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Dr. Tibor Szilvágyi (PhD):[1]

Target UAV's role in military training and capability building

Abstract:

The security of a state partially depends on its military capabilities and resilience. Air defence forces play an inevitably important role in protecting the state's sovereignty and territorial integrity. The supremacy of the airspace above the country is a prerequisite for peace. Successful military training is the keyword in preparation for any security challenge, crisis, military conflict or war. The most prudent training method of the air defence forces is a combination of software and hardware, or with other words exercises with simulation and real military technology together. In this case the combination is represented by target UAVs. Their payloads make it possible that aerial targets can simulate real adversary air campaigns, strikes and other similar security threats coming from the air. HM EI Zrt. is committed to deal with target UAV development, production and services for the Hungarian Defence Forces. In the future target UAVs remain inevitable tools for training of soldiers and operators serving at the air defence forces and also for destructing of the enemy's moral and resilience with its swarm tactics during a military conflict or war.

Keywords: Air defence forces, missile, rocket, machine gun, target UAV, payload, military training and exercise, simulation, METEOR-3MA target UAV, prudent operation, sustainability.

Introduction

"Der Krieg ist eine bloße Fortsetzung der Politik mit anderen Mitteln" ("War is a mere continuation of policy by other means") said General Carl von Clausewitz about the theory of war in his book published in 1832 with its original title: "Vom Kriege" ("On War").[2] Regular and irregular military organisations often wage war or use military technology in order to achieve their political goals. Military force is an ancient tool for realising own interests and it is not different even today. Thanks to the informatics and electronics the preparation for a battle or for a military mission can be realised with augmented or virtual reality as well. Simulators help

[1] Project leader at the HM EI Zrt. Electronics and Informatics Directorate Aviation Division.

[2] Carl von Clausewitz: Vom Kriege – Erstes Buch: Über die Natur des Krieges. https://clausewitzstudies.org/readings/VomKriege1832/Book1.htm#1-1 Downloaded: 9 June 2024

us to train soldiers, pilots and drivers in a situation that is close to a realistic one but it is not so expensive and dangerous. Computer games help us to understand the meaning of simulation that is a bit independent from the real circumstances. A simulation can be used in a different place and time, without real persons and tools that is cheap, secure and simple. Especially the military training is keen on the simulation since military technology is expensive and difficult to use and handle. It is reasonable to train soldiers with computer programs instead of using hardware that is amortising. Sustainability is one of the keywords in the military exercises and trainings as well.

This work would like to show one of the segments of the military training that is an especially good example for combining simulation (software) and real tools (hardware). In the next pages distinguished readers will be familiar with the operation of unmanned aerial targets that are fusing with each other a plenty of knowledge and experience coming from different science fields, let say aviation, mechanics, electronics, mechatronics, informatics, topography or meteorology. Unmanned aerial vehicles (UAVs) represent a disruptive technology that is used more and more often in several areas. Target UAVs are used in military training in order to teach and train the staff of air defence forces equipped with missiles, rockets or machine guns. Different weapon systems need different targets according to their capabilities and abilities. Instead of using commercial (piloted or screwed) aircrafts, rockets or towed appliances as targets, air defence forces usually require unmanned air targets since these are easier and cheaper to operate. This is still an old axiom that the human pilot is the most valuable and expensive part of the air operations. It means that real pilots and their life is worth saving in every situation. This is the reason and explanation for using ejectors or parachutes in airplanes and helicopters in emergency situations. An unmanned vehicle does not need these appliances for human beings since on the board there is no staff or person for saving their lives.

Air defence and target UAVs

Air defence forces are inevitably important to grant the military resilience of a state, its territory and airspace. These forces should be prepared how to deter or ward off adversary cutting-edge military aircraft and how to keep air superiority above the state's territory. Target UAVs are proper tools for training of the own air defence forces in peace-time. Aerial targets might be categorised according to their "master weapon systems", their receivers. Air defence machine guns, rockets and missiles need different targets to train their operators or military staff. The biggest advantage of the UAVs is that they can be dedicated to a special task with their payloads. Usually, an optimal UAV is built around the payload, in other words aerial vehicles are created mainly for the purpose of the payload. Bare UAVs are only transport tools that deliver the payloads to the right place in a proper time. They are pro-

grammable and, in many occasions, autonomous. This feature makes them able to pretend real military threats caused by the enemy in the reality.

Anti-aircraft machine guns are able to hit and destroy relatively small and slow-moving aerial targets from a distance of hundreds of meters or some kilometres. These weapons need optical or thermal target acquisition since their targets are usually made of composite material that has no or very small radar cross section[3] (RCS). In order to train anti-aircraft machine gun operators, UAVs are the best solution. Target UAVs might be remotely controlled in a designated airspace with special flying features. These aircrafts can simulate conventional small fixed- or rotor-wing aircrafts as well. Nowadays even small UAVs can be equipped with explosive devices or guns so they pose a real threat for civilians and military troops. This is the reason why also average soldiers should be trained to deter or to eliminate small UAVs with anti-aircraft machine guns. Tiny UAVs might provide the best simulations since in reality the same or nearly the same attacking UAVs might be a really dangerous and dirty weapons in the hand of the enemy.

Air defence rocket and missile systems are much more complex and complicated weaponries than anti-aircraft machine guns. They use radars in order to detect, identify, follow and intercept air targets. These systems are specialised for bigger air targets that pose a huge threat for own objects and troops. The guided missiles of these air defence weapon systems are equipped with thermal, infrared and electronic sensors in order to find and hit the target without remote control. For training purposes these air defence systems need also a target UAV that is fast, flies on a higher altitude and equipped with different payloads simulating the foe's aircraft.

Picture 1: Banshee Jet 40+; Source: Banshee Jet 40+ https://www.qinetiq.com/en/what-we-do/target-systems/aerial-targets/banshee-jet-40-plus Downloaded: 14 June 2024

[3] Radar Cross Section; Radar cross section (RCS) is a crucial characteristic that determines how much energy an object reflects back towards a radar. This feature has gained significant importance for military customers worldwide, as it helps assess the ease with which an object can be detected. https://www.nsi-mi.com/applications/radar-cross-section Downloaded: 14 June 2024

The Banshee Jet 40+ jet-powered uncrewed aerial vehicle is one of the most up-to-date target UAVs that works as a performance-focused training target designed for threat representation and military operational training. Fitted with a 40 kg thrust gas turbine engine, the Banshee Jet 40+ is able to achieve an impressive 140 m/s airspeed when flying straight and stable on a certain altitude level. Other features, such as integrated GPS, digital telemetry systems and parachute ejection recovery ensure effective navigation through various training simulations.[4]

The QF-16 target UAV represents a full-scale aerial target (FSAT) that is a converted, uncrewed type of the original F-16 (Fighting Falcon) fighter jet. In its cockpit there is an autopilot that controls the flight of the UAV. This military training solution creates a realistic air strike threat for the air defence missile forces' operators who are able to increase their anti-aircraft skills with the help of the QF-16 FSAT in nearly real circumstances. The first QF-16 aircraft was handed over by Boeing to the US Air Force (USAF) in 2012, followed by the first uncrewed flight test in 2013. Until 2022 more than 75 modified QF-16s were delivered to the USAF. After being modified, the FSAT can now be flown by a pilot, as well as remotely by a group of ground operators and technicians. The QF-16 is a reusable, optionally piloted FSAT system designed to carry out a variety of missions including air-to-air live fire training, evaluation of weapon systems, auto take-off and landing, supersonic flight and ground-to-air live fire missile tests. Each FSAT offers a lifespan of around 300 flight hours.[5]

Picture 2: QF-16 Target UAV; Source: USAF and Boeing fly QF-16 drone without pilot https://www.flightglobal.com/usaf-and-boeing-fly-qf-16-drone-without-pilot/111148.article Downloaded: 14 June 2024

[4] Banshee Jet 40+. https://www.qinetiq.com/en/what-we-do/target-systems/aerial-targets/banshee-jet-40-plus Downloaded: 14 June 2024

[5] Boeing delivers last QF-16 Zombie Viper FSAT to USAF. https://www.airforce-technology.com/news/boeing-delivers-last-qf16-usaf/?cf-view Downloaded: 14 June 2024

Payloads for target UAVs

Payloads are special devices on the board of UAVs that usually augment or substitute human sensing capabilities or mimic real military threats and capabilities. It sounds especially abstract but this is true that electronic devices (for example electro-optical and thermal cameras, multispectral sensors and radars) might detect, reveal, disclose or identify hidden objects and activities. These payloads are the most important parts of UAVs that nowadays are developing very fast thanks to the digitalisation and miniaturisation processes in electronics.

The most common payload on a target UAV is the passive radar reflector. It might be for example a Luneburg lens that was named after its inventor, Rudolf Luneberg. It provides a right RCS for the air defence system equipped with radars. The composite-made target UAV might transport different size Luneburg lenses in order to serve different air defence weapon systems. The optimal radar frequency – depending on the simulation – of the Luneburg lens determines its measure and also the airframe of the target UAV. The Luneburg lens is a passive radar device that increases the radar reflectivity of a target without using additional energy. Firstly, Luneburg lens exploits the phenomenon of refraction. When radar waves go through a special dielectric material with a varying refractive index, they change their direction. So, Luneburg lens can bend the incoming radar waves towards a specific point. These electromagnetic waves are bounced back towards the source, resulting in a stronger radar signal. Secondly, a Luneburg lens improves the signal reception of the radar system. By focusing the incoming radar waves, it reduces the loss of signal strength that occurs when waves spread out over a larger area. This means that the radar system can detect weaker signals or targets at longer distances. In summary, a Luneburg lens is a type of lens used in radar systems to enhance radar reflectivity and improve signal reception.[6]

Picture 3: Luneburg lens – Passive radar reflector
https://aresia.com/radar-reflector/?lang=en Downloaded: 14 June 2024

[6] What is a Luneburg Lens Antenna? https://www.sannytelecom.com/what-is-a-luneburg-lens-antenna/ Downloaded: 14 June 2024

There is also an option to use an active radar as payload on the target UAV that might emit radar signals in different frequencies and modulations. This system gives the opportunity to simulate different reflected radar signals originally coming from different aircrafts' radar systems. The active radar can operate in C, X and Ku Bands. The antenna system amplifies incoming signal and retransmits it according to the programmed RCS level. The active radar homing emulator (ARHE) is a payload designed and produced by QinetiQ Target Systems. When integrated to an aerial target platform, the ARHE represents an active homing missile threat in order to exercise a surface- or air-based electronic warfare system or the activation of warning systems and to evaluate the latest automatic defence systems. ARHE can be remotely controlled to switch on/off and between both sweeping and target acquisition modes by the target operator. It can provide a fast-moving mobile radar source that can be operated at low altitudes and pretend several multiple threat scenarios. The system can be programmed to enable operation against a variety of receiving equipment.[7]

Sometimes aerial targets require visual enhancement to ensure early acquisition. In order to increase the visibility of an aircraft, target UAVs can use infrared (IR) and smoke flares. These pyrotechnic stores might pretend the hit of an aircraft or the caused damage with its smoke or vivid lights. This seems to be very realistic and really spectacular during a military exercise. Smoke tracking flares produce an intense black or orange coloured smoke that is visible at ranges of 6 to 10 km in fair weather conditions. Ignition of the flare is initiated by the UAV operator sending a firing signal by remote controller, after which the smoke will be emitted for in excess of 40 seconds. A lightweight and simple design ensures that the maximum number of flares can be fitted easily to the range of aerial targets.[8]

The heat might be an ostensible payload as well since conventional military aircrafts leave an enormous thermal footprint with their engines. Gas turbine jet engines on target UAVs are the best simulators of this effect because these are working with a same method as their "bigger brothers". This heat (500–700 °C) coming from the jet engine of a UAV might be detected by thermal cameras searching for aerial targets in the air. There is a significant temperature difference between the surrounding air and the gas leaving the jet engine or between the vicinity of the piston engine and the airspace temperature.

Hot nose can simulate an (IR) resource that is artificial but gives a real IR trace picture from the UAV. The Hot Nose is a black-body infra-red enhancement system that provides a proven infrared source for IR tracked, guided or fused weapons. It can be easily fitted to a target UAV without affecting its performance or the installation of other enhancements. The nose cone is compact, safe and comprises two major

[7] Active Radar Enhancement. https://www.qinetiq.com/en/what-we-do/services-and-products/active-radar-enhancement Downloaded: 14 June 2024

[8] Smoke Flare. https://www.qinetiq.com/en/what-we-do/target-systems/other-products-and-services/smoke-flare Downloaded: 14 June 2024

assemblies, the heated nose itself and a reservoir for the propane fuel. The propane burner is equipped with a remote ignition system that allows it to be ignited on command from the target control ground station either before launch or during flight. In use the exhaust gases from the burner are directed over the fuselage so increasing the overall size of the heated area. Safety system equipped with solenoid valves initiates a shut-down on loss of aircraft command link, on demand or on parachute deployment.[9]

Despite the personal and technical efforts, the target aerial vehicle will not be eliminated in all cases. Sometimes bullets or rockets miss the target. In this case the miss distance indicator (MDI) can give you good odds about the unpunctuality of the orientation system. Acoustic MDI System is the latest in high resolution scoring systems for small supersonic projectiles at QinetiQ Target Systems. The detection of a passing projectile and the provision for detailed information regarding its proximity to a target during firing training results in a better understanding of errors and highlights successes.[10]

The above-mentioned payloads are a prove that capabilities of target UAVs might be extended by special appliances that are module and easy to change or use. These payloads might be switched on or off during the target UAV mission according to the scenarios or surprise requirements providing a close to reality battle situation.

Target UAVs at HM EI Zrt.

The HM EI Zrt. (HM Electronics, Logistics and Property Management Private Company Limited by Shares) deals among others with target UAVs' development, production and providing services for the Hungarian Air Defence Forces. The company has developed the so-called M-8 aerial target for anti-aircraft machine guns and METEOR-3MA target UAV for air defence missile systems (KUB, Mistral and later on NASAMS). The electric M-8 UAV is suitable for training of soldiers operating anti-aircraft machine guns. The threat posed by small UAVs is imminent so average Hungarian soldiers also should prepare to handle such kind of security challenges. The METEOR-3MA target UAV is equipped with gas turbine jet engine that creates enough thrust for acceleration, reaching the highest speed (250 km/h) and creating heat for thermal signature. Hereinafter this publication is going to deal with the METEOR-3MA in order to represent and show the meaning and importance of the target UAVs.

[9] IR Hot Nose. https://www.qinetiq.com/en/what-we-do/services-and-products/ir-hot-nose Downloaded: 14 June 2024

[10] Acoustic MDI Scoring. https://www.qinetiq.com/en/what-we-do/services-and-products/acoustic-mdi-scoring Downloaded: 14 June 2024

Picture 4: Hungarian Mistral air defence missile system, Mistral Coordination Post (MCP) and Atlas weapon system; Source: https://airbase.blog.hu/2017/06/23/_fight_as_one_elesloveszetre_keszulve Downloaded: 14 June 2024

METEOR-3MA target UAV is a semi-automatic unmanned aerial system (UAS) that imitates larger aircrafts with its Luneburg lens in the nose that passively creates a satisfactory RCS. The UAV is made of composite material and the airframe is a miniaturised ASW-15 sailing aircraft (5-meter wingspan) that has no RCS but it is strong enough for protecting the whole airplane with its payloads that is altogether 20 kg and should bear some *g*-loads during its manoeuvres as well. The engine of the UAV is a JetCat P160-RXI-B gas turbine engine made in Germany. It provides a 16 kg thrust. For taking off and landing, this UAV needs the operator's skills who guides the aerial vehicle with remote controller. The maximum range of this target UAV is about 20–25 km depending on the line-of-sight conditions of the data link. The average flight time of METEOR-3MA is 20–25 minutes (with about 5–6 litres of kerosene) that can be enhanced until half an hour. When the jet engine stops unexpectedly in the air (it might happen in dense clouds) there is an opportunity to start it

Picture 5: METEOR-3MA target UAV; Source: Photo of the HM EI Zrt.

again after a cooling and heating period. If the restart is not successful then the airplane flies (glides) without thrust. From a distance of about 10 km METEOR-3MA returns home without any problem if the altitude from the take-off place reaches 1000 m. It means that the UAV has a glide ratio of 10. Its further payloads are the infrared (IR) and smoke flares, three of them each on the wings of the UAV. These remotely launched pyrotechnic appliances can be used for increasing the aircraft's visibility or for imitation of its damage.

Mobile Flight Control Station (MFCS in English and MRVP in Hungarian) is an important part of the METEOR-3MA UAS. It is a towed vehicle that has three workstations with a computer and two screens each. Besides this, MFCS is able to transport four METEOR-3MAs and other equipment necessary for the service providing activity in the field. The unambiguous aggregator provides 220 V for the computers and for loading the batteries. One of the workstations' screens shows the software that facilitates programming the waypoints of the planned flight routes and some fail-safe functions. During the flight of three METEOR-3MAs the operators (remote pilots) are able to see and follow not only the own airplane's heading, motion, velocity and altitude but the others' flight features as well. The operator continuously gets telemetry data coming from the UAV and shown on the screens that helps controlling of the METEOR-3MA's flight. MFCS has three radios, three antennas and also three frequency bands for data link and other three radios, antennas and frequencies for receiving video stream and telemetry from the UAV.

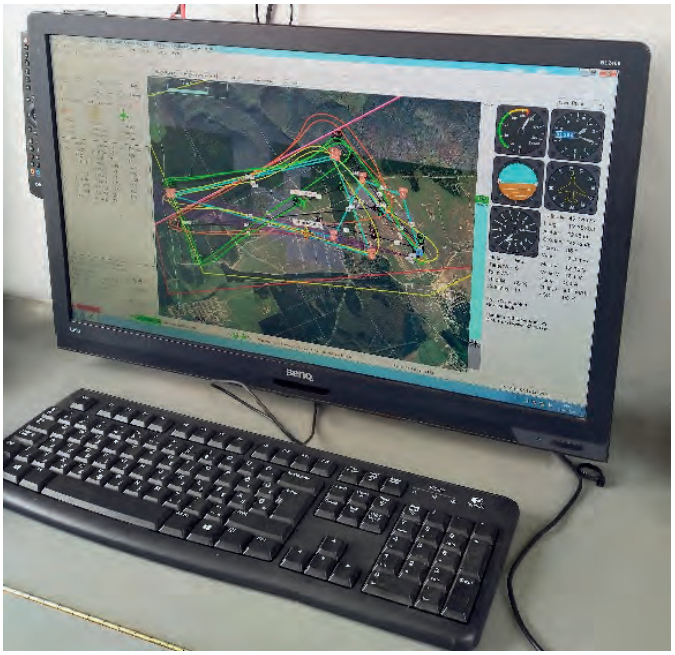
Picture 6: Mobile Flight Control Station and M-8 target UAVs in front on the left; Source: Photo of the HM EI Zrt.

The METEOR UAS has been operated mainly in dangerous airspace (for example in LHD36A Hajmáskér – Veszprém-Újmajor) since it is generally used during military exercises in military training areas. This is a closed airspace where other aerial vehicles are allowed to flight only with permission of the HungaroControl Airspace Management Cell (responsible for air traffic management in Hungary). Police and air ambulance helicopters have usually priority and are allowed to fly

into the dangerous airspace with the acknowledgement of the flight coordinator of the LHD airspace.

The HM EI Zrt's UAV operators spent 4 weeks between 15th of April and 9th of May 2024 in Veszprém-Újmajor at the military range providing METEOR-3MA target UAVs for soldiers and technical equipment of the Hungarian Defence Forces Dánielfy Tibor 205. Air Defence Regiment. This occasion was a really good experience and opportunity for the air target service staff to enhance their skills and gaining further practice. A target UAV team consists of at least 10 persons, three operators, three assistants, two technicians, one IT expert and one flight coordinator. This team is able to operate three METEOR-3MA at the same time. Target UAVs usually take off after each other and fly according to their in advance programmed routes. The operator can choose from different flying modes: manual, stabilised, waypoints, loitering and return to home. Every of them has its advantage and is optimised for the mission of the target UAV. The C4S-M autopilot keeps the UAV stabile and safe in every moment and provides fail-safe solutions in emergency situations.

The C4S programming and visualisation software makes it possible to plan the flying routes according to the tactical requirements and scenarios of the mission. The program helps to choose the right altitude and waypoint routes in order to avoid any artificial or natural obstacle and retaining the electronic line-of-sight between the ground and board antennas during the whole flight. The operator is able to observe the current flying position of the UAV in the map (civilian or military), its altitude and speed all the time that helps to avoid any collision when three UAVs are flying at the same time. The three METEOR-3MAs are separated from each other and sometimes from conventional military aircrafts in time and space as well. Safety is first in every moment of the flight time.



Picture 8: Waypoint routes on the screen; Source: Photo of the HM EI Zrt.

Usually, the biggest challenge for the target UAVs is the harsh and fast changing weather condition. As usual, there are flight limitations for the METEOR-3MA as well, and operators should take

them into account. In a serious rain the Pitot tube might be wet that can spoil the barometric sensor's data. In case of a mild rain METEOR-3MA is usually operated without Pitot tube. The strong wind can also complicate the UAV flight. 15 m/s strong wind is the limitation for taking off with METEOR-3MA. However, the METEOR-3MA has already experienced a 20–25 m/s strong wind in the air in an altitude of 1500 metres as well.

Target UAVs usually simulate hostile aircrafts that are attacking own troops. In order to pretend a good prepared attack, target UAVs should appear at a certain place (GPS position and altitude) and time in order to create a realistic strike formation. During the attacking period or approaching, target UAVs increase their speed until 200–250 km/h and decrease their altitude as it is common. To complicate the tasks of the air defence forces, target UAVs often cross each other's flying routes that results in a seeming mess. This time target UAVs start their IR and smoke flares in order to increase the visibility of the aerial vehicles. During a flight round at least two attacks can be realised so air defence forces do not have time for a rest. After landing with three UAVs the next round starts in about five minutes and the flight scenario proceeds again as it is planned.

In case of a small technical failure or problem on the ground, operators change the whole UAV and the mission continues according to the original plans. With a dynamic acceleration the late UAV is able to catch the front one, which can wait with loitering for the rear one. In the field the staff does not repair failed UAVs but uses their substitutes. It means that every target provider exercise should have at least half of the fleet number as substitutes or reserves. If we use six UAVs, we should have another three UAVs as replacements. These substitute UAVs are equipped with the same payloads and programmed with the same flying routes in order to be operational every time if necessary.

METEOR-3MA is a cheap and reliable solution for the air defence forces' training. Commercial aircrafts are more expensive and dangerous to operate. This target UAV is flexible since its flying routes are easy to program and to amend according to the new requests. It has a weather limitation but every aerial vehicle has a certain one. This aerial target is built for elimination and not for survival. During a live firing exercise, the METEOR-3MA is expendable and there is no risk of a personal injury or loss.[11]

The future of target UAVs

Target UAVs have a past, a present and a future as well. Simulation (computer-based software) is one of the best solutions to diminish training costs but it is sometimes far from the reality. However, target UAVs ensure a nearly real situation and true practice that highly supports the training of air defence soldiers and operators. This

[11] More information at Aeronautics. https://hmei.hu/en/szolgaltatasok/repules/ Downloaded: 14 June 2024

is an authentic aerial vehicle so it has all the features of a conventional aircraft. Probably it flies slower than a fighter jet but for the missile sometimes the low angular velocity is a bigger challenge than a high speed.

As target UAVs are significantly cheaper than conventional military aircraft, these aerial vehicles might be produced and applied in a huge volume that has a plenty of advantages. Target UAVs pretend factual military air competence but, in the reality, these are less effective alone but in mass. It is a good camouflage tool for distracting the attention of the enemy or occupying the capability and power of the hostile air defence forces. That way target UAVs are asymmetric warfare tools and they are able to cause huge material damages with low costs for the adversary troop.

The future expectation for new target UAVs is that they should, if possible, achieve the technical characteristics of military fighter jets. This will be a double gain since firstly, they would increase the quality level of the training of the own air defence forces and secondly, they would pretend real strikes against the enemy with cheaper and limited military capability. These target UAVs will have their advantages during peace- and wartime as well. During the peacetime camouflage UAVs might be used mainly for training and during the wartime for decoy manoeuvres or misleading missions. Consequently, they are very useful and valuable part of military technology and equipment stock.

There is a possible special using method of the target UAVs. These aircrafts simulate original combat aircrafts that strike the enemy's facilities or military technology. In case these target UAVs are used in mass (this is the swarm tactics), the enemy might think that there is a huge hostile invasion against the own troops. The reaction will be exaggerated when the air defence forces' attention is directed on the fake attack made by UAVs. So, target UAVs are able to pretend huge airstrikes that might distract the enemy's capabilities and expensive weapon systems from the direction of real threats.

In the future UAVs might be engaged as targets for special operations accomplished by strikers and fighters of an up-to-date Air Force that helps especially in training and preparation for unexpected air combats. Autopilots are getting better and better; they are more sophisticated than earlier so these avionics are able to make UAVs complete nearly irreal aerobatics and complicated air missions. This makes it possible that a new paradigm and method is evolving in the current warfare. One can hope only that this phenomenon might lead to a less tragic military conflicts with less human casualties and losses but this is entirely uncertain.

Conclusions

Target UAVs remain also in the future an unambiguous tool for military training and capability building. These aerial vehicles might play a special role in peace- and

wartime as well. In peacetime these vehicles can be used for preparation of the real (manned) forces and military technology for harsh battles and fighting. In wartime these target UAVs might be operated as decoys or realistic weapons for deterring or eliminating the enemy and protect own forces. There are a plenty of payloads of these aerial vehicles that are usually used to model the reality or simulate conventional military aircraft. Target UAVs make a great commitment to decrease costs of the enormously expensive military training, to spare pilots' lives and to diminish environmental (ecological) footprint of military operations. Concluding the story about target UAVs I can state that these aerial vehicles are much more sustainable than their conventional (piloted) colleagues, let say "flight-mates". So, this is the reason why target UAVs are and remain inevitable accessories of modern military training areas and battlefields.

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Csilla Andrea Kissné dr. Szabó[1]:

The development and regulation of in-house procurement

Abstract

This article examines in particular the conditions under which contracting authorities may opt out of the public procurement procedure, i.e. award in-house contracts.

After the entry into force of Act CVIII of 2011 on Public Procurement, the volume of in-house contracts in Hungary has increased, but this trend has stagnated since the entry into force of Act CXLIII of 2015.

The Act XXX of 2016 on Defence and Security Procurement (hereinafter referred to as the „Act XXX of 2016") introduced the in-house legal basis into the field of defence procurement.

In this article, I will present the historical development of in-house contracting as a special procurement method, both through the case law of the European Court of Justice and the development of Hungarian legislation.

Keywords: in-house, public procurement, European Court of Justice, structural dependence, economic dependence

In-house procurement and its evolution under the case law of the European Court of Justice

Recital 4 of Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC (4) states that „EU public procurement rules are not intended to regulate all forms of payment of public money; they only apply to the acquisition of works, supplies or services for consideration under a public contract."

Directive 2014/24/EU also includes in-house contracts within the scope of public contracts, but the Directive itself exempts this type of contract from the public procurement obligation, subject to the conditions established by the case law of the European Court of Justice.

What makes a purchase in-house? The primary answer is that it depends on the ability of the procuring entity to produce a specific product or service itself.

[1] Director, HM Electronics, Logistics and Property Management Co., Logistic and Textile Directorate.

However, it is also true for „in-house" procurements that the form in which this capability is available to the contracting entity can be assessed in both a narrow and a broad sense.

„In a narrower sense, an in-house transaction is any procedure in which a public body gives a mandate to its own (non-public) body or department.

In a broader sense, situations where the contracting authority enters into a contract with an apparently independent company with its own legal capacity, controlled by the contracting authority, may also be considered as in-house procurement."[2]

The public procurement rules allow a contracting authority to purchase goods or services without a public procurement procedure from a wholly-owned company which, although not ostensibly part of the contracting authority, is structurally dependent on the contracting authority, under certain conditions, known as in-house procurement.

For a purchase to qualify as „in-house", strict criteria must be met. The development of this set of criteria is based on the case-law of the European Court of Justice and has led to the current set of rules.

The European Parliament and the Council of 2014. Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC states that „public contracts awarded to controlled legal entities shall not be subject to the procedures provided for in the Directive where the contracting authority exercises such control over the legal entity concerned, control similar to that which it exercises over its own departments, provided that the controlled legal person carries out more than 80 % of its activities in the context of the performance of tasks assigned to it by the contracting authority exercising control or by other legal persons controlled by that contracting authority, irrespective of the beneficiary of the contract. This exemption may not cover situations where a private economic operator holds a direct participation in the capital of a controlled legal person..."

So we are talking about an in-house contract - and therefore the public procurement rules do not apply - if:

- the contract is concluded between legal entities which are structurally dependent on each other; and
- at least 80 % of the revenues of the controlled legal person come from the controlling contracting authority; and
- the controlled legal person has no private equity participation.

Control similar to control over an entity's own organisational unit occurs when the contracting entity has decisive influence over a legal entity in terms of its strategic objectives and major decisions, so that the entity has only a semblance of autonomous will to enter into contracts.

[2] Ágnes Juhász: In-house (public) procurement: exception or dodge? Miskolc, Legal Review, 2009, Vol. 4, No. 1.

In the case of a contracting authority, control may also be exercised by another legal person controlled by the contracting authority. It is also possible for control to be exercised jointly by several contracting authorities, in which case each participating contracting authority must be represented in the decision-making bodies of the controlled legal person and must jointly exercise decisive influence over the strategic objectives and major decisions of the controlled legal person.

The case law of the European Court of Justice has significantly contributed to the development of the in-house criteria as they are currently formulated, as the principle was established relatively early in EU law that in cases where contracting authorities are able to produce certain goods or services „in-house", they do not have to obtain the goods or services from the market, with the involvement of the private sector, in accordance with public procurement rules.

The case-law of the European Court of Justice on public procurement has repeatedly pointed to cases where EU law leaves the contracting authority free to use its own administrative, technical and other resources to carry out the public tasks entrusted to it, without recourse to external bodies outside its own departments.

If a contracting authority carries out a public service task using its own resources without entering into a contract for pecuniary interest because it has an „internal relationship" with the legal entity concerned, i.e. all the resources necessary for the performance of the task to be carried out are available within the contracting authority itself, EU public procurement law does not apply. Although the concept of in-house procurement is not explicitly mentioned in the European Public Procurement Directives, the „idea" itself is there.

The Teckal criteria

The European Court of Justice first formulated the criteria for when an organisation's public procurement can be considered in-house in the so-called Teckal case.

According to the facts, the municipal council of the town of Viano, by a decision, entrusted Azienda Gas-Aqua Consorziale (AGAC) with the operation of heating installations in certain public buildings. This decision was not preceded by a public call for tenders. As a result of the decision, AGAC was entrusted with the operation and maintenance of the heating installations in the public buildings concerned, including the necessary repairs and the supply of fuel. The company Teckal Srl brought an action against the municipality of Viano and AGAC, claiming that the award of the contract was not preceded by a public call for tenders and that Teckal was therefore excluded from the bidding process. In the company's view, the procurement fell within the scope of the Community directives and the municipality of Viano should therefore have followed the procedure for the award of public contracts provided for by Community law, that is to say, it was not entitled to award the contract directly.

The competent Italian national court could not decide on the facts whether Directive 92/50/EEC or Directive 93/36/EEC was applicable, so it referred the matter to the European Court of Justice for a preliminary ruling.

The European Court of Justice held in Teckal Srl v Comune di Viano and Azienda Gas-Acqua Consorziale (AGAC) di Reggio Emilia (C-10/98) that the municipality of Viano, as a local authority, is a contracting authority within the meaning of Article 1(b) of Directive 93/36/EC. It is for the national court to determine whether the contract was concluded between the local authority on the one hand and a person legally distinct from it on the other. A company is not regarded as legally distinct where the local authority exercises over the person in question the same control as it exercises over its own bodies and where that person carries out a substantial part of its activities with the local authority or authorities which own it.

The Court of Justice has ruled that EU public procurement law does not apply when the contracting authority concludes a contract with an entity over which it exercises control similar to that exercised over its own bodies, i.e. where the party concerned is not essentially independent of it, but only formally independent.

In addition to the organisational dependency detailed above, the court also examined the issue of economic dependency and stated that this case law applies to situations where „the third party does not involve private capital and is dependent on the contracting authority both organisationally and economically."[3]

On the basis of the European Court of Justice's judgment, case law has examined and still examines the existence of 3 criteria for in-house purchases, known as the Teckal criteria:

1. Teckal criterion: organisational dependence
   The contracting authority or contracting entities must exercise „similar control over the in-house entity as over its own organs", thus having the possibility to limit the freedom of action of the entity in question.
2. Teckal criterion: economic dependence
   The in-house organisation must carry out a substantial part of its activities for the contracting authority/entities controlling it. Otherwise, if the controlled entity operates on the market, is likely to be in competition with other undertakings, economic dependence cannot be established. Consequently, there should be no private capital in the capital of the in-house entity.
3. Teckal criterion: The organisation carries out a substantial part of its activities in-house for the body/ies that control it.

If the in-house body is controlled by more than one contracting authority, the criterion of „substantial part of the activities" may be met even if the body carries out the activities in question not necessarily with one of these contracting authorities but with all of them.

[3] Dr. Zsanett Mária Nagy: The practice of in-house procurement in the case law of the European Court of Justice, Legal Forum, 2013.

The Stadt Halle case

In Case C-26/03 Stadt Halle, the City of Halle awarded a waste management service contract without a public call for tenders to a company in which it had a majority shareholding, Recyclingpark Lochau GmbH (RPL Lochau). In addition, Stadt Halle intended to conclude target agreements with two neighbouring municipalities in order to use the capacity of the incineration plant, on the basis of which those municipalities transferred the task of waste treatment and recovery to Stadt Halle for the purpose of compliance, so that ultimately the other non-recyclable waste of those municipalities would also be treated at the incineration plant of RPL.

The decision was appealed by Arbeitsgemeinschaft Thermische Restabfall- und Energieverwertungsanlage TREA Leuna.

The Stadt Halle qualified the contract as an „intra-unit economic operation" since RPL is composed of Stadtwerke Halle GmbH (a company wholly owned by the City of Halle) with a 75.1%, i.e. majority, shareholding on the one hand and the privately owned RWE Umwelt Sachsen-Anhalt GmbH with a 24.9% shareholding on the other.

Another important factor for the present case was that the contract available in the draft significantly exceeded the threshold for such service contracts.

According to German national legislation, an „award of a public contract" can be appealed, but an appeal can only be lodged if the applicant seeks to compel the tenderer to behave in a way that is part of an ongoing formal public procurement procedure. In this case, the German court held that where the contracting authority does not publish a public invitation to tender and thus does not formally initiate a public procurement procedure, the review procedure cannot be pursued. The Oberlandesgericht Naumburg, the court hearing the case, referred the case to the European Court of Justice for a preliminary ruling.

In its judgment in that case, the European Court of Justice, referring to the „mixed interest" nature of the company in question, explained that the fact that one or more private individuals hold shares in the entity in question, even if they are minority shareholdings, precludes the possibility of the contracting authority exercising its right of control to the same extent as it does over its own internal departments.

„The award of a public contract to a mixed-ownership undertaking without a call for tenders is contrary to the objective of free and fair competition and the principle of equal treatment of all interested parties, in particular where such a procedure favours a private undertaking holding a share in the capital of that undertaking over its competitors." (point 51)[4]

„In the case of a contracting authority wishing to conclude a contract for pecuniary interest in the field of services covered by Directive 92/50 with a company which is legally separate from it and in the capital of which it holds one or more

[4] Judgment of 11 January 2005 in Case C-26/03 City of Halle and RPL Recyclingpark Lochau GmbH v Arbeitsgemeinschaft Thermische Restabfall- und Energieverwertungsanlage TREA Leuna [2005] ECR.

shares jointly with private undertakings, the public procurement procedures provided for in this Directive must always be applied." (point 52)"[5]

The European Court of Justice also explained in paragraphs 31-33 of its judgment that the pre-contractual decision of the contracting authority to select the tenderer with whom it will conclude the contract, the decision of the contracting authority to withdraw the invitation to tender for a public service contract, the decision of the contracting authority to abandon the procurement procedure, are all decisions which are subject to review.[6]

To sum up, in Stadt Halle, the European Court of Justice confirmed the criteria it had laid down in Teckal, by reiterating that the criterion of organisational and economic dependence can only be met if the private capital is not present in the in-house organisation in the capacity of owner.

The Coname case

The Coname case is based on a contract awarded directly by the Italian municipality of Cingia de' Botti to Padania Acque SpA (‚Padania') without publication of a call for tenders. Coname sought the annulment of the decision on the ground that the award without publication of a call for tenders was contrary to the Community rules on public procurement.

The municipality of Cingia de' Botti has directly awarded the local public transport service to a company which it maintains and controls. The service in question is remunerated, at least in part, by the purchase of tickets by its users and is therefore a public service concession falling not only within the scope of the Community directives on public service contracts but also directly within the scope of the provisions on fundamental freedoms laid down in the EC Treaty.

In its reply, the European Court of Justice reiterated the criteria already established in the Teckal and Stadt Halle cases. It stated that the contracting authority may award a contract without a call for tenders, but that this is subject to the strict condition that the contracting party is a legal entity separate from the contracting authority, but that „the contracting authority exercises over the separate legal entity in question control which is equivalent to that which it exercises over its own departments, and where that entity carries out a substantial part of its activities with the authority or authorities which own it.[7]

The Court also pointed out that the 0.97% shareholding held by the municipality of Cingia de' Botti is so small that it does not allow the level of control that would be required under the Directives if in-house procurement were to qualify for the

[5] Judgment of 11 January 2005 in Case C-26/03 Stadt Halle and RPL Recyclingpark Lochau GmbH v Arbeitsgemeinschaft Thermische Restabfall- und Energieverwertungsanlage TREA Leuna [2005] ECR.

[6] Judgment of 11 January 2005 in Case C-26/03 Stadt Halle and RPL Recyclingpark Lochau GmbH v Arbeitsgemeinschaft Thermische Restabfall- und Energieverwertungsanlage TREA Leuna [2005] ECR.

[7] Dr. Zsanett Mária Nagy: The practice of in-house procurement in the case law of the European Court of Justice, Legal Forum, 2013.

exception.[8] The lack of control is also confirmed by the fact that Padania is a company partially open to private capital, which prevents it from being considered as an ‚internal' management structure of the municipalities participating in it.[9]

The Parking Brixen case

Parking Brixen GmbH has brought an action against the municipality of Brixen for having awarded the operation of two public pay and display car parks to its subsidiary Stadtwerke Brixen AG without a prior award procedure. Parking Brixen also undertook, under a concession contract, to operate the car parks in the municipality, and thus contested the validity of the agreements with Stadtwerke Brixen AG.

The articles of association of Stadtwerke Brixen AG stipulate that the participation of the municipality of Brixen in the share capital may in no case be less than an absolute majority of the shares, but this clause limits the control rights of the municipality to the extent of the majority shareholding.

Following the request for a preliminary ruling, the Court of Justice sought primarily to clarify whether the award of the management of the car parks constituted a public service contract or a public service concession.

In its judgment, the Court of Justice classified the award of the management of car parks as a public service concession within the meaning of Article 1(4) of Directive 2004/18/EC[10], given that the public authority receives as consideration the sums paid by third parties to the service provider for the use of the car park.[11] Since the activity in question does not fall within the scope of the Public Procurement Directive, there can be no finding of failure to comply with the obligation to publish a public invitation to tender.

In its judgment, the Court of Justice clarified the first Teckal condition, according to which any participation by private persons, even if a minority, in any event precludes control in the same way as control over their own bodies. Thus, a majority shareholding by the contracting authority in the capital of its subsidiary is not a sufficient condition and does not amount to „control equivalent to that exercised over its own organs". The presence of a private third party always presupposes that the entity takes at least a minimum of account of its economic interests - only in this case will a private individual make its know-how or capital available to the public authority.[12]

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[8] Judgment of 21 July 2005 in Case C-231/03 Consorzio Aziende Metano (Coname) v Comune di Cingia de' Botti [2005] ECR [2005], paragraph 24.

[9] Judgment of 21 July 2005 in Case C-231/03 Consorzio Aziende Metano (Coname) v Comune di Cingia de' Botti [2005] ECR [2005], paragraph 26.

[10] Judgment of 13 October 2005 in Case C-458/03 Parking Brixen GmbH v Gemeinde Brixen and Stadtwerke Brixen AG [2005] ECR.

[11] Judgment of 13 October 2005 in Case C-458/03 Parking Brixen GmbH v Gemeinde Brixen and Stadtwerke Brixen AG [2005] ECR.

[12] Dr. Zsanett Mária Nagy: The practice of in-house procurement in the case law of the European Court of Justice, Legal Forum, 2013.

Thus, if a third private party acquires a stake in an undertaking, possibly following a public tender, the consideration of its economic interests may deter the public owner from fully pursuing its own public interests, even if this were possible in purely legal terms. It is on the basis of this intertwining of private and public interests that so-called mixed-interest companies can be essentially distinguished from mere bodies of public administration. Since mixed-interest companies cannot therefore be controlled by the public authority in the same way as its own bodies, all legal transactions concluded by the contracting authority with its own mixed-interest subsidiaries are essentially subject to the rules of public procurement law, in particular the non-discrimination and transparency obligations.

The Carbotermo case

Reference has been made to the Italian courts for a preliminary ruling in the proceedings between Carbotermo SpA (‚Carbotermo') and the Municipality of Busto Arsizio and AGESP SpA (‚AGESP').

The specificity of the Carbotermo case is that the contracting authority did not conclude the contract directly with the company it had set up, without competitive tendering, but with a public limited company set up and indirectly controlled by itself and wholly owned by it. The Court of Justice has held that the fact that the contracting party is indirectly owned by the contracting authority indicates that the contracting authority exercises over that company a control similar to that which it exercises over its own departments.[13]

On this basis, it can be concluded that the Teckal criteria are in principle fulfilled even if the company concludes the contract with a company that it indirectly controls.[14]

According to the Court's judgment, despite the inclusion of the holding company, the transaction in question constituted an in-house acquisition, thus allowing the European Court of Justice to conclude in-house contracts for related entities.

The Stadtreinigung Hamburg case

The Stadtreinigung Hamburg case is a landmark in EU in-house practice.[15]

In this case, 4 rural districts in Lower Saxony have concluded waste disposal contracts with the public waste disposal service of the city of Hamburg without a public procurement procedure. On the basis of the contract, the City of Hamburg's

[13] Judgment of 11 May 2006 in Case C-340/04 Carbotermo SpA and Consorzio Alisei v Comune di Busto Arsizio and AGESP SpA [2006] ECR.

[14] Dr. Zsanett Mária Nagy: The practice of in-house procurement in the case law of the European Court of Justice, Legal Forum, 2013.

[15] Case C 480/06 Commission of the European Communities v Federal Republic of Germany – Failure of a Member State to fulfil obligations – Directive 92/50/EEC – Absence of a formal European public procurement procedure for the award of waste management services – Cooperation between local authorities.

Public Waste Management Service reserves a capacity of 120 000 tonnes for the four administrative districts at a price calculated on the basis of the same method for each of the parties concerned. This price is to be paid to the operator of the facility, the party which has concluded the contract with the City of Hamburg's Public Waste Management Service, through the intermediary of that Service. The duration of the contract is fixed at twenty years. The parties agreed to start negotiations on the extension of the contract no later than five years before its expiry.[16]

However, it is clear from the case-law of the Court of Justice that an invitation to tender is not mandatory where the contracting authority exercises over the separate legal entity in question a control which it exercises over its own organs, provided that the entity carries out a substantial part of its activities for the benefit of the authority which owns it or for the benefit of other regional or local authorities.[17]

Similarly, with regard to the award of a public service task by a municipality to an inter-municipal association whose sole purpose is to provide services to the adjoining municipalities, the Court held that the award of that task could lawfully be made without a call for tenders, since it held that, notwithstanding the autonomous aspects of the management of that association by its board of directors, the adjoining municipalities must be regarded as exercising joint control over that association.[18]

The novelty of the Stadtreinigung Hamburg model was that, irrespective of the ownership structure, a cooperation between contracting authorities may be established for the performance of public tasks and the provision of public services, but no more than 20% of the annual net turnover of the contracting authorities' activities covered by the cooperation may come from the open market.

Remondis judgment: in-house or delegation

One of the latest judgments in the development of European Union law is the so-called Remondis judgment. The judgment of the Court of Justice of the European Union of 21 December 2016 is based on the following facts: The Region of Hannover and the City of Hannover have jointly decided to create a new public law entity by means of a statutory instrument for the performance of waste management tasks in order to transfer to it certain powers which are partly shared and partly conferred on those municipalities. Those municipalities have provided it with the means which they themselves had at their disposal when they exercised those powers and have undertaken to cover any shortfall in the budget of that entity, which is entitled to charge fees and collect the amounts due and to carry out certain activities which are not the exercise of the powers conferred on it but which are nevertheless of the same nature as those which result from the exercise of the powers conferred on it. Lastly, the new legal entity has functional autonomy, but must respect the decisions of the

[16] CJEU Case C 480/06, point 5.
[17] CJEU Case C 480/06, point 34.
[18] CJEU Case C 480/06, point 35.

assembly of representatives of the two municipalities which created it, which is an organ of that entity and has the power, inter alia, to elect the person responsible for the management of that entity.[19]

A public procurement contract is only a transaction for consideration, but in the case of Remondis, since the entity created is autonomously entitled to charge and collect the fees for the services it provides, there is no payment of consideration by the municipalities. According to the Court of Justice, there is therefore no in-house contract in the present case, but a delegation of powers within the meaning of Article 1 paragraph (6) of Directive 2014/24/EU.

In addition to in-house procurement, this transfer of powers may create new opportunities for municipal companies with a public service mission to conclude contracts without a public procurement procedure.

The development of in-house regulation in Hungarian law

Act CXXIX of 2003.

In line with EU public procurement law, the first Hungarian Act on Public Procurement (Act CXXIX of 2003) (hereinafter referred to as the 2003 Public Procurement Act) contained rules on in-house procurement.

The concept of in-house procurement was introduced into the Act as Article 2/A of the 2003 Public Procurement Act when it was amended in 2005, with effect from 28 May 2005.

Under the legislation in force until 31 December 2011, agreements concluded by contracting authorities, which:

- is established between the contracting authority and a wholly-owned economic entity over which the contracting authority has full rights of direction and control, both strategic and managerial, by virtue of its statutory responsibility for the performance or organisation of the public task or service, provided that
- the entity derives at least 90% of its annual net turnover after the conclusion of the contract from the performance of contracts with the sole member (shareholder) contracting authority. The performance of the contracts shall also give rise to the payment of the value of the public service obligations provided to third parties on the basis of those contracts, irrespective of whether the payment is made by the contracting authority or the person using the public service.

According to the legislation, such „in-house" contracts could be concluded for a fixed term of up to 3 years (until 14 January 2006, in-house contracts could only

[19] Case C 51/15 Remondis GmbH & Co. KG Region Nord and Region Hannover, in proceedings between Zweckverband Abfallwirtschaft Region Hannover and Region Hannover, judgment of 21 December 2016 [2016] ECR 38.

be concluded for a period of one year), and could only be legally renewed without a public procurement procedure if the conditions were still met.

This exception was a known and effective solution in the field of public service and economic activities related to the provision of public services, such as operation, waste management and road maintenance.

In the list of contracting entities in the 2003 Public Procurement Act, it was already stipulated that entities concluding so-called in-house agreements are considered contracting entities.

In the case of in-house contracts concluded under the 2003 Public Procurement Act, a significant part of the contracting party's turnover had to be derived from the performance of contracts with the contracting entity, which was a significant economic barrier to the take-up of in-house contracts. In addition, the legislation stipulated that the contracting authority was required to carry out an impact assessment at least every three years, with the assistance of an independent expert, covering not only the experience gained in the performance of the in-house contract but also the quality, efficiency and costs of the economic activity carried out in the context of the public service or public task. This obligation imposed additional burdens and tasks on contracting entities.

New legislation introduced by Act CVIII of 2011

Act CVIII of 2011 on Public Procurement (hereinafter referred to as 2011 Public Procurement Act), adopted in the summer of 2011 and in force from 1 January 2012, contains a „relaxation" in the area of in-house procurement compared to the previous legislation.

The definition of in-house organisations is set out in Articel 9. paragraph (1) k): an in-house body was defined as an entity which is wholly owned by the contracting authority (or by several contracting authorities) and over which the contracting authority, having regard to its task of performing a public task or service or organising the performance thereof, has full control in the exercise of its functions of a managerial nature and the power to exercise a significant influence over the strategic objectives and major decisions of the entity, and at least 80% of the net turnover of the entity in the financial year following the conclusion of the contract is derived from the performance of contracts with the sole member (shareholder) contracting authority/entities.

The essence of the scheme is that state bodies and municipalities do not have to compete with each other in the performance of their public tasks, as this could jeopardise the performance of public tasks.

The 2011 Public Procurement Act included a provision on in-house cases stating that - in line with the public procurement directives and the case law of the European Court of Justice - direct award of contracts without competitive tendering may only be made in the interest of the performance of a public task or public service.

In the case of the 2011 Public Procurement Act, the relief was the reduction of the percentage of the required turnover from the contracting authority/entity, instead of the previously required 90%, from 1 January 2012, for „in-house" contracts, at least 80% of the turnover of the entities subject to structural dependency must be derived from the performance of contracts to be concluded with the sole member contracting authority/entities after the conclusion of the contract.

The amendment also changed the time limit on the duration of in-house contracts: instead of the previous 3-year term, in-house contracts may be concluded for a fixed term of up to five years, unless otherwise provided by law. However, Article 9 paragraph (4) also stipulates that the in-house conditions must be maintained for the entire duration of the contract. If the conditions are no longer fulfilled, the contracting authority is entitled and obliged to terminate the contract, but it must do so with a period of notice sufficient to enable it to ensure the performance of the public service task and to carry out the necessary procurement procedure.

However, it remains the case in the Hungarian legislation that economic entities signing in-house contracts qualify as contracting entities pursuant to Article 6 paragraph (1) d) of the 2011 Public Procurement Act.

Compared to the 2003 Public Procurement Act, there is a minimal difference: the previous legislation did not classify the contract itself, which was concluded as a result of an in-house transaction, as a public procurement contract, whereas the 2011 Public Procurement Act excludes in-house procurement itself from the scope of public procurement rules, in line with Community principles.

Act CXLIII of 2015

The current Public Procurement Act contains some changes in relation to the in-house case circle compared to the 2011 Public Procurement Act regulation.

Article 9 paragraph (1) of the Public Procurement Act specifies the cases in which the Act does not apply, and this taxative list of exceptions includes the in-house case:
„9. § (1) This Act shall not apply to
(h) to a contract concluded by a contracting authority with a legal person, as defined in Article 5paragraph (1), over which the contracting authority exercises control similar to that which it exercises over its own departments, has a decisive influence on the definition of its strategic objectives and on the major decisions regarding its operations, and in which it has no direct private participation, and more than 80% of its annual net turnover derives from the performance of contracts concluded or to be concluded with the controlling contracting authority or with another legal person controlled by the contracting authority pursuant to this point;
(i) the 5. § (1) of a contract concluded by a contracting authority with a legal entity over which the contracting authority exercises, jointly with other contracting authorities, control similar to that which it exercises over its own departments, the contracting authorities jointly have decisive influence on the definition of its stra-

tegic objectives and on the taking of significant decisions regarding its operation, and which does not have a direct private participation and which derives more than 80% of its annual net turnover from the performance of contracts concluded or to be concluded with the contracting authority/entities exercising control or with another legal person controlled by that contracting authority/entities in accordance with this point;"

In this case, the Public Procurement Act specifies that all contracting authorities must be represented in the decision-making bodies of the controlled legal person.

In 2015, in accordance with EU case-law, the so-called horizontal in-house case was included in the text of the legislation.

Accordingly, the provisions of the Public Procurement Act do not apply:
„(j) to a contract concluded by a contracting authority as defined in Article 5 paragraph (1) with another contracting authority or contracting authorities for the purpose of establishing cooperation between contracting authorities for the performance of public tasks or the provision of public services or for the pursuit of common objectives of general interest, where no more than 20% of the annual net turnover of the contracting authorities from the activity covered by the cooperation comes from the open market;"

A further extension of the in-house case, the so-called reverse in-house, has been declared in Article 9 paragraph (2):
„(2) Paragraph (1) (h) shall also apply where a public contract is concluded by a controlled legal person acting as a contracting authority with a contracting authority which controls it or with another legal person controlled by the contracting authority pursuant to paragraph (1) (h)."

With the above-mentioned amendment to the law, all three in-house cases will now be regulated in the Hungarian legislation in force in accordance with the development of the law of the European Court of Justice and the EC Directive:

- the classic in-house;
- horizontal in-house;
- horizontal in-house, horizontal in-house, reverse in-house.

Article 9 paragraph (3) of the Public Procurement Act also states that where the controlled legal person is a member of the State, „the conditions under paragraph (1) (h) must be met in relation to the legal entity exercising the ownership rights (in the case of a minister or other person heading a central government body, the body headed by the minister or other central government body) as contracting authority."

A further amendment compared to the 2011 Public Procurement Act regulation is that the time limit on the duration of in-house contracts has been removed from the text of the legislation, so in-house contracts can be concluded for a period exceeding

5 years, or even for an indefinite period. However, the condition that the in-house conditions must remain in force for the entire duration of the contract, otherwise the contracting authority is entitled and obliged to terminate the contract.

Article 5 paragraph (1) (d) of the Public Procurement Act states in the list of contracting entities that „d) legal persons within the meaning of Article 9 paragraph (1) (h) to (i)", i.e. legal persons entitled to conclude in-house agreements, are considered contracting entities.

The current Public Procurement Act on in-house contracts is in line with Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC.

However, there is a significant difference in that Directive 2014/24/EU does not contain a provision that would place the entity that concludes the in-house contract in the position of contracting authority.

Article 2 of Directive 2014/24/EU includes a definition of „contracting authority" in the definitions (Article 2 paragraph (1) (1–4)). The definition of contracting entities does not include in-house contracting entities.

The Hungarian legislation, by imposing an obligation on economic operators signing an in-house contract to carry out a public procurement procedure, significantly complicates and prolongs the time needed for performance.

Regulation of the in-house case in Act XXX of 2016 on Defence and Security Procurement

Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security, and amending Directives 2004/17/EC and 2004/18/EC (1) states in paragraph 1 that „National security remains the exclusive responsibility of each Member State, both in terms of defence and security".

National defence and security instruments play a key role both for the security and sovereignty of the Member States and for the autonomy of the Union. Consequently, procurement of goods or services in the fields of defence and security is often of a sensitive nature.[20]

Given the sensitivity of defence procurement, this area has always had its own specific procurement rules.

Procurement for defence and security purposes was regulated by various government decrees prior to the entry into force of the Act XXX of 2016 on Defence and Security Procurement ((hereinafter referred to as DPA). Procurement for defence purposes was regulated by Government Decree No. 228/2004 (30 July

[20] Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security, and amending Directives 2004/17/EC and 2004/18/EC, paragraph 8.

2004) on specific rules for the procurement of goods and services for military, law enforcement and police purposes of fundamental security interest in the field of defence (hereinafter: Government Decree No. 228), which was in force until 31 July 2016.

Government Decree No 228 did not contain any provision for in-house procurement. The Ministry of Defence concluded contracts with its own companies in the field of defence procurement on the basis of Government Decree No. 228, following negotiated procedures by invitation to tender, negotiated procedures with publication of a contract notice or negotiated procedures without publication of a contract notice. However, in these types of procedure, the Ministry had difficulty in pursuing the various essential security interests. In the case of restricted and negotiated procedures with publication of a contract notice, the procedures often involved market players who, for example because of their ownership structure, posed a security risk when supplying military equipment or services.

The ministry has been constantly looking for ways to create a legal environment in which it can promote its basic security interests without prejudice to the principles of equal opportunities and competitive neutrality, while at the same time ensuring the expansion of the Ministry of Defence's Ltd-s.

Following the entry into force of the 2011 Public Procurement Act, the Ministry has applied the practice of concluding in-house agreements in several cases for the companies of the Ministry of Finance under its ownership.

Based on the experience gained from the successful conclusion and performance of in-house contracts under the Public Procurement Act., the Ministry of Defence, as the main drafter and proposer of the DPA, has introduced the possibility of concluding in-house contracts in the field of defence procurement. For this purpose, the existing Public Procurment Act was taken as a basis and the legal regulation was drafted in the same way as the Public Procurement Act.

The parties concerned expected the regulation of in-house procurement in the DPA to enable the defence companies to obtain contracts by exploiting their own military industrial capabilities and complying with a strict set of requirements.

Article 7 of the DPA, which entered into force on 01 August 2016, contains exceptions in which the rules of the DPA do not apply. The scope of in-house contracts has been included in this list of taxative exceptions.

„7. § (1) The Act shall not apply

15. to a contract concluded by a contracting authority with a legal entity over which the contracting authority exercises control similar to that which it exercises over its own departments, has a decisive influence on the definition of its strategic objectives and on the taking of significant operational decisions, and in which it has no direct private participation, and more than 80% of its annual net turnover derives from the performance of contracts concluded or to be concluded with the contracting authority exercising control or with another legal entity controlled by the contracting authority pursuant to this point,

16. a contract concluded by a contracting authority with a legal entity over which the contracting authority exercises, jointly with other contracting authorities, control similar to that which it exercises over its own departments, and which jointly exercises decisive influence over the definition of its strategic objectives and the taking of major decisions regarding its operation, and which does not have a direct private participation and which derives more than 80 % of its annual net turnover from the performance of contracts concluded or to be concluded with the controlling contracting authority or contracting authorities or with other legal entities controlled by the contracting authority or contracting authorities within the meaning of this point,
17. a contract concluded by a contracting authority with another contracting authority or contracting authorities for the purpose of establishing a cooperation between contracting authorities for the performance of public tasks or the provision of public services or for the pursuit of common objectives of general interest, where no more than 20% of the annual net turnover of the contracting authorities concerned by the cooperation comes from the open market."

As it can be seen, with the above wording, the DPA has introduced the possibility of concluding horizontal in-house contracts in addition to the so-called classical in-house circle.

The DPA also regulates the case of the so-called reverse in-house in the same way as the Public Procurement Act; this is set out in Article 7 (4).
„*(4) Paragraph (1) 15. point shall also apply where the procurement contract is concluded by the controlled legal person acting as contracting authority with the contracting authority exercising control over it or with another legal person controlled by the contracting authority pursuant to paragraph (1) 15. point.*"

Paragraph (5) of Article 7 of the Regulation states that where the legal person controlled is a member of the State, the in-house conditions must apply to the legal entity exercising the ownership rights – in the case of a minister or other person heading a central government body, the body headed by the minister – as contracting authority.

With regard to the companies of the Ministry of Defence, it can therefore be said that the Ministry of Defence, as the contracting authority, exercises over them a control similar to that exercised over its own departments, and has a decisive influence in determining their strategic objectives and in taking important decisions concerning their operation.

There is no direct private equity participation in the entities as 100% state-owned companies, so the only criterion to be assessed for in-house terms – in order to be eligible for an in-house contract – is the economic dependence criterion, i.e. more than 80% of the companies' annual net turnover must be derived from the performance of contracts concluded or to be concluded with the controlling contracting

authority or with another legal entity controlled by the contracting authority as referred to in this point.

It can also be concluded from the fact that the legislator based on the provisions of the Public Procurement Act when drafting the DPA, that in the list of contracting entities in Article 6 of the DPA, the economic operators concluding in-house contracts under the Public Procurement Act were defined as contracting entities.

„Article 6 The persons required to conduct a procurement procedure under this Act are:

(c) legal persons as defined in Article 7 (1) paragraph 15–17. points,"

The definition of the contracting entity under the public procurement act makes it considerably more difficult for the companies of the public sector to perform in-house contracts.

In order to perform certain in-house contracts, the companies are obliged to carry out a (public) procurement procedure under the current legislation. In many cases, different, sometimes parallel, procurements of goods and services have to be carried out in order to ensure performance, the subject matter of which may fall under both the Public Procurement Act and the DPA.

Also related to the position of in-house contracting organisations as contracting authorities is the fact that there has been a significant decline in the number of in-house contracts signed by Ministry of Defence's companies in the last year.

One reason for this is that the companies of Ministry of Defence have realised the difficulties of performance and the time needed to carry out public procurement procedures, and are therefore less and less willing to take on the obligations of such contracts.

In many cases, subcontractors with specialised knowledge are needed for the performance of certain in-house contracts, but the selection of subcontractors is also only possible under the current rules by (public) procurement rules, through a (public) procurement procedure.

In order to perform in-house contracts, the HMOs declare their capabilities and capacities prior to the conclusion of the contract. However, short deadlines set by the ministry or the complexity of the services ordered often mean that subcontractors have to be engaged to perform the contract.

In the current legislative environment, the status of contracting authority is based on the signature of an in-house contract, which means that, once the contract has been signed, the economic operator is subject to a public procurement obligation for the supplies and services necessary for the performance of the contract. Any performance that takes place after the entry into force of the in-house contract entails a public procurement obligation.

An important aspect of the performance of in-house contracts is that the economic operator concluding the in-house contract is essentially carrying out its activities for the contracting authority which maintains it. According to the case-law, it also

follows from this wording that the contract must essentially be performed by this economic entity, i.e. the possibility of entrusting performance to a third party is limited.

In case No D.971/2010, the Arbitration Committee for Public Contracts ruled that the tasks set out in the in-house contract must be primarily performed by the contractor, but that, to a minor extent in relation to the overall performance of the contract, it is possible to involve other economic operators (hereinafter: subcontractors) for the performance of specific tasks, given the nature of the tasks performed. However, the selection of the subcontractor is only possible in compliance with the rules set out in the Public Procurement Act, given the quality of the contracting authority.

Based also on the opinion of the Public Procurement Arbitration Committee, it can be clearly stated that in order to perform an in-house contract, the companies of Ministry of Defence may, on the basis of public procurement rules and as a result of a competitive tendering procedure in accordance with the law, use subcontractors for specific tasks to a minor extent compared to the whole in-house contract. However, in cases where they are able to carry out the task themselves, but only because of the finite nature of the capacities of the economic operator, there is no legal possibility to subcontract.

In several cases, the question arose whether the ability of subcontractors already used by companies could be reflected as a capability of each company if a cooperation agreement or a general contractor agreement is signed between the company and the subcontractor before the in-house contract is signed. In this way, companies would be able to perform in-house contracts beyond their actual capabilities.

The involvement of other economic operators without a public procurement procedure would result in the participation of an entity over which the contracting authority does not exercise structural control, which is directly involved in private capital and which is also a market player in the field. On the basis of the above, there is no possibility that the capacity of certain subcontractors already used in the past could be reflected in the capacity of companies Of MoD on the basis of a cooperation agreement or a general subcontracting agreement.

However, I also see the possibility of involving the subcontractor in the performance of the in-house contract by concluding an in-house contract based on so-called horizontal cooperation. This possibility is provided for in both the Public Procurment Act and the DPA.

The use of horizontal cooperation would allow another entity registered as contracting authority to participate in the performance of the in-house contract. The scheme may only be used for the performance of public tasks, the provision of public services or the pursuit of general interest objectives.

A further condition is that this other economic operator must also be registered as a contracting authority under the public procurement act and that, once the contract

has been concluded, the goods and services required for performance may be procured only by applying the rules of the public procurement act or the public contract law, following a competitive tendering procedure.

Conclusions:

The case law of the European Court of Justice

The number of cases brought before the European Court of Justice and the constant changes in the in-house rules show that the problem of in-house procurement plays an important role in the field of public procurement law in all EU Member States.

The Court of Justice first explicitly formulated the criteria for when an organisation's procurement can be considered in-house in the Teckal case.

In what have become known as the Teckal criteria, in-house procurement occurs when a contracting authority enters into a contract with a supplier that is legally separate from it, but (1) the contracting authority exercises over that person a control that it has over its own organs („structural dependence") and (2) that person carries out its activities essentially for the benefit of the contracting authority (or body) that maintains it („economic dependence").

The existence of the two conditions thus established has been considered by the Court of Justice to be decisive up to the present day.

In Stadt Halle, the Court of Justice stated in its judgment that the fact that one or more private individuals hold shares in an organisation, even if they are minority shareholdings, precludes the possibility that the contracting authority exercises its control rights to the same extent as it does over its own internal departments.

In the light of the legal developments in the Stadtreinigung Hamburg case, an in-house cooperation between contracting entities may be established irrespective of the ownership structure, but in this case no more than 20 % of their net annual turnover may come from the open market.

The Remondis case draws attention to the fact that EU jurisprudence applies the delegation of powers set out in Directive 2014/24/EU, creating a new possibility for public procurement in line with the public procurement directives, in addition to in-house contracts.

Experience of the Hungarian legislation

As a result of the legal development, the Directive 2014/24/EU was transposed into Hungarian law by the adoption of Act CXLIII of 2015.

An in-house contracting company always carries out its activities for the contracting authority that maintains it, it has only an apparent autonomy, the actual framework and conditions of its operation are managed and supervised by the contracting authority.

Due to the subordination of the parties, the conclusion of in-house contracts cannot be considered as a contract based on free contractual will under the Civil Code. Although the parties to the contract are apparently separate legal entities, in reality they are one and the same person/organisation, so that the will of one person/organisation prevails in the conclusion of the contract.

Under the 80% turnover rule, these companies cannot have any autonomy with regard to real market conditions either, the turnover limit being a factor affecting market conditions, which also affects the market entrepreneurial activity of the in-house entity.

The aim of public procurement law is to ensure that contracting partners are chosen in a transparent and non-discriminatory way, in order to spend public money as economically and efficiently as possible.

However, in line with the case-law of the European Court of Justice, it is necessary and accepted at EU and national level that in certain cases public procurement rules are waived.

In today's Hungarian public procurement practice there is/should be a place for in-house contracts. However, in order to make the practice as efficient as possible, a more flexible set of rules is needed, the first step of which should be a review of the obligation of contracting authorities.

If the actual framework and conditions of operation of the economic operator entering into an in-house contract are controlled and supervised by the body exercising the ownership rights (contracting authority), it must also be stated that the exercise of ownership rights must not have the purpose of rendering the controlled economic operator economically unviable or jeopardising the performance of the in-house contract.

The majority of EU Member States take into account the rules on dependency laid down in Directive 2014/24/EU when concluding in-house contracts, exercise strict control over the conclusion of in-house contracts, but do not make it more difficult for economic operators by imposing a public procurement obligation for performance where in-house conditions are met.

An example to be followed is German case law, which, where in-house conditions exist, leaves it to the discretion of the company, once the contract has been concluded, to decide how and in what way it can perform the contract in the shortest possible time and in the most efficient way within the legal framework.

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Dezső Kiss[1]:

Cold war fighter fleet on display in a garden

Abstract

While walking through the city of Kiskőrös in Hungary, the attentive visitor may also be surprised when driving down a secluded street he spots fighter jets in the garden of a family house. The city of Kiskőrös is well known as the birthplace of famous Hungarian poet, Mr. Sándor Petőfi. The owner who dreamed up the mini collection of fighter aircrafts Mr. János Firkó, is passionate about everything that connected with fighter pilots and their airplanes. Documenting the restoration of a Soviet fighter-bomber SU-22M3 (NATO code: Fitter-J) jet aircraft, this publication shows in details how lengthy and difficult mission is to found and develop such a park, and what a persistent, dedicated team is needed for such a large task.

Keywords: home defence, military technology, fighter jets, fighter-bombers, defence education, dedication

MIG-stop and Suhoi nest

This is how the owner named the collection, which currently consists of 1 MiG-15 BiS (NATO code: Fagot) from the city of Szolnok (side number: 818), a MiG-21 BiS (Fishbed) that flew in Pápa, (46) and the 10 Su-22M3[2](Fitter), as well as it consists of 2 helicopters (MI-24D – 575 (Hind) and KA-26 – HA-MZE (Hoodlum)). The MiG-15's previous "station" was the yard of a flower shop in the city of Vác, where it tried to draw attention to the crops sold there by its pink painting. The lightweight building that will house the airplane simulator and the rest of the collection – about 1,600 models, clothing, helmets, other accessories and equipment – has by now been completed. Of course, the thing is not for its own sake, anyone can visit and see the airplanes at a pre-arranged time, free of charge. The Association" Wings of the Past" was also established:

"The goal of the association is to present the history of Hungarian military aviation through the aviation technologies of the past, thereby bringing future military and civilian pilots, as well as future aviation specialists, closer to aviation and airplanes. The aim of the association is also to present flying machines representing the state-of-the-art of technology and the service devices essential for their oper-

[1] Dezső Kiss is a retired aircraft engineer lieutenant colonel of the Hungarian Air Force.

[2] https://www.reptar.hu/repulogepeink/szu-22m3-sugarhajtasu-vadaszbombazo-repulogep.html

ation, and thus to make the widest possible segment of society fall in love with flying. The association unites the fans of fighter planes, all those who like to learn about airplanes and the history of aviation."[3] The guiding principle is patriotism, the goal is the transfer of knowledge. If only a few young people get interested in the matter of military aviation and national defence after visiting the collection and meeting the knowledgeable professionals who present it, we have already done a lot to serve our beloved country.

Nest dwellers
The MiG-15Bis fighter with side number 818

It arrived in Kecskemét by rail to the 62nd Fighter Wing on January 20, 1953. It completed the factory run-in in 1 hour and 53 minutes. From November 14, 1954 to November 4, 1956, it flew at Taszár. During the restart in 1957[4], he remained in Taszár, in the 2nd swarm (group) of the 2nd squadron. It was overhauled in 1958 at the "Pestvidéki Machine Factory" (PG). From Taszár to Szolnok it was transferred and it joined the György Kilián Flying Officer School at the beginning of 1962. In 1967, "Pestvidéki Machine Factory" (PG) again carried out a major overhaul on the plane, until then it had flown for 996 hours and 35 minutes. On September 1, 1971, it was handed over to the staff of the 101st Reconnaissance Aviation Regiment in Szolnok, it participated in the Military Parade on August 20, 1975, in Budapest,

MiG-15 in pink
Credit: Firkó János archive

[3] Kecskemét Court 18.Pk.60.036/2023/4. No. Ruling.
[4] After the suppression of the 1956 Revolution, there were no Hungarian military flights in the country for a while.

then on September 1, 1975 it was withdrawn from service and was preserved then on February 13, 1976, after 1,495 flight hours, it was scrapped. From August 21, 1977 to 1990, it was displayed in the military technology park in Ajka, after which it came into private hands and was displayed at a gas station in Sződliget, but the deputy mayor of the city at the time did not like it, so the machine was transferred to a flower garden in Vác, and from there it finally came to Kiskőrös.

Renovated MiG-15
Credit: Demeter Péter

The MiG-21BiS fighter side number 46

The MiG-21 is an all-metal, delta-wing, supersonic single-person crew aircraft equipped with an afterburner jet engine, retractable landing gear and a hermetic cockpit. It was developed in the 1950s and was primarily intended for front-line fighter tasks, so it can stay in the air for a relatively short time. Late versions of the MiG-21Bis – including the 46 – already had a boundary layer blowing system (Russian abbreviation SPS), which significantly reduced the landing speed. Out of the total of eight versions of the MiG-21 type family, 261 pieces entered the ranks of the Hungarian Air Force. Among the airplanes in the park, the 46 is the only plane for which we have the complete documentation, so anyone can look into them. (If only the history of all our aircraft could be compiled from their remaining documents! – the Author's remark). This fighter arrived in Hungary on January 11, 1980, previously during the factory run-ins it flew 9 hours and 50 minutes in the Soviet Union out of thirteen takeoffs. After assembly and acceptance of the machine, it was

flown in on February 2, 1980, with three take-offs, and then began active service. It flew for the last time on April 13, 2000, spending 1 hour 23 minutes in the air completing two takeoffs. With a total of 2,753 take-offs[5], it flew for 1,572 hours and 17 minutes until the type was finally withdrawn from Hungarian service. "In the city of Kecel it got renewed, and we followed the original colourings during the painting, but it was no longer possible to mix-out the special paints. Therefore, we no longer used the paint qualities in individual locations due to the needs of daily tasks. The wheels were not given heat-resistant paint, and the plastic coverings of the various antennas were not given metal-free paint. On the other hand, we restored the original colourings of all the pipes, we took care to mark the quick-locks of the installation openings, and the exact colourings and placement of the warning signs. The cockpit was almost completely preserved, not much had to be replaced in it. The plexiglass cover of the cabin roof is perfectly intact, for which we had special covers made. The machine's

MiG-21 Fishbed as it arrived
Credit: Firkó János archive

MiG-21 at the exhibition
Credit: Demeter Péter

[5] The number of landings is recorded in the aircrafts' documentation.

future stand was also ready in due time. Although we bought new tires for the undercarriage, after the several-kilometer, route-licensed Kecel - Kiskörös towage, the renewed 46 also got on a jack”.[6]

MI-24D side number 575

The Mi-24 is a classic layout, one main rotor – one tail rotor combat helicopter. Its purpose is to provide fire support for ground forces, destroy enemy armoured targets, transport wounded and loads in the cargo hold or by external suspension. The D, V and P versions of the Mi-24 combat helicopters have been fielded in the Hungarian People’s Army, later in the Hungarian Defence Forces. The structure and construction of these are almost identical. There is a difference in the built-in engines, some on-board equipment, but mainly in the weapon systems between the above-mentioned versions. the attack helicopter side number 575 was put into service in the factory on June 30, 1978, its factory number is B7041, so it received the side number 417 on August 13, 1979 in the German Democratic Republic, where it belonged to the HG-54 Helicopter Squadron (Heeresfliegerstaffel). From December 1, 1981, she flew with the KHG-17 Attack Helicopter Squadron (Kampfhubschraubergeschwader), then from 1986 with the KHG-5. At the time of German reunification, it received the registration number 96+24, and was withdrawn from active service on October 3, 1990. She completed a total of 1,849 flight hours until

MI-24D from the GDR
Credit: Firkó János archive

[6] Mr. János Firkó’s words were written down by Mr. György Punka.

MI-24D at the garden
Credit: Kiss Dezső

then, during 3,413 takeoffs. In 1995, it was removed from the German military order and brought to the helicopter unit at Szentkirályszabadja, Hungary, as a donation at the end of July 1995. After the closure of Szentkirályszabadja helicopter unit, it was transferred to the Hungarian Defence Forces' surplus weapons' storage site in Mezőfalva in 2004, in 2013 it was decommissioned at Solár Kft.'s site in Csepel, and from there it was taken to Kövesgyűrpuszta.[7] We brought it over from Kecel in 2024, with the Hungarian aircraft marking, following the pattern and colours of the original Russian painting, then we restored it with page number 575, aiming to restore the same conditions as it was when arrived at the helicopter base in Szentkirályszabadja on April 18, 1985.

HA-MZE KA-26

The special feature of the Ka-26 "Kamov" helicopter is that it is lifted up by two three-bladed rotors on a common axis, with the same speed but rotating in opposite directions. The helicopter is powered by two N-14V26 air-cooled, nine-cylinder, single-row radial engines with a power output of 325 HP per engine. The helicopter was primarily used for agricultural chemical work, but it is also suitable for cargo and passenger transport tasks. The pilot's cabin is for two persons, most of the time the pilot and the helicopter's on-board mechanic made up the crew. The HA-MZE was produced in 1973, its original factory number is 7304004. From 1992, it was

[7] Collection of Mr. István Hérincs.

stationed in Őcsénypuszta, Tolna County. It was included in the collection in working condition, it had been decommissioned due to the near end of the service life of the rotary wings, it flew over, landed at Akasztó airport, and from there we towed it to the park by road. It is displayed in its original condition as a civilian, agricultural helicopter. The main reason for its exhibition is that the originator of the park, Mr. János Firkó, admired the flights of a such a helicopter and fell in love with flying as a small child.

Su-22s in the Hungarian Air Force

In 1983, Hungary purchased a squadron of Szu-22M3 single-seat "combat" (12 units) and Szu-22UM two-seat training "UTI" (3 units) fighter-bomber aircraft with variable wing geometry. This meant that the weapon-, radio- and electrical systems of the aircraft were the same as the Su-22M4 version actually offered for export and fielded by the majority of the socialist countries (and still in service in Poland today), but they were equipped with a different make of engine. The Su-22M3 fighter-bomber was a third-generation, single-engine supersonic fighter-bomber designed for the so-called "aviation of fronts"[8], produced in large numbers. It is a combat aircraft capable of supporting ground troops, deploying nuclear bombs and dropping bombs above the speed of sound. It also had significant reconnaissance (KKR-1 reconnaissance container[9]) and jamming capability (SPS-141[10]) jamming container. Its maximum weapon load is 4 tons. The squadron was founded as the legal successor of the MN1929 flying squadron (Szolnok) and was based in Taszár Air Base. On November 15, 1971, the 101st Independent Reconnaissance Flying Regiment was founded in Szolnok from the flight training regiment of the "György Kilián" Air Technical College. Two of the regiment's squadrons were equipped with MiG-15 aircrafts, and one squadron was equipped with Czechoslovak-made L-29 aircrafts designed for training. In 1983, the 101st Reconnaissance Squadron was transferred from Szolnok to Taszár in accordance with the "Mátra IV Organizational Plan"[11] of the Hungarian National Army Aviation Commander. The L-29 Dolphins were withdrawn from service, and replaced by Su-22s with significant strike and reconnaissance capabilities. The regiment also got a new table of organization and equipment (TOE). The Suhojs were subordinated to the Land Forces, the Army Aviation Command.

At the beginning of 1983, reconnaissance training for the flying staff began under the organization of the Zrínyi Miklós Military Academy. After its completion, the first group of designated pilots and technical personnel traveled to the Soviet Union for retraining on July 27, 1983. The second group - consisting only of tech-

[8] Soviet army and air force terminology.

[9] A container suitable for day and night photo-reconnaissance, taking panoramic pictures and detecting and storing radiation data.

[10] A container designed to jam and deceive radars, radio traffic.

[11] Central Archives (by Mr. István Katona) AAC measures 1980–1989. 287. d, 3888. he. e, (13/07/1983).

nical specialists – completed the course between October 1983 and February 1984. In the winter of 1983 – 1984, 12 Sukhoi aircraft arrived at Taszár Air Base on transport planes, and their assembly and in-flight was completed by March 1984. The theoretical retraining in Hungary started at the beginning of 1984, and training flights could also begin from April on. During the following two and a half years, the trained-over pilots reached their previous training level. The plans of the military leadership included the acquisition of additional Su-22s and even Su-25 fighter planes, but the worsening economic situation already prevented this.

The squadron's motto was "Discover – and destroy" because the mobility of the targets detected by the fighter-bombers necessitated their immediate destruction, which is why it was necessary to precisely practice attacking ground targets. The new aircraft was presented to the public for the first time at the 1989 Kecskemét Aviation Day. On November 1, 1991, the 31st Kapos Combat Aviation Regiment was formed by merging the 101st Independent Reconnaissance Aviation Squadron and the 31st Fighter Regiment.

On November 8, 1995, the Hungarian Parliament passed a resolution in which Hungary contributed to the settlement of the South Slavic crisis. As part of this, the Taszár Airport was offered to the IFOR/SFOR peacekeeping forces. The airport mainly performed the support of transportation tasks of the international troops. The regiment's aircraft were relocated to Pápa Air Base, where they continued their training flights. On December 15, 1996, the commander of the Hungarian Armed Forces withdrew the regiment from the order of battle, and also ordered the establishment of the MH Kapos Base Airport by April 30, 1997. On February 2, 1997, Major László Kovács flew over to Pápa the plane side numbered 15, and this was the last takeoff of the type in the Hungarian Air Force, then the type was withdrawn from the military service. After that, Su-22s, as well as MiG-21 and MiG-23 fighter jets, were parked on the so-called "dog tongues" (stands) along the taxiways at the Papa Airport until 2000. In 2008, another radical change took place, when, after a long preparation, Pápa was chosen as the home of the C-17 transport planes operated within the framework of NATO's strategic air transport program. In the fall of 2009, the last plane of the 3-member C-17 fleet arrived. Thus, the aircrafts withdrawn from operation had to be moved again, this time they were towed side by side to a grassy area of the airport that had not been used for a long time.

Direct reasons for the fighter-bomber acquisition

The main direct reasons for the development of the army in the planning period of the first half of the 1980s were the followings[12]:

- In 1979, the neutron bomb entered the US arsenal;
- the so-called "Carter Doctrine" announced on January 23, 1980;

[12] Miklós M. Szabó: The history of the Zrínyi Miklós Military Academy, 1980–1989, Zrínyi Media Nonprofit Ltd., Budapest, 2011.

– In the US Senate in 1980, the ratification of the SALT-II Convention was frozen;
– NATO's "dual decision" to deploy Pershing missiles in Europe;
– In 1981, the US deployed a strategic unmanned aerial vehicle (UAV);
– In 1981, US President Ronald Reagan's proposal for the "zero solution"[13], which was rejected by the Soviet Union;
– Domestic political events in Poland in 1981, as a result of which the American trade sanctions against the Soviet Union were implemented;
– deployment of medium-range missiles by the USA;
– American President Ronald Reagan's 1.6 trillion-dollar military program for the period 1982-1987 and the interruption of the Geneva missile negotiations;
– Deployment of Pershing and cruise missiles in Western Europe.
– The military policy of the United States of America - proposed by Mr. Zbigniew Brzezinski, the chief national security adviser - forcing the Soviet Union into an arms race and "economically exhausting" it, put the Soviet Union in an increasingly difficult economic situation, and with it the member states of the Warsaw Pact too. Over time, this policy proved successful.
– In this situation, Hungary could do:
– We had to undertake our obligations stipulated in the Warsaw Pact – we could at a maximum do nothing but to slow down as much as possible the level of arming and the pace of procurement of combat equipment.
– Our outdated weapons and weapon systems had to be replaced anyway, as decades-old weapons systems were in use.
– The organizational structure had to be transformed in accordance with modern strategic expectations and adapted to the new weapons[14].

The Su-22M3 fighter-bomber side number 10 – through the renovation of which I will present the collection and the renovation of the aircraft

"Life" of the side number 10 airplane

The aircraft serial number 51610, flown in Hungary with the side number 10 – according to the factory terminology, it is a "C52MK product" – is a single-seat, so-called combat aircraft which was produced on October 7, 1983 in the city of Komsomolsk nad Amur in the Soviet Union. The factory run-in was carried out during eight take-offs, flying for 5 hours and 58 minutes, after which it was disassembled and prepared for transport. It was transported by plane to Taszár, where a mixed group of factory specialists and Hungarian technicians assembled it and, and after the ground checks, it carried out its first takeoff in Hungary on 03/21/1984.

[13] The „zero solution": US President Ronald Reagan suggested in November 1981 that the Soviet Union should withdraw from service all its medium-range missiles, and as compensation, the US would not deploy its Pershing missiles in Western Europe. Persing missiles could reach their targets in 5-8 minutes.

[14] István Katona: History, circumstances and background of the acquisition of the Szu-22M3 aircraft type (1983–1987), Military Review, 2016 (IX), Nr. 3.

After a 35-minute in-flight, it was declared operational and could begin its service. It spent 1,111 hours and 8 minutes in the air during training flights until 15 December 1995 completing 1,555 take-offs, and was then overhauled at the "Pestvidéki" Machine Factory. After the operational in-flight, she returned to the air unit, but she only flew for 18 hours and 52 minutes, making 29 landings, the last time on 16 December 1996 at the Pápa airport. It was then decommissioned, officially decommissioned and decommissioned according to the CFE.[15] Mr. János Firkó bought it through a middle-man in 2021.

Since the owner really fell in love with fighter planes through model building, he set himself no less a goal than restoring real planes. Therefore, the goal for the iron bird with side number 10 was to bring it to the state in which it rolled out of the hangar door of the Pestvidéki Machine Factory after the overhaul. The engine of the aircraft survived relatively well the vicissitudes of long outdoor storage and multiple transports. As for the quality and durability of the materials used in the aircraft, it tells much the fact, that in the on-board oxygen system of the plane that was stalled in 1996, in 2023(!) there was still 50 bar pressure. (Due to the flammability of pure oxygen, it caused quite a bit of sweat and headaches for the professionals carrying out the renovation, as it was only possible to release the pressure with a special tool back in time.) Water was standing in the cockpit of the aircraft, which led to serious corrosion, not to mention the fact that, over the years, everything possible was stolen from among the instruments and equipment. Due to rusting, it was impossible to open the catapult seat lock on the floor of the cockpit, it could only be removed by wrecking it before lifting the seat. Since the weight of the cabin roof (174 kg) does not allow manual opening, it was necessary to somehow solve the simple, yet safe lifting. Restoring the factory solution was out of the question because, on the one hand, the cabin roof is nowadays not opened and closed by skilled technicians who are aircraft mechanics, and on the other hand, untrained, civilian people can also sit in the cabin - as, after all, the aircraft is there so that they can see and experience what it was like to operate such a machine - that's why we designed and installed a hybrid system. The movement of the cabin roof was controlled and resolved by a pneumatic system in the default position, feeding a two-way working cylinder, synchronously with the opening/closing of the cabin[16] and the opening and closing of the 4 locks. This system operated at a pressure of 50 bar. The emergency removal of the roof - when the pilot did not want to leave the plane, "only" for some reason it became necessary to open it - was done from the emergency air system with a pressure of 200 bar. Since the aircraft was also equipped with an ejection seat, when rescuing the crew, strictly following the ejection sequence, gunpowder gases with a pressure of 200 bar were used to move the seat (with the pilot in it) as

[15] Conventional (Armed) Forces in Europe – in Hungarian: Conventional Armed Forces in Europe Treaty. (abbr.: CFE) https://www.osce.org/files/f/documents/4/9/14087.pdf

[16] Since the aircraft also performed tasks at high altitudes, the pilot's cabin was hermetically sealed, and overpressure was created in it.

well. All this happened without human intervention. That's why it had to be simplified. In the end, the solution was a commercially available, so-called bag compressor, which directly feeds the cab roof moving cylinder through the quick connector located in the front wheel nacelle. For safety, there is also a special support, on which the roof can be lowered after opening, thus relieving the air system.

The renovation

The aircraft was partially disassembled and arrived by truck in the city of Kecel, the site of the company which carried out the painting preparation and most of the locksmith work, which happens to be in a disused wine making factory. After the condition assessment, we removed the cab roof, then removed the catapult seat, the leather parts of which was sent to an upholsterer, while the metal seat cup to a locksmith. To safely move the fuselage of the aircraft – the structural weight of the Su-22M3 is 10,800 kg, the length of the fuselage is 19 m – a special cradle was designed and manufactured using the rear bridge of a truck, from which a crane only lifted it during the final assembly. Altogether 10 people worked on the renovation of the aircraft, according to their profession: painters, locksmiths, machinists, upholsterers and decorators. The owner carried out the complete renovation of the cabin, the procurement of the missing instruments and the organization of the work – often at home, late into

SZU-22 Fitter stays at Balatonfűzfő
Credit: Firkó János archive

Renovated SZU-22 in Kiskőrös
Credit: Demeter Péter

the night – while also running his business. The instruments and other components that could not be procured from anywhere, were made with 3D printing. The stabilizers of the R-3S self-guided air-to-air missiles attached to the aircraft are also printed from plastic, the control head itself is original, and the missile body is a true-to-size steel tube. The support elements needed to hang the weapons on the aircraft had to be designed and manufactured separately, because the bomb locks that could be used anywhere else were removed from the supports. The cabin roof had to be covered in any case, because the Plexiglas parts would be destroyed very quickly under the influence of strong sunlight, and a uniform cover had to be sewn on the "MiGálló" aircraft. In the meantime, the exhibition area was expanded and officially reclassified, because grapes were planted on the neighboring plots, so accordingly, it was classified as a production land (farming land). The concreting of the new "standing areas" and the foundation and assembly of the lightweight building have begun. During the concreting, the support columns of the UV filter net were already in place, the power supply was installed and the alarm system was redesigned. A ladder is also made for each plane, so that visitors can comfortably and safely see the wonderful "workplace" of the fighter pilots. All this took more than a year and a half.

Surface treatment, painting

Only 2-component, synthetic acrylic, solvent-based paints could be considered for painting, as only they provide the best possible corrosion protection for such old metal structures and weather-resistant, long-lasting colour retention and wear resistance.

(The airplanes are stored outdoors, although we will later cover the standing areas with a special UV filtering net.) The primer was plastic epoxy, applied in 2 layers, with manual sanding between layers. The cover paint is an acrylic-based paint, also in 2 layers, sanded between the layers. After each sanding, there was an anti-silicone wash, air dust removal, and then a "honey cloth"[17] cleaning. After the new sanding, a matte varnish was used for varnishing, with a cold-optimized hardener on the fuselage, which otherwise only counts for the application. All this was done on the wings with normal varnish. (An addition about the sensitivity of the materials used: during painting, the hot air was accidentally turned on for the heating in the workshop, which caused the left wing to "collapse", in other words, the applied paint flowed on it, and the entire process had to be repeated.) The pattern of the spots requires freehand painting, it cannot be stenciled. These technologies are the technologies of the present, none of them were available in the painting workshop of the Pestvidéki Machinery Factory in 1997! There, in the age of oil paints, two important aspects were communicated to the painters. The first was that the aircraft should be given a four-colour, so-called Central European camouflage colouring. The second, very important condition was that the colours of the plane and the pattern of the spots could not match those of the MiG-21s. The third – actually the toughest condition – was that they could only use paints that were in stock! It was necessary to explain all of this because the original colour samples and colour codes did not survive, and the original painting was worn and faded, and the computer analysis was also difficult. At that time, since it was highly classified military technology, only very few people could take pictures of aircraft, even fewer people could use colour films for photography, and digital technology was still rudimentary. Those who took photos while flying, in the air, put their military profession and the living of his own and that of his family at risk and developed the black-and-white images only back home, in their own darkroom practically secretly. That is why it happened during the renovation that – despite the computerized colour mixing and modern materials and technology – there was a colour that had to be mixed and blown out in hundreds of samples in order to get the colour shade that best approximated the original state. After the painting was finished and dried, the employees of a decoration company stuck on the original 1,240 pre-printed templates containing operating instructions and signs translated from Russian to Hungarian, which were then blown with the appropriate colour, using a manual HVLP and LVLP[18] gun with a drop tank system.

Assembly

After the painting and all the components were completed, the final assembly loomed large for the team. The elements weighing 10 tons had to be moved in a

[17] https://autotechnika.hu/cikkek/veteran/10903/oereg-jarmuvek-fenyezese-festese

[18] https://paulturner-mitchell.com/hu/8751-kakoy-kraskopult-vybrat-hvlp-ili-lvlp-kak-otlichit-kraskopult-hvlp-ot-lv-lp-kraskopulty-lvlp-otzyvy.html

narrow yard and a garden, and care had to be taken to ensure that they were joined with millimeter accuracy. The fuselage had to be lifted out of the guest cradle, the half-wings, control planes and other components had to be removed. Due to the large weight, width and height of the shipment, it was necessary to walk the route in advance. Towing and escort had to be carefully planned and authorized. Reserve roads and turning options from Kecel to Kiskőrös had to be designated. The two assembly trolleys and the fuselage supports needed for the winging had to be obtained from somewhere, because without them it is not possible to complete the assembly of the plane. At least two truck cranes had to be rented, one of which had to have a capacity of 40 tons. Due to the high rent costs of the cranes and other preoccupations, it was also necessary to ensure that the planned works were completed in the shortest possible time. The fuselage was towed by a tractor on a special trailer converted from a truck trailer, the wings and control planes were transported with two other tractors on one trailer each through the town of Kiskőrös, on Good Friday morning - when almost no one is on the roads. It was a particular difficulty that the only 24 m long assembly transporting the body had to be towed all the way through a residential area, and then it had to be carefully maneuvered and backed into the yard in the narrow street. The information that the equipment essential for the winging will be used on loan from Poland in Kadarkút, Somogy county, was a huge help - and it assumes a very serious relationship capital. It just had to be transported from Kadarkút to Kiskőrös and back. After everything and everyone arrived at the site in order, during one hard working day it was possible to secure the plane to its stand and open the wings to the take-off position.

The Su-22 was an aircraft with variable wing geometry. For takeoff and landing, a high-pressure hydraulic system opened the half-wings to a 30˚ position, increasing the wing surface by 6 square meters. This, together with the combined use of nose auxiliary wings and flaps that can be retracted and swept back, reduced the landing and take-off speed of the heavy aircraft, i.e. the length of the runway path required for take-off and landing. Since restoring the aircraft's hydraulic system was out of the question due to the very high costs, another solution had to be found to open the half-wings as well. We finally solved this mechanically, by hand. After releasing the band brakes of the wing moving mechanism, the synchronizing shaft connecting the two wings was turned with a ratchet wrench. It took weeks to finalize and install the weapons.

Conclusion

The creation of the collection and the formation of the Past Wings Association serve the same purpose: primarily to introduce fighter planes to young people and draw their attention to the importance of national defence. The personal viewing and "climbing" of this enormous value aircraft, preserved in their original form, can

bring young people closer to flying and to serving the country in the armed forces, even in this digital age, when almost anything can be found within a single QR code distance. Motivated and ambitious young people who love their country are still looking for opportunities to see firsthand any military technology and/or to meet and talk with military technology specialists who operate it. They are interested in history; they find attractive the graceful fighters created with a lot of engineering work and experience. They rave about the mostly electro-mechanically controlled, yet reliably working engines and the robust, yet graceful and streamlined design of the iron birds. They can get to know the military values, through volunteering to maintain the planes displayed in the MiG and Sukhoi nests. In the city of Kiskőrös, young people who intend to continue their studies or choose a profession can experience first-hand the possibilities of how they can choose to serve the country as their profession, or how they can become contract or reserve soldiers. Keeping their profession and preserving military traditions, this is how the Wings of the Past can best serve the future.

Open Day at "Migálló", Kiskőrös 2024
Credit: Demeter Péter

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Evelin Trembeczki[1] – Dr. István Kobolka:

The Future of Leadership in Healthcare Institutions

Abstract

Leadership within healthcare is a new domain that needs further investigation. Conventionally, the practice was to elevate medical professionals into leadership positions who would then be required to undertake administrative tasks. In some instances, they were exclusively engaged with administrative tasks while giving up all their clinical roles. While, there are also hybrid managers who juggle administrative as well as clinical roles. But of late, there has been a shift in leadership where non-medical professionals are being engaged in managerial positions within healthcare institutions, thus allowing clinical practitioners with the opportunity to concentrate only on clinical roles. However, this model has been criticized. There are schools of thought where one believes that clinical professionals will make good managers while others opine that non-medical professionals with knowledge about management are better equipped to manage. But this would require further exploration and investigation, especially from the context of Hungary.

Keywords: management, non medical professionals, leadership within healthcare, hybrid managers, healthcare system

Introduction

Leadership within healthcare institutions has emerged as a significant topic in practice as well as in literature. This is mainly attributed to the anticipated affirmative impact that medical professionals within positions of leadership can have on patient safety, care quality and efficiency in terms of costs[2]. As per research, it has been indicated that hospitals tend to function well when medical professionals are in positions of leadership[3]. Furthermore, it has also been found that medical professionals tend to have a greater level of influence on their medical peers as compared to non-medical professionals within healthcare institutions[4]. Medical professionals, when they engage in leadership roles, tend to play a key role in motivating fellow medical professionals in realizing organizational as well as clinical objectives.

[1] PhD Student, University of Pécs.
[2] Spurgeon et al., 2017.
[3] Clay-Williams et al., 2017.
[4] Bresnen et al., 2019.

Nonetheless, during the period prior to the 1970s, hospitals were mostly run by doctors[5] whereas the role played by administrators was more into coordination, instead of leadership roles[6] . With a transition into a highly bureaucratic-business[7] practice models, administrators were engaged to effectively manage business performance, though medical professionals continued to make key decisions related to patient care. There is a certain level of intricacy and complexity associated with controlling and managing healthcare institutions. This complexity arises largely due to a conflict amongst managerial / administrative logic and professional logic. A rather intricate description of healthcare has been provided by Mosadeghrad[8], where the focus is on underlying divisions of the two key logics in to four diverse domains entirely. These would comprise of care, cure, community and control. Healthcare is deemed to be highly complex as each of the said four domains has their own individual rationale and there is no joint coordination amongst the diverse domains. The domain of cure mainly refers to the logic of the doctor, and it is founded on the basis of medical interventions that have been put in place to enhance patients' conditions with an eventual goal of curing them. It is possible to elucidate medical interventions into four diverse categories such as; incursion, ingestion, manipulation and mediation[9]. This should be perceived in continuity from intrusive to interpretive where incursion is deemed as the one which is most intrusive while mediation refers to conversing with the patient (interpretive). There are two other aspects between the two which is ingestion (offering medication) and manipulation (touch). Cure is largely carried out through medical specialization with professional hierarchies that are informal.

At the same time, care largely pertains to coordinating and operating the intricate workflows in a healthcare environment[10]. Control is essentially an order of bureaucracy and has turned out to be powerful within the domain of healthcare, particularly in scenarios where administrators have designated themselves as managers. Managers are expected to utilize the available resources in a highly effective manner, in order to achieve the objectives of the healthcare institutions.

Logic related to control is founded on containment and administrative hierarchy[11]. Managers tend to intervene by placing restrictions on organizational (professional) activities like re-organization, restrictions in budget, number of beds etc. Whereas, the logic around community pertains to interest of communities which is largely signified by politicians. However, there is still much intricacy surrounding healthcare institutions and systems, as it involves offering private as well as public health services, primary healthcare, provide care for chronic, acute and aged in diverse settings. Healthcare institutions have been undergoing a process of continu-

[5] Bruce & Hill, 1994.
[6] Buchanan et al., 1997.
[7] Davies, 2003.
[8] Mosadeghrad (2013).
[9] Pirlott & MacKinnon, 2016.
[10] WHO, 2018.
[11] Andersson, 2013.

ous evolution wherein they have been learning to adapt to societal, epidemiological and demographic changes. The advent of new technologies, in tandem with social political, environmental and economic realities leads to the creation of an intricate agenda in terms of healthcare globally[12]. As an outcome, the role played by non-medical professionals have been widely recognized and accepted for effectively driving innovation and managing the requirements of the population. Healthcare institutions today have been underlined with the notion of collaborative governance, wherein both health as well as non-health related actors work in tandem with one another to ensure delivery of service[13]. This collaborative governance is driven with the objective of catering to the changing needs while fulfilling new priorities. However, the World Health Organization through one of their publications 'Working Together for Health' has outlined the lack of adequate human resources to tackle the existing and emergent requirements of people around the world. Given the scenario, it becomes imperative to understand whether collaboration between medical professionals and non-medical professionals can be facilitated within the context of healthcare institutions within Hungary.

Medical Professionals as Leaders

A fact that cannot be disputed is that in order to provide a care quality of high level consistently to patients, there is a need to have excellent medical leadership, in tandem with other factors. Nonetheless, across several nations leadership skills conventionally do not feature within the syllabus or evaluation or appraisal systems for doctors and medical students as well. Currently, as a subject, leadership has been frequently projected within other domains as 'communication skills or professionalism[14]. In addition, progression within medical careers has conventionally depended on academic and technical capability, while compromising on skills or individual attributes that result in good leadership[15]. An absence of emphasis and focus has resulted in substantial variation within benchmarks for medical leadership. In order to realize medical leadership that is of high standards, it is imperative that medical professionals adopt a macroscopic viewpoint related to resource allocation and healthcare provision in order to get an idea about the social, political, economic and technological drivers for change that would direct their thoughts during the course of their careers[16].

Medical professionals need to be aware about finances, governance, organization and management that are vital for effectively managing any healthcare institution. Furthermore, there also need to be provided with due support from systems that are well-developed, clarity in terms of responsibility and reporting lines and an

[12] Senkubuge et al., 2014.
[13] Emerson, 2018.
[14] MourAo, 2018.
[15] Filipe et al., 2014.
[16] Fitzgerald et al., 2013.

organizational culture which offers appropriate information while stimulating the use of information for enhancing performance[17]. Lastly, all medical professionals, regardless of whether they continue to function as medical practitioners predominantly or make a shift as organizational leaders or take up roles that are strategic, are expected to be aware about 'followership', a concept that is highly deliberated which acknowledges the significance of participation and enabling others to lead. In case these aspects are not taken care of, medical professionals continue to be at substantial disadvantage. They are not in a position to actively participate within discussions pertaining to delivery of service, unable to navigate and lead others within the organization and systems within which they are known to function. In the present day, physicians have successfully managed to establish themselves within management roles. The findings from a survey carried out amongst Accountable Care Organizations (ACOs) within the United States (US) reported that till 2014, 51% of management positions within healthcare institutions were held by physicians[18].

In healthcare organizations and also in hospitals, medical departments were generally managed by physicians who were known to report to a Medical Director (MD) who was usually a member within an executive team. With the transition into the 21st century, 50% of physicians within the US did not practice medicine anymore and they were widely recognized in their roles as administrators within institutions that offered managed care[19]. At the same time, within the United Kingdom (UK)[20] and several other nations[21], where culturally the environment were not open to accept physicians who gave up clinical practice, a large number of medical executives in the present day functioned as hybrid managers. Such hybrid managers continued to be actively engaged in clinical practice while also handling management tasks. Within the National Health Service (NHS) in UK, physicians were known to hold power positions in healthcare institutions which allowed them to take part in managerial decisions, improving medical engagement within leadership is perceived as an integral aspect that might result in an enhanced performance of the healthcare institution[22]. One of the key advantages in facilitating physicians to handle the managerial and operational aspects of a healthcare institution would comprise of bottom-up leadership, increased political influence and enhanced communication amongst senior management and physicians[23]. The present focus on engaging physicians within leadership revolves around initiatives to relate decisions that are clinical to those that belong to strategic management[24]. Irrespective of the prevalence of physician leaders who are positioned as leaders within healthcare systems, not

[17] Ferlie, 2016.
[18] Colla et al., 2014.
[19] Harvin et al., 2014.
[20] Prenestini et al., 2021.
[21] Kippist & Fitzgerald, 2009.
[22] Spurgeon et al., 2011.
[23] Loh, 2015.
[24] Dickinson et al., 2013.

much is known about the level of performance of subordinates and improvement in operational aspects in healthcare is impacted by them.

Research conducted in the past has failed to find any variation in terms of operational performance when healthcare institutions are managed by medical or non-medical leaders[25]. Nonetheless, viewpoints on who is most suited to manage healthcare institutions are rather polarized and prevalent. However, it has been opined that the mindset of a physician varies from that of a non-medical manager[26].

Non-Medical Professionals as Leaders

Given that healthcare organizations are dynamic and intricate, the nature of organization warrants the need for organizations to offer leadership while also focusing on activities like coordinating with employees, and supervision. Organizations have been created such that they realize organizational objectives which were beyond the capability of individuals on their own[27]. Within healthcare organizations, task intricacies and its scope executed while offering services are so great that individuals functioning on their own are not in a position to successfully execute the task. Furthermore, the required tasks in creating services within healthcare environment warrant smooth coordination between several specialized disciplines who work in tandem. Managers are required to ensure that organizational activities are executed in the best manner to achieve organizational outcomes. Managers in healthcare are recruited in authoritative positions, where they make significant decisions to shape healthcare organizations[28]. These decisions would comprise of staff recruitment and development, technology acquisition, addition and reduction to service and budgeting. Decisions taken by healthcare managers do not just focus on ensuring suitable, effective and timely services but it also tackles the issue or realizing performance goals as expected by the manager[29]. With a view to effectively execute their functions, managers in healthcare are expected to have several vital competencies. The competencies include; having technical, conceptual and interpersonal skills[30]. Along with these, healthcare managers need to possess management skills which results in organizational success while enhancing employee performance. In terms of qualifications, healthcare managers need to have knowledge and skills to execute their duties. In short, their qualification is essentially defined as their behaviour while executing their duties. This reveals their personal traits, motivation, self-image, experience, social roles and accountability[31].

[25] Sarto & Veronesi, 2016.
[26] Edwards, 2003.
[27] Hin Ea et al., 2009.
[28] James & Reblando, 2018.
[29] Parand et al., 2014.
[30] Chichirez & Purcărea, 2018.
[31] Moradi et al., 2020.

Doctor	Manager
Decision making in the interest of individuals	Decision making in the interest of organization
Accountable to profession (peers)	Accountable to multiple stakeholders
Decision led by professional rules and norms	Decision led by organizational goals
Normative and autonomous decisions	Group decisions, political environment, bargaining, compromise

Table 1: Difference between Medical Managers and Non-Medical Managers; Source: Kuntz and Scholtes[32] (2008)

Hybrid Managers in Healthcare

The domain of healthcare has been a key domain that witnessed the advent of hybrid professional managers. Across several nations, medical managers have created occupational associations and, in certain instances, have developed novel types of certifications[33]. It has been stated by Sarto et al.[34], that within the US, physician managers have received much recognition. Within the UK, there is an increased involvement of physicians within leadership and management has received much motivation on the part of policy makers[35]. This was specifically the case keeping in mind the increasing evidence where medical engagement within management and leadership was intricately associated with enhancements in patient care[36]. Certainly, it has been recommended that during recent times, there has been a shift in medical leadership from the dark side to center stage[37]. Barriers that hamper the development of hybrid medical managers, in terms of occupation is clearly evident on the demand and supply side. The demand side comprises of occupational medicine culture, nurturing clinical individualism and a general awareness about work in the capacity of managers [38]. Though certain physicians tend to circumvent their socialization to emerge as voluntary hybrids[39].

They are confronted with other challenges which would restrict their openness to pursuing a career in management over a long-term period[40]. This is particularly true when support from the organization for hybrid medical managers is rather weak and there is lack of financial opportunities or incentives for providing additional training[41].

[32] Kuntz and Scholtes (2008).
[33] Ferlie, 2018.
[34] Sarto et al. (2019).
[35] Hummers-Pradier et al., 2009.
[36] Geerts et al., 2020.
[37] Spurgeon et al., 2017.
[38] Blumenthal et al., 2012.
[39] Mcgivern et al., 2015.
[40] Bresnen et al., 2019.
[41] Hummers-Pradier et al., 2009.

Medical vs Non-Medical Managers

Owing to forces within the market, growth in competition and pressures in terms of corporate governance, healthcare organizations have transitioned from their position as professional bureaucracies where the onus of managing clinicians rested on clinicians[42]. For instance, certain healthcare organizations are being managed by non-medical managers who were adept in management and were not elevated to a managerial position from a clinical position as such. Such a model in healthcare parlance is termed as 'managed professional business' model[43]. While such a model does allow a professional base, however, there is also an additional layer comprising of professional managers who oversee clinical professionals while incorporating additional corporate strategies and values. Nonetheless, such a model within healthcare organizations has faced much criticism for eliminating the flexible and dynamic manner of conventional healthcare run by professionals, as being very top-down in their approach[44]. The tradition of hospitals being managed by medical professionals has led to the retention of certain cultures that are a part and parcel of professional bureaucracies. But at the same time, it is being touted that clinical managers can only be highly effective in situations where senior management authorize and legitimize their actions and decisions. It has also been observed that medical professionals who serve as clinical directors within healthcare institutions are most disenchanted within the healthcare system[45]. This is due to the fact that they are often caught between professional clinical domains and the domain of management and politics. This makes it imperative to explore the scope for having non-medical managers to manage healthcare institutions.

Healthcare System in Hungary

The constitution in Hungary ensures the right to healthy environment, where levels of mental and physical health are optimum, while providing benefits in income maintenance through social security. The overall responsibility in terms of health social welfare however rests on the central government. However, other parties such as local governments, national assembly, and regional health councils along with several other bodies are actively involved in the process of decision making in organization as well as operation of the healthcare system. As per the current system of health in Hungary, there is a substantial departure from the highly centralized Semashko-style which was known to exist during the communist period. The present healthcare system structure is depicted through figure 1 below.

[42] Andreasson et al., 2018.
[43] Andreasson et al., 2018.
[44] Stoller et al., 2016.
[45] Loh, 2015.

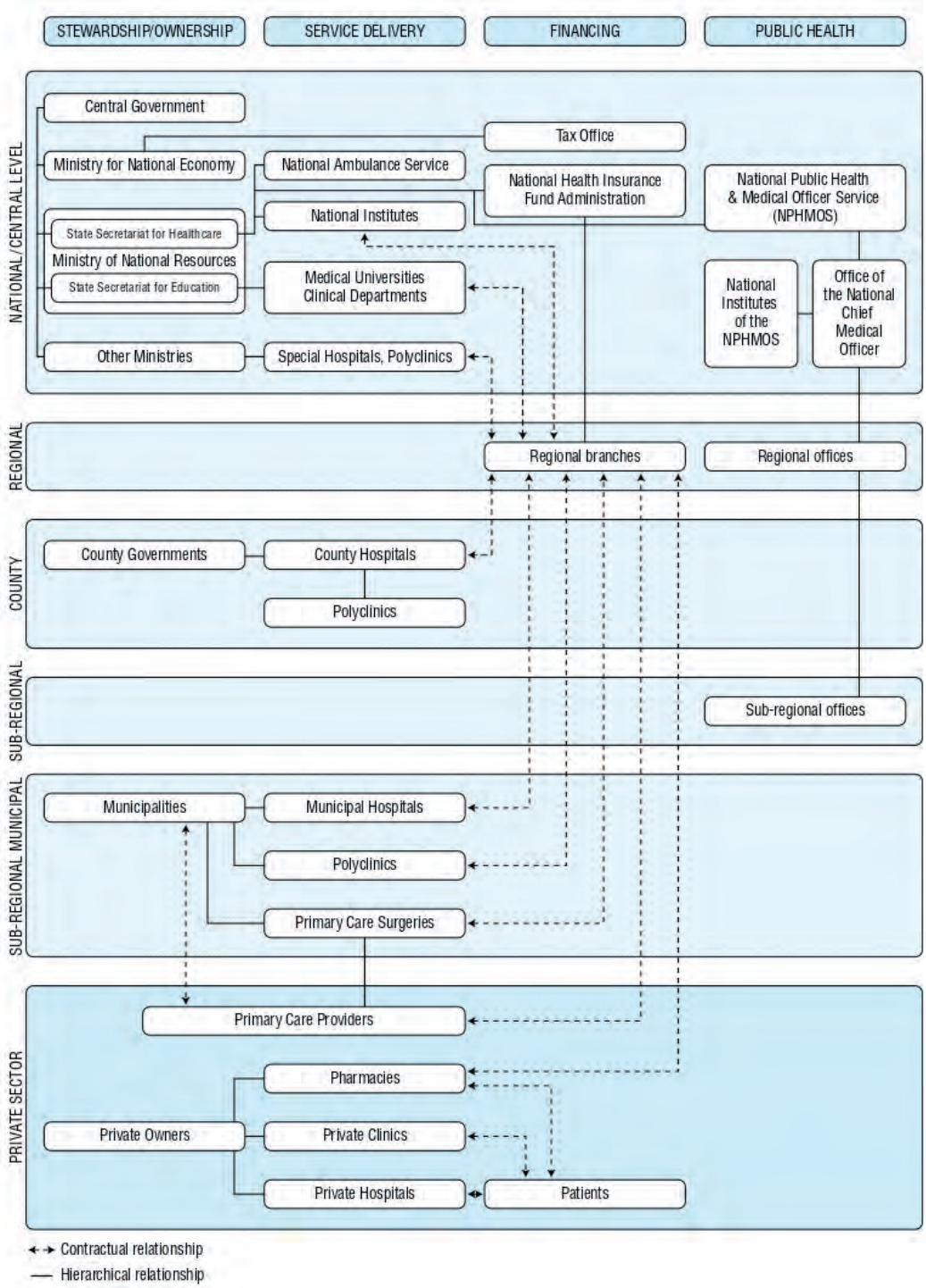

Figure 1: Organizational Structure of the Healthcare System in Hungary; Source: Gaal et al. (2011)

Health professionals who were categorized as non-medical, such as; nurses and assistants were provided training at several levels. Nurses in practice were provided with training for four years at vocational training institutes at a secondary level[46]. In Hungary, physicians' careers are inclined in three key directions; academic, professional or managerial. Usually, such directions are distinct, but for certain practicing physicians it is not. For example, within a county hospital, a head of the department is not only involved in providing treatment and care to patients but they are also engaged in the supervising subordinates and managing the operational aspects of the healthcare institution[47].

Healthcare Management Globally

Doctors within the healthcare system in the United States (US) are not considered as employees, or owners of healthcare institutions. This is because doctors are known to operate as independent economic entities[48]. Nonetheless, doctors within US frequently engage with healthcare institutions with the objective of gaining access to privileges associated of being a staff, while receiving assignments for special processes that are practiced mostly within a healthcare environment. Few researchers[49], within studies pertaining to hospital management within US have addressed the issue of managerial interplay and have highlighted the significance of top managers in terms of innovation within management practices. Nonetheless, there are limitations with regards to strategic aggressiveness and managerial cognitions. Furthermore, not much is known about the role played by non-medical managers and medical managers within the healthcare system in US. However, Linnander et al.[50], also add that students enter medical schools to emerge as physicians and nurses and not health managers or leaders. Healthcare organizations across the world have been under much scrutiny for enhancing the quality of care owing to the changing system of healthcare[51]. This poses tremendous challenges for governing bodies within healthcare. Generally, management boards are entrusted with the task of managing the day-to-day operations, and the onus of overseeing and assessing their activities rest on trustees, who arrives at decisions like hiring and firing key personnel[52]. On the other hand, hospital managers are held liable if questions emerge regarding safety and quality of care.

[46] Gaal et al., 2011.
[47] Gaal et al., 2011.
[48] Kim, 2016.
[49] Linnander et al., 2017; Keskinocak & Savva, 2020.
[50] Linnander et al. (2017).
[51] Eeckloo et al., 2004.
[52] Botje et al., 2013.

Conclusion

Healthcare within the United States is experiencing a process of substantial changes and has assumed center-stage within their political milieu. Though deliberations around healthcare management are still ongoing, leaders are expected to progress further while carrying out work that benefits healthcare organization and patients as well. The Dutch in the Netherlands are now focusing on the development of medical leadership frameworks which is inclusive of relevant competencies pertaining to the role played by physicians in managing or leading[53]. However, such frameworks are under dispute[54].

From a general standpoint, frameworks of leadership tend to gain from having a cumulative knowledge about educational content and practices within leadership[55]. Presenting detailed information relating to behaviors, medical leadership frameworks would be instrumental in presenting clarity in meaning and roles required to be played by healthcare managers.

Across several nations, healthcare managers have created national association for facilitating the process of knowledge, expertise and information sharing. In certain nations, associations are formally expected to embody the profession, whereas in other nations, it is known to exist as ad-hoc groups, devoid of any legal or regulatory authority. Though major variations are known to exist in terms of the settings where healthcare managers function globally, each of them are bound by a mutual responsibility of improving the managerial and leadership capability and capacity of their membership, while promoting their profession. Nonetheless, not much is known about how leadership within healthcare systems across Hungary is defined. While there is scant literature about non-medical and medical personnel as leaders in regions like the US and UK, this aspect is yet to be explored within the context of Hungary.

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Éva Ladányi[1]:

The Laotian Coffee: From Opium to Sustainable Economy

Abstract

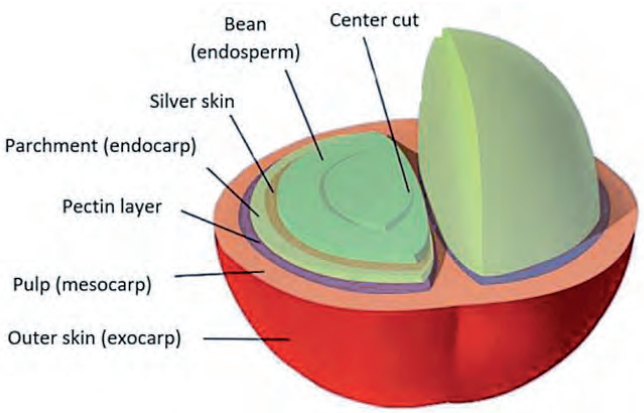
This article outlines the characteristics of Laotian coffee production with an emphasis on sustainability practices, quality control, and their socio-economic impacts. It also examines the historical context of coffee cultivation, particularly during the French colonial period, which shaped the industry and the country's economic landscape. Additionally, it reviews various initiatives such as capacity building programs, certification efforts, community empowerment, environmental conservation measures, and fair trade practices aimed at promoting sustainability in the Laotian coffee industry and the country's economic landscape. The transition from opium production to coffee cultivation has significantly improved the livelihoods of local farmers, contributing to both economic development and social stability.

Keywords: Laos, Coffee production, sustainability, community responsibility, quality control, French colonialization

Introduction

Coffee is one of the most important agricultural commodities globally, and its quality is closely related to pre- and post-harvest processing steps.

Every stage, from selecting premium coffee varieties to preparing the final beverage, is critical to the end product's quality. Various factors influence the overall quality of coffee, including physical and chemical properties, as well as sensory



Picture 1: Anatomy of the coffee bean
Photo: Mesfin Haile and Won Hee Kang

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characteristics. Approximately 60% of green coffee bean quality is determined by post-harvest processing steps such as harvesting, processing, drying, husking, cleaning, sorting, grading, storage, roasting, grinding, and cupping. The purpose of this article is to examine the unique aspects of Laotian coffee production, highlighting the sustainable practices that have emerged in recent years and their impact on local communities.

The Coffee Plant *(Coffea)*: From Shrub to Sustainable Economy

The coffee plant *(Coffea)*, belonging to the Rubiaceae family, is commonly known as the coffee shrub or tree. Native to tropical regions in Africa, Asia, and parts of South America, coffee species typically grow as shrubs or smaller trees. Coffee production is an important export in several countries, particularly in Central and South America, Asia, and Africa. The two most significant coffee species, arabica *(Coffea arabica)* and robusta *(Coffea canephora)*, are commercially valuable, with arabica accounting for roughly 75-80% of the world's coffee production and robusta the remaining 20%.

Picture 2: Bolaven Plateau
Photo: Jean-Philippe BABU, Shutterstock

The cultivation of coffee involves a complex interplay of factors such as soil type, climate, altitude, and agricultural practices, all of which significantly influence the quality and yield of the coffee beans.

In Laos, the Bolaven Plateau and the Annamite Mountains provide ideal growing conditions, making these regions key areas for coffee cultivation.

Picture 3: Annamite Mountains
Photo: Gene Bromberg

The History of Laos Through Coffee

The development and cultural significance of the coffee industry in Laos is closely intertwined with the period of French colonization. In the 19th century, French colonial expansion brought significant territorial gains in Southeast Asia, including Laos, which became part of the French Indochina Union. French colonial objectives focused on economic development and infrastructure development, leading to the construction of roads, railways and trade networks.

The establishment and promotion of coffee plantations was an integral part of this strategy, transforming Laos' economy and cultural identity. Coffee production became central to Laos, especially on the Bolaven Plateau, during the French colonial period. By the 1950s, there were more than 40,000 hectares of coffee farms in southern Laos. Despite setbacks in the early 20th century due to diseases such as

a fungal infection, coffee rust *(Hemileia vastatrix)* and other challenges, the Lao government's 1998 opium eradication programme focused on coffee cultivation, contributing to economic development and sustainability. The number of coffee plantations also decreased during this time. The relationship between the French colonial period and coffee production not only influenced industrial development, but also shaped Lao society and culture. French influences were evident in the coffee industry and throughout the country, including infrastructural developments, economic changes and urbanization. The rise of coffee production brought not only economic changes, but also social and political consequences in Laos.

The history of the Laotian coffee industry provides a comprehensive picture of the economic and political transformation of Lao society, providing valuable insights into sustainable farming and social development.

Lao Coffee: From Local Farms to International Recognition

The largest coffee-growing areas are in southern Laos, particularly on the Bolaven Plateau and the Annamite Mountains, which offer an ideal climate and rich soil for coffee cultivation.

Picture 4: Coffee plantation in Laos
Photo: Mark Morphew

Despite challenges such as coffee rust disease, Lao coffee growers have persevered, particularly with robusta beans, leading to a resurgence in coffee production.

The Bolaven Plateau Coffee Growers' Cooperative, established in 2007, has played a crucial role in coordinating resources, providing training, and implementing best practices. Today, coffee is grown on more than 76,000 hectares, involving over 250 villages, contributing significantly to the local economy and sustainability.

Year	Coffee Production (metric tons)	Area Harvested (hectares)
1960	1,800	5,000
1970	3,500	10,000
1980	4,500	12,000
1990	5,000	15,000
2000	8,900	25,000
2010	11,200	35,000
2020	13,000	76,000

Picture 5: Timeline of Coffee Productions
Photo: Internet

Cultural Significance and Unique Characteristics of Lao Coffee

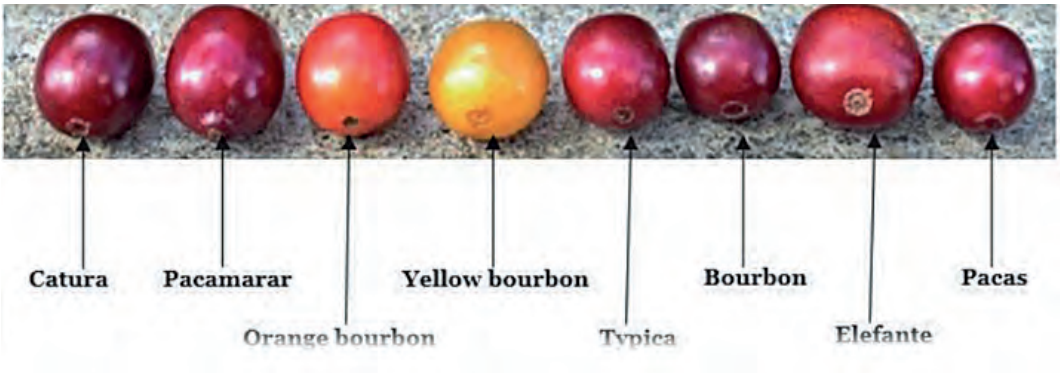
The Lao culture is as peaceful as the sun's rays caressing the facades of ancient buildings. Luang Prabang, a World Heritage Site, is like a glowing painting on a painter's canvas. Monks dressed in saffron robes quietly roam the streets, knocking door to door to collect donations. Twilight and dawn weave a golden glow through the city, the light dancing playfully on the shimmering domes of churches. The mountains around the city paint a stunning backdrop, like protective arms that embrace the city and shelter its timeless culture and peaceful soul.

The lush, verdant landscape and the traces of the ancestors weave together like a timeless fabric, intertwining the landscape like a magical thread of past and present. This place is an oasis of tranquillity and eternal wisdom, where nature and man unite in harmony to capture and experience a profound communion of peace and tranquillity.

It is in this landscape that the spirit of coffee is deeply embedded, where coffee is not just a drink but a way of life that brings you together with the world around you and gives you a sense of joy and contentment.

Lao coffee indulges the soul not only with its taste, but with an orgy of flavours that makes it unique in the world of coffee bean production. Although Lao coffee does not have the highest international reputation, its unique characteristics make it attractive to coffee lovers. This coffee is made from hand-harvested beans, which are carefully grown and harvested by local farmers with great respect for the coffee trees.

The coffee's characteristics include delicate aromas, a strong roast and a delicious balance that are the result of unique know-how. Two main coffee varieties are produced in Laos: robusta and arabica (mainly *Typica*, *Catimor* and *Bourbon*). A small amount of *Liberica coffee* is also grown.



Picture 6: Different types of arabica coffee beans
Photo: Mesfin Haile and Won Hee Kang

Lao coffee is not for those who prefer milder brews. Rather, it is robust, dense and rich in flavour.

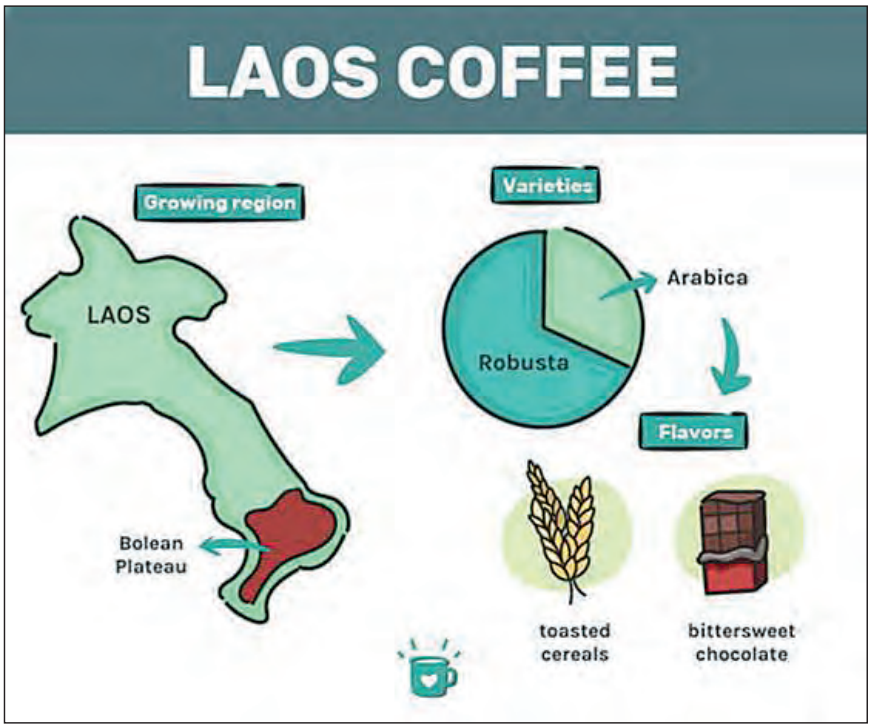
The more fruity-tasting brew, known as Café Lao, is usually made using a fabric filter. The brewed liquid is poured into a glass containing sweetened condensed milk and milk powder. This drink has subtle chocolate notes and offers coffee lovers a thick, tasty, strong drink. While men prefer Café Lao, women have their own choice. And that is the refreshing Café Nom Yen, which is like a cool breeze with every sip on a warm summer day. This iced latte is pleasant and creamy, making it a popular choice against the region's high temperatures.

Picture 7: Café Nom Yen
Photo: Joma Bakery Cafe, Vientian

The Nam Lam variety is one of the richest in terms of aromatic nobility. This Arabica is very famous. Thanks to the subtle notes of cocoa and walnut, Nam Lam coffee has a roundness that does not leave you indifferent.

Quality and Future Prospects

Recent initiatives aimed at ensuring the long-term success of the Laotian coffee industry include collaborative efforts between local stakeholders, governmental agencies, and international organizations.



Picture 8: Coffee production in Laos
Photo: Interet

These initiatives focus on several key areas to enhance quality, sustainability, and marketability:

1. *Capacity Building and Training Programs:* Implementing comprehensive training programs for local coffee farmers and producers to improve agricultural practices, post-harvest processing techniques, and quality control measures. These programs aim to empower farmers with the knowledge and skills necessary to produce high-quality coffee beans consistently.
2. *Infrastructure Development:* Investing in infrastructure development projects to enhance coffee processing facilities, transportation networks, and access to markets. Improving infrastructure not only facilitates the efficient movement of coffee beans but also ensures the preservation of quality throughout the supply chain.
3. *Certification and Traceability:* Promoting certification programs, such as Fair Trade and Organic certifications, to ensure adherence to international standards of quality, sustainability, and ethical production practices. Additionally, implementing traceability systems allows consumers to track the journey of their coffee from farm to cup, fostering transparency and trust.
4. *Research and Innovation:* Supporting research initiatives and innovation in coffee cultivation, processing, and marketing. Investing in research helps identify

new varieties, cultivation techniques, and processing methods that improve coffee quality, yield, and resilience to climate change.

5. *Market Diversification:* Exploring new markets and opportunities for Laotian coffee on both domestic and international fronts. Developing niche markets, specialty coffee blends, and unique branding strategies can differentiate Laotian coffee products and enhance their competitiveness in the global marketplace.

By prioritizing these initiatives and fostering collaboration among stakeholders, the Laotian coffee industry can strengthen its position in the global market, ensure the sustainability of coffee production, and contribute to the long-term prosperity of local communities.

Plans[2]

Laos is currently striving to build new hydroelectric power plants to generate more energy for international export, aiming to address a severe, long-standing national debt. Expert opinions suggest that the planned expansion of hydroelectric power plants is likely to cause greater harm than benefit, considering that dams obstruct the migratory routes of economically significant fish and climate change reduces river water levels (and thus energy production), while consumer countries increasingly turn to other renewable energies instead of importing hydroelectric power. Ironically, the expansion of hydroelectric power plants not only fails to bring significant returns to Laos but also risks natural resources and ecosystem services, which may ultimately be more valuable. They believe that enhancing the value of Laotian agricultural products (which already account for 5.7% of GDP) poses much lower environmental risks than hydroelectric power plants. Coffee is particularly important as it is Laos' fifth most valuable agricultural export product (valued at $51 million), and coffee grown on the Bolaven Plateau in Champasak province is sought after by international buyers, including the lucrative EU market. However, Laos currently ranks low in the global coffee market - 34th among coffee-exporting countries in 2020 - and coffee export value has stagnated in recent years. Moreover, most coffee producers lack sufficient bargaining power to secure better prices for their produce, especially amid increasingly volatile global prices. All this means that Laos' current coffee exports (and general agricultural exports) are insufficient to offset the need for revenue from merchandise exports. To increase the value of Laotian coffee exports and reduce Laos' economic dependence on hydropower, alongside ensuring sustainable coffee production, Seneca[3] proposes a project to establish and operate an international, profit-oriented, sustainable coffee laboratory. Such a laboratory could

[2] Thomas Gomersall, Seneca Impact Advisors. https://senecaimpact.earth/project/how-a-coffee-laboratory-could-save-laos-environment/

[3] Seneca Impact Advisors is a consultancy specialising in impact assessment, developing innovative financial solutions for scalable and commercially viable nature-positive projects. https://senecaimpact.earth/about-us/overview/

be crucial for achieving Laos' economic goals, as it would apply rigorous scientific measurement methods to determine coffee quality and thus its price, such as density, caffeine content, and roast color (among others). Armed with this information, producers can accurately assess coffee quality and, in turn, negotiate better and fairer prices.

Currently, there is no coffee laboratory in Laos, and Laotian coffee is sent to Thailand for testing. Additionally, the laboratory would categorize coffee according to sustainability indicators (e.g., indicators related to climate change adaptation), identifying farmers' risks regarding their crops' resilience to climate change, developing annual climate change plans, and implementing sustainable practices accordingly. Such practices include more efficient irrigation, agroforestry, the use of weather-resistant hybrid beans, and the protection of nearby, conservation/ carbon storage significant habitats. Sustainable coffee would become more valuable. To improve the overall sustainability of the Laotian coffee industry, the laboratory would assist farmers and traders in incorporating sustainability into coffee production, as well as other areas such as sourcing and transportation of coffee beans. It would also strive to incorporate sustainability into the inspection process. If farmers are aware that sustainable coffee commands a higher price, it can incentivize them to adopt more sustainable practices. The laboratory would be a profit-oriented enterprise, charging fees for its services, including physical laboratory testing of green and roasted coffee, chemical analyses, tasting services, as well as training of coffee growers and knowledge sharing. Coffee inspection businesses based on such services have already proven successful worldwide, including in Vietnam, Thailand, Indonesia, and India. Establishing such a laboratory in Laos could also save the costs of sending coffee to Thailand for inspection.

Costs

Establishing the laboratory will involve financing through a mixed funding structure, with consultants available to assist in its setup. While the costs of consultants may vary depending on their expertise and services, it's essential to budget for these expenses. Physical testing procedures for coffee entail minimal equipment costs, while chemical testing may require initial capital investment. However, prudent financial planning can mitigate these expenses, especially if the project generates regular income.

In terms of labour, skilled personnel may initially need to be sourced from outside Laos. However, with effective training and knowledge sharing initiatives, there is potential to transition to local labour, reducing operational costs over time.

Conclusion

The transformation of Laos from an opium-producing region to a sustainable coffee economy illustrates the significant social and economic impact of government policies and community efforts. Promoting coffee production supports economic diversification, social stability, and the reduction of drug trafficking. Ensuring fair trade practices and adopting sustainable methods will enable the Lao coffee industry to contribute meaningfully to national development while minimizing negative impacts.

Laos' journey from opium cultivation to a thriving coffee industry highlights the potential of sustainable agriculture to drive economic development and social progress. The concerted efforts of local farmers, government agencies, and international organizations have not only improved the livelihoods of many Lao families but also positioned Lao coffee on the global stage as a high-quality, sustainable product. Continued focus on quality improvement, sustainability, and fair trade will be crucial for the long-term success and competitiveness of the Lao coffee industry in the international market.

Promoting coffee production not only supports economic diversification but also enhances social stability and contributes to the reduction of drug trafficking. The shift towards sustainable agriculture in the coffee industry aligns with broader developmental goals, fostering environmental conservation and empowering local communities.

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Esther Ondrejcsák (PhD)[1]:

The biography of Anton Straka

Abstract

Slovakian Anton Straka has been working as the Czechoslovakian cultural attaché between World War I and World War II in Budapest for 10 years. The result of this Czechoslovakian-Hungarian overture was the "Anthology of Czech and Slovakian Poets" editing by Straka. Beside of Straka's cultural organizing work, his translations of literary works were also significant.

Keywords: Anton Straka, biography, Cultural history, Czechoslovakia, Košice, Budapest, Praha

Anton Straka was a diplomat who had the backing of the Czechoslovak Ministry of Foreign Affairs. Between the two world wars, he assisted Hungarian writers and poets in Budapest and Prague as an official rather than a private person. He aimed to promote Hungarian literature and music in Czechoslovakia, and Czech and Slovak literature and music in Hungary. Straka considered himself an advocate for both cultures. He was an individual who initially sought to wield influence in his capacity as a priest. Anton had a profound love for both his country and humanity. When confronted with the moral problems of his time, he became disillusioned with the Church and searched for alternative ways to build a better future for the Slovak people. At the beginning of his journalistic career, Straka expressed a nationalist sentiment that led him to hold negative opinions about Hungarians. However, he soon evolved from this mindset and began advocating for the unification of the Czechs, Hungarians, Slovaks, and other small nations. Straka opposed fascist ideologies and believed that all nations deserved equal rights to peace, development, the use of their native language, and the recognition of their cultural heroes. He demonstrated that diplomacy can overcome obstacles across cultures and achieve international friendship by recognising each other's values.

Anton Straka was born on July 13, 1893, in Kassa, in a Slovak working-class family.

His father, Ján Straka (02.05.1858), came from a family of millers from Močidľanoch located in Sáros. He started his career as a miller's assistant, then moved to Gar-

[1] The author of the study was granted a "Magyar Állami Eötvös Ösztöndíj" scholarship from the Tempus Public Foundation.

bovca, near Kassa. Later, Ján moved to Kassa itself, where he learned carpentry and worked as a carpenter's assistant.

As a child, he lost his father, Ondrei, and had to provide for the family. After his mother's, Anna Jakubčinová's, second husband passed away, Ján once again became the head of the family. Facing various difficulties in his life, he completed only two grades of primary school. However, he was determined to continue learning, and with his perseverance, he read, studied and wrote. Despite the challenges, Ján developed into a skilled writer and an organizer of Slovak Catholic life. Furthermore, he fought against Hungarianisation and stood up for his beliefs. By the age of nine, Straka's mother, Maria Grabanová (born on March 4, 1863), became an orphan. She served wealthy families and then became a tobacco factory worker. Maria stayed there and did the same job for thirty years. She was a loyal and dedicated woman who shared the same thoughts as her husband. She passed away in 1942 in Kassa.

Anton and his brother Ján (1895–1917)[2], grew up in a prejudiced, uncompromising and one-sided Catholic world, isolated from the external impact. However, he was able to witness the true strength of pure faith. According to his mother, he was a reserved, lonely, and thoughtful child. The family used to speak Slovak at home. Anton learned Hungarian while attending school in the multilingual city of Kassa. Presumably in mid-1939, he wrote his autobiography,[3] in which he explained that his parents were brought up in a world filled with deep religiosity and that they lacked thought or reflection, even though their intentions were good. It was a happy life in its way. Along with religiosity, his soul was filled with the observation of the national struggle for the life and rights of the Slovak people, which he observed all around him. After completing elementary school, his parents intended for him to become a shoemaker, because he was physically weak and had endured serious illnesses. Anton's primary school teacher strongly objected to this idea because he considered him very talented and saw great potential for further studies. He had a remarkable aptitude for languages and was proficient in several. However, the family was unable to finance his education expenses. It was then that he received an offer from the Slovaks in the US and Slovak leaders in Felvidék who wanted to support him. Anton also received aid from the Matica slovenská. Financial support was provided to him due to his father's widely known and respected work. This enabled him to study at the Premontrei Főgimnázium in Kassa 1903/1904 – 1910/1911. Ernő Kundt, an English linguist and member of the Order, was his class teacher.

Even as a high school student, Straka was reclusive. His personal life was, by his own description, colourful, vibrant and intriguing right up to his graduation.[4] In 1911, after graduating from high school, he applied to become a priest because he felt that this was the best way to serve the Slovak people. Straka believed he could

[2] He died of wounds at the 32nd Division medical corps. He was buried in Col dolla Berettan, Italy. *A Magyar Szent Korona Országainak Vörös Kereszt Egylete, 245111 sz. irat*. Bp., 1918. aug. 5.-i jelentés. *Straka-hagyaték*, MTA KIK, Kézirattár.

[3] *Anton Straka önéletírása. Straka-hagyaték*, MTA KIK, Kézirattár.

[4] *Uo.*

help the Slovaks in their most deprived chaplaincy, even if he would be persecuted for his efforts. His approach towards life changed during his participation in the priest seminars in Kassa, the young company awakened in him the pure childlike joyfulness that had been hidden until then. Straka had a smile at the world from ear to ear and became the funniest and most cheerful of the priest younglings. On July 16, 1915, he was ordained[5] and later worked as a catechist at the "Hunyadi utcai Állami Népiskola" (from September 1, 1915, to March 1, 1919). He was considered a highly respected spiritual pastor and teacher, who performed his duties with the greatest devotion, diligence and enthusiasm.[6] Straka was a gifted orator, his sermons were welcomed by the followers. He enjoyed music as well. According to István Gál, he was the one who replaced Gregorian music with modern church music in the cathedral in Kassa.[7]

On 28 March 1916, Jenő Balogh, Minister of Hungary, appointed Straka as a member of the Juvenile Probation Department in Kassa for the period until 31 December 1918.[8] He was appointed on the recommendation of the President of the Court of Appeal in Kassa and on 17 May he took the solemn oath before Bishop Ágoston Fischer-Colbrie, who was President of the Probation Department.

The society underwent a transformation after the First World War. Straka became involved in social work during the armed conflict. In the spring of 1917, the Supervisory Authority ordered the provision of assistance to war invalids, war widows and orphans within the organisation, and Straka was asked by the Bishop of Kassa to take up the leadership post in that institution.[9] In addition to his work as a priest, he and his father were constantly observing the ongoing events. They were informed of the imminent national liberation and they waited. In the autumn of 1918, the Society of Slovak Intellectuals was formed, and they contributed to its activities.

On 29 December 1918, Straka was present at the invasion of Kassa, waiting for the Czechoslovak marching troops in front of the barracks and greeting them on behalf of the Slovaks of Kassa.[10] A National Council was immediately set up, in which he took on the role of notary. The *Slovenský východ* daily newspaper was soon launched. It was in this atmosphere, in February 1919, that Straka wrote a few lines about his impressions, which he anxiously presented to the editors. He listened to the comments of the editor-in-chief and the writer Janko Hrušovský, and they

[5] *A kassai egyházmegyei hatóság 4575/1915. számú irata. Kassa, 1915. okt. 11., Straka-hagyaték*, MTA KIK, Kézirattár.
[6] *A Kassai Állami Népiskola értesítése.* Kassa, 20 September 1921, *Straka-hagyaték*, MTA KIK, Kézirattár.
[7] Gál István, *Anton Straka, József Attila csehszlovák diplomata-barátja*, Filológiai Közlöny, 1964/1–2., 188.
[8] *1915/60977 számú okirat. Straka-hagyaték*, MTA KIK, Kézirattár.
[9] *1917/334 számú okirat. Straka-hagyaték*, MTA KIK, Kézirattár.
[10] Berkes Tamás points out in his study Párhuzamos életrajzok: Anton Straka és Sárkány Oszkár (Európai Utas, 2003/3., 40–45.) that at first Straka's "appearance may not be very appealing to the Hungarian reader: he walks alongside the commander of the Czechoslovak legion marching into Kassa in priest clothes, as a field pastor, as if he were leading the invaders into the city". In Vécsey Zoltán 's novel A síró város (Kazinczy Kiadóvállalat, Kassa, 1931), he is called Vrana Tóni, where 'vrana' means crow, a play on Straka's family name, which means 'magpie' in Hungarian. In the novel, the author describes Straka as a trusted, serious, silent young chaplain who is a bit obtuse but is hard-working and likes to read. *A síró város* was seized by the Czechoslovak authorities and its copies were destroyed. The publishing house in Kassa went bankrupt. Vécsey was expelled from the country and lived in Hungary from 1933. In 1939, his book was republished by Genius Kiadó, but was also banned in 1945.

invited him to the editorial office after the conversation, even though Straka did not speak the Slovak literary language and had no knowledge of journalism. Nevertheless, he was appointed as one of the editors in charge because the newspaper's leadership wanted his family name and his father's name to appear on the front page. But he started working under a pseudonym. His articles have received a great deal of attention in political and journalistic circles. The bohemian Tamás Berkes states in his *Párhuzamos életrajzok*: *Anton Straka és Oszkár Sárkány* that initially some of Straka's articles were anti-Hungarian and anti-Jewish. By 1919, on the other hand, he was already in the defence of the rights of the Hungarian minority. That same year he was called to serve in the Czechoslovak army as a regional curator.

On 4 June 1919, Kassa was occupied again, this time by the Red Army of the Soviet Union. Ján Straka was imprisoned for the second time in a Hungarian prison, from where he returned to a deteriorated state of health. A month later, another turn of events ensued: the Czechoslovak troops occupied the town.[11] During that time, Anton Straka continued to edit the newspaper, wrote, lectured, and worked in the National Council and in the city's representative body, to which the Slovak National Party in Kassa delegated him. He corresponded with the poet Pavol Országh Hviezdoslav.[12] Straka was actively participating in the founding of the first Slovak sports club and the tourism club. In the year of 1919, Anton published a small book for the tourist association titled *Turistický Sprievodca po Východnom Slovensku* (Kassa, 1920). As president of the Association of Czechoslovak Tourists, he launched discovery tours to explore the Slovak Paradise. In 1921, he prepared a tourist guidebook for northern Slovakia, which included information about this region. The waterfall named after him at the Kolostor-szakadék commemorates his work (Kláštorská roklina – Vodopád Antona Straku).

In his lifetime, Straka travelled a lot. He loved hiking and knew his country well. His heritage includes many manuscript travel journals, for example, a three-day trip to the Tatras in July 1918, which he recorded in a notebook.[13] He visited the "Csorba-tó, Fátyol-vízesés, Poprádi-tó, Tengerszem-csúcs" (Csorba-lake, Fátyol-waterfall, Poprádi-Lake, Tengerszem-Peak), Ótátrafüred and the Óriás-vízesés. Straka undertook this journey as a priest, and nine people from Kassa volunteered to accompany him. They had their first glimpse of the Tátra from the train at Igloo. During these years he also made small excursions in the spring and summer, mainly half-day trips within Slovakia.

In the spring of 1920, the Hodža's Agrarian Party offered him the post of General Secretary in Western Slovakia, which he turned down because he did not feel strong

[11] Under the title of *Kassa három megszállása*, it was described by Simon Attila, historian and minority researcher, in his study in Történelmi Szemle, 2017/4., pp. 569–590. He also deals with the history of Kassa in his book *"From Kassa to Košice: Molnár Miklós emlékkönyv"* (co-authors: Szeghy-Gayer Veronika, Bukovszky László), published by the Fórum Kisebbségkutató Intézet, Somorja, 2020.

[12] See *Straka szlovák nyelvű levelét Hviezdoslavhoz Dolný Kubínra*. Kassa, presumably January or early February 1919 (draft) and *Pavol Országh Hviezdoslav válasz levelét Strakához*. 9 Feb. 1919 to Kassa, enclosed envelope with his business card. *Straka-hagyaték*, MTA KIK, Kézirattár.

[13] *A három napos tátrai út története.* 1918. június 15., 16., 17., *Straka-hagyaték*, MTA KIK, Kézirattár.

and capable enough to work in party politics. Then, in a stern display of disapproval for Hlinka's views, he declined an offer from Hlinka's People's Party to become the main editor of the Slovácka newspaper. Straka was soon invited to Prague to work for the Ministry of National Defence. Embracing the opportunity, he accepted a position there as a field pastor in May 1920.

In Prague, he joined the editorial staff of *Tribuna,* the most influential Czech daily paper at the time. Straka's work caught the attention of the Press Department of the Presidency of the Council of Ministers. As a Slovak and Hungarian affairs expert, Elb, the chief of the Press Department, invited him into his office. In the meantime, he gave lectures to Slovak students. Straka founded the Tatran sports club. In 1922, he was selected to serve as vice-president of the Czechoslovak Football Association before being named president. In March 1922 he was appointed president of the Slovak Commission of the Czechoslovak Tourists' Association, cooperating in the organisation of Slovak sports and tourism. In March 1922 he was appointed as an official of the Press Department.

Straka's private life changed in Prague, he gave up the clerical life and got married in July. His wife looked after the family and took part in his activities. Straka wrote a memoir of their relationship,[14] which tells us that they first met in Prague in March 1921. The Czech actress Věra Langerová was just about to graduate from high school and was keen to get to know Slovakia. Anton offered to accompany her and her mother and show them the beauty of his beloved country. The two grew close rapidly because of their shared interests and love of nature. They had three children, Vladimír, Milán and Ján.

In October 1922, Straka was sent to Ungvár from the Ministry of Culture as press director of the Transcarpathian Civil Administration. There, Straka lived a busy life, working as a journalist, getting involved in politics, and never ceasing his activities in tourism and sport. He was aware of the shortcomings of politics, openly confronted the Agrarian Party and was recalled in January 1924. The Agrarian Party, with whom he had a fierce conflict, promised him everything if he agreed to join them, but he declined and out of defiance joined the Social Democratic Party. They first offered him a job as editor-in-chief of the *Robotnícké noviny* newspaper and then wanted to appoint him as an official, but he declined these offers as well.

Anton Straka was never really involved in political life, because he considered autonomy and independence above everything else, he did not want a political party to interfere in his life, he wanted to follow his own convictions – this is what he wrote in his biography. In January 1924, he returned to Prague to the Press Department, worked at the *Tribuna,* and wrote as a journalist for *Národní osvobození, Národní politika, Robotnické noviny, Slovenský východ, Slovenský denník.*

The next turning point in Straka's life came in the spring of 1925. The press chief Elb wanted him to become editor-in-chief of *Robotnické noviny* and offered him a

[14] *Anton Straka életrajza és háború alatti tevékenysége.* Prága, 1976. jún. 6., *Straka-hagyaték*, MTA KIK, Kézirattár.

seat as a representative in the 1926 elections. Straka, on the other hand, still had no appetite for political life, feeling that his sensitive and emotional nature would not be able to cope with the harsh political environment. When the press attaché at the Czechoslovak Embassy in Budapest died, the search was on to find someone who knew Hungarian affairs and the language, and he was approached by the Minister with full authority in Slovakia (Minister s plnou mocou pre správu Slovenska) to accept the post. Straka agreed. He was intrigued by the opportunity to gain experience in the field of diplomacy. Anton was sent to the Ministry of Foreign Affairs, from where he was posted to Budapest as a press attaché.[15] There, in addition to his main duties, he was fully involved in the cultural affairs of his Czechoslovak and Slovak compatriots in Hungary, dealing with their cultural needs, organising events and developing cordial relations with the Hungarian cultural scene. Regular meetings with prominent figures in Hungarian cultural life, lectures, translations and cultural evenings were in order. Straka regarded these as the most remarkable jobs and years of his life.[16] He stayed in Budapest until April 1936, when he returned to Prague because the Foreign Ministry ordered him to do so.[17] Although he requested – on the grounds of the cultural work he had begun – to stay in Budapest for two more years, he was turned down. Straka then lived in Prague, in an apartment at 14 Za Pohořelcem (Praha 6 – Střešovice), with his wife and children.

In Czechoslovakia, he continued to work as a journalist in both Czech and Hungarian and did not stop cultivating Czechoslovak-Hungarian cultural relations. Straka corresponded with his Hungarian friends and the Hungarian minority in Czechoslovakia, gave lectures in Prague at meetings of the Táncsics Kör and the Petőfi Sándor Kör, and continued to translate.

In 1938 he was also affected by the first Vienna Treaty. The Secretary of the Delegation of Czechoslovakoslovakia instructed him to negotiate with Hungary and to take part in the negotiations in Komárom,[18] which temporarily deprived him of his father's grave in Kassa. Straka's father died in January 1934. A memorial was placed in his honour in Kassa and their street was named after him. The Hungarians vandalised the memorial and removed the inscriptions. In Kassa, they also constructed a bust to the honor of his name, but it was destroyed during the conflict.[19] He was later given a new plaque in Eperjes, where he had worked since 1906 as the founder of the first Slovak Tatra Bank, which was established there. One of Anton Straka's last notes on his father's memorial expresses incredible humanity: "What

[15] *Palkovič levele Strakának*. (1925?) aug. 6., Prága, *Straka-hagyaték*; *Új csehszlovák attasé Budapesten*. Uo. (újságkivágás), MTA KIK, Kézirattár.

[16] *Anton Straka önéletírása. Straka-hagyaték,* MTA KIK, Kézirattár.

[17] Koričánsky, Gustáv, *Anton Straka odchádza z Budapešti,* Slovenský denník, 1936. ápr. 2., 2.

[18] *Štátny policajný úrad v Komárne*. Komárom, 1938. okt. 10.; *Legitimácia*, the Czechoslovak delegation included: Anton Straka, Dr. Jozef Tiso, Dr. Ferdiš Klinda, Bauco, Kudlák, Ján Ursínyi, Pavel Florek, Henrik Bartek, Fedor Houdek, Dr. Jozef Zvrškovec, Karol Danihel, Dr. Takáč, Stauch (Hauch ? – illegible writing), Kuhoročan, Auch, Ing. Ján Procházka, Rudolf Viest, Dr. Ferdinand Ďurčanský, Komárom, 1938. okt. 12., *Straka-hagyaték*, MTA KIK, Kézirattár.

[19] Gál, Evžen literary historian in his lecture "Határátlépések Anton Straka életében és életművében", writes that "in the meantime – on 29 September 2016 – the head sculpture of Ján Straka was inaugurated for the third time in the northern district of Kassa". (Kézirat.)

an unspeakable and perhaps cruel whim of fate: the Hungarians destroyed my father's plaque, they throw bombs at my Slovak brothers and sisters, and they open fire on them, and I bury myself deep into my soul and translate Ady's "Hungarian Jakobinus Song" into Czech!!!"[20]

When the Foreign Ministry was dissolved, Straka returned to the Press Department of the Presidency of the Council of Ministers. He was determined to pursue a job in which he could remain loyal to the Slovak people and build a better future for the nation.[21] In July 1939, in collaboration with Emil F. Burian, he founded the D40 Baráti Kör (Kruh Přátel D40), of which he became secretary in the service of Czech cultural life. He spent 5-6 hours every afternoon doing this after his official work. He maintained correspondence with progressive poets until March 1941, despite all the threats. After Burian's imprisonment and the closure of his avant-garde theatre, Straka was also arrested by the Gestapo on 21 March.[22] He was charged with left-wing activities and sentenced to three years imprisonment. Straka was first imprisoned in Pankrác prison in Prague.[23] It is not entirely certain why he was taken from here to Bautzen, and how he ended up in concentration camps in Gross-Rosen and Mittelbau-Dora. At the end of August 1941, he was still in Pankrác, where he was interrogated, but on 8 September he was already writing from Bautzen. There, he was given the number 747. Straka's correspondence with his wife was in Czech, but the Germans checked what was being exchanged, so they mostly discussed private life and health matters or things related to the parcels and rations.

Anton reported from Gross-Rosen on June 25, 1944, in German. Afterwards, they used this language in their correspondence with Věra Strakova. The envelopes are labelled with the block number where Straka lived. He wrote his last letter from here on 7 January 1945. In it, he expressed his gratitude for the neatly packed food he had received for Christmas and also sent his regards to his friends and family.[24]

Straka's letters from his time in prison show that even in his final years he remained true to the spirit of European humanism. In 1940, he made a self-confessed statement to Gyula Földessy: "I have never been interested in careers, recognition, and other such things, and therefore I do not like publicity. I am not doing what I am doing because of that. I appreciate the greetings of Móricz and Német M., and I would like to return them."[25] Then in 1943, he wrote this in Czech: "I want to live, work and create for our future, and I want to continue the work I have done so far, even after the changes in my present way of life."[26]

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[20] *Straka levele Palotai Borishoz*. 1939. ápr. 13., *Straka-hagyaték*, MTA KIK, Kézirattár.

[21] *Likvidačnej komisii min. zahr. vecí v Prahe*. 1939. márc. 28., *Straka-hagyaték*, MTA KIK, Kézirattár.

[22] *Gaftbefehl*. Das Landgericht, Prága, 1941. aug. 4., *Straka-hagyaték*, MTA KIK, Kézirattár.

[23] *Staatspolizeileitstelle Prag.* 1944. márc. 29., *Straka-hagyaték*, MTA KIK, Kézirattár.

[24] *Anton Straka levele Věra Strakovának*. *Straka-hagyaték*, MTA KIK, Kézirattár.

[25] Sára Péter, *Levelek Anton Strakától = A Petőfi Irodalmi Múzeum Évkönyve 1959,* szerk. Vargha Balázs, Bp., PIM – Képzőművészeti Alap Kiadó, 1959, 176. (here the writer is referring to Németh László). Földessy Gyula writes in a letter dated 9 April 1940 that Móricz Zsigmond and Németh László send him their greetings. This is Straka's reply.) *Straka-hagyaték*, MTA KIK, Kézirattár.

[26] Október 31-i levél. *Straka-hagyaték*, MTA KIK, Kézirattár.

In 2003, at a conference in Budapest, his thoughts were expressed by his great-grandson, the actor Martin Palán, who stated that he had not asked for clemency, he had not waited for clemency. He had wanted justice.[27] In 1942, he wrote to his son, Milán: "I was always an oak tree, Milánka, but I did not live in the forest, I stood on a lonely hill, lightning and storms often struck me, a deserted tree. But I have kept and still keep my roots, which are tenaciously attached to my dear homeland."[28]

In the concentration camp, Straka's number was 40188, according to an official document issued on 13 August 1975, informing Věra Straková that her husband had been transferred to Bergen-Belsen on 6 March 1945 and that he had received his identity number in Gross-Rosen on 24 May 1944. There is no evidence of his death.[29] Presumably, he died marching near Bergen-Belsen.[30]

His wife had spent a long period trying to find her husband. A few witnesses came forward to tell her about Straka's fate in the camps. One was a teacher, Karel Kasl. He described how he was arrested by the Gestapo and imprisoned with Straka for some time, and while he was with him, he behaved bravely and kindly, spoke of his family, and looked forward to his new life and the joys of working in Slovakia.[31]

We discover from Dr Rudolf Glöckner that when Straka appeared as a Slovak in Gross-Rosen, he was the first person he rushed to, as one of his duties in the camp was to get to know the Slovaks. Straka was sent to Block 8, where he also lived. With his comrades, he was given undemanding work and became close to them. In the autumn he was transferred to block 7, which consisted of invalid people. From then on, they did not see each other as frequently, but he knows for sure that he managed to survive the concentration camp until the end of January 1945. After that, the Germans quickly began to prepare the evacuation, and from that point on he heard no further news of him.[32]

Václav K. Vašátko was working in the Nazi camp when Straka arrived at Gross-Rosen. He watched him with fascination and helped him to settle into the concentration camp. The military leader had family bonds with the Slovaks and was keen to help Straka. He was given the privilege of taking him in for as light work as possible, and on one occasion saved him from working in a quarry that would have killed him in a few days. On Christmas 1944, he lost touch with him, and after that, they were unable to speak, as Straka soon left with the rest of the people on his march of starvation and death.[33]

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[27] Martin Palán's presentation in the Cseh Centrum, Budapest, 2003 (kézirat), *Straka-hagyaték,* MTA KIK, Kézirattár.
[28] Július 12-i levél. *Straka-hagyaték,* MTA KIK, Kézirattár.
[29] *Federální Ustředni Výbor Československého Svazu Protifašistických Bojovniků,* official document of Comité International Genevé, 1562/75., *Straka-hagyaték,* MTA KIK, Kézirattár.
[30] *Anton Straka életrajza és háború alatti tevékenysége*. *Straka-hagyaték,* MTA KIK, Kézirattár.
[31] *Karel Kasl levele Věra Strakovához*. Kard. Řečice, 1945. jún. 20., *Straka-hagyaték,* MTA KIK, Kézirattár.
[32] *Dr. Rudolf Glöckner (Glykner?) levele Věra Strakovához*. Prága, 1946. márc. 2., *Straka-hagyaték,* MTA KIK, Kézirattár.
[33] *Václav K. Vašátko levele Věra Strakovához*. Plzeň, 1946. febr. 23., *Straka-hagyaték,* MTA KIK, Kézirattár.

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László Trembeczki – Dr. István Kobolka:

Telehealth Implementation for Remote Patient Monitoring: Facilitators and Barriers influencing the Effectiveness – A Systematic Review

Abstract

Remote patients may use telemedicine to communicate with doctors regarding their medical problems. Telehealth service enables individuals to exchange, transmit, and discuss data or information in real-time (simultaneously) at home with a healthcare professional a physician – at a hospital location. E-consultation usage might be good or harmful. However, the use of telehealth may have a positive or negative effect towards the healthcare system. This systematic review examines the barriers and facilitators that impact the adoption of telemedicine services in the health sector. It also assesses its efficacy in increasing patients' healthcare and system satisfaction. We conducted a systematic literature review to search for studies about online health consultation in four digital libraries: PubMed, ScienceDirect, Scopus, MEDLINE Complete, CINAHL Complete, and EMBASE. The database search yielded 15,300 articles; after applying the inclusion and exclusion criteria, the number of included articles for the final review was 17. In addition, a qualitative content analysis was performed to identify barriers and facilitators to telehealth systems, their effectiveness, and patient satisfaction with them. The systematic literature research demonstrates many external and internal telemedicine systems facilitators and barriers utilized to make a telemedicine strategy. Additionally, the data suggest that telemedicine technologies employ computers, cellphones, and telephones as a platform to conduct online consultations through various platforms. In addition, telemedicine technologies were utilized to treat various ailments in patients of different ages and demographics. For instance, most of the research studies reported positive responses on the usage of telemedicine, whereas relatively few experienced acceptance hurdles. Remote health services benefited all demographics and health situations. Online consultation facilitators promoting efficient and easy distant therapy enhanced patient acceptability. Some patients and doctors preferred in-person consultations over online ones. However, certain obstacles affected online consultation resistance. The framework identifies telehealth uptake enablers and impediments.

Keywords: Telehealth; facilitators, Barriers, effectiveness, online consultation

1. Introduction

As information and communication technology (ICT) advanced globally in the 1990s, "e"-terminology evolved. In the year 2000, eHealth was introduced as a tool for enhancing the performance of healthcare systems (Oh et al., 2005). Over the last few decades, rapid ICT advancements have significantly impacted the health sectors of developing countries (Sarsam et al., 2020). It has been demonstrated that using information technologies (IT), such as telemedicine, e-health, mobile health, and telehealth, can lower overall healthcare costs and the risk of medical errors (Bervell & Al-Samarraie, 2019). Compared to in-person clinic visits, telemedicine improves accessibility to healthcare by lowering financial and geographical barriers, increasing convenience, decreasing the cost of visits, and streamlining case triage and scheduling (Trettel et al., 2018). During the recent COVID-19 pandemic, telemedicine has taken on a new level of significance because it makes patient monitoring easier while simultaneously lowering the risk of transmission and exposure (Zhai et al., 2020). Because of these factors, numerous organizations in the United States are advocating for expanding telehealth implementation (AMA, 2021; Centers for Medicare & Medicaid Services, 2020; Department of Health and Human Services, 2020).

Telehealth allows patients to be assessed without their presence at a clinic. In most cases, an evaluation will take place in the patient's own home or in the community where they live. Data can be gathered through remote monitoring programs with symptom surveys, wearable sensors, and other medical devices. And then, this information will be sent to healthcare professionals so they can conduct a clinical evaluation and decide. In the past ten years, several studies have provided examples of how remote monitoring can be carried out to improve the outcomes for patients dealing with chronic conditions Vegesna et al. (2017) for monitoring blood pressure Margolis et al. (2018) and glycemic index Kitsiou et al. (2017).

Furthermore, adapting telehealth in randomized controlled trials revealed reduced readmissions and mortality rates among patients with heart failure and chronic obstructive pulmonary disease (COPD) (Pedone et al., 2015; Ho et al., 2016). Several systematic literature reviews have been conducted on telemedicine and e-consultation in health care. Most of these studies concern telemedicine's effectiveness, efficiency, and capability to improve healthcare services. E-consultation improves patients' access to speciality care without a face-to-face consultation. According to (Vimalananda et al., 2015; Maarop & Win, 2012) found that an asynchronous store-and-forward teleconsultation system was an effective tool between Malaysian primary and tertiary healthcare facilities. Roine et al. (2001) found that telemedicine technology provided an efficient and effective method of electronic referrals and video conferencing between primary and secondary healthcare providers.

Similarly, Hasselberg et al. (2014) showed that image-based telemedicine systems for medical expert consultation in acute injury treatment delivered accurate diagnosis

and affected patient management by assuring diagnostic validity, system quality, and clinician and user satisfaction. Additionally, additional systematic literature studies studied aspects that impact the adoption, adaptability, sustainability, and acceptability of telemedicine services among healthcare professionals and providers (Bradford et al., 2016; Brewster et al., 2014; Gagnon et al., 2012; Radhakrishnan et al., 2016; Ross et al., 2016). The telehealth system allows patients to exchange, transmit, and discuss data or information in real time from their homes with a care provider – typically a physician – at a clinical location using ICT-enabled telemedicine services (Almathami et al., 2020). Both facilitators and barriers may impact the utilization of telehealth. Facilitators are good influences, while barriers are negative influencers. External or internal forces might be influencers. External aspects include the system's environment and the system itself, while internal elements include the user's behaviour and motivation while using the system. As a result, it is necessary to determine the facilitators and obstacles to telehealth utilization. eHealth service adoption in specific locations and illness situations, such as mental health, has been the subject of much research. These studies have revealed barriers and facilitators for eHealth service adoption (Batterham et al., 2015; Hadjistavropoulos et al., 2017; Koivunen et al., 2008), veterans' health care (Kruse et al., 2018; Miake-Lye et al., 2011; Mishuris et al., 2015), and hypertension (Band et al., 2017; Mileski et al., 2017; Shaw et al., 2013). However, to our knowledge, there is no systematic review on barriers and facilitators influencing telehealth for accessing patient care using the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009). The framework offers a theory-based constructs guide for systematically assessing potential barriers and facilitators to successful implementation across different organizational settings. Therefore, this systematic review aims to apply the TDF/CFIR Michie (2005) in a systematic review context to identify the modifiable enablers and perceived barriers to using and implementing telehealth for remote patient monitoring and management. The specific objectives are to identify the published and grey literature reporting the enablers or facilitators of the implementation of telehealth in remote patient monitoring; identify the published and grey literature reporting restricting/hindrance factors that prevent telehealth from being leveraged for remote patient monitoring; extract reported barriers/enablers and categorized these according to the TDF/CFIR domains.

2. Methodology

The current systematic review and meta-analysis were carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009).

2.1 Search Strategy, Data Sources, and Study Selection

Source electronic database: Six bibliographic databases were selected to identify the relevant published literature. This includes PubMed, ScienceDirect, Scop-

us, MEDLINE Complete, CINAHL Complete, and EMBASE. An example search strategy for MEDLINE is provided in Appendix S1. A Google search engine was also used, but we limited it to the first 15 pages. Cross-references of included studies were screened for additional studies.

Time frame: For each dataset, papers in English published between 2017 and 2022 were searched using specific MeSH keywords.

Document type: Qualitative or quantitative type of Original articles (observational study and cross-sectional) in peer-reviewed academic journals.

Search strategy: specific MeSH keywords were included and linked using the Boolean search to maximize the search sensitivity: (implement*) AND ("eHealth" OR "health" OR "Telemedicine" OR telehealth OR "mHealth" OR "Mobile health") AND ("video conferencing" OR Video Conference*) OR ("Electronic consultation" OR "online consultation" OR (online video counselling) OR "e consultation") AND [barrier* OR "facilitate* OR enable].

2.2 Eligibility criteria

Inclusion criteria: Only the studies that met the following criteria were considered for study inclusion.

- Research has been done or published between the years 2017 and 2022.
- Original publications in peer-reviewed academic journals are qualitative or quantitative (observational study and cross-sectional study).
- Research on any online/remote health consultation between patients and health experts facilitated by any care provider.
- Population: Studies investigated the perspectives and /or experience of healthcare professionals (e.g., directors, managerial staff, and clinicians) and /or administrative personnel (e.g., IT staff, clerical) concerning telehealth implementation and monitoring.
- Intervention: Studies on remote consultations done at patients' homes (i.e., e-consultation) using any videoconferencing technology (e.g., computer with a webcam) to facilitate treatment.
- Outcome: Studies identified implementation barriers, challenges, lessons learned, and/or facilitators in treating any chronic condition.
- Studies that were published in the English language.

Exclusion criteria: Studies of the following type were excluded from this review.

- Studies that were published prior to 2017 or after 2022.
- Studies were not published in peer-reviewed journals.
- Studies published in theses or conferences.

– Studies on online consultation systems that provide offline consultations (forums and emails).
– Studies regarding online consultations conducted away from patients' residences.
– Studies in which the person involved is not a patient caregiver.
– Studies in which researchers present an idea, model, or scenario for a system evaluated in a lab without engaging patients.
– Studies of review literature, trial, case-control, any systematic reviews, meta-analyses, study protocol, and guidelines.
– Studies that were not published in the English language with incomplete data.

2.3 Risk of bias

The criteria proposed by Hawker et al. were used in order to analyze the potential for bias within the research (Hawker et al., 2002). Poor, fair, and excellent ratings were given for each of the following nine categories: (1) abstract and title; (2) introduction and goals; (3) method and data; (4) sampling; (5) data analysis; (6) ethics and bias; (7) findings; (8) generalisability or transferability; and (9) implications and usefulness. Examining the research methodologies, ethics committee approvals, study financing, and authors' conflicts of interest, as well as determining how the risk of bias may alter the cumulative evidence across studies, was how we calculated the risk of bias.

2.4 Data Extraction

The experienced author will instruct the rest of the study team on article selection and data extraction before extracting the data. The goal was to verify data uniformity and to evaluate the authors' selection and data-gathering techniques. Four researchers examined each manuscript's title and abstract independently and chose to reject any article that did not meet the inclusion criteria during the screening phase. The included manuscripts were then searched for in the entire text. They were obtained for free via institutional access or by contacting the authors. The evaluation process included full-text reading to choose articles that met the inclusion requirements, for instance, participant quotations in qualitative studies while quantitative findings from questionnaire and survey studies. Any conflicts that arise during the screening of the article opinion by the senior author over article selection will be handled.

To extract qualitative analyses, we followed the Theoretical Domains Framework to interview from semi-structured interviews that combines content and framework analysis approach (Atkins et al., 2017). The following four steps were used a) data extraction, 2) deductive analyses (theoretical domain framework coding, 3) inductive analysis (thematic synthesis), and 4) identifying the essential domains. Data

extraction and quality appraisal of the included studies were performed in duplicate, i.e., all by authors, and rechecked for the quality assessment. Data were entered into an excel sheet and then entered into the tabular form (Table 1).

2.5 Quality assessment

The quality of the literature was assessed using appropriate tools. To assess the qualitative studies, we use the instrument recommended by the Cochrane Qualitative Research Methods Group, i.e., the Critical Appraisal Skills Programme (CASP) (http://media.wix.com/ugd/dded87_29c5b002d99342f788c6ac670e49f274.pdf) For the grey literature, and we will use the Authority, Accuracy, Coverage, Objectivity, Date, and Significance (AACODS) checklist https://dspace.flinders.edu.au/jspui/bitstream/2328/3326/4/AACODS_Checklist.pdf). The Effective Public Health Project tool for published quantitative studies (Thomas et al., 2004).

3. Results

We conducted a qualitative analysis for every included study to identify the facilitators and barriers to remote patients and healthcare professionals using telehealth. Furthermore, the findings show that telehealth systems use computers, smartphones, and telephones via various platforms as a medium to facilitate online consultations. Furthermore, telehealth systems have been utilized to treat various illnesses in patients of varying ages and characteristics.

3.1 Eligible studies

The scholarly search yielded 15,300 articles from databases such as PubMed, Science Direct, Scopus, MEDLINE Complete, CINAHL Complete and EMBASE. 14,600, of which were initially excluded due to repetition and irrelevance. After screening the titles and abstracts, 620 articles were eliminated from 700. For full-text evaluations, 80 potentially relevant articles were chosen. Clinical reports (7), editors' messages (2), conference presentations (1) reviews, scoping reviews, and systematic review articles (n=53) were excluded as studies that did not meet the inclusion criteria. Finally, 17 studies that met the selection criteria outlined in the PRISMA flow chart were included in this review (Figure.1).

3.1.1 Characteristics of the Studies

The included studies were conducted in countries such as Canada (n=2), Columbia (n=1), the United States (n=5), Switzerland (n=1), Italy (n=1), Netherlands (n=1), Australia (n=1), Germany (n=1), Denmark (n=1), Bangladesh (n=1), Spain (n=1), and Europe (n=1). Table 1 summarises the study characteristics, aim, type of telemedicine used, facilitator and barrier of each study.

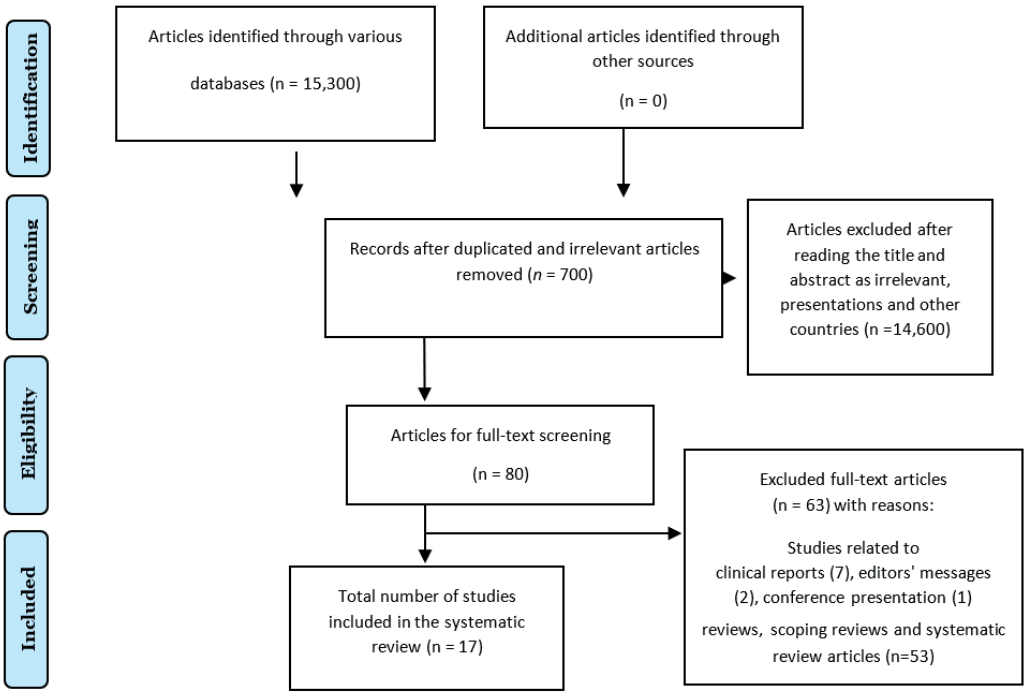

Figure 1: PRISMA Flow chart

3.1.2 Participants Characteristics

Most of the patient participants were female gender when comes to health care professionals were of male gender (Table 1), with ages ranging from 18-88 years old. With various health illnesses such as Orthopaedic/Musculoskeletal, Dermatology, Physiotherapy seeking patients, Cancer, Atopic Dermatitis, Heart Disease, substance use disorders, Kidney Disorders, Mental Health Issues, Prenatal and Postnatal and Diabetes. Healthcare workers included orthopaedic surgeons, physicians, oncologists, radiotherapists, physiatrists, psychologists, dermatologists, nurses and other professionals.

3.1.3 Devises and systems used for the Telemedicine

Each reviewed article used simultaneous video conferencing systems or software to enable interaction between a healthcare professional and a patient or a patient's carer. The teleconferencing characteristic was either part of a sophisticated telemedicine system or a simple stand-alone application software on a patient's mobile phone or desktop pc. The findings revealed that findings obtained digital meetings using specifically designed telemedicine processes that include teleconferencing as part of one's primary services. The mode of telemedicine was via Multiple devices such as Telephone, Smartphone or Computer, Tablet, and basic cellphone) with/ without health apps, online meeting tools, video conferencing, video consultation,

e-consultations, Web-based monitoring, Online systems or mobile portals, and a computerized web portal.

3.1.4 Patients and Healthcare professional's satisfaction towards telemedicine

As noted by the authors of each article, the potential of a telemedicine system to achieve healthcare coverage and health experience determines its efficacy in providing remote consultation. Nine of the 17 studies included showed positive attitudes toward feedback as simple to use. As a result, in a few studies, patients were more comfortable to use than healthcare professionals. According to the findings of the Telehealth Satisfaction Scale (TeSS) questionnaire from Cheng et al. (2020), most patients and families have been satisfied with their experiences using telehealth as a potential substitute for the in-office orthopaedic consultation process. Respondents also evaluated the ease of obtaining a consultation room and the duration of their time with the surgeon as outstanding. According to the Ghani et al. (2021) study, few respondents have been "very" interested in taking part in teledermatology. Younger age, relatively high education levels, more significant family income, online activity, mobile phone equity, and a background in computerized healthcare information exchange with a physician were all linked to increased involvement in teledermatology. Rausch et al. (2021) reported that the patients, in contrast to physicians, have a better attitude toward telemedicine. However, most PTs did not believe that virtual remote treatment could supplement regular physiotherapy practice. Therefore, they did not intend to use virtual remote therapy just after the pandemic.

According to Cascella et al. (2022), patients and doctors viewed their telemedicine experiences favourably. It was found that patients had a good experience irrespective of sex, racial origin, wealth, professional training, employment status, kind of cancer, treatment plans, or treatment type. On the other hand, older patients reported having distinct expertise with telemedicine. Patients who were elderly had significantly increased chances of experiencing a good experience with telemedicine when compared to those who were younger. According to Hennemann et al. (2018), there is a moderately common healthy approach to utilising telehealth. As a result, the incorporation of telemedicine necessitates a-prior-education, which should include the advancement of knowledge and understanding as well as favourable attitudes concerning the effectiveness and usefulness of the method in a collaborative setting.

3.1.5 Facilitators and barriers

Table 1 (facilitators and barriers) provides the data on every facilitator and barrier discussed in the included study results. This table is a summary of the facilitators and barriers that were recognised in each of the individual articles. According to one of the studies, there are more barriers to effective communication between Athletic trainers and clinicians than when using telemedicine (Winkelmann et al., 2020). According to the findings of another study Ghani et al. (2021), using telemedicine

was challenging for the participants because they had to overcome barriers to adoption, such as a lack of confidence in web-based cancer information, online sharing of data, and the utilisation of mobile health apps.

Inadequate pay for digital physiotherapy implementation and maintenance, a lack of digital literacy, a preference for a "hands-on" technique, information management developers' ignorance of physiotherapy methods and processes, and technological solutions that do not meet practical requirements Rausch et al. (2021), faced concerns the IT infrastructure Cascella et al. (2022), adoption of eHealth interventions included concerns about the availability and allocation of resources, training Ariens et al. (2017), financial aspects, reliability, security, and confidentially, using new technology more challenging, limited internet bandwidth Tang et al. (2019), high cost of infrastructure, and software development (Beaver et al., 2020).

4. Discussion

As was discussed before, the administration of medical treatment to a patient at a remote location utilizing a technological tool is an example of telemedicine. Technologies that fall under the telecommunications category include telephone, email, and videoconferencing (Pathipati et al., 2016). It is generally accepted that telehealth plays a significant part in patient safety, which is expected to become more critical in the future (Pathipati et al., 2016). However, considering the nature of healthcare coverage, its use of this technology and the delivery of services will affect the overall healthcare framework, despite the absence of cost estimating that demonstrates how telehealth impacts both patients and healthcare professionals at present (Sjogren et al., 2001). Consequently, healthcare practitioners must consider how they may engage with a telehealth system to provide patient care regarding expertise, skills, and capabilities.

Earlier researchers Kruse et al. (2017) concluded that better results, simplicity of use, cheap cost, effective communication, and lower total travel were the primary contributors to patient experience. In even though it possesses beneficial qualities with the potential to improve the correlation between a physician and a service user, the implementation of telehealth in medical care is hindered by factors such as its effectiveness, convenience of use, configuration, advanced devices, period, and conversations with patient populations and workmates (Gagnon et al., 2016). When, how, or why physicians might accept the possibilities of such a delivery mechanism for care delivery must be understood to gain conceptual knowledge of the adoption of technology and telemedicine platforms in the healthcare industry. Following perceived behavioural control, an individual's attitudes, subjective norms, and behavioural control may be directly connected to their purpose to utilise technology and telemedicine (Chang et al., 2015). According to the acceptance and use of technology, an individual's intentions to utilise a piece of technology are often influenced by

their attitude and perceived level of usefulness (Chang et al., 2015). The perceived utility of telehealth tools was the most crucial element in determining whether or not doctors would embrace them (Chau & Hu, 2002).

The encouragement and motivation of the practitioner are critical factors in determining a significant number of long-term acceptance of telehealth. Earlier studies have portrayed the inadequacy of telehealth as being caused by a paucity of physician engagement (Wade et al., 2014); however, once clinicians embraced and promoted the innovation, the patient soon followed. Following the innovation adoption, how exercise science professionals continue to apply for the program in standard care delivery would eventually be determined by obstacles, regardless of whether the problems were foreseen, imagined, or experienced. In addition, it is essential for ATs that want to utilise videoconferencing to establish the level of digital literacy of both their patient and the doctors who supervise their teams. One of the research that was included Winkelmann et al. (2020) discovered that respondents thought the technology was easy to use, and they found that with experience, they were even more comfortable using it. Finally, prospective researchers must investigate the digital health literacy of patients and ATs to understand where instructional activities must be focused to enhance technology innovations such as videoconferencing throughout the professions.

Even though people preferred face-to-face interactions more often than doctors prefer, the majority of doctors thought that telehealth did not negatively impact the connection that exists between their patients. The treatment of cancer involves input from several different specialists. Because it is possible to link numerous medical community members simultaneously, telehealth could make interdisciplinary treatment more efficient (Hoi et al., 2021). In addition, telehealth can make cancer survival treatment, pain and symptoms in pain management, and engagement in clinical studies more accessible to patients living in remote areas (Chan et al., 2021; Naito et al., 2021). Telehealth was introduced into treating patients by various professions in Saskatchewan several years before the COVID-19 epidemic. This was primarily due to the significant local population in the province. Patients have avoided travelling a combined total of over 6,000,000 kilometres due to its use by numerous experts at over 440 locations in 147 villages throughout the province for more than 17,000 consultations. Therefore, telehealth has the possibility of lowering costs associated with healthcare and lessening service differences among rural and non-rural communities. This can be accomplished by decreasing the time spent travelling and having to wait, the amount of time spent at work, the amount of stress caused by urban travel, and the amount of money spent on travel, trying to park, and accommodation, in addition to the number of skipped in-person consultations caused by the responsibility of travel.

The level of contentment experienced by both patients and medical professionals is critical in determining whether telemedicine will be an effective and sustainable means of providing medical treatment in the future. In summary, efficiency, both in

terms of time and money savings as well as money, is intrinsically linked to patient pleasure. A system's clinical effectiveness and usability are more likely to lead to satisfied clinicians (Garavand et al., 2022; Almathami et al., 2020). In addition, a comprehensive examination of qualitative investigation on cancer survivors' interactions with telehealth provides evidence for the conclusion that telehealth alleviates the responsibility of diagnosis and the interruption it causes in the existence of people with cancer, and it also offers people living with cancer an opportunity for autonomy and affirmation (Cox et al., 2017).

The results of this study indicate that both healthcare providers and care recipients have a generally positive mindset toward the execution and utilization of telemedicine services in everyday health condition practice. These services include the potentiality of e-consultations, Internet ability to monitor, and Internet self-management training. On the other hand, specific problems that still need to be solved were discovered. Because of this, patients and medical professionals recognise the benefits of eHealth services and are open to implementing digitally-based treatments into their routine care. Patients like the all-encompassing convenience of digital care and the opportunity to obtain insight into their medical records and get in touch with a medical expert when their symptoms worsen. In addition, professionals in the healthcare industry appreciate the possibility of increased productivity in their work schedules and partnerships. Finally, considerations about financial implications, durability, safety, secrecy, and expense of the interference as a whole, in addition to an absence of information and training, were cited as significant obstacles in implementing and accepting eHealth therapies. Other obstacles would include an absence of training and education.

5. Conclusion

In conclusion, the purpose of the study was to create a strategy that could be used systematically to give perspectives on underlying variables that influence both deployments and uptake of telehealth in routine health care. The general attitude toward embracing and using healthcare systems amongst patients and physicians appeared encouraging; nevertheless, researchers equally discovered several significant difficulties in the adoption process. Expertise in communicating health-related information was one of the changeable access barriers to telemedicine acceptance. Other configurable significant barriers would include confidence in internet data on various medical problems examined in the investigation and the utilisation of health apps. The outcomes of this study may assist in adapting the implementation approach to the attitudes, requirements, and perspectives of healthcare providers and patients, ultimately improving the effectiveness of eHealth treatments in everyday practice. Furthermore, to provide fair and equal access to care for a wide range of patient groups, any future use of telehealth needs to consider the recognised elements contributing to internet usage.

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Appendix

Table 1: Characteristics of included studies

Sl. No	Author and Year	Country	Study aim	Methodology/ Study design	Period of data collection/ study period (in months)	Patient age (Years)	Patient Health condition/ disease/ treatment	Type of telecom-munication used	Facilitators (staff, care takers and patients)	Barriers/ challenges (staff and patients)	Advantage	Telemedicine User (staff, care takers and patients) feedback	Ethics committee approval	Study outcome
1	Cheng et al. (2020)	Canada	To assess the usefulness of a telemed-icine MSK (TeleMSK) service for long-term care patients who need orthopaedic treatment.	Cross-sectional study	September 2018 to April 2019	NR	Ortho-paedic/ Musculo-skeletal issue	Telephone	• Patients = 32 • Telemedicine liasons = 27 • Orthopaedic surgeon = 01	None	TeleMSK allows for rapid or-thopaedic appoint-ments without affecting quality of patient care.	Excellent	Approved	This research found that patients, family and friends, and telemedicine liaisons were very satisfied with respect to ser-vice, convenience, and dependability of utilising a telemed-icine programme in an orthopaedic consultation context.
2	Win-kel-mann et al. (2020)	Colum-bia	To explore the experiences and perspectives of health care pro-fessionals using telemedicine.	Cross-sectional explanatory sequential mixed-methods study	July 2017 to January 2018	27±7 years	Musculo-skeletal Condi-tions	Smartp-hone or Computer	• Atheltic trainer = 17 (male-9, Female-8) • Care takers = NA • Health care workers (orthopaedic physicians) = 5 male	Athelitic trainers and clinicians are being challenged to collabo-rate.	Improved patient care, more convenient scheduling, and the develop-ment of coopera-tive rela-tionships	The social demands of colleagues greatly influenced collaboration among ath-letic trainers and doctors.	Approved	ATs and doctors faced societal pres-sures to collaborate when telemedicine was introduced to athletic training. It improved patient care, timing, and cooperation. Tech-nology adoption and telemedicine patient selection were difficult. Tele-medicine integration stakeholders could use the TPB-TAM methodology to measure provider engagement, lessen buy-in concerns, and lead educational and training seminars.

Sl. No	Author and Year	Country	Study aim	Methodology/ Study design	Period of data collection/ study period (in months)	Patient age (Years)	Patient Health condition/ disease/ treatment	Type of telecom-munication used	Facilitators (staff, care takers and patients)	Barriers/ challenges (staff and patients)	Advantage	Telemedicine User (staff, care takers and patients) feedback	Ethics committee approval	Study outcome
3	Ghani et al. (2021)	United States	This research examined demographic factors and interest in sharing digital photographs or films of skin lesions with health care practitioners through educational seminars.	Cross-sectional survey	2014	18 to≥65	Dermatology issue	Multiple devices (Tablet, smartphone and basic cellphone) with/without health apps	• Patients = 3677 (Male-1340, Female-2052, Unknown-55) • Care takers = NR • Health care workers = NR	Modified teledermatology access obstacles adoption included online health information exchange, cancer information confidence, and mobile health app usage.	Younger age, higher educational attainment, higher income, internet usage, type of mobile device ownership, history of electronic medical information exchange with a clinician within the previous 12 months, and high level of trust in web-based cancer information were all associated with greater interest in using teledermatology.	Only 24% of the participants were comfortable and interested to use teledermatology	Approved	Some modifiable access obstacles to teledermatology acceptance include trust, knowledge with telederматology, and usage. Establishing a teledermatology programme needs be taken into account these distinct facets of the digital divide in order to provide equitable access to treatment for a wide range of patient groups.

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4	Rausch et al. (2021)	Switzer-land	This research explores the influence of a moratorium during the first wave of the COVID-19 epidemic on the usage of digital remote physiotherapy and Swiss physiothera-pists' impres-sions of its use (PTs).	Cross-sectional on-line survey	30th June and 31st August of 2020	43 (±11)	Physio-therapy seeking patient	Multiple digital tools (smart-phone, online meeting tools, smart watches etc.)	• Patients = NR • Care takers = NR • Health care workers = 742 (Female-550, Male-174, rest unknown)	Lack of compen-sation for digital physio-therapy deploy-ment and main tenance, poor tech-nological literacy, tendency for a „hands-on" approach, infor-mation system de-velopers' lack of awareness of physi-otherapy procedures and work-flow, and technical solutions that do not satisfy practical demands	Low-cost and easily accessible	Attitudes towards the use and benefits of digital remote therapy was not positive.	Approved	During the first COVID-19 lock-down, Swiss PTs used a variety of inexpensive and readily available digital tools to assist their patients. Their sentiments regarding the utilisation and advantages of digital remote treatment, on the other hand, were not favourable. Physiotherapists need specialised education and training, as well as the introduction of relevant digital technology and the development of an adequate compensa-tion plan.

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5	Gondal et al. (2022)	Canada	The purpose of this research was to assess the telemedi-cine experience of both rural cancer patients and their doctors, as well as to investigate characteristics associated with a favourable patient experi-ence.	Cross-Sectional Study	March 2019 to May 2019	59–75 years	Cancer	Tele-medicine via video conferncing	• Patients = 165 (Male-84, Female-51) • Care takers = Not Reported • Healthcare workers = 25	NR	Useful for the elderly and rural patients.	When compared to doctors, patients have a more positive attitude.	Approved	Cancer patients and doctors have a high proportion of favourable telemedicine experience. When compared to doctors, patients showed a strong preference for telemedicine. When compared to younger individuals, older patients had more favourable experiences.

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6	Cascella et al. (2022)	Italy	This study aimed to trace a pathway for a progressive implementation of the telemedi-cine process for the treatment of pain in the set-ting of cancer patients.	Cross-Sectional Study	March 2021 to February 2022	62.9±11.6	Cancer pain man-agement	video consulta-tion	• Patients = 92 (F-48, M-44) • Care takers = Not Reported • Healthcare workers = oncologists, radio-therapists, physiatrists, psycholo-gists, and other professionals	The first problem to be faced concerns the IT infrastruc-ture and alack of training for the heal care providers	Telematic consulta-tions were highly appreciated at the start of the COVID-19 crisis	patients reflected high satis-faction rates compared with the care providers	Approved	The proposed model seems to be a promising approach for addressing cancer patients' pain management. Patients reported high satisfaction to-wards the approach. A methodological approach based on the degree of satisfaction combined with the analysis of the pathways can help to implement the quality of a service provided through telemedicine. Based on these findings, further research is needed to ensure the rapid implementa-tion of telemedicine in well-designed cancer pain manage-ment pathways.

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7	Ariens et al. (2017)	Nether-lands	This study aimed to assess opinions of the most important stakeholders influencing the implementation and use of eHealth services in daily dermatology practice.	Cross-Sectional Study	Not Reported	47 (SD 10.5)	Atopic Dermatitis (AD)	• e-consul-tations • Web-based monitor-ing	• Patients = 9 (F-8, M-1) • Care takers = NR • Healthcare workers = 99 (65 were dermatolo-gists and 34 nurses)	Implemen-tation and adoption of eHealth inter-ventions included concerns about the availabili-ty and al-location of resources, financial aspects, reliability, security, and confi-dentially and the lack of educa-tion and training	Reported advantages included the possi-bility of sending photo-graphs and request e-repeat prescrip-tions, the quick and satisfying response to questions, and the fact that it is available on any weekday without making an appoint-ment.	Health care professionals and patients acknowledge postive feedback	Approved	The patients and healthcare profes-sionals acknowledge the benefits of eHealth services in daily dermatology practice. However, barriers such as availability, alloca-tion of resources, financial aspects, reliability, security, confidentially, and the lack of education and training should be identified and implemented for the success of eHealth interventions in dermatology.

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8	Cajita et al. (2017)	United States	The primary aim of this study was to examine factors that influence intention to use mHealth among older adults with HF	cross-sectional, correlational study	NR	71.5 ± 4.6	Heart Disease	mobile technology	• Patients = 129 (F-34, M-94) • Care takers = NR • Healthcare workers = NR	using new technology more chal-lenging	easy enough to use even for the less technology-savvy	easy to use	Approved	Researchers should consider using the participatory approach in developing their interventions in order to ensure that their mHealth-based interventions will not only address the patient's HF self-management needs, but also be easy enough to use even for those who are less technology-savvy
9	Onuma et al. (2019)	United States	To determine patient prefer-ences regarding the use of newer technolo-gy in delivering test results during cancer surveillance.	single institutional, cross-sectional analysis	NR	59.1 years (SD 13.5)	Cancer survivors	Online systems or mobile portals	• Patients = 257 (F-158, M-99) • Care takers = NR • Healthcare workers = NR	With low education levels and a lack of knowledge of using telecom-muni-cation, patients require a friend or family member to assist with the use of technol-ogy	mitigating patient travel and alleviating clinic congestion	Majority of the patients reported „very effective"	Approved	Although many cancer patients preferred to receive "normal" surveil-lance results electronically, the majority preferred receiving abnormal results via direct conversation with their provider. Shifting routine communication of normal surveillance results to techno-logy-based applications may improve patient satisfaction and decrease health care system costs

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10	Molfenter et al. (2018)	United States	The aims of this study are as follows: (a) Assess level of interest in using certain telemedicine applications in SUD treatment settings. (b) Assess use rates of telemedicine applications in SUD treatment settings. (c) Determine if organizational technology adoption behavior profle groupings can be developed, based on an organization's technology use characteristics. (d) Assess what organizational factors infuence an organization's technology adoption behavior.	cross-sectional survey	10/1/15 and 1/30/16	NR	substance use disorders	Computerized web portal, mobile and Telephone	• Patients = NR • Care takers = NR • Healthcare workers = NR	facilitators to adopting telemedicine in SUD treatment need to be better understood	Organizations pursuing these goals will have demonstrated innovative tendencies in other organizational practices and have top leadership supporting the use of telemedicine.	Fify percent of the organizations expressed high rates of interest in seven of the telemedicine applications, demonstrating the appeal of telemedicine within this feld	Approved	These data suggest that SUD treatment organizations in the United States are interested in the greater use of telemedicine technology. The use of telemedicine in SUD treatment settings will probably begin with computerized assessments and texting appointment reminders, followed by telephone, video, and mobile health applications. Organizations pursuing these goals will have demonstrated innovative tendencies in other organizational practices and have top leadership supporting the use of telemedicine. In addition, SUD treatment outcomes need to be improved, and overdose deaths need to be decreased. In addition, telemedicine could be a mode to achieve these desired goals or, at the least, provide new methods for delivering SUD treatment and recovery support.

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11	Bonner et al. (2018)	Aus-tralia	Evaluating the prevalence and opportunity for technology use in chronic kidney disease patients	cross-sectional survey	June, 2015 and March, 2016	18 to >71 years	Kidney Disorders	computer internet and mobile apps	• Patients = 708 (F-316, M-389, missing-3) • Care takers = NR • Healthcare workers = NR	lack of knowledge to use the technol-ogy	easy to use for young age popu-lation	effective for young age patients to use than old age	Approved	In the CKD cohort, younger patients are more likely than older patients to use mHealth intensively and interactively although all patients' technology literacy ought to be thor-oughly assessed by renal teams before implementing in practice. Further research testing mHealth interven-tions to improve self-management in a range of patient cohorts is warranted.
12	Henne-mann et al. (2018)	Ger-many	This study examined acceptance and person-centered barriers to potential uptake of OEMH for work-related distress in employees with an elevated risk of early retirement.	cross-sectional survey	NR	49.93 years (SD = 4.06).	Mental Health Issues	Web or mobile	• Patients = 1829 (F-1007, M-822) • Care takers = NR • Healthcare workers = NR	NR	NR	negative	Approved	The risk group under study has fairly negative attitudes toward OEMH. Therefore, a-priori education is necessary for OEMH implemen-tation, including the promotion of awareness and positive attitudes toward effectiveness and usefulness in a cooperative manner.

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13	Rossen et al. (2019)	Den-mark	The aim is to get insight of how cancer survivors grouped by their readiness for technology are receptive towards using technology in connection with exercise to propose how services can be tailored to the groups charac-teristics	cross-sectional survey	NR	50.5-69.0	Cancer	Web or mobile	• Patients = 305 (F-216, M-89) • Care takers = NR • Healthcare workers = NR	experience techno-logy-specific barriers		Almost 30% of the partic-ipants were un-receptive to use tech-nology	Approved	Findings show that evaluation of individuals' receptiveness to use technology in a rehabilitation context and their readiness for health technology may identify different strata of cancer sur-vivors with potential for personalizing rehabilitation pro-grams according to individuals' skills and needs. This could reduce the risk of alienating low-resource individuals when introducing health technology and identify individ-uals who require additional/targeted support in order to engage in technology-based interventions.

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14	Tang et al. (2019)	Bangla-desh	This study aimed to investigate the prevalence and sociodemo-graphic pattern of mobile phone use for health services among women and relationship between the use of mobile phone use and the up-take of essential maternal health service	cross-sectional survey	NR	15-39 years	Prenatal and Postnatal Services	Web or mobile	• Patients = 4494 • Care takers = NR • Healthcare workers = NR	limited internet band-width, high cost of infrastruc-ture, and software develop-ment	women who are using mobile phones are more likely to use ante-natal and profession-al delivery services than those who do not	had higher odds of mak-ing 3+ ANC visits and delivering at a health facility	Approved	The findings of this study conclude that women who use mo-bile phones are more likely to use ANC and professional delivery services than those who do not. More in-depth studies are necessary to understand the mechanism through which mobile phone-based services enhance the uptake of maternal health care.
15	Rodrí-guez-Fortú-nez et al. (2019)	Spain	The aim of this study is to de-scribe patients' perceptions about TM and to identify preferences on TM resources, in Spain.	A descriptive cross-sectional observational study	18 April 2016 to 5 August 2016	60.3 (15.0)	Diabetes	Web or mobile	• Patients = 1036 • Care takers = NR • Healthcare workers = NR	NR	Simple resources, allowing treatment-related data to be recorded as well as providing hygiene and nutri-tion tips, enabling the adjust-ment of treatment and the exchange of infor-mation with the medical team	well accepted	Approved	In Spain, nearly 10% of patients with T2DM have expe-rience with TM and it is well accepted, especially one based on glucometers. Nevertheless, in order to promote TM use, easier and time-saving programmes for patient-physician interaction should be optimised.

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16	Shea et al. (2018)	United States	To identify community and hospital characteristics associated with adoption of telestroke among acute care hospitals in North Carolina (NC)	cross-sectional survey	NR	NR	stroke	NR	• Patients = NR • Care takers = NR • Healthcare workers = NR	internal barriers (e.g. organi-zational, technical, and educa-tional) and external barriers (e.g. economic, legal, and regulatory environ-ment) to providing telestroke	NR	NR	Approved	Our findings suggest some hospitals may have neither the financial resources nor the ability to pool resources for acquiring needed technology, and dif-ferences in adoption may result in geo-graphic inequities in access to telestroke services.
17	Beaver et al. (2020)	Europe	This study aimed to explore the preferences of endometrial cancer patients and their levels of satisfaction with HFU and nurse-led TFU.	cross-sectional survey	November 2014 to March/April 2015	36 to 88 years	Cancer	NR	• Patients = 236 • Care takers = NR • Healthcare workers = NR	clinically effective, cost effective and meet patients' needs is challeng-ing	The telephone group were more likely to indicate that ap-pointments were on time	high levels of satisfac-tion with informa-tion and service were reported	Approved	the introduction of patient-initiated follow-up approaches may become standard and preferred practice for patients treated for different types of cancer, TFU remains a high-quality alternative to HFU and may provide an effective transition between HFU and patient-initiated follow-up.

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