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Redakce Vojenských rozhledů vám představuje článek profesora Jaroslava Komárka “The Roots of Military Logistics in a Retrospective”, který byl uveřejněn v časopisu Economics and Management 2/2019.

## **The Roots of Military Logistics in a Retrospective**

**Jaroslav Komárek**

**Abstract:** No military operation is conceivable without logistics. It is widely known, however, the origin of the term logistics is not unambiguously stated in publications and sometimes refers to ancient Greek. There is no doubt that the term “logistique” was first used by the general of Napoleonic army Antoine-Henri Jomini and Lieutenant Colonel George C. Thorpe, U. S. Marines, anglicized Jomini’s term to “logistics”. Among many distinguished authors that paved the way to the current theory of military logistics cannot be omitted Rear Admiral Henry Eccles. It is also worth to mention Austrian-American economist Oskar Morgenstern and his attempt to outline a consistent language between military and business logistics and to formulate a general theory of logistics.

**Key words:** Logistics; Strategy; Supplying; War; Theory.

## 1. INTRODUCTION

No military operation is conceivable without logistics. Military logistics provides the resources of combat power, positions those resources on the battlefield, and sustains them throughout the execution of operations. It is widely known, however, the origin of the term logistics is not unambiguously stated in publications and sometimes refers to ancient Greek. There is no doubt that the term “logistics” was first used by the general of Napoleonic army Antoine-Henri Jomini. He took part in a row of campaigns and after the war published his views on the nature of war and its basic principles. Jomini originally defined logistics as the *“art of well-ordering the functioning of an army to assure its arrival at a named point”* and the term “logistique” (like a “mathematique”) derived from a military rank “Marechal de logis” (Quartermaster) known in the French royal army till in the 18<sup>th</sup> century.

Nearly one century the term of logistics was fully neglected in the military thinking and reappeared again in 1917, when the Lieutenant Colonel George C. Thorpe, U. S. Marines, anglicized Jomini’s term to “logistics” (like mathematics) in his book entitled “Pure Logistics: The Science of War Preparation”. Thus, his thoughtful and perceptive analysis stands out as a milestone between the ground-breaking treatise of Jomini and later writings on logistics that did not begin to appear until about the time of World War II.

Among many distinguished authors of that era cannot be omitted the “Clausewitz of Logistics” Henry E. Eccles. “Logistics in the National Defence” was the first significant attempt to describe the relationship of logistics to strategy and economics. Eccles’ writings outline the complex interrelationships that exist across the government, the services, and the force generating components. The most important aspect of his synthesis is the recognition that all of the relationships combine and must be managed to produce the required outcome: effective support to the combat force. Eccles is credited with perhaps the most powerful idea in all of military logistics theory: *“Logistics serves as the bridge between a nation’s economy and its forces”*.

## 2. FROM THE LA MANCHE TO AUSTERLITZ

The logistics in the Napoleonic wars arose not only “eo nomine”, but also “de facto”. Indeed, the Napoleonic wars represented a qualitative change in the history of the military, both in the scale of operations across the whole of Europe and even overseas, and by the unprecedented size of armies.

First of all, it needs to note that supplying since the ancient times meant supplies for several days carried along with the army (partly on a soldier’s back, partly on a horse-drawn wagon), to enable manoeuvring and make up for an unexpected shortage of the main supplies from local sources. Local sources, however, could appear insufficient in the face of a huge army. Considering the soldier’s daily ration of two pounds, an army of 100 000 men needed over 80 tons of food every day. That was about 60 to 80 wagons full of load. Yet the capacity of local sources should not be underestimated. A village of 500

with provisions sufficient from spring to the next harvest (approximately 90 000 person-days), could feed 10 000 men for several days. Nevertheless, the consequences for the village were obviously dire. An even more critical the problem, a horse needed ten times more than a man, which made about 400 tons of fodder for 50 000 horses every day, plus twice as much water [1]. In favourable conditions, it was possible to count on the grass but 50 000 horses needed the area of about 1 000 acres (405 hectares) a day [1]. For an idea, in a free pasture of 500 meters on both sides, it would be a 4-kilometre lane. Fodder for horses was always a priority. Shortage of fodder meant a shortage of horses which in turn meant less possibility of supply.

In his first campaigns, Napoleon organized supplying the way he had done while defending the republic, solely through requisition, contribution, and booty. As the army kept growing to become the Great Army (*Grande Armée*) of 250 000 men in 1805 and the campaigns became longer, there was a growing need for depots and supply units. The only reason was not the provisions, but the enormous use of ammunition in line with Napoleon's conviction that artillery is the decisive factor on the battlefield.

The first test of the supplying system of Napoleon's army came with the blitz march from the La Manche to Austerlitz [1]. Once the independently operating corps of the Great Army crossed the Rhein in late September, they began to live from the country and the corps supply officer "ordonnateur" was responsible for providing supplies from the neighbouring areas. He and the divisional "commissionaries" were to inform local authorities of the number of men and horses to be fed and the demands made on each of them, as well as fixing the place where the provisions were to be brought. No payment had to be made, but receipts specifying the exact quantities were to hand out so as to make it possible to settle accounts in future (by the French treasury on the own territory, and by the defeated side on its). In order to arrange the transport of messages, supplies, and reinforcements, as well as the transport of wounded and prisoners, a route from the Rhein to the army distribution centre Nordlingen near the Danube was secured by the field gendarmerie. During the fights in Bavaria several depots of the Austrian army were captured, yet the distance from France exceeded the capacity of transport. In October, with the enemy not far, requisition could no longer be organised centrally from the corps level and there were difficulties in supplying. The task was assigned to commissionaries or regiments themselves and in some cases, soldiers had to pick potatoes in fields. To relieve the situation, a transport route between Strasbourg and Augsburg was established in late October. The route of 300 kilometres was divided into seventeen parts, each served by sixty wagons and supplies for the entire army for two weeks to come could then be amassed by Augsburg. Transport was upgraded also by the use of water routes on rivers in Bavaria and Austria. There were more problems in early November. With few routes between the Alps and the Danube, four corps shared one route from Enns, and the infantry arrived at places, where till all had been consumed by the cavalry. Napoleon himself inspected the transport organisation in Linz, ordering that a basis be built in Braunau on the Danube, where flour for 3 million rations had been brought and there were bakeries capable of serving 100 000 pieces of bread a day. Luckily, Vienna was near, and by its capturing the army acquired great amounts of food, ammunition, and armament. Plus, Vienna was ordered that 80 000 men of the Napoleonic army be catered for the next three weeks. An interesting order was given to build ovens with the

capacity of 60 000 portions a day at Brno Spilberk castle. In the meantime, before the order was actually carried out, the battle of Austerlitz took place and the Great Army gloriously returned, laden with a huge booty.

### 3. FROM THE NEMAN RIVER TO MOSCOW

The Russia campaign stands for the peak in logistic requirements. Analysing his experience from the sparsely populated East Prussia and Poland, Napoleon carefully studied the situation of the future campaign and ordered huge supplies to be accumulated in Baltic ports. He also increased the capacity of the army supply corps to twenty-six supply battalions, eighteen of which were equipped with 252 heavy wagons (1,5 t each) hauled by a four-in-hand. All told, over 10 000 wagons and 6000 back-up-horses were at the army disposal [1]. Ammunition supplies reached standards they never had before, e.g., in early May 1812, there were almost 750 000 cannonballs of various calibres in Prussia [1]. The vast supplies for the army of half a million men plus 250 000 horses were supposed to last a three-week campaign. Supplies for the journey back were to be taken care of by the defeated enemy. In spite of some initial trouble (heavy wagons turned out to be unsuitable for muddy roads after July storms), transport of supplies ran smoothly and corps commanders from all directions reported a surprisingly favourable situation. The decisive battle, though, did not take place at the expected place and time. The Great Army set out for 900 km far Moscow, where it arrived two and a half months later after two heavy battles (Smolensk, Borodino) even with a third of forces in relatively good condition. At this point, supplying at such a great distance was beyond that time. Aware of this, the Russians kept destroying supplies that could have been used by the enemy, conducting guerilla war to cut off supply lines, and by the fierce battle of Maloyaroslavets (changed hands eight times) forced Napoleon to retreat along the original route through the ravaged landscape.

Jomini became the military commander of Smolensk in early October, he found nearly 15 000 sick or wounded soldiers without food and medical personnel there, and the native population almost entirely had left the devastated town [2]. According to the Emperor's orders, the town was in the process of organizing a major military depot, a hospital with capacity for 8 000 men, warehouses to store nearly 250 000 pieces of artillery ammunition, and supplies of uniform and other provisions. The main task of the Governor and Jomini as his assistant were holding Cossacks and partisans off the line of communications, and collecting supplies through trade and requisitions from the countryside. The issued proclamation declared: *"Peasants, enhance your calm, go about your business and have no fear, as the French troops will not disturb you any longer. All arriving troops are strictly informed not to cause you any trouble... The French government awaits from you delivery of bread and other provisions for which you shall receive a decent pay from His Majesty himself; he is awaiting your submission and obedience"*[2]. But the growing unwillingness of the local population to cooperate with the French administration made this task very difficult. Nevertheless, Jomini continued his efforts to collect provisions and sent various trains with food supplies to Moscow. But it

was a little too late; the Great Army left Moscow on 19th October. On 9th November, after difficult marches, battles, inclement weather and first signs of the demoralisation the Great Army reached Smolensk. Jomini managed to organize a vast stock of provisions, but all attempts at maintaining order were nullified by bands of deserters who raided the magazines. Most of the precious stores went to waste, for the Imperial Guard and the other leading troops consumed and scattered the supplies in three days of looting which left Marechal Ney's rearguard with nothing at all. Assigned by the order of Napoleon to his Imperial Headquarter, the unsuccessful commandant of the strategically important town joined the retreating army but distinguished himself further in helping to save the remnants of the Great Army.

Jomini had not been appreciated as a founder of logistics, but namely, as a brilliant military thinker compared to Carl von Clausewitz. Prior to the American Civil War, the translated writings of Jomini [3] were the only works on the military strategy that were taught at the United States Military Academy at West Point and the officers for both the Union and the Confederacy began by following Jomini's principles [4]

Logistics in Napoleon's army was well ahead of the times. The remarkable accomplishments were due to the fact that Napoleon was in charge of not the only army but the entire state. His strategy was to ruthlessly force both his enemies and his allies to carry the financial, material and personal burden of the war. At the same time must be pointed out that logistics in the Napoleonic wars was very limited in terms of its technological level. But in the fifty years to come, the technology of war was to change substantially. Gone were the brightly coloured coats, white breeches, and muzzle loaded firearms. In their place rattled Gatling machine guns, the soldiers dug trenches on the battlefields of the American Civil War, and the trains wheezed in the rear.

#### 4. THORPE'S PURE LOGISTICS

Like most Marine officers of the early 20th century, Thorpe had enjoyed a varied career [5]. He had served as a 2nd lieutenant during the Spanish-American War and then as a 1st lieutenant in time to see action in the Philippines. In 1903, Captain Thorpe commanded the Marine detachment accompanying the first American diplomatic mission to Addis Ababa. This was an assignment testing both his logistical and tactical skills, involving an arduous month-long trek by mule and camel across some 300 miles of Ethiopian desert and mountains, confrontations with hostile tribesmen, and a mutiny of spear-carrying camel drivers. Thorpe's subsequent career included service in the West Indies, Cuba, and the Panama Canal Zone; as Fleet Marine Officer of both the Atlantic and Pacific fleets.

During his long career, Thorpe's most enduring contribution may well have been his authorship of "Pure Logistics", published after one-and-a-half years as student and staff member at the Naval War College [5]. The time at Newport had been most productive, or it was there that Thorpe enjoyed what may well have been his first real opportunity to study and think about some of the broader aspects of the art of war. It is clear that his interest soon focused on the area of logistics. He quickly discovered that military

commentators other than Jomini offered only “silence” on the subject. He thus began to write his own definition and analysis and to develop a set of principles for the organization and direction of this long-neglected branch of warfare. Thorpe viewed logistics as science which, like other sciences, could be divided between “pure” and “applied,” between theory and practical usage. “Applied Logistics” drew on the general principles of “Pure Logistics”, concerning itself with the specific details of logistical functions before and during a war.

## 5. THE ESSENCE OF PURE LOGISTICS

Thorpe’s conception of logistics was akin to that of Jomini: strategy and tactics constituted the conduct of war; logistics provided the means. But this means was not limited to the narrow functions of transportation and supply. Logistics indeed embraced the entire range suggested by Jomini as well as all those larger and deeper aspects subsumed within the economics of warfare. Logistics as thus broadly defined, argued Thorpe [5], constituted an entity. It comprised many activities, but was nonetheless a single whole. To ignore or reject its unity and the interrelationship of its parts, a common error, was to divide or splinter a natural functional category of the art of war.

Separating supply and transportation, for example, from engineering, maintenance, hospitalization, administration, and other aspects of logistics was unnatural and dangerous. It left these interdependent activities to be planned, organized, and managed without unifying direction and coordination: a certain invitation to defeat in battle and disaster in war. Logistics, in short, was *“a distinctive branch of warfare,”* embracing *“a large number of activities that should be coordinated, but not confused, with tactical or strategical activities”*. To prove the validity of this concept, Thorpe offered three historical examples: Napoleon in Russia, Sherman’s Atlanta campaign, and the Prussian army in the war with France. Napoleon, noted Thorpe, had made great personal efforts to ensure sufficient supplies, yet his campaign failed because the logistical functions of the French army were poorly coordinated and the demands placed on them were too great. Sherman, on the other hand, had planned and established an efficient logistical organization that enabled him to carry out his bold, ambitious campaign. The Prussians had been the most foresighted of all, felt Thorpe. Several years before the start of the Franco-Prussian war, the chief of General staff Moltke had made a careful estimate of the logistical base of both the French and Prussian armies, planned for war accordingly, and organized his staff to ensure proper logistical support of his strategy and tactics.

But a reader looking for a theory of logistics according to Thorpe’s title would be disappointed, there is no such thing [5]. Building on his analysis of the German general staff, Thorpe proceeded to draw up a detailed organisation for the direction of American fighting forces. It was an ambitious and far-sighted plan, reflecting broad logistical considerations and concepts in many ways ahead of their time. Thorpe recommended the establishment of a National Board of Strategy to be responsible for strategic planning and national logistic considerations. The National Logistic Staff of the Board would manage those logistical activities common to both Army and Navy, including certain types

of procurement and services, as well as peacetime industrial preparedness. Within each of the armed forces, logistical functions would be clearly delineated and handled by him proposed positions of logistical staff at all levels.

The entire military organization would be based on an effective military educational system to prepare the nation's military system for "efficient operation." [5] Thorpe outlined a scheme of education for cadets, officers, and even enlisted personnel and stressed that officers must be efficient teachers and therefore should be pedagogy an item in the military curriculum. He did not specifically discuss logistical training and education, but he did urge that all strategical and tactical problems examined at the staff colleges "be solved logistically" to determine the feasibility of any proposed action. By way of illustration, he provided a detailed numerical example of such a logistical solution in an exercise involving a major fleet operation from an advanced base against an enemy effort to seize that base.

Nor did "Pure Logistics" fare any better. Thorpe's broadly conceived view of logistics and his ideas for implementing it, aroused little or no interest at a time when neither the Army nor the Navy was prepared to drop traditional concepts of supply and support. Nor did logistical developments in the aftermath of World War I do much to change this attitude. Logistics, indeed, continued to be viewed narrowly. The word had entered the military lexicon but was still defined in the traditional sense of movement and supply of troops in the field, a definition that lingered on well into World War II. It was not until the later stages of the war with the huge landing operations that logistics began to take on the broad meaning ascribed to it by Thorpe.

## 6. THE "CLAUSEWITZ OF LOGISTICS"

First of all, it should be mentioned that Henry E. Eccles wrote his book [6] from a wealth of personal experience, having "served as a combat-tested commander, a theater-wide logistician, and a world-class educator [7]. After his graduation from the U.S. Naval Academy in 1922, he served aboard several battleships and commanded a submarine. In the months that followed America's entry into the war, Eccles commanded the destroyer through thirteen intense combat engagements in the Pacific. After relinquishing command of his destroyer, Eccles completed a tour in the Maintenance Division of the Office of the Chief of Naval Operations in Washington, followed by completion of the Command Course at the Naval War College. He was then ordered to Pearl Harbor as Officer-in-Charge of the Advanced Base Section that placed him in the midst of the largest logistics operation ever conducted. The operations in the Pacific theatre became because of its enormous demands a fundamental resource for the postwar development of logistics at all. At a distance of over 10 000 kilometres, which required 2-3 weeks boating supply ship, it was necessary to transport all the material for hundreds of aircraft, thousands of vessels and hundreds of thousands of men. Any fault at the place of loading could have had a disastrous consequence in the destination area.

Navy captain Eccles returned to the Naval War College in the late spring of 1946 to lecture on advanced base development. On a trip to Washington, a friend showed him

the directive signed by the Chief of Naval Operations, Fleet Admiral Nimitz, which established the logistics course at the Naval War College and called for a flag officer to head the course. Eccles was asked if he could suggest anyone for the job. When he mentioned two or three names, he was told those officers were either not available or not interested. Finally, he was asked if he might be interested. Admiral knew Eccles and, believing that commitment and knowledge were more important than rank, eagerly approved assigning him to lead the course even though he was not a flag officer (rank of admirals). Eccles was able to gather a competent staff and have them on board in sufficient time to prepare for the opening of the course in July 1947. After nearly five productive years of teaching logistics, Eccles was given the opportunity to put his theories into practice (!). In 1951, he became Assistant Chief of Staff for Logistics for the Commander-in-Chief, U.S. Naval Forces North-eastern Atlantic and Mediterranean. He performed the same function for the Commander-in-Chief Allied Forces Southern Europe when that NATO command was established. He held that position until his retirement in 1952, and at that time, he was promoted to the rank of rear admiral. After retirement, Eccles renewed his close relationship with the Naval War College and lectured there during the nearly three decades.

## 7. THE ESSENCE OF LOGISTICS IN THE NATIONAL DEFENCE

It is not easy to characterize the content of a three-hundred-page book, it is necessary to study it for full understanding, so at least try to approach it. The book is divided into three major sections: Basic Considerations, Operational Factors, and Organization and Readiness [6]. Each part builds upon the previous, and collectively, they address the issue of logistics from its theoretical basis through practical application, at a remarkable level of detail.

The first one-third of the book, Basic Considerations, lays a firm foundation for the subsequent discussion. This section engages the reader in a preliminary discussion of the nature of war and the relationship between strategy, tactics, and logistics. The whole structure of logistics definitions are explained further, and the influence of level, range, and nature of the situation on logistic planning discussed.

Part two opens with a discussion of one of the most famous of Eccles' logistical concepts, the so-called logistic snowball. The "snowball theory" holds that logistical operations have a tendency to grow in size and complexity far beyond the minimum level needed to support the operations at hand. He cautions commanders to carefully monitor the level of support being planned for a given operation, and when a growing "snowball" is detected, attempt to curtail excesses before they become burdensome and threaten to crush the operation. He cites a number of reasons for the growth of the "snowball," some of which are primarily psychological in nature. He reasons that commanders may discover some aspect of logistical support that they consider inadequate, and once such logistic "under-planning" is identified, there becomes a tendency to "over-plan."

In the third part, Eccles turns to issues of organization and readiness. He discusses problems of centralization vs decentralization; the relation between logistic system,



command, and staff work. Further, he deals with major factors in the development of logistic readiness: the mental attitude of command, the balance of logistics and combat forces, the logistic plans and policies, the logistic organization, the state of material readiness, and the program of training. In the end, he offers thoughts on the relationship between logistics and the theory of war and the need for study and research.

It is clear that today's world is far different from the one in which Henry Eccles worked and lived, but in fact, the tasks of today's logistics have not changed that much.

## 8. CONCLUSION

More than a hundred years after Thorpe's "Pure logistics" the military logistics won both the current definitional framework [8] substantially in his proposed scope, both applied principles of a binding national economy to logistics examined by Eccles. But what is common to both authors is to emphasize the importance of triad Strategy-Tactics-Logistics. Strategy deals with the determination of objectives and the broad methods for their attainment; Tactics deals with the specific employment of weapons and forces toward the attainment of the objectives of strategy; Logistics deals with the creation and sustained the support of combat forces. Or, stated somewhat more simply: Strategy and tactics provide the scheme for the conduct of military operations, logistics provides the means, therefore. In any event, whenever a commander is faced with a military problem, he should not become so absorbed in one aspect of the problem (whether strategic, logistical, or tactical) that he considers it without reference as to how it affects and how it is affected by other elements [6]. The question is how this basic concept is applied to the current content of General Staff courses at the Faculty of Military Leadership.

As already explained, the lessons learned from naval operations contributed decisively to the development of military logistics. But not only that, but they have also become a basis for the development of business logistics. This term was first mentioned by a significant Austrian-American economist Oskar Morgenstern (together with mathematician John von Neumann authored the famous "Theory of Games and Economic Behaviour") in the article "Note on the formulation of the theory of logistics", published in *Naval Research Logistics Quarterly*. It was an attempt to outline a consistent language between military and business logistics and to formulate a general theory that "*enables categorical, quantitative, spatial and temporal association of physical goods in production and business processes*" [9].

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**O autorovi:** **Prof. Ing. Jaroslav Komárek, CSc. (plk. v. v.),** nar. 1938, Vojenská akademie 1961, strojní inženýr. Po šesti letech praxe v technických funkcích u útvarů pozemního vojska a letectva vědecká příprava (CSc. 1971) a výuka na katedře inženýrské letecké služby a letištního technického zabezpečení fakulty letectva a PVO. Od roku 1975 ve Výzkumném ústavu dopravním, zaměřením na prognózy dopravního zatížení dálnic. V r. 1990 návrat do armády, 1992 kurz řízení obranných zdrojů v Monterey, 1993-95 prorektorem Vojenské akademie pro vědeckou činnost, od r. 1996 v Ústavu managementu a podpory vzdělávání VA, účast na dvou projektech NATO RTO a prestižních mezinárodních konferencích, zaměřením zejména na simulační modely personálu a logistiky. Od r. 2003 výuka managementu a logistiky na soukromých vysokých školách.