuss the possibility of concluding a peace deal between Hamas and Israel. This can lead to ease the suffering of Gazans who are in a dire situation with about two million living in 362 km²; however, the article claims that a long-standing comprehensive political peace agreement between Hamas and Israel is not possible in the current time, with the preponderance of Israeli power and the imbalance that occurred after the deal of the century and the appalling Palestinian division among the different Palestinian factions. Israel and Hamas, at best, can conclude a security and humanitarian deal that pauses the conflict for a limited period.

The proposed definition of politicisation in this article is ‘the use of a political process to incur a change of the role nature of armed groups into becoming a political entity that has no connection with the use of violence as a mean to achieve its objectives’. This process is usually accompanied by economic and political gestures from the involved states.

The main theoretical conditions for politicisation are established based on academic research obtained by studying 648 terrorist organisations that operated between 1968 and 2006. Jones and Libicki found that 43 per cent of these groups ended their terrorist activities due to the political process.⁴

There are several ranges of variables that affect a group’s craving to turn toward a successful politicisation process. Firstly, the group’s organisational structure, networked organisations are less likely to negotiate than hierarchical groups.⁵ Secondly, public support and its importance to the group. Thirdly, the existence of a hurtful stalemate between the group and its antagonists.⁶

Another condition to consider is the breadth of objectives⁷ that contributes to the success of negotiations between states and armed groups; groups with narrow policy goals mean narrow policy changes. Minor territorial changes with narrow objectives make it easier for governments to concede to armed groups’ demands. Goals can range from narrow goals (such as forcing governments to change a specific policy) to broader ones (such as the goal of overthrowing multiple regimes), examples include the United Self-Defense Forces of Colombia, and to some extent loyalist paramilitary groups in Northern Ireland, like the

³ Khaled Hroub, *Hamas: A Beginner’s Guide* (London: Pluto Press, 2006).

⁴ Seth G Jones and Martin C Libicki, *How Terrorist Groups End: Lessons for Countering al Qaeda* (Santa Monica, CA: RAND Corporation, 2008).

⁵ Audrey Kurth Cronin, *How Terrorism Ends: Understanding the Decline and Demise of Terrorist Campaigns* (Princeton: Princeton University Press, 2009).

⁶ William Zartman, ‘The Timing of Peace Initiatives: Hurting Stalemates and Ripe Moments’, *The Global Review of Ethnopolitics* 1, no 1 (2001), 8–18.

⁷ In this paper, the breadth of objectives might not coincide with the same suggested by other experts; the broader here means the ones that are difficult for the state to accept as they jeopardise its survival, while the narrow objectives are those that governments can discuss and approve, for example, giving more political rights to deprived ethnicities.

Ulster Volunteer Force. At the end, pursuit of peaceful solutions with groups that do not adapt their objectives to narrow ones is a waste of time.⁸

At the same time, negotiation should not deprive the group's sense of presumed victory; groups typically end their activities when their announced objectives have been achieved, as was the case with The Irgun Group and its offshoot Stern gang in Israel after 1948. Governments throughout history claim that terrorism is ineffective as an instrument of political change. Nevertheless, previous examples provide convincing evidence to the contrary.⁹

As far as states are concerned, the primary variable is their willingness to reach a peace settlement and negotiate with 'terrorist organisations'. Some countries claim that they cannot negotiate with those whose 'hands are stained with innocent blood'; however, historically, most states have negotiated directly or indirectly with terrorist groups, for example, Colombia successfully negotiated with the FARC, and the U.K. with the IRA.

Indirect negotiations between Hamas and Israel are directed mainly by the Egyptian Intelligence and limited United Nations (UN) supervision to achieve unstable peace between both parties. Deals never went to the level of a peace agreement; it is not a strategic agreement with political ends like the previous ones announced by Sheikh Yassin, which talked about an Israeli withdrawal from the occupied territories after 4 June 1967, return of refugees, Jerusalem status, security and borders.

The suggested deal is more to be named by a long-term truce or 'Hudna'. Some people prefer to call it 'Tahdiaa'.¹⁰ This agreement entails a return of missed in action Israeli soldiers' bodies, lifting the siege over Gaza, allow inhabitants of Gaza to travel through Israel to the West Bank and beyond, plans for a Gaza seaport with agreed security measures. For all that, Hamas needs to exercise its authority in the sector over itself and over other Palestinian factions.

Factors affecting Hamas's ability to conclude a peace agreement with Israel

The main variables that hold Hamas and Israel back from concluding long-lasting settlement are public support, breadth of objectives, ideological stance, division between Hamas and Fatah.

⁸ Andrew H Kydd and Barbara F Walter, 'The Strategies of Terrorism', *International Security* 31, no 1(2006), 49–80.

⁹ Bruce Hoffman, *Inside Terrorism* (Columbia University Press, 2006), 61.

¹⁰ 'Tahdiaa' means the pacification of violent activities between the warring parties, though from a language perspective it hints that Tahdiaa is concerned about a limited and short interval of time. Some think that Hudna is a religious term, but that is not true, as Hudnas were signed between some Arab states like Jordan and Israel after the conclusion of the 1948 war in Rhodes. Tahdiaa means cessation of military activities for a particular limited time; it implies a short time interval. It does not imply hostilities. In English, it is more to be named ceasefire understandings.

Public support

A leadership with public support is essential condition for concluding peace agreements, similar to what happened on the Israeli side, when Prime Minister Ariel Sharon dismantled Israeli settlements from Gaza in 2005 and when Menachem Begin withdrew from Sinai after the success of Camp David in 1978. This proves the thesis that hard decisions need leaders with aggressive attitudes, ones who have bloodstains on their hands. Hamas is sensitive to the public opinion inside Gaza and the West Bank; without having the proper public support, peace is meaningless as the main concern for Hamas is its survival, which counts on its ability to mobilise and recruit to replenish fallen fighters and be ready for future rounds of battles.

A survey about the support of peace between Hamas and Israel was distributed in the West Bank, and results came as follows.

Table 1: Public support for peace process

What	Percentage
Support for a long-term truce between Hamas and Israel ('Hudna')	40 per cent
Peace between Hamas and Israel will impact the popularity of Hamas negatively	70 per cent

Source: Compiled by the author.

40 per cent of the respondents answered that they welcome a Hudna between Hamas and Israel, while 70 per cent of the same group answered that Hamas’s popularity decreases in the aftermath of such agreement. This result shows that peace with Israel has to be in line with Palestinian’s expectations; otherwise, it can be disastrous to Hamas.

Another survey done by the Palestinian Center for Policy and Survey Research (PCPSR) in 2019 reveals that 52 per cent (down to 44 per cent in the Gaza Strip) believes that the chances for a Hamas–Israel agreement on a long term Hudna or cessation of violence are slim, while 36 per cent think that chances are medium, only 10 per cent believe that chances are high.¹¹

In 2006, Hamas won the Palestinian Legislative Council (PLC) elections, which gave a clear indication of its popularity. The movement’s election platform, along with four independent candidates supported by Hamas, reaped almost 60 per cent of the votes, with a result of 78 per cent of eligible voters, but that is not reflective to Hamas’s weight within the Palestinian community; that victory was primarily attributed to the failure of Fatah at that time in many administrative issues. Khaled Hroub believes that Hamas’s bedrock popularity with the Palestinian constituency ranges from 30 to 40 per cent.¹²

The Palestinian people’s support for peace is also evident in two separate polls held by two Palestinian centres under the supervision of David Pollock. The results for the questions to a formal ceasefire with Israel garners more support than opposition: 73 to 25 per cent in one poll; 51 to 45 per cent in the other. On the question of complete peace with Israel, both polls show more popular support than opposition. One poll shows Gazans

¹¹ PCR, ‘Public Opinion Poll’, s. a.

¹² Hroub, *Hamas*, 80.

say yes by a margin of 53 to 45 per cent; the other poll yields a slightly narrower margin, 48 to 44 per cent¹³ in 2018. This poll testifies that people in Gaza need peace and look for it.

Ideological constraints

There are some obstacles embedded within Hamas's 1988 Charter; in 2017 Hamas published its new political charter, which modified its previous charter. The main amendments in this political program are: 'Hamas affirms its position that its conflict is with the Zionist project in Palestine not with the Jews. Hamas movement does not wage a struggle against the Jews because of their religion but instigates a struggle against the Zionists who occupy Palestine. Secondly, the new charter abandons past references claiming Hamas is part of a pan-national Muslim Brotherhood (MB), to which it was closely linked when formed'; this new position helped Hamas in improving its contacts with the Egyptian regime.

Breadth of objectives

In this respect, Hamas cannot claim the liberation of the whole of historic Palestine as a realistic demand for peace with Israel. Hamas changed its tone to cope with international demands. In a 2008 interview, the chief of Hamas Politburo Khaled Mishal offered that a peaceful resolution could be achieved with the establishment of a Palestinian state with full sovereignty based on the 1967 borders, including East Jerusalem, without Israeli settlements.¹⁴ This is not a new offer and is along the lines offered by Sheikh Ahmad Yassin and Abed al-Aziz al-Rantissi, and others as far back as 1996.¹⁵ Currently, the objectives of Hamas are getting narrower to be humanitarian-oriented aimed at improving the living standards of Gazans and a return of prisoners and detainees in the Israeli prisons.

The existence of the Mutually Hurting Stalemate (MHS)

William Zartman¹⁶ claims that 'Parties resolve their conflicts only when they are ready to do so—when alternative, usually unilateral means of achieving satisfactory results are blocked, and the parties feel that they are in an uncomfortable and costly predicament. At that ripe moment, they grab on to proposals that most of the time has been in the air for a long time and that only now appear attractive'.¹⁷

¹³ David Pollock, 'A Nation Divided: Palestinian Views on War and Peace with Israel', *The Washington Institute*, 22 June 2020.

¹⁴ Al-Jazeera English, 'Talk to Al Jazeera – Khaled Meshal: Struggle is against Israel, not Jews', 07 May 2017.

¹⁵ Zaki Chehab, *Inside Hamas: The Untold Story of Militants, Martyrs and Spies* (London – New York: Tauris, 2007).

¹⁶ Zartman is a scientist and writer of conflict management.

¹⁷ Zartman, 'The timing of peace initiatives'.

The ripeness of a moment is one of the absolute essences of diplomacy, wrote John Campbell, ‘You have to do the right thing at the right time’, without indicating definitive causes.¹⁸ He also said that: ‘Stalemate is the most propitious condition for settlement.’ Conversely, practitioners usually hear that specific mediation initiatives are not advisable because the conflict is not yet ripe.

The concept of a ripe moment focuses on the parties’ perception of a ‘Mutually Hurting Stalemate’ (MHS), optimally linked with an impending past or recently avoided catastrophe.¹⁹ MHS is based on the perception that when the involved parties find themselves locked in a conflict or war from which they cannot escalate to victory, and this deadlock hurts both of them, they ask for an alternative policy or way out. The crisis provides a deadline or a lesson indicating that pain can be sharply increased if nothing is done about it now.

Israel failed in subjugating Hamas by the use of different methods, ranging from targeting of senior leaderships to the wage of military operations against Hamas.²⁰

Hamas proved its ability several times to hurt Israel whenever it liked; according to Israeli human rights organisation B’Tselem, Palestinian factions killed about 1,426 Israelis ‘civilians and military’ from 1987 to 1996, and Israelis killed 5,050 Palestinians during the same period (137 Israeli children and 998 Palestinian children, less than 18 years old).²¹



Figure 1: Comparison of fatalities among Israelis and Palestinians

Source: Data from B’Tselem.

¹⁸ Ibid.
¹⁹ Ibid.
²⁰ Ahmad Mansour, ‘Interview with Sheikh Ahmad Yasin’, 20 May 2010.
²¹ B’Tselem, ‘Fatalities: All Data’, s. a.

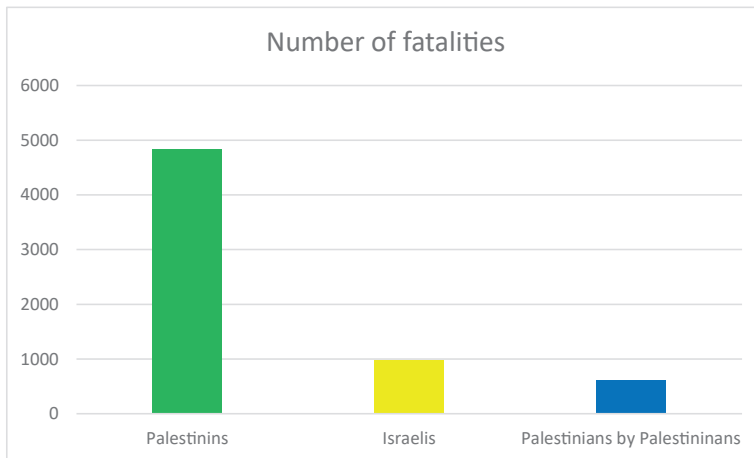


Figure 2: Number of fatalities from 2000 to 2008

Source: Data from B'Tselem.

Those statistics demonstrate that Hamas managed to inflict damages inside Israel and Israel has interest to have some kind of peace with it.

Organisational structure

The organisational structure might hinder or enhance the chances of success for peace deals, one of Hamas's advantages is the separation of outside political leadership (mainly present in Qatar and Turkey), from its military wing. Hamas's organisational structure is divided into three parts: West Bank, Gaza and outside political leadership, with seven geographical regions in the West Bank and five in Gaza.²² It has a strong leadership in Ismail Haniyah; his leadership is mainly based on democratic legitimacy as most Gazans favour him even inside the West Bank. Simultaneously, the military wings are expected to play partially against concluding a complete peace agreement with Israel.

The loss of state sponsorship

Structural reforms happen when the group loses its main contributor; an example is the FMLN in El Salvador after the collapse of the USSR. The total dependence on state

²² Jacob N Shapiro, *The Terrorist's Dilemma: Managing Violent Covert Organizations* (Princeton: Princeton University Press, 2013).

sponsorship impedes peace agreements unless the sponsored state endorses the proposed agreement.

Hamas is still in good relation with Iran; its relations with Egypt were affected by the Muslim Brotherhood's weakness (MB), but currently started to improve.

Its neutral stance during the Syrian civil war caused her the loss of the Syrian support, though, when Yahiya Sinwar took over from Ismail Haniyeh in 2017 as the leader of Hamas in Gaza, he returned the relation with Hezbollah and Iran to its normalcy. However, it is believed that Iran will hinder any political solution between Hamas and Israel.

Reason for survival

The Palestinian Authority (PA) is stringent in demanding to disarm Hamas and other factions before their transformation into a political entity. Ironically, the minute Hamas stops fighting Israel, Fatah and other Palestinian groups will be portrayed as a traitor to the resistance cause.

Armed groups like Hamas and Hezbollah need a pretext of conflict to remain in life and compete with other local competitors' 'raison d'être', when they lose the resistance reason for survival, they are compared to other secular groups.

One of the primary reasons that militarised Hamas in 1987 and expedited its shift from being social services provider is that most of its supporters left to join the Palestinian Islamic Jihad (PIJ).²³

Omar Shaban,²⁴ a Palestinian expert, claims that people in Gaza are classified into three main groups about Hamas: the first group are supporters of Hamas; the second group are anti-Hamas like Fatah supporters; the last group is the not-caring ones, but mostly they sympathise with what they feel is suitable for themselves. The first group might not accept peace with Israel, but in the end, they are committed to the cause of Hamas, the second group will exploit any peace deal to stigmatise Hamas and attack its credibility; the third group will build their opinion upon the change they notice in their everyday life.

The main factors affecting the Israeli side

Ideological stance

The Zionist identity is based on the value of Jerusalem and that Palestine or 'Judea and Samaria' are the biblical land of the Israelites. The historical suffering of the Jews gave them a distinct identity that magnifies the paranoid character and suspicion of other 'Gentiles'. The ideological view about Gaza is not the same as the view towards the West Bank, Gaza is not part of the biblical land for the Zionists, and it is viewed as a reservoir of economic and humanitarian problems. In contrast to its position toward the West Bank,

²³ Chehab, *Inside Hamas*.

²⁴ Personal communication, interview held with him in 2020.

in 2005, Ariel Sharon unilaterally dismantled Israeli settlements and withdrew from the Gaza strip. So, it will not be an issue to get the required Israeli public support for a peace deal that focuses on Gaza without connecting it to the West Bank complex situation.

Willingness to make peace

Analysts and experts often quote Henry Kissinger's assertion that 'Israel has no foreign policy, only domestic policy'. While stressed too strongly, Kissinger's comment captures well the common understanding among political scientists and international relations specialists that domestic considerations have a significant effect on the Israeli foreign policy.²⁵

During a lecture in Budapest, Avigdor Liberman answered about a peace deal with Hamas that it is a low-intensity conflict and Israel can live with it.²⁶ In terms of quality, quantity and military effectiveness, Hamas's weapons and all other Palestinian weapons combined, for that matter, have never amounted to a severe threat to the State of Israel. These weapons could only inflict harm in the form of guerrilla attacks, quick and short shootouts and suicide bombings.²⁷

A high percentage of Israelis support ceasefire talks with Hamas, according to a survey, done as part of the Israel Democracy Institute's monthly peace index, which was released amidst reports of indirect negotiations between the state of Israel and Hamas to reach an agreement that would end months of violence and struggle along the Gaza border and improve humanitarian conditions in the Palestinian enclave of Gaza. Among Israeli Jews, 57 per cent said they support holding talks with Hamas, with those numbers peaking to 70 per cent and 81 per cent, respectively, among voters on the centre and left of the political spectrum. Right-wing voters, however, were divided, with 45 per cent supporting and 47 per cent opposing negotiations with the Hamas movement, while 60 per cent of Arab Israelis said they were in favour.²⁸

The fragmentation of the opponent

The known devil is better than unknown angels, Hamas is well known to the Israelis since its inception, and they have an excellent database about it as a result of the detention of its principal leaders and the extensive use of informants. Sources in Israel believe that Hamas turns to be a stabilising force and tries to rein in other groups like the Palestinian Islamic Jihad (PIJ) who tries to derail stabilisation efforts in the beleaguered enclave.

²⁵ Avi Shlaim, 'Israeli Politics and Middle East Peacemaking', *Journal of Palestine Studies* 24, no 4 (1995), 20–31.

²⁶ As reported by Rozsa Erisbel (a specialist in WMD proliferation and the Mena region), who attended that lecture.

²⁷ Hroub, *Hamas*.

²⁸ Alexander Fulbright, 'The majority of Israelis back truce talks with Hamas – poll', *The Times of Israel*, 05 September 2018.

The effect of the deal of the century

The Trump Peace Plan (also called ‘the deal of the century’) was rejected by 94 per cent of a Palestinian sample, while more than 80 per cent say that it returns the conflict to its existential roots.²⁹ The main elements of Trump’s deal are that the united, undivided Jerusalem is the capital of Israel, connecting Gaza with the West Bank, which brings economic growth to the Palestinians, disarming Palestinian groups like Hamas. The failure of the deal brought the logic that any deal without Palestinian consent is a waste of time.

Conclusions

*If Hamas has thrown the gauntlet to Israel, Israel should pick up the gauntlet and explore every possibility.*³⁰

Blair, who was the envoy of the Middle East quartet – composed of the U.S., EU, UN and Russia said that the international community should have tried to ‘pull Hamas into a dialogue’. He added that he and other world leaders were wrong to yield to Israeli pressure to impose an immediate boycott of Hamas after the Islamic faction won Palestinian elections in 2006.³¹

According to the social constructivist line of thought, both Hamas and Israel have fundamental issues to their rapprochement; Israel insists on its Jewish identity, making it unlikely to compromise on Jerusalem. Hamas is also having hindrances like its 1988 charter, though some experts believe that it is of little importance to it,³² especially after the publication of its political document in 2017. The internalisation of Hamas forces it to change its norms to adapt to the international realm set of norms that prohibits violence and call for peaceful means. Hamas’s nature and ideology cannot compromise a call to eternal peace with Israel, this ideological standpoint constrains their manoeuvrability, which leads to the conclusion that Hamas and Israel are unlikely to come to a comprehensive strategic peace agreement that discusses vital issues of the Israeli–Palestinian conflict that are borders, refugees and Jerusalem; the other element that will not allow such an agreement is the expected opposition from Iran and even from Fatah.

Currently, the only option that is available for Israel and Hamas is a deal of peace that is restricted to security and humanitarian aspects entailing the release of prisoners, lifting the economic siege over Gaza, lifting movement restrictions over Gazans, more economic growth to the citizens of Gaza, the return of the Israeli soldiers to Israel, control of the border with Israel. In a nutshell, security and humanitarian truce are in the interest of both sides, it is not in the interest of Israel to have chaotic Gaza in its backyard, and Hamas likes to respond to the aspirations of the youth of Gaza to have a better future.

²⁹ PSR, ‘Public Opinion Poll (75)’, s. a.

³⁰ Gershon Baskin, ‘Encountering Peace: Israeli–Hamas negotiations now!’, *The Jerusalem Post*, 11 April 2018.

³¹ Donald Macintyre, ‘Tony Blair: ‘We were wrong to boycott Hamas after its election win’,’ *The Guardian*, 14 October 2017.

³² Khalil Shikaki, ‘Peace Now or Hamas Later’, *Foreign Affairs* 77, no 4 (1998), 29–43.

Israel does not mind of a role of Hamas inside the Gaza strip but to restrict the dialogue inside Gaza or a prospected state in Gaza, that move could precipitate international support to the Strip; however, Hamas is not in power of limiting its authority to Gaza.³³

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The Consequences of Public Procurement and Its Associated Irregularities in Ghana

Emmanuel Abeku ESSEL¹ 

Ghana spends a large number of its public resources on the acquisition of goods, works and services with most of them being sourced through Public Procurement. The country in its quest to ensure transparency and efficiency in its public transaction established the Public Procurement Authority (PPA) and clothed it with powers by an Act of Parliament to discharge the given responsibilities. However, since 2003 when the 4th Republican rule was instituted, not a single government regime has exited from office without recourse to irregularities associated with the procurement processes as reported by the Auditor General's Annual Reports or reports by Civil Society Organisations (CSOs). The goal of this paper is to look at the consequences of these irregularities in the procurement process posed to Ghana's development. The methodology used in carrying out this study centred mainly on secondary data, and some recommendations have been offered for consideration.

Keywords: *procurement, irregularities, consequences, government, corruption*

Introduction

Fighting corruption is not easy in a third world country like Ghana. Many Sub-Saharan African countries are battling corruption every day with the hope of winning them. Unlike many criminals, dishonest public officials often continue to have power and influence. Political interference, even in cases involving low-level officials, can frequently derail a prosecution. Civil society organisations may help uncover fraudulent activities, but they also may undermine effective prosecution by inadvertently tampering with evidence or tipping off the crooked politicians. As a consequence, a heightened sense of accountability among politicians, public bodies and institutions has emerged, as has a consequent demand for anticorruption agencies. Given the widespread perception of corrupt practices and inefficiencies in the process, the Government and its development partners thus, found it expedient to take the necessary steps to revamp the process and also build trust to eliminate corruption. It is in light of these that the Public Procurement Act, Act 663 was passed in 2003. This law, which is a comprehensive legislation designed to eliminate the shortcomings and organisational weaknesses which were inherent in public procurement

¹ PhD student, University of Public Service; e-mail: abeabi@yahoo.com

in Ghana, sought to ensure sanity and value for money in the public procurement landscape. Ghana spends a significant portion of its public resources on the acquisition of goods, works and services and these are sourced through the Public Procurement Authority (PPA). This mechanism was a way of ensuring efficiency and transparency, because about 80 per cent of the country's national tax revenue, which is an equivalent of about 17 per cent of the country's GDP, is spent through public procurement.²

According to Ofori-Mensah and Rutherford (2011),³ most audit reports on public procurement in Ghana have, in most cases, highlighted several procurement breaches. For instance, the immediate past Chairperson of the Electoral Commission (EC) of Ghana was deemed to have blatantly breached procurement laws in the award of several contracts in her three-year period at the helm of affairs, prior to the 2016 elections. The breaches upon which she was removed from office included but was not limited to the creation of a new EC logo; engagement of lawyers without going through the proper procurement process as no formal contractual arrangement between the EC and the law firm (Sory@Law); unilaterally abrogating a duly procured contract with a tech company, STL; the decision to acquire a new office block for the Commission; the award of a contract for the construction of pre-fabricated District Offices for the Commission, and a contract for consultancy for the pre-fabricated works. Ofori-Mensah and Rutherford (2011) further added in their study that, the goal for the enactment of the Public Procurement Law, 2003 (Act 663) which was to eliminate the shortcomings and organisational weaknesses that were inherent in the public procurement process in Ghana was far from being achieved. In the face of these challenges, it became evidently clear that, the best way to ensure an efficient public procurement system and to have value for money in the area of government expenditure, which is essential to a country facing enormous developmental challenges is through the proper procurement process.

The World Bank⁴ reported that about 50–70 per cent of the national budget of Ghana (after personal payments), is procurement-related. The passage of the law on Procurement undeniably set into motion other relevant governing and regulatory mechanisms and ultimately, the Public Procurement Authority. All this was an effort to regulate government expenditure in the area of Procurement, something, which came into being after the Public Financial Management Reform Programme (PUFMARP) in 1996 with the hope that it would help end the perennial problem of government resources going down the drain in the area of Procurement.⁵ Ever since the law was passed with the belief that it would help push back all manner of irregularities and leakages in governmental expenditure on Procurement, the anomalies still persist. Considering the significant proportion of national revenue used on Procurement, it could be said that most governments around the

² Collins Ameyaw, Sarfo Mensah and Ernest Osei-Tutu, 'Public Procurement in Ghana: The Implementation Challenges to the Public Procurement Law 2003 (Act 663)', *International Journal of Construction Supply Chain Management* 2, no 2 (2012), 55–65.

³ Michael Ofori-Mensah and Lucas Rutherford, 'Effective Parliamentary Oversight: Mission Impossible?', *Governance Newsletter* 17, no 3 (2011), 1–9.

⁴ The World Bank, *Public Procurement Act of Ghana – Country procurement assessment report* (Washington, D.C.: The World Bank, Report No. 29055, 2003).

⁵ Ameyaw et al., 'Public Procurement in Ghana'.

world often flop in their meticulousness in the area of contracts or procurement process, and this leads to inefficiencies in the country's governance system. This practice leaves in its trails harsh environmental conditions for the citizenry, social and economic impacts.⁶ These irregularities ultimately culminate into the loss of huge sums of money, something that has a far-reaching consequence on the country and the citizenry, which invariably impedes national development.

As stated by Hui et al (2011),⁷ corruption could threaten legitimacy in governance, and as such, good policies and procedures must be put in place, if not to check it, but to eliminate corruption in order to enhance transparency, accountability and integrity. Public procurement irregularities undeniably are a risky phenomenon which if not well checked can serve as an avenue for embezzlement and misappropriation of state funds. In recent times, however, there have been calls to consider long-term economic, social and environmental benefits of governments' procurement practices towards continuous development.⁸

The paper looked at the procurement processes in Ghana with emphasis on the irregularities that has engulfed the system and the consequences it has brought on the governance system in the country.

Public procurement practices in Ghana

Procurement is considered part of the budget and financial management in the national economy. Improvement in the public procurement system, therefore, has a direct and beneficial effect on the overall economic performance of the economy of every country.

In the words of Adu Sarfo and Baah-Mintah (2013)⁹ as cited by Tweneboah Senzu and Ndebugri (2017),¹⁰ financial management, mainly public financial management is an attempt made by the Government to ensure that reliably, the budget is either balanced or there is a surplus to deal with other contingencies. According to Lysons and Farrington (2012),¹¹ the word procurement defies a single lexicon – in terms of definition. Neupane et al. (2014),¹² referred to public procurement as processes through which government

⁶ Peter Adjei-Bamfo, 'Mainstreaming Sustainable Public Procurement in Ghana's Public Sector: The Role of E-Government', 2017.

⁷ Wee Shu Hui, Radiah Othman, Normah Hj Omar, Rashidah Abdul Rahman and Nurul Husna Haron, 'Procurement issues in Malaysia', *International Journal of Public Sector Management* 24, no 6 (2011), 567–593.

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¹⁰ Emmanuel Tweneboah Senzu and Huruna Ndebugri, 'Evaluating the Effectiveness of the Procurement Acts in Public Financial Administration; The Case Study in Ghana', 2017.

¹¹ Kenneth Lysons and Brian Farrington, *Procurement and Supply Chain Management* (Edinburgh Gate: Pearson Education Limited, 2012).

¹² Arjun Neupane, Jeffrey Soar and Kishor Vaidya, 'An Empirical Evaluation of the Potential of Public E-Procurement to Reduce Corruption', *Australasian Journal of Information Systems* 18, no 2 (2014).

agencies, departments and other public organisation acquire goods, services, works and activities from third parties. This includes renting, leasing, buying or purchasing supplies, construction, or services. The term also comprises all such functions (description of the requirement, selection and award of contracts, among others) that relates to obtaining goods and services by the Government to serve its citizens. Nichols (2002)¹³ observed that Procurement is an essential policy in the procurement process with the function of contributing to the achievement of government operations and improved service delivery. Hence, one can deduce from the words of Nichols (2002) that, the goal of Procurement is to ensure that government activities are carried efficiently.

As a way of regulating its procurement activities, Ghana has had a checked history in the area of several laws on the phenomenon called procurement. In 1960, the Government enacted the Contracts Act, 1960 (Act 25), and the Ghana Supply Commission Act which was revised and replaced in 1990 by the Provisional National Defence Council (PNDC) law 245. In 1976, the Ghana National Procurement Agency Decree, 1976 (SMCD 55) was also passed by the Supreme Military Council. In 1979, another law which also seeks to regulate government expenditure, the Financial Administration Decree (SMCD 221) was also passed. All these decrees, rules and instruments were meant to provide a comprehensive framework of administrative powers to regulate the activities of Procurement within the public sector. However, consecutive evaluation of the public procurement administrations in Ghana revealed substantial inefficiencies, corruption and lack of transparency in the procurement processes by governmental agencies because of an unclear legal framework, lack of harmonised procedures, regulations, vague official and administrative procedures needed in the management of the public procurement process. It also lacked capacity development of procurement practitioners and career paths for those in the Public and Civil Service entrusted with procurement powers.

This simple task of getting things supplied to governmental agencies to have the government machinery run smoothly in Ghana, however, has become a milking cow owing to some loopholes inherent in the Procurement Act. Taking a close look at the Act, one can say specific rules emanate from it which according to Adu Sarfo (2011)¹⁴ must be adhered to, and failure to do so amounts to irregularities in the procurement process. Ghana, it is said remains one of the most corrupt nations in the world in reference to the annual Corruption Perceptions Index (CPI) released by Transparency International. In its 2019 report, Ghana placed 80th out of 180 countries with an average score of 40 over 100.¹⁵

Tabish and Jha (2011)¹⁶ put public procurement irregularities into five categories, namely anomalies related to transparency; professional standards; fairness; contract monitoring and regulations; and procedures. However, one cannot lay claim and boldly

¹³ Philip M Nichols, 'Regulating Transnational Bribery in Times of Globalisation and Fragmentation', *The Yale Journal of International Law* 24, no 1 (1999), 257–304.

¹⁴ Patrick Adu Sarfo, *Assessing the Effects of the Procurement Act (663) on Public Financial Management in Ashanti Region* (Unpublished thesis submitted to the School of Graduate Studies, Kwame Nkrumah University of Science and Technology, Ghana, 2011).

¹⁵ Transparency International, 'Corruption Perceptions Index 2019: Overview of Corruption and Anti-Corruption in Ghana', 2019.

¹⁶ Syed Zafar Shahid Tabish and K N Jha, 'Lesson learned from irregularities committed in public procurement', 2011.

say that the passage of the Public Procurement Law and its implementation has made or brought about any significant effect in limiting corruption in the public procurement space in Ghana.

Schiele and McCue (2006)¹⁷ were also of the opinion that public procurement implementation challenges are affected in several ways environmentally. These factors, among other things, include market conditions, organisational and socio-economic environment and legal and political environment factors. Despite the numerous lapses found in the procurement process one can say that, regardless of the effort by the central Government and its related agencies to nib in the bud of the challenges facing the implementation of the regulations in the process and an understanding of adding value to the procurement procedure and also improve the capacity of procurement departments, a large number of governmental agencies act on their own and frequently by-pass the procurement regulations and do things on their own, something which feeds into the irregularities theory of the Procurement process in the country. Among other things, the public Procurement Act (663) regulates and defines the rules for public Procurement in Ghana. The preamble to the Act stipulates ‘an act to provide for public procurement, establish the Public Procurement Board; make administrative and institutional arrangements for procurement; stipulate tendering procedures and provide for purposes connected with these’.

The rules in the public procurement system covers:

Procurement plan: The Act requires procurement entities to prepare a procurement plan for each fiscal year, and develop quarterly updates for approval by the Tender Committee. Procurement planning is expected to be part of the budget preparation process; this should include a detailed breakdown of goods, works and services required in a schedule of delivery, implementation or completion dates for all products, and an estimation of the value of each package of goods, works and services required and the source of funding.

Qualification of tenderers: Tenderers are expected to possess the necessary technical and professional skills, which include finance, personnel, equipment and physical facilities.

Form of communication: The Act requires all communication between procurement entities and tenderers to be in writing.

Record of procurement proceedings: The Act requires a comprehensive record of each procurement proceeding to be maintained and requirements for disclosure when it is needed. The record should contain or indicate the location and source of documents.

Rejection of tenderers, proposals and quotations: The rejection of individual tenders, recommendations, or quotations are subjected to the grounds stated in the tender documents or the request for proposal or quotation. The following are grounds for rejection; when there is evidence of corruption, fraud, coercion, collusion among tenderers and insufficient funding is available for the Procurement.

Entry into force of the procurement contract awards: Successful tender shall be accepted, and notice should be sent to the tenderers within 30 days.

¹⁷ Joseph J Schiele and Clifford P McCue, ‘Professional service acquisition in public sector procurement’, *International Journal of Operations and Production Management* 26, no 3 (2006), 300–325.

Inducement from suppliers, contractors, and consultants: Procurement entity or officials should reject all forms of incentive directly or indirectly in the award of contracts. (Public Procurement Act, Act 663, 2003.) From the above one would expect that irregularities associated with Procurement in Ghana would be the thing of the past as the framers of the Act had envisaged, but that was never to be.

Research approach

A multiple research approach which includes the review of pertinent literature, and analyses of documents (evaluation of reports and contract files) available at the procurement entities were studied. The literature review helped to position the study within its context. The researchers also purposively targeted the field reports in Ghana, news materials, academic literature, books and research findings.

Results and discussions

One of the most important and celebrated principles of the public procurement legal regime is the principle of transparency. The principle of transparency serves two main objectives: first is to introduce a system of openness in the public purchasing, so potential discrimination can be eliminated; secondly, transparency in public procurement represents a substantial component for a system of best practices for both the public and private sectors, a system which could introduce operational efficiencies within the relevant markets. Article 40, clause one of the Procurement law says, ‘a procurement entity may engage in single source with the approval of the board’. However, most procurements in Ghana are single (sole) sourced. Sourcing is either restricted or unknown. National Competitive Tendering is absent in government contracts. This trend is not good enough since the Public Procurement Law aims at ensuring greater competition in all contracts. It was also observed from contract files that most of the contracts which could have been aggregated to attract competition were split into smaller lots that allowed for the use of Request for Quotations (RFQs). In a study undertaken by the Danquah Institute in 2010, it was revealed that public procurement contracts awarded on either the single source or restrictive tender basis were over GH¢ 12 billion (US\$ 2.96 billion in nominal terms). The study further revealed that an estimated 65 per cent savings could have been made if those procurements were subjected to competitive tendering. Instances where the tendering process had been advertised, the contracts have ended up being given to cronies of heads of the governmental agencies seeking the goods and services to be procured. According to Osei-Tutu et al. (2012),¹⁸ ‘this act is a medium for a politician to enrich themselves because contracts are awarded to friends or cronies who simply inflate the cost of the item(s) to be purchased and later give this back to the political heads as kickbacks’.

¹⁸ Ernest Osei-Tutu, Ernest Kissi and Safowaa Osei-Tutu, ‘Sole Sourcing Procurement: The Ghanaian Procurement Experience’, 2012.

In a related development on how this tool is used to siphon state resources, one of Ghana's anti-corruption journalist, Manasseh Azure Awuni in pain taken investigations conducted in the year 2017 revealed that the Chief Executive Officer of the Public Procurement Authority has been selling or awarding contracts to a company of which he owns shares.

One of the cardinal regulatory tools in Procurement according to the World Bank is transparency, which has to do with fairness and competition in Procurement to bring to public light mistakes, errors in judgments and corrupt practices that affect the management and administration of the country. However, in most cases, the bidding process has not been transparent. If what Manasseh reported was anything to go by, then one cannot but agree with the World Bank that a significant irregularity bedeviling the procurement process in Ghana is a lack of transparency.

Another form of irregularity in the procurement process in Ghana is the situation where contracts are awarded without the due process being followed. A case in point is the award of contract for the supply of drugs worth over two hundred thousand (GH¢ 200,000) at the Tamale Teaching Hospital without due process. Even though the regulation calls for an advertisement to be carried out in the national dailies, this primary requirement in the award of the said contract for drugs to be procured for the hospital was not followed.¹⁹ In addition to that, owing to procurement irregularities, the World Bank in 2019 rejected an audit report sent to it by the Government of the day. This rejection of the audit report happened because, the said audit report was not conducted by the Ghana Audit Service (GAS), the body clothed with constitutional powers to carry out Government or state audits. The said report was 'an in-depth review' of all Procurement connected expenditures from the period spanning the life of the administration from January 2017 to 30 June 2019. A private audit firm was engaged to conduct the said report, and the World Bank threw it out because 'it is obvious that there were some systemic challenges with procurement and contracts'. Not only that, but the World Bank was also at a loss why the Government could by-pass a state-recognised institution like the GAS and give such a vital task to a private firm to undertake.

Consequences of the procurement irregularities in Ghana

To every action, it is said, there is an equal reaction, and the various infractions of the procurement policy come with an equal consequence, something, which goes a long way to affect the governance of the country. To start with, one can say that, irregularities lead to loss of funds to the state. In the year 2017 alone, Ghana lost eight hundred and ninety-two million cedis (GH¢ 892,000,000.00) due to financial irregularities related to Procurement.²⁰ Secondly, the anomalies are fertile ground for the payment of needless judgment debts, something which leads to the state losing revenue and not meeting its

¹⁹ *Report of the Auditor-General on the Public Accounts of Ghana Ministries, Departments and other Agencies (MDAs) for the Year ended 31 December 2013* (Accra: Ghana Audit Service, 2014).

²⁰ Majeed Ali, 'Auditor General's Report on the Public Accounts of Trinidad and Tobago 2017', 2018.

development agenda.²¹ Again, in the year 2011, the Government paid a judgment debt of four hundred and fifteen million cedis (GH¢ 415,000,000.00) to the African Automobile Company limited because of breaches in the procurement for the supply of vehicles to the state.²² Furthermore, the irregularities breed corruption, something that the World Bank (2004)²³ and other Bretton Wood institutions espouses to be done away within the governance space of every country of which Ghana is no exception.

Recommendations

As a way of ensuring that the Ghanaian Government gets the best out of the procurement process as envisaged in the passage of the law, the paper recommends that efforts should be geared towards making the law bite. Those found liable must be dealt with according to the criminal laws of the country. Again, for the rule of law to thrive, the Government must have the political will to prosecute members of their political parties when they break the law.

This, when done would send a strong signal to the average Ghanaian that if members of the same political party with the Government of the day are being prosecuted, they too would not be spared should they fall foul of the law. This principle bolsters the argument for the principle of equality before the law. However, this is not the case. In a report released in 2011 by the USAID affirmed that ‘while presidential appointees, such as the Minister of Justice and Attorney General, may have the constitutional mandate to uphold the law, they face political incentives not to prosecute members of their party’.

According to Van Greuning (2005),²⁴ ‘transparency refers to the principle of creating an environment where information on existing conditions, decisions and actions are made accessible, visible and understandable to all individual participants’.

Transparency is, also one of the goals of Procurement and even a significant ingredient and an element of governance. To eliminate the irregularities associated with the procurement process, the process should be transparent as possible to all who have the money to go through all the bidding procedures, and anyone who meets the laid down bidding criterion be awarded the contract. When this is done, it will help erase the perception of corruption in the award of government contracts as far as the procurement procedure is concerned. Further to that, the single source clause in the Act ought to be looked at again and if need be scrapped. The provision of the single source clause has become one of the primary means by which most of the irregularities are channelled through because competitive bidding is pushed to the back burner and every government procurement is sourced through this means.

²¹ Ibid.

²² *Report of the Auditor-General. The Public Accounts of Ghana (Consolidated Fund) for the year ended 31 December 2012* (Accra: Ghana Audit Service, 2013).

²³ The World Bank, *Uganda country procurement assessment report. Main findings and recommendations* [Washington, D.C.: The World Bank, Report No. 32499, (2)].

²⁴ Hennie Van Greuning, *International Financial Reporting Standards: A Practical Guide, 5th Edition* (Washington, D.C.: The World Bank, 2005).

It is a known fact that governance is a continuum, a process where gaps should not be entertained in government business. This is because governments inherit both assets and liabilities. To avoid needless payments of judgment debts as the case is in Ghana because successive governments cancel existing contracts and award new ones, breeds a situation where goods and services already procured are left to rot.

To deal with the canker of procurement irregularity, the paper again recommends that the constitution should be amended to compel successive governments to continue with existing contracts on Procurements initiated by past governments regardless of the circumstances under which those goods and services were procured. However, in a situation where actions of certain people are found to have gone contrary to the rules governing the Procurement of any goods and services for the state, to avoid a repetition of such acts, all personalities found to have acted contrary to the law should be surcharged and made to pay for their actions and punished if need be according to the laws of the state.

Further to that since it has become an open secret that the very Act that sought to regulate the procurement process has become the same channel through which fraud is perpetrated on the state. In order to curtail the practice, the Act, Act 663 should be looked at again and if need be the Entity Tender Committees of all State-Owned Enterprises (SOEs) and Metropolitan Municipal and District Assemblies (MMDAs) be broadened to include members who belong to recognised professional bodies with the needed expertise in Procurement. If this is implemented, every step of the way of the procurement process as prescribed in the law would be followed and implemented by the SOEs and MMDAs, something that would protect government purse.

Added to that, as a way to make infractions on Procurement unattractive, is about time government puts the necessary measures in place and ensures that the recommendations of the Auditor General's reports are taken seriously, and these are implemented to the latter.

Ghana, on the assumption of the 4th Republican governance system has made a name for itself in the area of press freedom with the repeal of the criminal libel law. Based upon this, the citizenry and the media which is considered the 4th estate of the realm could be empowered to play a critical role by closely monitoring activities of the government on procurement and in instances where the procurement laws had been breached, they could expose agencies, people and government officials on procurement irregularities.

Conclusion

The goal of this paper has been an attempt to look at the consequences of procurement irregularities in Ghana. It is an undeniable fact that in as much as Government and its agencies continue to exist to function there would be the need for the necessary supply of goods and services for the smooth running of government business, which is the goal of Procurement. For all intent and purposes, the procurement Act of Ghana has come to serve a need, and it is the law regulating government expenditure. On the contrary, the same law is what state officials are using to milk the state owing to gaps inherited in it, and this is having dire consequences on the state and its resources.

Since in any governance space obedience of the law is a sine qua non, those found guilty and found to have acted irregularly to the law should be punished to serve as a deterrent to others. The country must consciously find means to protect anti-corruption investigators and practitioners. According to the Ghana Integrity Initiative (GII), the local chapter of Transparency International, the murder of one Ahmed Hussein-Suale, a courageous investigative journalist is a 'dangerous twist to the fight against corruption in Ghana'.

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A Tracking Method in FM Broadcast-based Passive Radar Systems

Ádám KISS¹ – Levente DUDÁS²

Passive radars are popular because without the expensive, high-power-rated RF components, they are much cheaper than the active ones, nevertheless, they are much harder to detect from their electromagnetic emission. Passive radars produce so-called RV matrices in an intermediate signal processing step. Although accurate RV matrices are found in DVB-T-based passive radars, the characteristics of the FM signals are not always suitable for this purpose.³ In those situations, further signal processing causes false alarms and unreliable plots, misleads the tracker, and consumes power for processing unnecessarily, which matters in portable setups. Passive radars also come with the advantage of a possible MIMO setup, when multiple signal sources (broadcast services for example) are reflected by multiple targets to the receiver unit. One common case is the stealth aircraft's which form is designed to reflect the radar signal away from the active radar, but it could also reflect the signals of the available broadcast channels. Only one of these reflected signals could reveal the position of the target.

Keywords: *Passive radar, bistatic tracking, FM passive radar, RV matrix*

Introduction to the test system

Our instrument starts with a four-element Yagi array. One of the antennas points to a publicly known broadcast FM transmitter tower, the others point to the opposite direction and form a three-element MRA, a linearly distributed antenna array with minimal redundancy.⁴ All of the four antennas are connected to a coherent four-channel software-defined radio.

¹ MSc student, Budapest University of Technology and Economics Department of Broadband Infocommunication and Electromagnetic Theory, Radar Research Group; e-mail: kiss.adam@simonyi.bme.hu

² Lecturer, Budapest University of Technology and Economics Department of Broadband Infocommunication and Electromagnetic Theory, Radar Research Group; e-mail: dudas.levente@vik.bme.hu

³ Rudolf Seller, Tamás Pető, Levente Dudás and Levente Kovács, 'Passzív radar I. rész', *Haditechnika* 53, 6 (2019), 51–55.

⁴ Li Bo and Sun Chao, 'A new method for array extension based on minimum redundancy linear array', *IEEE 10th International Conference on Signal Processing Proceedings*, Beijing, 2010, 332–335.

In the first step of the signal processing, the reference signal is subtracted from the surveillance channels, which is done by a Wiener filter. Having the pure surveillance signal, the reference channels can be cross-correlated with the surveillance ones.

$$\chi(\tau, f_d) = \langle s_s(t), s_{ref}(t - \tau) e^{j2\pi f_d t} \rangle = \int_{-\infty}^{\infty} s_s(t) s_{ref}^*(t - \tau) e^{-j2\pi f_d t} dt \approx \int_0^T s_s(t) s_{ref}^*(t - \tau) e^{-j2\pi f_d t} dt$$

where $\chi(\tau, f_d)$ is the RV matrix, τ is the time delay between the signal of the surveillance channel (s_s) and the reference channel (s_{ref}), and f_d is the Doppler shift caused by the movement of the target, and T is the time interval during samples are gathered.

In the used configuration the dimensions of the RV matrix were 75 km and, ± 955 m/s, the resolution was 64 cells both in velocity and in distance.

Only a signal with an infinite spectrum could produce a Dirac delta as its autocorrelation function. According to the scaling theorem, the more the bandwidth of a signal is decreased, the wider its autocorrelation peak. In FM systems this means when the modulating signal (which includes stereo pilot and the RDS carrier among others) has lower energy, lower effective frequency deviation is produced during the modulation, hence the momentary spectrum is narrower, the autocorrelation peak is wider. The broadcast stations often use compressors on the transmitter side, so this case is rare.

The FM modulation also has a special property that shows itself when modulating with pure sine waves. In this case, the modulated spectrum is discrete despite the non-linearity of the modulation. All these unique, randomly appearing cases decrease the randomness of the signal, resulting in a time-variant autocorrelation function in general.

Due to the fluctuation of the FM broadcast signal's autocorrelation properties, sometimes the RV matrix is not as clean as should be for accurate processing, so the unusable ones should be dropped.

Method of selection

Finding one algorithm to work properly for every case is difficult, a more convenient and more easily understandable/developable solution is diverse, and sums up the results of different scenarios.

Wide autocorrelation

The autocorrelation function of the recorded sample may be too wide, not as narrow as it could be suggested from the bandwidth supposing the necessary randomness. In this case, the detection of the peak could be impossible. To separate these cases, checking against the distribution could be used. The method assigns a scalar to every point of the RV matrix, in this test case, that was the absolute value function. The challenge is to find the number of elements in every row having a greater metric than a specified threshold. The threshold can be chosen by a constant between 0 and 1, representing a linear scale between the minimum and the maximum metric found in the matrix. Knowing the number of columns

above the threshold in a row can reveal if there is a wide correlation peak with the Doppler shift pointed by the row number. The minimum width of a correlation peak failing the test should be chosen. In the test, the multiplied value of the matrix width and the previously mentioned threshold constant between 0 and 1 was used.

A matrix can be found faulty by the number of failed lines in it. In the examples below, the threshold value of 0.43 was used. Due to the choice of the threshold metric, this test is called dynamic check in this paper, since the metric is calculated from the dynamic of the RV row.

Cow-like RV matrix

It is also possible that the incoming matrix has many so-called patches in it. This is caused by multiple peaks in the autocorrelation function. One algorithm to detect these cases is to map every cell in the RV matrix as a graph, give a metric to all the adjacent cells, then find the shortest path from one dedicated point to another. Using the same endpoints shows the difference between the RV matrices in this view.

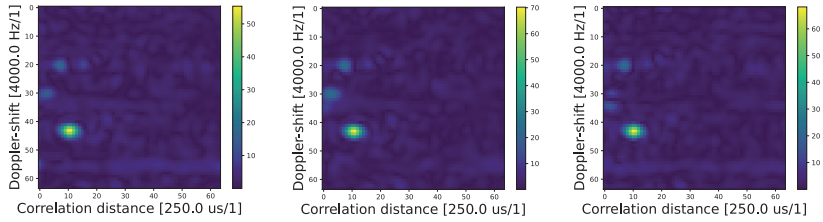
In this test setup, a one-dimensional Manhattan metric was given to every edge adjacent cell, so the metric is the positive difference of the difference between the cells' absolute values:

$$W_{i,j} = ||\chi_i| - |\chi_j||$$

where χ is the RV matrix, i and j are cells from the RV matrix. Then a Dijkstra algorithm⁵ can be performed on the given matrix, which gives the shortest path between the start and the stop points by building deeper and deeper distance trees from a start point. For the start (3,3) point was used from the top left corner (nearest distance and the biggest velocity moving away), and (61,61) was used as a destination. Picking these is better, than the corners themselves, since that would decrease the degree of freedom for the algorithm. The upper limit used in the tests was 110 for the pieces of the shortest path, and 20 for the summed weights along the path.

An example of cow-like RV matrices and three reference matrices are shown in Figure 1 and Figure 2. The data registration was taken in early 2020 at Budapest Ferenc Liszt International Airport.

⁵ Chen Peng, Xiaoqing Lu, Jiyang Dai and Linfei Yin, 'Research of path planning method based on the improved Voronoi diagram', *25th Chinese Control and Decision Conference (CCDC)*, Guiyang, 2013, 2940–2944.

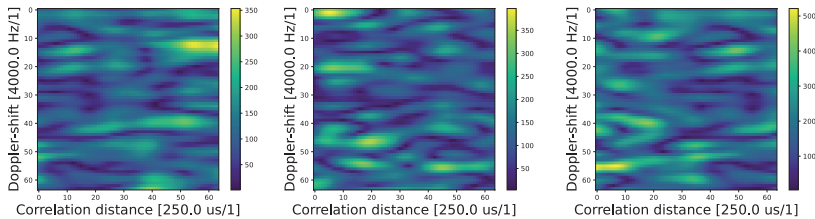


(a) RV matrix from the first antenna of the MRA (b) RV matrix from the second antenna of the MRA (c) RV matrix from the third antenna of the MRA

Antenna	Property	Result
First	Number of Dijkstra optimal path elements	102
First	Length of Dijkstra optimal path	22.02
First	Failed lines on dynamic check	0
Second	Number of Dijkstra optimal path elements	105
Second	Length of Dijkstra optimal path	21.08
Second	Failed lines on dynamic check	0
Third	Number of Dijkstra optimal path elements	105
Third	Length of Dijkstra optimal path	20.43
Third	Failed lines on dynamic check	0
Summary		Passed

Figure 1: Passed result of the sanity checking on a set of RV matrices from the MRA

Source: The results of the algorithms of the measurement data introduced in the text.



(a) RV matrix from the first antenna of the MRA (b) RV matrix from the second antenna of the MRA (c) RV matrix from the third antenna of the MRA

Antenna	Property	Result
First	Number of Dijkstra optimal path elements	133
First	Length of Dijkstra optimal path	754.84
First	Failed lines on dynamic check	9
Second	Number of Dijkstra optimal path elements	126
Second	Length of Dijkstra optimal path	1057.66
Second	Failed lines on dynamic check	7
Third	Number of Dijkstra optimal path elements	137
Third	Length of Dijkstra optimal path	1269.56
Third	Failed lines on dynamic check	15
Summary		Failed

Figure 2: Failed result of the sanity checking on a set of RV matrices from the MRA

Source: The results of the algorithms of the measurement data introduced in the text.

Summing up the results

The Dijkstra algorithm appeared to be more reliable in determining the sanity level of a matrix, but not all the bad matrices reached the decision thresholds. Every failed test for a matrix was counted as one point. If there was a failed Dijkstra algorithm during the inspection of the MRA in the view of the weighted path length, one plus point was added to the sum of the three matrices' points. When an MRA set had five or more points, it was dropped in the test setup.

Hit generation

Having sane RV matrices the potentially target-related cells could be determined. These are called hits. The hits considered to be a target are called plots.

Even on the friendly RV matrices, finding the hits on them is still a challenge. Although the cell-averaging CFAR algorithm is commonly used for this problem, in this test system a new kind of implementation was used.

Theory of operation

A Wiener filter is used at the very beginning of the signal processing chain, hence it is known that the zero Doppler line of the RV matrix is approximately zero. The algorithm:

1. Reinterpret the matrix cells as a set of numbers named S .
2. Throw away the highest and lowest h and l per cent of the elements ordered by their absolute value from S .
3. Determine a threshold level from the remaining numbers' absolute value.
4. Having determined the threshold, select every point with higher absolute values than the threshold.
5. Select the potential hits from points above the threshold.
6. Accumulate the results from the three RV matrices and decide for hits.

In our tests, 25 per cent for h and l were used. Ignoring these elements allows to neglect the presence of the uncommon zero Doppler line and the ringing of the hits, assuming that a large enough h and l was chosen.

The remaining numbers have a mean value and a variance. The threshold was calculated by summing the mean component and the variance multiplied by an encouraging factor:

$$T = M + (B \cdot V)$$

where T is the threshold, M is the mean value, V is the variance and B is the encouraging factor. The encouraging factor compensates for the statistical error from the ignored elements and also contains a minimal hit-to-noise relation from where a peak in the RV matrix is considered to be a hit. In the tests, the value 50 was used for B .

The hits from the points above the threshold are selected by the sign of the gradients for the absolute values in the matrix. The local maximums are hits on one RV matrix. An absolute hit is triggered when at least two of the antennas have a hit on the same RV coordinates.

Figures 3 and 4 show the result of this technique on three reference matrices and three others not having the necessary autocorrelation property. The data registration was taken in early 2020 at Budapest Ferenc Liszt International Airport.

Angle measurement

The measurement of the incoming wave is done by a three-element MRA. In the tests, the Capon method⁶ was used, when it failed, it was replaced by the Bartlett method. The correlation values filling the correlation matrix for the used methods are from the RV matrix fields where the hits occur.

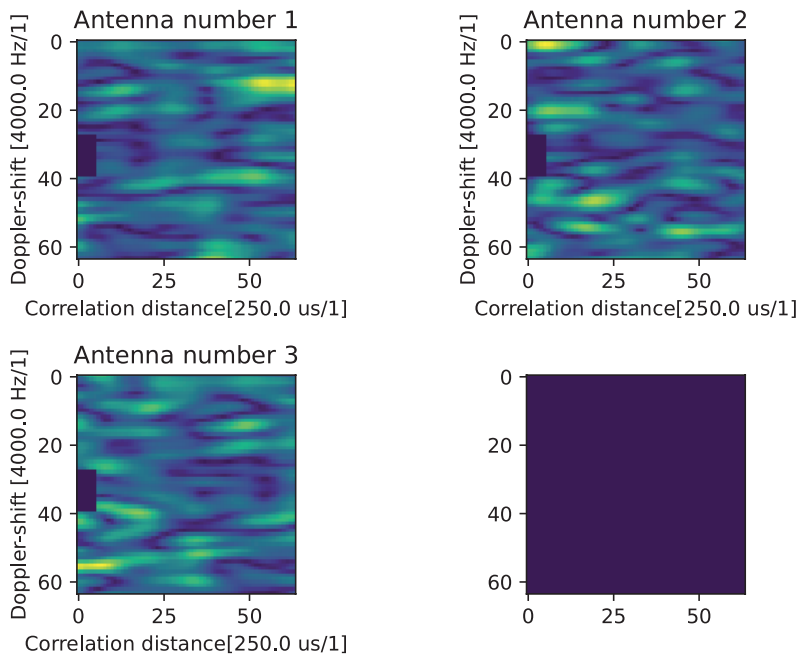


Figure 3: Hits on a measurement

Source: The results of the algorithms of the measurement data introduced in the text.

⁶ Michal Meller and Kamil Stawiarski, 'Capon-like DoA estimator for rotating arrays', 2019 International Radar Conference (RADAR), Toulon, 2019, 1–6.

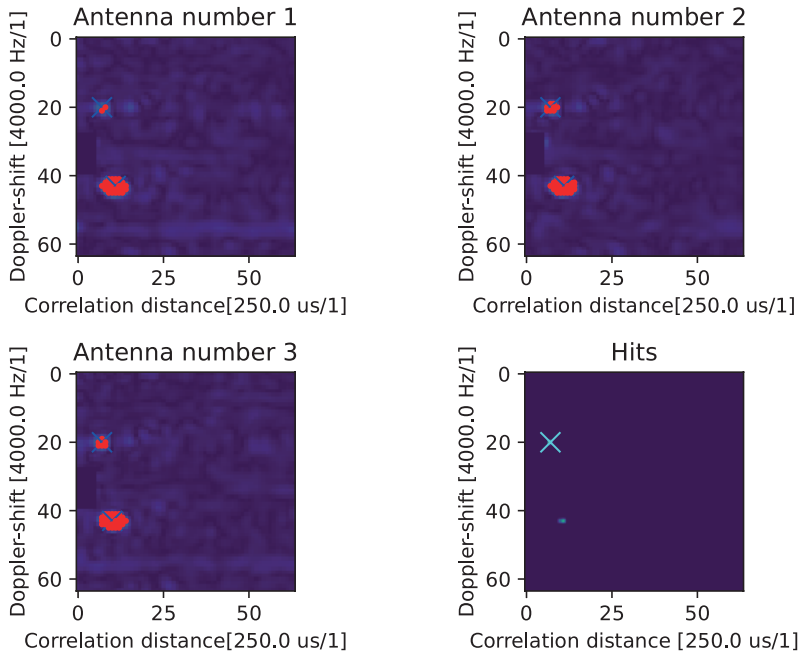


Figure 4: Hits on a measurement

Source: The results of the algorithms of the measurement data introduced in the text.

Correction method

The calculation of every Doppler-corrected reflection is an FFT spectrum. The used windowing function is a rectangular one, which produces the narrowest main lobe in the spectrum, but high-level sidelobes. The task from this point is analogous to a frequency measurement in a basic Fourier spectrum.

The method used in the article resamples a basic sinc lobe (seen in an ideal discrete domain Fourier spectrum) with the same sample rate, but with different shifts between the original bins and the output. The produced three Fourier-bin-wide vector is then correlated with the highest energy row in the RV matrix around the potential target. Where the correlation is the highest, the shift is nearly equal to the distance of the theoretical direct received signal and the test signal peak. The Gaussian noise in the matrix causes a little uncertainty, and so does the width of the FM signal's correlation. The tracker can treat normal distribution noise in the next stages, the goal of this method is to normalise the distribution of the measures. The necessary plus information comes from the adjacent cells of the RV matrix.

Resampled sinc function in the test system:

$$f[n, offset] = \left| \frac{\sin(\pi(n + (offset/N)))}{\pi(n + (offset/N))} \right|$$

where N is the precision of this estimation process, the number of steps in the estimation process; n is the distance from the point with the highest energy; and $offset$ is the running index from which the offset is calculated. The $offset$ variable iterates from $-N$ to N . The absolute value function is needed, because, in this version of the algorithm only the amplitude of the RV matrix is correlated, not its complex value.

The correlation is given by the traditional dot product of two vectors: one is from the proper row of the RV matrix, the other is $f[n, offset]$, where n is the dimension of the scanning test vector, and $offset$ is the currently indexed phase delay in the resampling. The task is to determine the offset value at the maximum value of this correlation.

In the tests, value 3 was used for n , and value 31 was used as steps for N .

Having the offsets for the three RV matrices, they were averaged to estimate the real offset.

Filter output on a sample track is shown in Table 1.

As it can be seen from the test result, by using the adjacent cells and a sinc-based filter, a less quantised bistatic distance estimation can be made than without this method.

Table 1: Filter result on a recording from a landing plane

Serial number of the RV matrix	Matrix row with the highest value	Estimated Doppler coordinate	Matrix column with the highest value	Estimated distance coordinate
6	47	46.69	18	19.00
8	47	46.58	18	18.49
11	46	46.51	16	15.82
15	45	45.58	15	15.31
16	45	44.69	15	15.64
17	45	44.51	15	14.78
20	45	45.62	14	14.84
21	45	45.82	14	14.18
23	45	45.64	13	13.33
27	45	45.11	12	11.82
29	44	43.80	12	12.69
30	44	44.51	11	10.47
31	44	43.58	11	11.84
32	43	42.51	11	11.49
35	43	43.16	10	10.33
36	43	42.56	10	10.33
39	43	42.56	9	9.47
40	43	43.22	9	9.49
42	43	42.62	9	9.33

Serial number of the RV matrix	Matrix row with the highest value	Estimated Doppler coordinate	Matrix column with the highest value	Estimated distance coordinate
46	43	42.49	8	8.13
47	43	43.60	8	7.98
49	43	43.27	7	7.84
53	43	42.49	6	6.49
54	43	42.51	6	6.13
55	43	42.51	6	6.49
56	43	43.33	6	6.18
59	43	43.33	5	4.82
60	43	43.82	5	5.18
62	43	42.80	4	3.62
63	43	42.67	4	3.62
64	43	42.18	4	3.78
65	43	43.60	3	2.82
66	43	43.31	3	3.49
67	43	43.47	3	3.18

Note: False alarms were cleared from the table.

Source: The raw data the correction was made on was recorded in early 2020 at Budapest Ferenc Liszt International Airport.

Tracker

The tracker uses a UFIR-like algorithm to track the targets. The tracking is done in the bistatic plane. When a hit ingresses the tracker, it starts to track it using its bistatic velocity (calculated from the Doppler shift). When another hit comes close enough to the tracked one, it registers the second hit and changes the track state to established. From this moment on, the used tracker outputs a plot at every moment as a track.

Theory of operation

False alarm avoidance

Despite using every check and threshold selection described in the previous sections, false alarms can appear as inputs of the tracker. As every hit either initialises a new track or appears as a continuation of a current track, this could be dangerous; however, false alarms are quite random, hence plotting tracks having more than one hit appeared to be enough for this test.

Theory of tracking

Tracking could be done in a Descartes plane in general. Doing so here is not a good choice, since the measuring is done in the bistatic polar plane, and the conversion from it to a Descartes one would have nonlinear distortion and nonlinear error distribution on it. This error would also appear in the conversion of the bistatic speed, which is a directly measured state variable of the system. The transformation of the speed has another difficulty as not every component can be directly calculated from the bistatic speed.

A solution is to do the tracking in the bistatic plane, then convert the track to a Descartes plane. The track should interpolate the hits; therefore, output points appear more frequently, so the information of the directly measured bistatic speed will be contained by the interpolated points on the classic plane.

Plots only mean samples from the plane's trajectory with some margin of error. Measuring its distance multiple times at the very same point cannot be accomplished in this test setup. One possible solution is using an unbiased FIR-like filter. In this setup, the sampling time is not consistent, because full RV matrices are dropped sometimes. Knowing that the bistatic acceleration is not constant in a real-world situation, this effect causes an accumulation of error in the UFIR. This could be decreased by a proper weight function.

Another mandatory information for the location is the angle of the arriving signal. This is measured with all the hits, but its first derivative is not given, as it was in the case of distance. The time function of the angle should also be estimated for the tracking. In these measures, the basic angular velocity formula was used and treated as a constant between hits.

Tracking of the bistatic distance

In the test, a three long FIFO was used to store the previously measured bistatic points with timestamps, and a separate point was used to track the head of the trajectory. Whenever there was a plot (a new output was generated), the oldest element of the FIFO was dropped, the new was introduced, and also the bistatic velocity of the newest point updated the state variable of all the points in the FIFO.

Every plot event updates every entry in the FIFO from their bistatic velocity (updated on every income) and the elapsed time from the last plot. The update is simply done by multiplying the velocity by the elapsed time, and then add the value to the original bistatic distance.

In the test environment, every element of the buffer was averaged with equal weight regardless of the difference of their income time, no time-adaptive weight function was used to produce a single distance coordinate for the output of the tracker.

Tracking of the angle

Calculating the angle is different from the case of the bistatic distance since the derivative is not given. The method used to step this variable during plotting is to determine the angular velocity from the last two hits using the difference of the rotation and the time.

Although this could be a good solution, with an imaginary target moving on a constant bistatic curve with constant angular velocity, in real life, this scenario is not realistic. A target with a linear trajectory on a Descartes plane would fail the tracking – the tracker is unstable. Simulations prove this fact.

To stabilise the method mentioned above, a correction factor was used. At the point of the correction, the new plot's bistatic distance is calculated, but the angle is left in the previous state. Descartes coordinates of the previous and the current state are calculated. From these data, the static error of the tracking could be estimated analogue to the arcus tangent demodulation method in FM software radio systems:

$$Corr = \frac{(y \cdot x_{before}) - (x \cdot y_{before})}{r_{receiver}^2}$$

where x and y are the Descartes coordinates of the plot and the previous plot, and $r_{receiver}$ is the distance from the receiver for the currently calculated plot. The result is in radians. The correction (as the static error was integrated for the time between the before and the now state) should be subtracted from the new plot's angle, and after this, the previously calculated speed term should also be accumulated.

The correction method could be analogous to the FM demodulation technic because the set of the used points can be interpreted as a constellation diagram.

Known limitations

The bistatic speed is sampled with every hit, but since the trajectory of the target is mostly linear, the bistatic distance is not a linear function, hence the bistatic speed function as the first derivative of the distance is not sufficient for the tracking, the distance is either over or underestimated because of the zero order estimation on the sampled speed in the algorithm above. On average, this generates a rotated trajectory. In the future, a lookup method should be used, which could determine the speed from interpolated hits, then correct the coordinates from this information.

In some trajectories, crossing the perpendicular axis from the bistatic axis causes the loss of the tracking since the correction used in the angle calculation is failing, and cannot be used.

Most of the computer systems used nowadays have parallel computing capability. Changing the used shortest path algorithm to another one utilising these resources may increase the speed of processing.⁷

Testing

To test the work of the tracker, a simulator was used. The blue points are the actual trajectory of the simulated target. The green points are the output of the tracker. The parameters used in the sample generator are shown in Figures 5, 6 and 7.

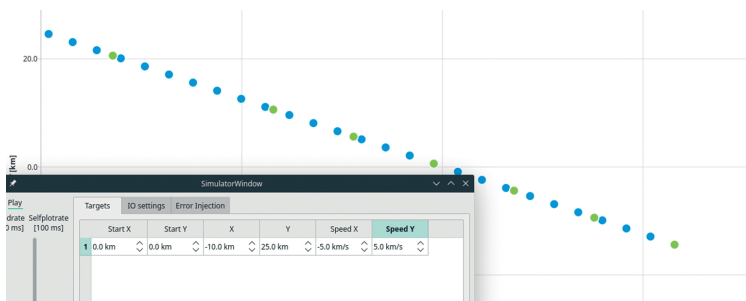


Figure 5: Output of the tracer on a simulation with linear, but not vertical trajectory

Source: The trajectories were generated using a simulator written for this test. Figure 5 simulates a coherent speed target with the shown parameters.

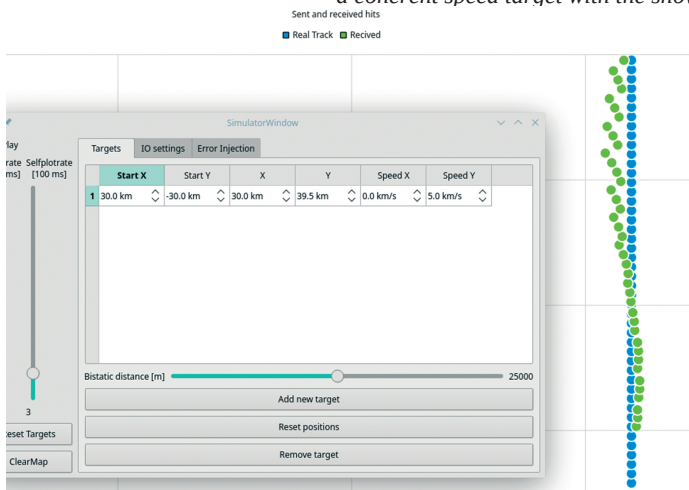


Figure 6: Output of the tracer on a simulation with linear and vertical trajectory

Source: The trajectories were generated using a simulator written for this test. Figure 6 simulates a coherent speed target with the shown parameters.

⁷ David R Alves, Madan S Krishnakumar and Vijay K Garg, 'Efficient Parallel Shortest Path Algorithms', 19th International Symposium on Parallel and Distributed Computing (ISPDC), Warsaw, 2020, 188–195.

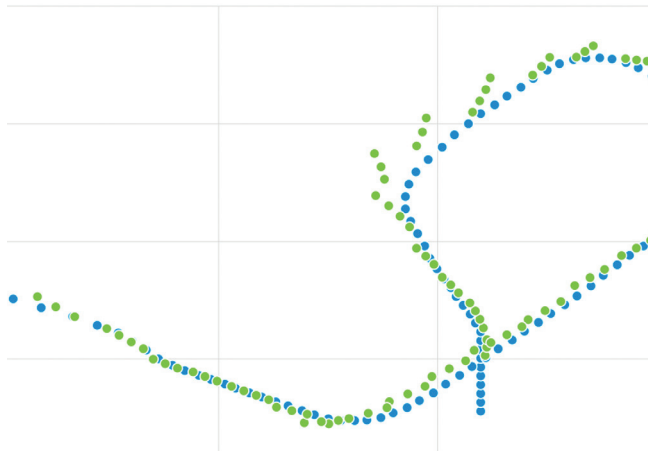


Figure 7: Output of the tracker on a simulation with nonlinear trajectory and additional Gaussian noise

Source: The trajectories were generated using a simulator written for this test. Figure 7 shows a dynamically changing trajectory.

Conclusion

The proposed extractor tracker could be effectively used in FM-based passive radar systems for general ATC purposes. Targets having micro Doppler effect, such as helicopters, could appear on the RV matrices as more than one peak; therefore, they should be preprocessed to one point before using this tracking technique. The accuracy of the plots does not count in near distances, because in a system where multiple passive radars are used, more accurate measurements could be done with a directed signal processing on a wider band DVB-T or DVB-T2 channel.⁸ DVB passive radars consume more power than an FM one since due to its wider spectrum occupation, more processing cycles are required to produce a result. By only processing a smaller part of space and a smaller range of Doppler shifts, the terrestrial DVB passive radar uses much less computation power. Having more FM channels as reference sources, compressed sensing technology could be used to produce a higher quality of RV matrices. In a more complex tracking, for example having inputs from more illuminators or targets, better state estimation technics could be done, such as a particle filter.

⁸ Rudolf Seller, Tamás Pető, Levente Dudás and Levente Kovács, 'Passzív radar II. rész', *Haditechnika* 54, no 1 (2020), 43–47.

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- Seller, Rudolf, Tamás Pető, Levente Dudás and Levente Kovács, 'Passzív radar II. rész'. *Haditechnika* 54, no 1 (2020), 43–47. Online: <https://doi.org/10.23713/HT.54.1.09>

Security and Military Relevancies of Digitisation, Globalisation and Cyberspace¹

Tibor BABOS² – Alexandra Lilla BEREGLI³

The goal of this study is to explore security threats and challenges of digitisation. Digitisation as one of the key technological factors has a significant impact on the development of today's modern world. Beyond general security circumstances, this impact touches upon economic, financial, social, technological, medical, educational, defence and military issues, as well all over the world.

The argument of this study is that the modernisation of defence systems is an essential key to successfully responding to new security challenges in our digital explosion era. Therefore, it is a must that government organisations, including defence and military systems fundamentally upgrade their own technical, structural and operational capabilities and accept digitisation as the driving factor of future defence and military development.

In light of the above, the study first examines digitisation as a global security challenge and then presents a comparative analysis of the relationship between hybrid warfare and cybersecurity. Finally, before drawing conclusions, it takes stock of the military policy relevance of the cybersecurity challenges relevant to Hungary.

Overall, it can be stated that digitisation and digital transformation are present all over the world as a result of globalisation. Developed nations, including Hungary must be connected to digitisation and by digitisation to each other's various systems and technologies. This system has to be integrated, but independent at the same time, as well as connected but separable in order to be able to be involved in the whole cyberspace and get the benefits of it or get separated from it to defend threats or direct attacks coming from the outside. The Hungarian Defence Forces has a key role in this very important process.

Keywords: Hungary, cybersecurity, digitisation, globalisation, hybrid warfare

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² Founding Director, Szent István Security Research Center; Associate Professor, Hungarian Agricultural and Life Sciences University Faculty of Mechanical Engineering; Founding Director, Security Science Center; Founding Director, Security Science College, Professor, Doctoral School of Security Sciences; Honorary Professor, Óbuda University; Honorary Professor, University of Public Service Doctoral School of Military Sciences, Doctoral School of Public Administration; e-mail: babos@mil.hu

³ PhD student, Óbuda University Doctoral School on Safety and Security Sciences; Vice President, College of Security Sciences; e-mail: beregi.lilla@uni-obuda.hu

Introduction

In his presentation entitled *The Four Global Trends and Nine Challenges of Security* delivered at the Annual Conference of the Hungarian Military Science Society on 5 November 2019, Tibor Babos first presented his thesis according to which European security today is fundamentally determined by four global trends and nine risk factors. The aim of his study was to find answers to the following dilemma: in order to research or understand our current security environment, which factors and contexts should be taken into account and what are their contents? According to Babos, its content can be summarised as follows.⁴

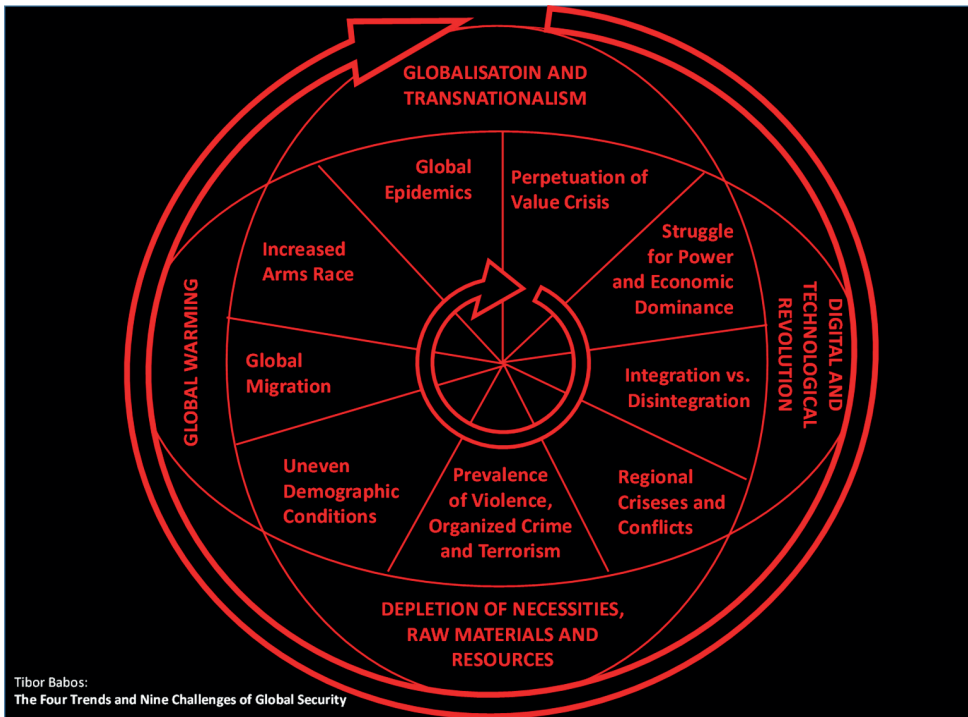


Figure 1: *The Four Trends and Nine Challenges of Global Security*

Source: Compiled by the author.

The four trends interact with the challenges and the challenges greatly influence the development of the trends, the challenges are clearly not the dominant factors though. It can also be stated that these four trends are not a permanent phenomenon in our time, but they are definitely a long-term one, while the challenges can be apostrophised as temporary or changing factors. Challenges, in addition to prioritising trends, shape each other's nature

⁴ Tibor Babos, 'A biztonság globális és európai összefüggései', in *Kutatás és innováció a hazáért*, Conference Proceedings, Budapest, 5 November 2019.

according to a complex mechanism of action. Based on global and continental conditions known today, it can be stated with great certainty that these security factors must be taken into account even in the medium term and their role and impact may increase even more in the future than at present.⁵

Based on the reasoning of the above presentation, the argument of this study is that today's most defining security challenges are (1. the expanding globalisation; 2. the boom of digitisation; 3. the perpetuation of global warming; and 4. the increasing depletion of raw material resources).⁶ These global and Europe-wide security policy trends define national ambitions and objectives all over the world. Among the above trends, this paper explores digitisation as a security challenge because digitisation, as the only technological factor of the above four, has the greatest impact on the development of today's modern world. This trend has an impact on the security of Europe as well as of Hungary.⁷

As a result of the IT revolution, politics, public administration, economy, industry, agriculture, education and science, health, transport, logistics, energy, diplomacy, national security and military systems have been transformed. We can say that this process is a global change of our era and it is therefore necessary to examine how nation states are adapting to the challenges of the technological revolution. However, with the development of digitisation, there are not only benefits but also serious dangers. Statistical data and case studies show that today we are increasingly counting on a rise in the number of cyberspace attacks and the quality and success of these acts. As a result of the rapid development of the technological level of mankind, new challenges emerge that determine the security of the world and thus of our country.⁸ Although the recently released digital space is not the most important security factor, it is undoubtedly continued, sometimes defining other known challenges.

As a result of digitisation and smart cities, almost everything becomes more accessible to members of society more easily and quickly. Cyberspace attacks in many cases result in irreversible political or economic damage. Nation states, including Hungary, must have the ability to detect and address cyberspace threats, build cybersecurity, ensure the smooth functioning of critical information infrastructure, fend off attacks and properly carry out cyber defence tasks. However, the upsizing of digitisation takes place not only in cyberspace but also has a major impact on the following 4 global common spaces, which are also operational spaces from a military point of view: 1. land; 2. sea; 3. air; 4. outer space.⁹

The study looks for answers to the following questions: How can digitisation be identified in the global space as a security challenge? What are the main elements of hybrid warfare and cybersecurity in Hungary? What are the military policy relevancies

⁵ Ibid.

⁶ Tibor Babos, 'A biztonság globális és európai összefüggései', *Hadtudomány* 29, no 4 (2019), 16–29.

⁷ Alexandra Lilla Beregi, 'A Magyar Honvédség digitálizációja a Zrínyi 2026 Honvédelmi és Haderőfejlesztési Program tükrében', in *Digitális Biztonságpolitika Konferencia*, Conference Proceedings, Budapest, 25 May 2020.

⁸ Tibor Babos, 'A Digitális Jólét Program biztonság-, védelem- és katonapolitikai relevanciái', *Hadtudomány* 28, E-publication (2018), 122–145.

⁹ Tamás Csiki Varga and Péter Tálás, 'Magyarország új nemzeti biztonsági stratégiájáról', *Nemzet és Biztonság* 13, no 3 (2020), 89–112.

of cybersecurity challenges relevant to our country? How could we characterise the cyber capabilities of the Hungarian Defence Forces nowadays?

The argument of this study is that the modernisation of defence systems is an essential key to successfully responding to new security challenges in our digital explosion era. Therefore, it is a must that government organisations, including defence and military systems fundamentally upgrade their own technical, structural and operational capabilities and accept digitisation as the driving factor of future defence and military development. In order to ensure that our country has knowledge of and capabilities to overcome the new security challenges created by digitisation in all operational areas the Hungarian Defence Forces need to switch to a new type of digital platform.

In light of the above, the study first examines digitisation as a global security challenge and then presents a comparative analysis of the relationship between hybrid warfare and cybersecurity. Finally, before drawing conclusions, it takes stock of the military policy relevance of the cybersecurity challenges relevant to Hungary.

Digitisation as a global security challenge

The current security processes, challenges, changes and trends need to be examined equally in order to pursue a successful policy both domestically and internationally. In the current unstable security environment, the factors and risks and threats to security are also changing. This means that, in addition to the economic, financial, social, cultural, religious, environmental, public security and migration problems, digitisation is causing us to face an increase in technical, IT systems and with it, cyberspace risks as well.¹⁰

As a result of the digital revolution, the centres of gravity of the new global power centres in Europe are being transformed and redefined. The success of the development of new power centres consists in the active and conscious use of digital, technological and information systems. In the meantime, we are seeing a mutation of global and European security challenges, which means that the security factors of our time are smaller in space, but more diverse and dynamic, easily cross state borders and may become global as well. We can conclude that globalisation can bring security challenges together, multiply smaller threat level to a significant and more complex one, as well as interconnect foreign and domestic security issues. Cultural and religious reasons stand in the way of globalisation and urbanisation, which are the scene of conflicts in the digital space. The contrast between radicalism and technology poses a great danger because rapid technological advances make the rich even richer and the poor even more poor and peripheral.¹¹

The use of weapons of mass destruction and terrorism as an asymmetric security risk factor pose the greatest threat to developed countries. Due to proliferation of weapons of mass destruction and the lack of control of technologies, the world's balance of power is being transformed. Parties opposed to developed countries are more often using asymmetric devices for example viruses in cyberspace. Even with their low or limited

¹⁰ Tibor Babos, *Az európai biztonság öt központi pillére* (Budapest: Zrínyi Kiadó, 2007).

¹¹ Babos, 'A Digitális Jólét Program'.

sources, they are able to cause a significant, or even a universal destructive effect. All this means that beyond nuclear, chemical, biological technologies, genetic engineering, proliferation of weapons of mass destruction, the massive use of IT and technology is one of the greatest security risks and threats of our time.¹²

NATO issued a new strategic concept at the Lisbon Summit in November 2010 to ensure that NATO capabilities provide more reliable protection against modern challenges. This means that action against hybrid threats, the protection of IT systems and electronic warfare will be at the heart of capability development.¹³ The Global Commons Project has been launched with the aim of examining the seas and oceans, airspace, space and cyberspace in depth. These common dimensions are interrelated because everyone uses them, allowing information, goods and services to flow. Globalisation has made these spaces accessible to all and can therefore be used for good purposes as well as for malicious purposes and therefore the strategic importance of these spaces is increasing. NATO's aim is to provide the ability to combat damage against common dimensions through political, diplomatic and military domains. The importance of the ever-changing security challenges inherent in dimensions is very high from a military point of view because the army, air force and navy actively uses the seas, oceans airspace and outer space to transport military troops, units, navigation devices, reconnaissance and command control and communication systems. Cyberspace became the newest, most complex and most dangerous domain of global commons today.¹⁴

From the point of view of security challenges, cyberspace is the most important because it is not clearly delineated and cannot be delineated at all and technological developments have led to an increasing number of uncharted opportunities for the widespread use of cyberspace. Cyberspace is physically dependent on the physical devices that operate it: computers, servers, modems, cables, satellites. This means that the primary attackers of cyberspace, the activities of hackers can be physically traced. Despite the fact that the four dimensions are not just connected but also interconnected, cyberspace is different from the others. Its information base and infrastructure is largely non-state-owned, so private companies, and non-state actors operate and determine future developments, weakening the state's control role over it. For this reason, it is important to strengthen the cyberspace influence of state actors. In order to detect attacks on national and state digital systems, nations and states have to build right tools and capabilities to combat them.¹⁵ Successfully facing new security challenges, especially in the cyberspace nations, states and their military systems need to invest more into digitisation and states need to review their strategy documents on cyber issues in the same way as new security risks.

¹² Ibid.

¹³ Gergely Varga, 'A NATO új, lisszaboni stratégiai koncepciója', *Nemzet és Biztonság: Biztonságpolitikai Szemle* 3, no 10 (2010), 79–86.

¹⁴ Tibor Babos, '„Globális közös terek” a NATO-ban', *Nemzet és Biztonság: Biztonságpolitikai Szemle* 4, no 3 (2011), 34–46.

¹⁵ Babos, 'A Digitális Jólét Program'.

Hybrid warfare and cybersecurity in Hungary

Hybrid warfare and cybersecurity today are developing parallelly; at the same time, they have direct connection to each other. Although hybrid warfare has a longer history than cyber, cyber is the dominant factor of the subject, due to the fact that its relevance and space is much wider. As a result of the rapid development of the technological level of mankind, new opportunities and challenges emerge that determine the security of our country. As a result of digitisation, everything becomes more accessible to members of society. Today, there is a strong need for cities and villages to be more intelligent and able to effectively address the challenges of urbanisation and to successfully adapt to new situations and provide adequate answers to emerging issues.¹⁶ Therefore, DJP2.0 places a special emphasis on the topic of Smart City developments to integrate smart solutions into the everyday life of settlements that make the lives of the people living there easier, more livable and safer. The basic task of the management of a settlement is both to create the safety of the people living in the settlement and their environment and to preserve the property of the institutions and companies operating under control. By building smart security systems, all of these above-mentioned goals can be achieved. Ensuring the security of networks is an essential condition for interconnecting and deploying systems.¹⁷ In many cases, cyberattacks cause irreversible political or economic damage. Cyberspace, alongside land, seas, air and space is now a separate operational space.

Cyberattacks such as attacks on countries, international and world organisations, government and economic operators, are among the most significant security challenges of the 21st century. Hungary must be able to identify, address and cope with cyber threats, build cybersecurity, ensure the smooth functioning of critical information infrastructure, counter attacks and carry out cyber defence tasks. The number of attacks on IT systems is steadily increasing, so it is necessary to strengthen their protection and to increase the level of information security of users.¹⁸

Cybersecurity, like global pandemics, organised crime or terrorism, cannot be blocked by state borders today, spreading as a result of globalisation. Since computing systems became the basic tools of our societies and science and technology is available to all of us, we must be prepared to unexpected cyberspace attacks. It is necessary to adequately protect against cyberspace attacks, such as disrupting the functioning of governmental or public information and communication systems. Particular emphasis should be placed on cyber defence and the provision of international critical infrastructure.¹⁹

¹⁶ Alexandra Lilla Beregi, 'Magyarország Nemzeti Biztonsági Stratégiája (2012) a mai biztonságpolitikai kihívások tükrében', *Hadmérnök* 15, no 2 (2020), 205–217.

¹⁷ Digitális Jólét Program, 'A Digitális Jólét Program 2.0.', Budapest, 2017.

¹⁸ Péter Tólas, 'Changes in International Power Relations and Their Geopolitical Consequences', in *Security Challenges in the 21st Century*, ed. by Géza Finszter and István Sabjanics (Budapest: Dialóg Campus, 2017), 13–36.

¹⁹ László Kovács, 'Európai országok kiberbiztonsági politikáinak és stratégiáinak összehasonlító elemzése I.', *Hadmérnök* 7, no 2 (2012), 302–311.

On 21 April 2020, the latest Hungarian National Security Strategy was released in which digitisation and cyberspace is one of the most dominant factors of new security challenges.

In the face of hybrid attacks, the defence and law enforcement forces are collectively able to combat civilian infrastructure. We can protect against new security risks including cyber warfare and technological advances that facilitate information flow, by adapting the right systems and improving our tools. This will make capacity improvements available with the support of the government, for the cybersecurity of our country. Continuous technical improvements are extremely important given the rapid rise in attacks on IT systems as a result of technological developments, a threat that is only further escalated by a low level of users' awareness on information security. For this reason, it is necessary not only to improve our tools and capabilities but also to increase user awareness.²⁰

In addition to cyberspace, power struggles are underway for dominance over international waters and their resources, the Arctic and space. Cyberspace is now a separate operational space alongside oceans and seas, airspace and space and land. It is most likely to be adapted that future conflicts will increasingly culminate in cyberspace.²¹

In strategic common spaces, digitisation and globalisation have led us to face new challenges such as technological and revolutionary developments in 5G and space technology. It is important that our national security and military systems continue to invest into and develop cyber defence capabilities since unexpected attacks not only may cause fatal damages but also are more expensive.

Changes to international security policy, such as non-state actors; organised crime groups; international terrorist organisations; cybercriminal organisations; extremist religious communities; privately owned security companies; and other non-governmental actors have an impact on our country's security policy. This means that cyberspace is used to obtain critical data and to harm both different states and non-state actors.²²

Increasing technological progress as a result of globalisation is based on digitisation. The vulnerability of information systems is a new security challenge. The number of malicious actions committed in cyberspace is increasing, it gets more sophisticated in their method and causes increasing damage. There is a great risk in the mass availability of information, which poses an information technology challenge but access to information can only be partially ensured for our country for the time being. Therefore, the introduction of processes supported by machine learning is no longer to be seen.²³

With the rapid development of space technology, there is a growing technological gap between those who use technologies significantly and those who try to catch up. Hungary needs to play a prominent role in the knowledge and application of space technologies,

²⁰ Government Resolution 1163/2020 (IV.21.) on Hungary's National Security Strategy.

²¹ Károly Szkála and Sándor Munk, 'A kibertér fogalma, értelmezése és fejlődése', *Földrajzi Közlemények* 142, no 4 (2018), 344–355.

²² László Kovács, 'A kiberbiztonság és a kiberműveletek megjelenése Magyarország új Nemzeti Biztonsági Stratégiájában', *Honvédségi Szemle* 148, no 5 (2020), 3–18.

²³ Dániel Berzsenyi, 'Kiberbiztonság', in *A globalizált világ kihívásai*, ed. by Péter Tólas, Tamás Csiki Varga, Alex Etl and Dániel Berzsenyi (Budapest: Ludovika Egyetemi Kiadó Iroda, 2021), 341–356.

because their use can become decisive in relation to development, economic indicators and political advocacy.

The unpredictability resulting from new security challenges is further undermined by the proliferation of weapons of mass destruction and their means of transport. Terrorist organisations, terrorist groups and various criminal organisations also possess and use weapons of mass destruction. Though these attacks induced by such means are not effective today due to the strong collective international community efforts, thus we must treat them as a major threat. It is in Hungary's interest to fight hybrid warfare within both national and allied frameworks. Hungary interprets cyber threats that causes direct attack against the state as conventional weapons. Cyberattacks, as aggression, is therefore considered classical attacks and may be responded by complex governmental domains with the approval and prior agreement of government agencies. Hungary pays particular attention to research and development, especially in the areas of cyber defence, artificial intelligence, autonomous systems and biotechnology. Today development of revolutionary technologies in Hungary are treated as strategic issues.²⁴

Military relevancies in fighting against cyber threats

Any cyber violation against Hungary can therefore be identified as a direct attack against all elements of government systems, E-administration, critical infrastructure and critical information infrastructure, public and non-state companies and organisations. Constitutionally, the Hungarian Armed Forces must be able to cope with these challenges as well. Therefore, the digital transformation of the Hungarian Defence Forces is a vital task to the government to create new digital and network-based military systems. As a result of the improvements, national defence as a whole could be set up on a digital platform, which would result in the operation of defence, military and national security systems for market high-tech systems and infrastructures used by the public administration independently and disconnected in order to support the government's information communication.²⁵

For Hungary to be able to face new security challenges, especially in cyberspace, the Hungarian Defence Forces need well-equipped and properly trained forces, effective, deployable and sustainable capabilities in the spirit of qualitative capability development rather than quantity. This means that the traditional tasks of the defence systems are complemented by new security challenges such as mass illegal migration, terrorist threat, hybrid attacks and disaster management. Therefore, the development of defence capabilities must be prioritised in such a way that it has the capacity to cope with all sorts of challenges up to war level. From the point of view of the armed forces, cyberspace

²⁴ Zoltán Rajnai (ed.), *Kiberbiztonság – Cybersecurity 2*. (Budapest: Óbudai Egyetem, Biztonságtudományi Doktori Iskola, 2019).

²⁵ Tibor Babos and Miklós Szakali, 'Magyarország biztonsága a transzatlanti kapcsolatok tükrében', *Felderítő Szemle* 19, no 1 (2020), 29–44.

support for force operations is important and it is therefore necessary to develop the military's cyber defence and cyber operations forces as planned.²⁶

To manage cybersecurity tasks, maintain cybersecurity and ensure the proper functioning of critical infrastructure, Hungary will take the following measures, based on the Hungarian National Security Strategy:

- identifying and monitoring challenges, risks and threats in cyberspace
- integrated and specific coordination of government agencies
- improving the legal regulation of cyberspace
- raising user awareness
- government information communication systems, national critical information infrastructure, the protection of open and classified information and the strengthening of the protection of national data assets, as well as the expansion of international cooperation on cybersecurity
- strengthening home-based research and development
- develop partnerships between public and non-state actors as well as between educational and scientific institutions and users
- fight against hybrid attacks should be based on the cooperation of state actors in the prevention, detection, intelligence and counter-response tools
- identifying cyberspace risks and addressing particular challenges
- being actively involved in international cooperation²⁷

Developing digital and cyber capabilities

The process of transformation of the Hungarian Defence Forces is very significant since the government announced the so-called Zrínyi 2026 Defence Development Program in 2016. Complex transformation, acquisition of new military equipment, restructuring military command system and introducing new training requirements lays the foundations for research, development and innovation in the whole defence architecture and beyond. Digital and cyber capabilities of the military is the core part of the Zrínyi 2026 Defence Development Program.

The theatre of information warfare is cyberspace; however, changes are taking place in all other theatres of operations as well. It seems to be proved that conventional forces are no longer able to act effectively, especially against terrorist organisations, non-state actors or hybrid threats, thus the age of fourth generation warfare has begun. Against this background, the most important issue for forces is to increase responsiveness and to seek solutions for the successful implementation of digital transformation in all fields of use of force.

Interestingly, the key of the 21st century military operations is to build a threat-responsive command system, which is decentralised and at the same time integrated. In other words,

²⁶ Klára Fekete-Karydis and Bence Lázár, 'A kibervédelem katonai dimenziói', *Honvédségi Szemle* 148, no 3 (2020), 44–54.

²⁷ Government Resolution 1163/2020 (IV.21.) on Hungary's National Security Strategy.

a command structure, which is integrated and complex, at the same time its parts are separable but more operable and can recognise and address current challenges faster. To this end, problem solving, critical thinking, creativity, networking and rapid adaptation to changing circumstances are inevitable, as well as development of human abilities. The innovation of warfare is not only new technology, but also a kind of combination of skill-level application, rapid acquisition and innovative use of these technologies and latest weapons and machines. All of this together may help the state to create a stronger, more flexible and rapid reactive force, as well as to develop an appropriate organisational defence structure that is able to absorb all new developments of technology.²⁸

Institutional transformations and, with it, organisation development have started in the Ministry of Defence and the Hungarian Defence Forces in 2019, three years later than the Zrínyi 2026 Defence Development Program was introduced. The Institute for Modernisation, the Hungarian Defence Forces and the Institute for Defence Research have been established in the same year. The Ministry of Defence has started to cooperate with different higher education institutions and launched a number of defence and military research projects. The National University of Public Service has also restructured its own educational and training focus. Professional education of new technologies, cybersecurity, engineering and hybrid warfare became the core curriculums of the Faculty of Military Sciences.²⁹

Among the new security challenges facing the world and Europe, special attention should be paid to cyberattacks and cyber defence for digitisation and network systems. In the face of hybrid warfare, the military plans to create a cyber defence system that can withstand third-party incursions into command and control systems and detect activity suggesting an attack on the network. In order to counter threats in cyberspace, up-to-date direct, specialised and sustainable training is needed for soldiers, to this end the Cyber Training Centre of the Hungarian Defence Forces was transferred to Szentendre in June 2019.³⁰

In order to achieve the comprehensive digitisation of the Hungarian Defence Forces, it is essential to develop the Hungarian Army's Separate Communications Network for Government Purposes. This is a special closed-end ICT network that should be able to support the management and command systems of the Hungarian Defence Forces, either in peacetime or during a qualified alert period, by providing a technological, technical and service background and an operating environment. A system is a network-based critical infrastructure based on special IT systems and tools. The network is responsible for serving the IT needs of higher military management, providing the technological and technical foundations of command systems, and enabling access to IT services during peace and classified alert periods. It is also responsible for connecting to and unloosing other ICT networks, that is, ensuring independent operation. The fundamental objective is to make the IT system, service and information centric. It also has to be user-friendly, multifunctional, convergeable and modern, and be able to satisfy both needs of the

²⁸ Áron Bencze, 'Digitális ugrásra készül a Magyar Honvédség', *Innotéka*, 03 May 2019.

²⁹ 'Középpontban a katona', 01 May 2019.

³⁰ 'Átadták a Magyar Honvédség Kiber Képzési Központját', 13 June 2019.

government and military sector. Another goal is to provide services to soldiers on the battlefield via real-time image streaming. The network should ensure cooperation with the networks of civil and law enforcement agencies on the one hand, and independent smooth operation in the event of a cyberattack or special legal order, on the other.³¹

As far as the international issues of digital and cyber capability development is concerned, it has to be mentioned here that Hungary is a founding member of the EU's Permanent Structured Cooperation (PESCO) project. PESCO is one of the European Union's permanent cooperation frameworks, which essentially supports defence-type projects and initiatives of member states. Many of these projects are already being organised by the European Defence Agency (EDA). The main objective of the PESCO project is to set up a cyber and information space, an information sharing centre, to create a common cyber situational awareness at the site of EU military operations. Hungary joined this initiative as a founding member. Establishing the Cyber and Information Domain Coordination Centre was carried out under the PESCO umbrella.³²

Conclusions

The argument of this research paper was that the modernisation of defence systems is an essential key to successfully responding to new security challenges in our digital explosion era. Therefore, it is a must that government organisations, including defence and military systems fundamentally upgrade their own technical, structural and operational capabilities and accept digitisation as the driving factor of future defence and military development. To ensure that our country has skills and capabilities to overcome the new security challenges created by digitisation in all operational areas, the Hungarian Defence Forces need to switch to a new type of digital platform. In other words, modernising the Hungarian Defence Forces was essential to successfully address new security challenges during the digital explosion period.

Considering the above, the study first examined digitisation as a global security challenge and then presented a comparative analysis of the relationship between hybrid warfare and cybersecurity. Finally, before drawing conclusions, it took stock of the military policy relevancies of the cybersecurity challenges applicable to Hungary. In detail, the first chapter presented digitisation as a security challenge in the global space by analysing the goals of NATO's 'global commons' project. The second part analysed and evaluated the topicalities of the cybersecurity situation in Hungary and gave a presentation of the relevant parts of the new National Security Strategy. Chapter three has lined up the military political relevance needed to guarantee our country's cybersecurity.

Overall, it can be concluded that digitisation and digital transformation are present throughout the world as a result of globalisation, so that Hungary, through the capability

³¹ Szabolcs Jobbágy, 'A Magyar Honvédség kormányzati célú elkülönült hírközlő hálózata', *Hadmérnök* 12, no 3 (2017), 223–236.

³² Lajos József Komjáthy, 'A hatékony haderő felkészítésének néhány területe a várható alkalmazás szempontjából', *Hadtudományi Szemle* 11, no 1 (2018), 71–84.

development of the Hungarian Defence Forces, must be connected to the various systems and technologies in order to allow the defence, military and national security systems used for market high-tech systems and the infrastructures used by the administration to operate independently and separately in order to support the government in information communication.

Overall, it can be stated that digitisation and digital transformation are present all over the world as a result of globalisation. Developed nations, including Hungary must be connected to digitisation and by digitisation to each other's various systems and technologies. This system has to be integrated, but independent and separated at the same time, as well as connected to each other but separable, too. In other words, on the one hand we have to use the benefits of the whole global cyber system, as well as be ready to get separated from it, to defend threats or direct attacks coming from there and protect our own system. The Hungarian Defence Forces has a key role in this very important process. The Hungarian Defence Forces must therefore have the ability to detect, address and cope with cyberspace threats, build cybersecurity capabilities and forces to fully carry out cyber defence tasks and to guarantee the smooth functioning of governmental and critical information infrastructure at all times, in accordance with its constitutional obligation.

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Costs of Infection Control and Special Challenges during the Covid-19 Pandemic: Experiences in a Military Hospital¹

Irén KOPCSÓNÉ NÉMETH² – Márta PÉNTEK³ –
Zsombor ZRUBKA⁴

Infection prevention and control (IPC) is a set of evidence-based practices of hospital epidemiology aiming to prevent and control healthcare-associated infections. The aim of the present study was two-fold. First, we estimated the costs of IPC in the Medical Centre of the Hungarian Defence Forces (MCHDF) in Hungary using a bottom-up microcosting approach. Second, we analysed how the involvement of the MCHDF in Covid-19 care changed the occurrence of multidrug-resistant infections in the hospital. Our results showed that depending on the type of ward, the daily costs of standard care ranged between 3,809–8,589 HUF, while the costs of isolation were between 9,203–11,200 HUF. Daily costs were highest in the intensive care unit (ICU). Total costs per patient ranged between 20,875–78,904 HUF for standard care and 79,996–282,892 HUF for isolation with highest values in the Neonatal Intensive Care Unit (NICU). The incremental isolation cost per patient compared to standard care ranged between 20,363–158,216 HUF. When the MCHDF became a Covid-19 care centre, the incidence of introduced Clostridium difficile and multidrug resistant cases increased by nearly 200 per cent and 40 per cent, respectively. Our results can be used as basic input data for the economic evaluation of IPC strategies and highlights an important IPC aspect to be considered for the redistribution of hospital capacities during the Covid-19 pandemic.

Keywords: infection control, economics, cost, multidrug-resistant infection, Covid-19, military hospital

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² Medical Centre, Hungarian Defence Forces; Corvinus University of Budapest, Doctoral School of Business and Management; e-mail: kopne.ira@gmail.com

³ PhD, Health Economics Research Center, University Research and Innovation Center, Óbuda University; e-mail: pentek.marta@uni-obuda.hu

⁴ PhD, Health Economics Research Center, University Research and Innovation Center, Óbuda University; Corvinus Institute for Advanced Studies, Corvinus University of Budapest; e-mail: zrubka.zsombor@uni-obuda.hu

Introduction

Although the invention of antibiotics has increased human life-expectancy substantially,⁵ their extensive use over the past decades led to the development of multidrug resistant bacteria (MDR), leading to treatment failure in potentially life-threatening infections. In addition, the use of antibiotics may result in the overgrowth of toxin-secreting *Clostridium difficile* (CD) bacteria potentially leading to severe diarrhoea or even death.⁶ One of the biggest challenges for healthcare providers today is the prevention of healthcare-associated infections (HAIs, or nosocomial infections) caused by MDR bacteria.

In countries with advanced healthcare systems, a worrying trend in the development of nosocomial infections and bacterial resistance has been recognised for decades, with increasing attention being paid to its prevention and treatment. In the last two decades, however, due to the accelerated spread of MDR bacteria, this has become an urgent compulsion everywhere. According to the report of Centers for Disease Control and Prevention (CDC) in the U.S., over 2.8 million MDR infections occur each year, and more than 35,000 people die as a result. In addition, in 2017 altogether 223,900 cases of CD occurred in the U.S. and at least 12,800 people died.⁷ The European Centre for Disease Prevention and Control (ECDC) reported that each year more than 3.2 million patients were infected at least once following exposure in healthcare facilities across the European Union and as a direct consequence of the infection, up to 37,000 of them died.⁸

Nosocomial infections can spread from infected or colonised patients to other patients and to staff. Appropriate isolation/precautions can reduce transmission if they are applied properly. Infection prevention and control (IPC) is a set of preventive practices based on scientific evidence of hospital epidemiology. IPC aims to prevent healthcare-associated infections.⁹ Isolation/precautions policies have several parts: hand hygiene, protective clothing, single rooms with special ventilation, environment hygiene, decontamination and sterilisation. Basic hygienic precautions (standard precautions) are recommended for all patient encounters. Transmission-based precautions (contact, droplet, airborne and mix precautions) are used for containing highly transmissible and/or epidemiologically important pathogens.¹⁰

The effectiveness of IPC has been proven in relation to various infections and healthcare settings.¹¹ In addition to precautionary isolation, comprehensive strategic measures, such

⁵ MI Hutchings, AW Truman and B Wilkinson, 'Antibiotics: Past, Present and Future', *Current Opinion in Microbiology* 51 (2019), 72–80.

⁶ Gulácsi et al., 'Clostridium Difficile Infection: Epidemiology, Disease Burden and Therapy', *Orvosi Hetilap* 154, no 30 (2013), 1188–1193.

⁷ CDC, *Antibiotic Resistance Threats in the United States, 2019* (Atlanta, GA: U.S. Department of Health and Human Services, 2019).

⁸ European Centre for Disease Prevention and Control, *Economic Evaluations of Interventions to Prevent Healthcare-Associated Infections* (Stockholm, 2017).

⁹ CDC, 'Infection Control', s. a.

¹⁰ M Mikulska, 'Infection Control and Isolation Procedures', in *The EBMT Handbook*, ed. by E Carreras, C Dufour, M Mohty and N Kröger (Cham: Springer, 2019), 189–195.

¹¹ Alp et al., 'Evaluation of the Effectiveness of an Infection Control Program in Adult Intensive Care Units: A Report from a Middle-Income Country', *American Journal of Infection Control* 42, no 10 (2014), 1056–1061.

as designated nursing staff and clustering patients in dedicated areas according to their infections can further enhance the effectiveness of IPC programmes.¹² However, less is known about the economic aspects of implementing different IPC measures. Health economic evaluations can inform about the comparative health benefits and required investments of alternative interventions.¹³ The health effects of the interventions can be expressed in natural units (cost-effectiveness analysis), in quality-adjusted life years (cost-utility analysis) or in monetary terms (cost-benefit analysis). Costs are equally expressed in monetary terms in health economic evaluations. The analyses can be performed from different perspectives (for example, patient, hospital, insurance, healthcare system, society) and relevant cost items are included accordingly.

A systematic literature review by Tchouaket Nguemeleu et al. on economic analyses of healthcare-associated IPC interventions in medical and surgical units was performed for the period between 2000 and 2019.¹⁴ Although the overall quality of the seven included papers was moderate, results suggested that clinical best practices of IPC generated net cost savings. In Canada, cost-benefit analysis was used to evaluate the effectiveness of a regional IPC programme in preventing incident cases of selected HAIs over a 4-year period.¹⁵ The IPC programme resulted in a reduction of 19 per cent HAIs with a cost saving of 9 million Canadian dollars. The ECDC performed a literature review to assess the economic evaluations of interventions to prevent HAIs.¹⁶ Altogether, 28 evaluations were identified (hand hygiene interventions: N = 4, personal protective equipment: N = 3; screening and/or isolation and/or decolonisation interventions: N = 21) with considerable heterogeneity across the studies. Moreover, most of the evaluations were performed in the U.S., followed by some European countries (for example, the U.K., the Netherlands, Switzerland), hence the available evidence does not cover a Europe-wide perspective.¹⁷ Given the diversity of health status, healthcare systems, availability of technologies, current clinical practice and economic development level across Europe, the transferability of economic evaluations is limited.¹⁸ Therefore, there is a clear need for local input data on both the resource use and unit costs reflecting the real situation in that country.¹⁹

The outbreak of the Covid-19 pandemic in 2020 has brought new challenges to IPC. On the one hand, new IPC measures directly related to Covid-19 had to be taken. Guidelines

¹² Fournier et al., 'Efficiency of Different Control Measures for Preventing Carbapenemase-Producing Enterobacteria and Glycopeptide-Resistant Enterococcus Faecium Outbreaks: A 6-Year Prospective Study in a French Multihospital Institution, January 2010 to December 2015', *Eurosurveillance* 23, no 8 (2018).

¹³ Drummond et al., *Methods for the Economic Evaluation of Health Care Programmes* (Oxford: Oxford University Press, 2005).

¹⁴ Tchouaket Nguemeleu et al., 'Economic Analysis of Healthcare-Associated Infection Prevention and Control Interventions in Medical and Surgical Units: Systematic Review Using a Discounting Approach', *Journal of Hospital Infection* 106, no 1 (2020), 134–154.

¹⁵ S Raschka, L Dempster and E Bryce, 'Health Economic Evaluation of an Infection Prevention and Control Program: Are Quality and Patient Safety Programs Worth the Investment?', *American Journal of Infection Control* 41, no 9 (2013), 773–777.

¹⁶ European Centre for Disease Prevention and Control, *Economic Evaluations of Interventions*.

¹⁷ Ibid.

¹⁸ Drummond et al., 'Transferability of Economic Evaluations across Jurisdictions: ISPOR Good Research Practices Task Force Report', *Value in Health* 12, no 4 (2009), 409–418.

¹⁹ Rennert-May et al., 'Economic Evaluations and Their Use in Infection Prevention and Control: A Narrative Review', *Antimicrobial Resistance and Infection Control* 7 (2018).

were adapted to the pandemic situation and, for instance, guidance for risk assessment of healthcare workers with potential exposure to Covid-19 were developed, recommendations on work restrictions and criteria for return to work for healthcare personnel with suspected or confirmed Covid-19 were established, as well as methods of optimising the supply of protective equipment.²⁰ On the other hand, the excess use of antimicrobial agents during the Covid-19 pandemic increased the incidence of antimicrobial resistance.²¹ Moreover, we cannot ignore the effects of the extra pressure Covid-19 puts on the healthcare system. The possible temporary staff shortages on both Covid-19 and other wards, the unavoidable restructuring of care (in terms of healthcare staff and health care services) might result a reduced compliance with IPC rules, especially in the learning and adaptation phase. In contrast, many interventions (for example, elective surgeries) were postponed which may reshape in a favourable direction the actual incidence of healthcare-related infections.

In this paper two aspects of the implementation of IPC are discussed. First, we address the costs associated with IPC. We report a pilot study in which patient-level standard- and transmission-based precaution activities were recorded in a large military hospital in Hungary with good IPC practice. In particular, costs were measured for those IPC activities, which are treated as overhead costs and cannot be retrieved from patients' medical records. These data can serve as a basic input for the estimation of financial demands of implementing IPC in other hospitals in Hungary. Second, through the example of the Covid-19 pandemic, we present some challenges of IPC in clinical practice. We describe how the occurrence of multidrug resistant infections changed since this same military hospital has been involved in the care of Covid-19 patients and discuss the opportunities IPC can offer to curb the wide-ranging effects of a pandemic.

Empirical research in a military hospital

Current IPC practice: resource utilisation and costs

This study was part of the research programme “Professional methodological development of the healthcare system (EFOP 1.8.0-VEKOP-17-2017-00001 project) – Change of organizational culture and patient safety culture” sub-project. The aim of this sub-project was to strengthen and integrate IPC activities into the National Health Insurance Fund financing system of Hungary. The pilot study was designed to provide basic input data for the estimation of financial needs of implementation of IPC at the hospital level. The Medical Centre of the Hungarian Defence Forces (MCHDF) has implemented IPC since 2012; therefore, it served as a suitable venue for assessing IPC costs in real-world practice.

²⁰ CDC, ‘Covid-19 Infection Control Guidance’, s. a.

²¹ Lai et al., ‘Increased Antimicrobial Resistance During the Covid-19 Pandemic’, *International Journal of Antimicrobial Agents* 57, no 4 (2021), 106324.

Study design and patient sample

The study was performed in a fixed 7-day time interval (from 30 March to 5 April in 2020). All patients receiving inpatient care in the Intensive Care Unit (ICU), Neonatal Intensive Care Unit (NICU), Internal Medicine (IM) and Surgical wards of the MCHDF were involved. No exclusion criteria were applied in terms of length of stay within the study period, that is, patients were both involved if they were already inpatients at the start of the study or had been admitted or discharged during the study period.

Infection prevention and control activities

Microbiological screening (laboratory tests) as well as IPC activities to detect and handle MDR and CD infections in the hospital are regulated by professional guidelines. All patients admitted into the hospital are treated following the basic standards of IPC. Depending on the transmission characteristics of the infection, patients of our study sample were stratified into four IPC groups: 1. standard care (also called standard isolation); 2. contact isolation; 3. droplet isolation; and 4. mixed isolation.

Standard care comprises routine IPC measures such as hand hygiene (based on the 5-moment rule of the WHO),²² use of personal protective equipment (gloves, protective jacket, mask, protective glasses) and decontamination of frequently touched surfaces based on predefined HAI rules. Contact isolation comprises the same methods as standard care; however, these are applied more frequently and more extensively (for example, decontamination of frequently touched surfaces should be performed at least twice per day) based on predefined HAI rules. Droplet isolation comprises the same methods as standard care; however, the use of mask and protective gloves are obligatory for all activities. Mixed isolation comprises the techniques of both contact and droplet isolation.

Measurement of resource use and costing

To estimate the costs of IPC, a bottom-up microcosting approach was used with slight modifications.²³ Data collection was performed on the individual (patient) level. All IPC activities/interventions that were performed on participants during the study period were recorded. Costs were estimated on the intervention level, that is, resource use data were multiplied by unit cost to estimate the expenditure.

In our study, only bedside IPC activities were taken into account. Activities in other hospital units than bedside (for example, operating room, laboratory) were not measured directly as these costs can be estimated based on protocols. The medical treatment related to the infections was also out of scope in this study.

²² WHO, *Your 5 Moments for Hand Hygiene* (Geneva, 2009).

²³ Špacírová et al., 'A General Framework for Classifying Costing Methods for Economic Evaluation of Health Care', *The European Journal of Health Economics* 21, no 4 (2020), 529–542.

Considering the respective IPC guidelines and legislations, for each patient by ward (IM, ICU, NICU, Surgical) and type of IPC protocol (standard care, contact, droplet, mixed isolation), resource use was recorded for the following items: antiseptic handwashing, alcohol-based hand rub, medical gloves (non-sterile), medical gloves (sterile), protective gowns, isolation gowns, protective masks, surgical masks, surface disinfection and equipment disinfection via wiping towels, textile cleaning and terminal cleaning at patient discharge.

For each patient, the number of days spent in the study and type of isolation was recorded. For cost estimation, we used mean length of stay reports of the IM, ICU, NICU and Surgical wards of the MCHDF for the entire 2019 (pre-Covid) year.

Unit costs of the materials and equipment were considered based on average Hungarian Forint (HUF) purchase price of the Hospital (MCHDF), multiplied by the average unit consumption per resource use episode (for example, mean use of alcohol-based hand rub per handwash in millilitres.) The average unit consumption per resource use episode was established from applicable WHO guidelines.

Statistical analysis

Given the small sample size and incomplete observation of the isolation episodes during the study period, we estimated costs via Monte-Carlo simulation.²⁴ For the standard care and isolation groups, we simulated daily resource use from the sample correlation matrices, mean values and standard errors of all items via gamma distribution for cohorts of 100 thousand observations. Length of stay and the duration of isolation was also simulated via gamma distribution. For each resource item, net unit prices were calculated using the weighted mean of purchase prices in proportion with the 2020 consumption volume. We assumed a standard error equal to 10 per cent of the mean for each price item and a gamma distribution. To account for incidental variation of consumed amounts per episode, for liquid soap, alcohol-based disinfectant preparations and textile cleaning we applied a gamma distribution assuming a standard error equal to 10 per cent of the mean values. The cost of closing disinfection was treated as a fixed cost and allocated evenly across standard care as well as isolation days. Simulated costs were analysed using descriptive methods (mean and 2.5–97.5 percentile range for 95 per cent credible interval). Furthermore, we performed one-way sensitivity analysis by examining the impact of changing resource use and cost parameters by ± 10 per cent. We observed the changes of mean daily costs and total patient costs in both the standard care and isolation groups. The simulation and analyses were performed using Stata 16 statistical software.²⁵

²⁴ A Briggs, K Claxton, and M Sculpher, *Decision Modelling for Health Economic Evaluation* (Oxford: Oxford University Press, 2006).

²⁵ Stata Statistical Software: Release 16, StataCorp LLC, College Station, TX.

Results

Altogether 84 patients were involved during the 7-day study period (IM ward: N = 16; ICU: N = 32; NICU: N = 22; Surgical ward: N = 14). Standard care was provided for 64 patients (279 days of observation) 20 patients over a total of 64 observation days were in isolation (contact isolation N = 13; droplet isolation N = 1; mixed isolation N = 6). Altogether 7, 7, 2 and 4 patients were observed under isolation in the IM, ICU, NICU and Surgical wards, respectively. Mean (\pm SD) days of observation per patient was 4.4 (\pm 2.2) days in the standard care and 4.0 (\pm 2.8) days in the isolation group. Table 1 summarises the main input parameters of the cost simulation model.

Table 1: Summary of input parameters to infection control cost estimation

	Mean daily use frequency in standard care	SE ^d of daily use in standard care	Mean daily use frequency in isolation	SE of daily use in isolation	Unit cost HUF ^e	SE of unit cost	Consumption per use episode	SE of consumption per use episode
Antiseptic handwashing ^a	6.95	0.93	6.75	1.94	0.43	0.04	3 ml ^f	0.30
Alcohol-based hand rub ^b	20.64	1.22	26.12	2.98	1.72	0.17	3 ml	0.30
Non-sterile medical gloves ^c	26.14	1.42	28.83	4.37	5.12	0.51	2 pc ^g	–
Sterile medical gloves ^c	0.63	0.12	2.36	1.82	35.48	3.55	2 pc	–
Protective gown	1.33	0.22	4.03	1.36	143.82	14.38	1 pc	–
Isolation gown	0.61	0.20	8.77	1.55	143.82	14.38	1 pc	–
Protective mask	2.93	0.51	8.44	3.22	400.94	40.09	1 pc	–
Surgical mask	7.42	0.82	12.70	1.95	4.30	0.43	1 pc	–
Surface disinfection	1.82	0.18	2.44	0.83	21.40	2.14	1 pc	–
Equipment disinfection	3.11	0.25	7.36	2.42	21.40	2.14	1 pc	–
Textile cleaning	1.57	0.14	3.79	0.84	663.00	66.30	1 oc ^h	0.10
Final disinfection (IM, Surgical)	–	–	–	–	6,800.00	680.00	1 oc	–
Final disinfection (ICU, NICU)	–	–	–	–	19,800.00	1,980.00	1 oc	–

^awith soap, water or other antiseptic detergents; ^balcohol-based liquid or gel preparation; ^cdisposable; ^dSE: standard error; ^emean exchange rate (2020.04.16–2021.04.15) 1 EUR = 356.7 HUF; ^fml: millilitres, ^gpc: piece(s), ^hoc: occasion

Source: Compiled by the authors.

The costs of standard care and isolation by ward as well as the incremental costs of isolation are summarised in Table 2. In addition to mean values, the 95 per cent credible intervals are provided.

Table 2: Summary of cost estimates by IPC activity and ward

		IM	ICU	NICU	Surgical
Standard care	Total daily cost (HUFa); mean, [95CIb]	3,809 [3,136–4,596]	8,589 [7,190–10,178]	4,089 [3,399–4,882]	4,539 [3,818–5,361]
	Length of stay (HUF); mean, [95CI]	9.1 [8.9–9.3]	3.6 [3.1–4.1]	19.3 [18.3–20.3]	4.6 [4.4–4.8]
	Total cost (HUF); mean, [95CI]	34,663 [28,529–41,819]	30,824 [26,159–35,920]	78,904 [65,354–94,615]	20,875 [17,538–24,677]
Isolation	Total daily cost (HUF); mean, [95CI]	9,203 [5,561–14,190]	11,200 [7,441–16,254]	9,265 [5,614–14,270]	9,413 [5,753–14,419]
	Length of isolation (HUF); mean, [95CI]	11.4 [10.6–12.2]	7.8 [5.8–10.1]	30.6 [23.9–38.1]	8.5 [7.3–9.8]
	Total cost (HUF); mean, [95CI]	104,907 [63,023–162,334]	86,935 [55,120–132,809]	282,892 [163,214–453,760]	79,996 [47,998–124,730]
Isolation vs standard care	Incremental cost per day (HUF); mean, [95CI]	5,393 [5,379–5,407]	2,612 [2,597–2,626]	5,176 [5,162–5,190]	4,875 [4,861–4,889]
	Incremental cost per patient (HUF); mean, [95CI]	61,488 [57,109–66,016]	20,363 [15,107–26,393]	158,216 [123,584–197,043]	41,452 [35,471–47,857]

^amean exchange rate (2020.04.16–2021.04.15) 1 EUR = 356.7 HUF; ^b95CI: 95 per cent credible interval (2.5–97.5 percentile range of the simulated distribution)

Source: Compiled by the authors.

The results of the one-way sensitivity analyses are provided in Figure 1. The daily costs of standard care were most sensitive to the costs of terminal cleaning and were negatively influenced by the length of stay due to the fix nature of terminal cleaning costs. Isolation costs were most sensitive to the quantity used and unit cost of protective masks, textile cleaning as well as terminal cleaning. Total costs of standard care and isolation were both most sensitive to the length of stay or length of isolation, as well as quantity and unit cost of protective masks, textile cleaning and terminal cleaning.

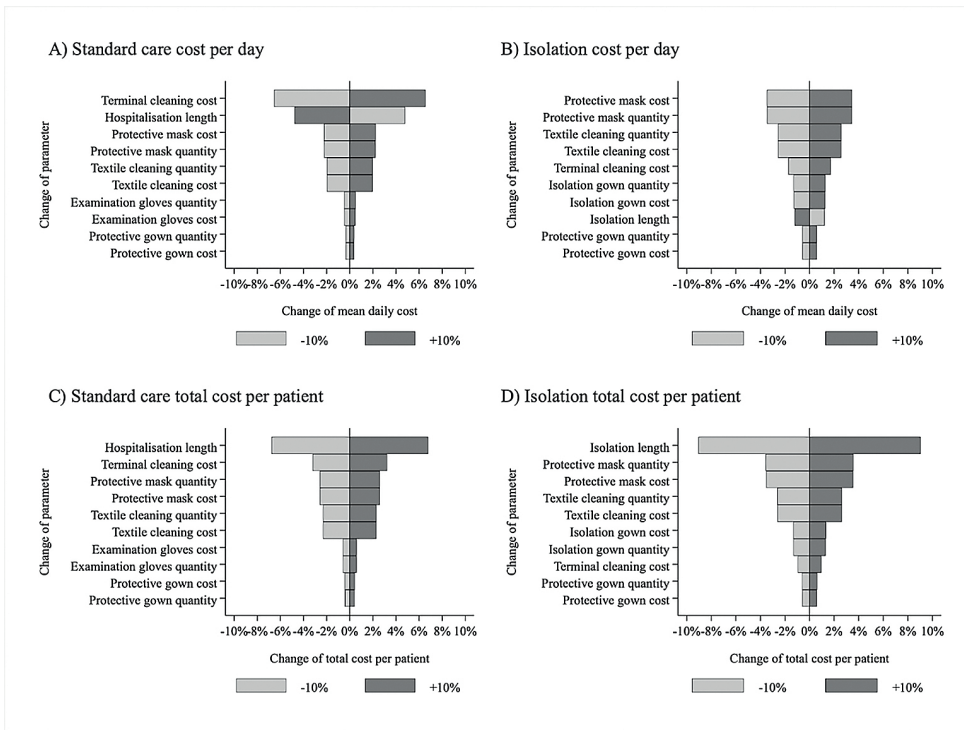


Figure 1: Results of one-way sensitivity analyses

Source: Compiled by the authors.

Multidrug resistant infections during the Covid-19 pandemic

During the Covid-19 pandemic, special infection control measures were introduced in Hungarian hospitals to prevent the spread of SARS-CoV-2. Until November 2020, the MCHDF encountered incidental Covid-19 cases, who were diagnosed during routine care, and after immediate isolation, were transferred to designated care centres. From November 2020 (Covid-care period), a designated Covid-19 care ward was established at the MCHDF, and the number of (predominantly severe) Covid-19 cases increased markedly compared to the pre-Covid-care period (Figure 2). We examined the impact of the pandemic on the occurrence of MDR and CD cases in the hospital.

Methods

Using data from the hospital's IPC surveillance system, we compared the monthly incidence of introduced (for example, acquired outside the hospital) MDR and CD cases

per 1,000 inpatients as well as the incidence density of nosocomial (for example, acquired in the hospital) MDR and CD cases per 10,000 inpatient days between the Covid-care and pre-Covid-care periods. Only months affected by the first and second wave of the pandemic (March–June, September–December) were included for 2019 and 2020. We applied Poisson regression, with time (months) as well as the Covid-care period (vs pre-Covid-care) as predictors. We also analysed the association between the number of Covid-19 patients (counted in 100's) and CD/MDR incidence. If the Poisson regression was not applicable due to inadequate distribution of data or goodness of fit test results, the generalised Poisson model was applied.²⁶

Results

The incidence of Covid patients were plotted against the incidence of introduced and nosocomial CD and MDR cases in Figure 2.

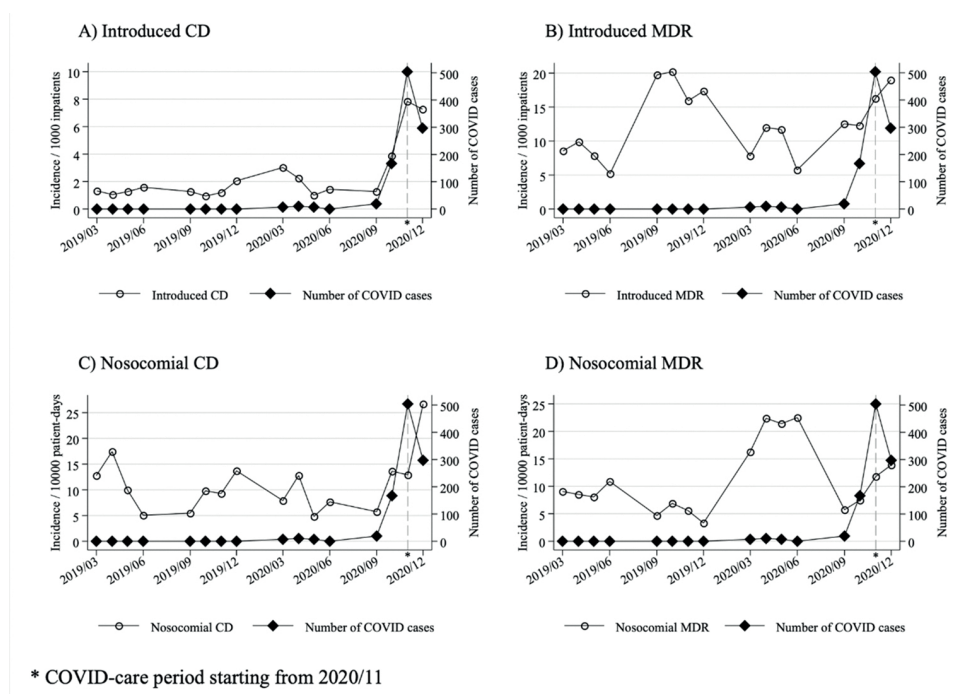


Figure 2: The incidence of Covid patients plotted against the incidence of introduced and nosocomial CD and MDR cases

Source: Compiled by the authors.

²⁶ T Harris, Z Yang and JW Hardin, 'Modeling Underdispersed Count Data with Generalized Poisson Regression', *The Stata Journal* 12, no 4 (2012), 736–747.

The incidence of introduced CD cases showed a mild increase over time, while the incidence of introduced MDR and nosocomial CD as well as MDR cases was stable over time. However, during the Covid-period, the incidence of introduced CD cases nearly tripled and the incidence of introduced MDR cases increased by nearly 40 per cent compared to the pre-Covid period. While the incidence density of nosocomial CD cases increased by over 2-fold, the change in nosocomial MDR incidence density was not significant (Table 3). The number of Covid cases showed association with the incidence of both introduced and nosocomial CD, while the association with MDR cases was not significant.

Table 3: Effect of the Covid-care period on the incidence of MDR and CD

	Incidence per 1,000 patients		Incidence density per 10,000 patient days	
Model	Poisson regression ^a	Poisson regression ^a	Poisson regression ^a	Poisson regression ^a
Predictors	CD ^b introduced	MDR ^c introduced	CD nosocomial	MDR nosocomial
Covid-care period	2.929***	1.394*	2.404*	0.811
Time (months)	1.001*	1.000	1.000	1.001
N (observed months)	16	16	16	16

^acoefficients are expressed as incidence rate ratios (IRR); ^bCD: clostridium difficile; ^cMDR: multi-drug resistant

* p < 0.05; ** p < 0.01; *** p < 0.001

Source: Compiled by the authors.

Table 4: Association of the number of Covid patients with the incidence of MDR and CD

	Incidence per 1,000 patients		Incidence density per 10,000 patient days	
Model	Poisson regression ^a	Generalised Poisson regression ^b	Generalised Poisson regression ^b	Generalised Poisson regression ^b
Predictors	CD ^c introduced	MDR ^d introduced	CD nosocomial	MDR nosocomial
Number of Covid patients, x100	1.306***	1.068	1.172*	0.950
Time (months)	1.001*	1.000	1.000	1.001
N (observed months)	16	16	16	16

^acoefficients are expressed as incidence rate ratios (IRR); ^bcoefficients are expressed as incidence rate ratios (IRR); ^cCD: clostridium difficile; ^dMDR: multi-drug resistant

* p < 0.05; ** p < 0.01; *** p < 0.001

Source: Compiled by the authors.

Discussion

In this paper, we estimated the costs of infection control in the MCHDF and demonstrated special challenges of infection control concerning MDR and CD cases during the Covid-19 pandemic. Depending on the type of ward, the daily costs of standard care ranged between 3,809–8,589 HUF, while the costs of isolation were between 9,203–11,200 HUF. Daily costs were the highest at the ICU, and the lowest at the IM wards. Total costs per patient ranged between 20,875–78,904 HUF for standard care and 79,996–282,892 HUF for isolation with highest values in the NICU ward due to lengthiest hospitalisation and isolation. The incremental isolation cost per patient compared to standard care ranged between 20,363–158,216 HUF.

When the MCHDF became a Covid-19 care centre, the incidence of introduced CD and MDR cases increased by nearly 200 per cent and 40 per cent, respectively. While the number of Covid-19 patients showed association with the incidence of both introduced and nosocomial CD, the MDR incidence was not associated with the Covid-19 patient count. The incidence density of nosocomial MDR cases was not affected during the first months of the Covid-care period.

ICP in hospitals is closely linked to continuous quality improvement, a systematic process of improving the quality of care and reducing costs. ICP has proven efficacy in reducing the incidence of HAIs, which not only compromise patient outcomes but are also very costly to manage.²⁷ Although the cost-effectiveness of IPC practices has long been recognised,²⁸ high quality costing studies are scarce. Fukuda et al. reviewed the quality and transferability of incremental costs of HAI until 2011 and found only a single study out of the included 89 papers that used microcosting and reported all input parameters at full detail.²⁹ Precise data on IC-associated costs are extremely important as IPC policies are frequently influenced by cost-effectiveness considerations.³⁰ Altogether, systematic reviews on the economic burden of HAIs suggest an increase of hospitalisation costs, length of stay and mortality.³¹ Economic evaluations of IPC are scarce in Hungary. The incremental costs of CD infections in 2012 were reported between 178,404–507,046 HUF depending on case severity and type of hospital ward.³² In this study, isolation costs were estimated by attaching unit costs to activities prescribed by the institutional IPC protocol (and not to real world practice). Mean incremental hygienic costs per CD infection vs standard care ranged between 66,408–89,098 HUF per patient in IM, ICU and surgical wards. The study involved 151 patients. Another study from 2010 reported 35,144 HUF

²⁷ Gulácsi et al., 'Risk-Adjusted Infection Rates in Surgery: A Model for Outcome Measurement in Hospitals Developing New Quality Improvement Programmes', *Journal of Hospital Infection* 44, no 1 (2000), 43–52.

²⁸ Arefian et al., 'Economic Evaluation of Interventions for Prevention of Hospital Acquired Infections: A Systematic Review', *PLoS One* 11, no 1 (2016), e0146381.

²⁹ H Fukuda, J Lee and Y Imanaka, 'Costs of Hospital-Acquired Infection and Transferability of the Estimates: A Systematic Review', *Infection* 39, no 3 (2011), 185–199.

³⁰ Tchouaket Nguemeleu et al., 'Economic Analysis of Healthcare-Associated Infection Prevention'.

³¹ Ibid.

³² Kopcsóné Németh et al., 'A Clostridium Difficile Fertőzések Költsége Magyarországi Kórházakban', *Egészségügyi Gazdasági Szemle* 51, no 2 (2013), 9–16.

incremental costs of disinfection and protective gear in an MDR epidemic³³ in a large county hospital involving five patients. The methods of cost collection were not reported.³⁴

The strength of our costing study is that due to a well organised IPC surveillance system and regular training of staff in the MCHDF, the collected cost data reflect reasonably well the costs of following evidence-based IPC guidelines under real-life conditions and can potentially be generalised to other healthcare institutions in Hungary. However, the low sample size was a limitation of the costing study, and more data are needed to improve the precision of estimates.

The incidence density of nosocomial CD infections reached 26 per 10,000 hospital days in the Covid-care period, which is an alarmingly high number. Granata et al. reported 4.4 CDI cases per 10,000 hospital days in 8,402 hospitalised Covid patients in Italy, with inferior outcomes compared to the CD negative population. Sandhu et al. reported the increase of CD incidence density from 3.3 to 3.6 per 10,000 patient days during the first months of the pandemic (March–April 2020 vs January–February 2020). However, while the increased incidence of MDR infections has also been reported in connection with Covid patients,³⁵ their incidence did not change in the MCHDF. A strength of our analysis is that the association of both introduced and nosocomial CD infections with the Covid-19 pandemic could be recognised early from the IPC surveillance data. However, data was not available to assess the clinical impact of CD infection in the outcomes of patients hospitalised due to severe Covid-19 symptoms. Also, more data are needed to understand the association of the Covid-19 pandemic with the risk of MDR infections. In addition to tradition hospital epidemiology methods, there are HAI simulation frameworks available which can be useful for in-depth analysis of MDR spread dynamics.³⁶

Conclusions

Implementation and maintenance of IPC in a hospital environment requires extra financial investment. Results of our small experimental study suggest that both the volume and structure of IPC-related costs vary substantially across different wards, being the highest in ICU unites per day and NICU units per patient. This implies that financial needs of IPC may vary significantly from hospital to hospital depending on their profile. Involvement of a hospital in Covid-19 care seems to significantly increase the incidence of admission of patients with previously acquired MDR bacteria or CD. This effect should be considered not only by the hospital IPC surveillance system but also for the reorganisation of hospital capacities and budget planning during the pandemic. Further studies are encouraged to assess the generalisability of our results to other settings in the region.

³³ Granata et al., 'The Burden of Clostridioides Difficile Infection During the Covid-19 Pandemic: A Retrospective Case-Control Study in Italian Hospitals (CloVid)', *Journal of Clinical Medicine* 9, no 12 (2020), 3855.

³⁴ M Knausz, G Kaproncai and F Rozgonyi, 'Cost/Benefit Calculations of Meticillin-Resistant Staphylococcus Aureus Screening Methods and Their Practical Importance', *Orvosi Hetilap* 151, no 22 (2010), 893–898.

³⁵ Lai et al., 'Increased Antimicrobial Resistance'.

³⁶ R Pethes, T Ferenci and L Kovács, 'Infectious Hospital Agents: A Hai Spreading Simulation Framework', *Acta Polytechnica Hungarica* 14, no 1 (2017), 95–110.

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