

Supply Chain & Logistics of the Ottoman Army (1300-1566)

Cengiz Haksever

Rider University, Department of Information Systems, Analytics, & Supply Chain Management, Norm Brodsky College of Business, 2083
Lawrenceville Road, Lawrenceville, NJ 08648, USA
haksever@rider.edu

Abstract—The Ottoman Empire developed from a frontier principality to become the most powerful empire in the world by 1566. It conquered lands and countries in three continents, covering an area of approximately 978,000 square miles at the time of Süleyman the Magnificent. The most significant conquest, without a doubt, was the capture of Constantinople in 1453 by Mehmet the Conqueror, which marked the end of the Eastern Roman Empire. Historians characterize this event as the end of the middle ages. Many historians agree that the Ottomans' success depended to a large extent on their ability to amply supply provisions and weapons to their soldiers. They also provided plentiful food for their animals which were the main transport means. In other words, although soldiers, Janissaries and cavalry, won battles, the supply chain and logistics of the Ottoman Army made it possible. To the best of the knowledge of the author of this manuscript, there is very little research on how militaries of the middle Ages supplied and logistically supported their soldiers and animals. This paper provides an example of how one of those militaries accomplished it. This research is based on published books and articles by prominent historians and covers the period of 1300 to 1566. It concludes that the basic principles used by the Ottoman Army for their supply chain and logistical activities are still valid today and used by excellent modern supply and logistics systems.

Keywords: Supply chain management, logistics, military logistics, Ottoman Empire, European history.

1. Introduction

This paper presents a study of the supply chain and logistics systems of the Ottoman army. The period under study is from 1300s, approximate date of the establishment of the Ottoman principality, to the death of the sultan Süleyman I (1566), also known as Süleyman the Magnificent, or the Law Giver. Many historians consider Süleyman's reign as the apogee of the Ottoman Empire. At which time the Empire had reached the limits of its expansion with lands in Europe, Asia, and Africa. End of Süleyman's reign was also the beginning of the decline of the Ottoman Empire; a decline that lasted hundreds of years. Many historians also agree that the supply chain and logistics systems of the Ottoman army was a major factor in its successes in conquering wide expanses of lands in three continents and winning wars. However, Ottomans had many failures and defeats, especially after 1566, largely blamed to the ineffectiveness of its supply and logistics systems.

The paper is organized in eight sections, and three side bars to provide more information about three very important institutions mentioned in the paper. The second section provides a brief summary of the history of the Ottoman Empire for the selected period. The third is a summary of the military organization of the army. The fourth section discusses the supply system of the army. The fifth section focuses on the logistics system. The sixth section describes the process of marching and halting in a campaign. The seventh section is a brief description of the Ottoman military marching band *Mehteran* as a moral support group in battle and in peace times, and the final section presents some observations and conclusions.

2. A brief history of the Ottoman (*Osmanlı*) Empire (1300-1566)

Historical documents about the beginnings of the Ottomans (the Europeans corrupted the word *Osmanlı* to Ottoman) are scarce. Historians generally rely on documents written much later. However, it is generally accepted that the family that established the Ottoman dynasty belonged to the Kayı branch of Günhan arm of *Oğuz* Turks [1]. The Kayı people entered Anatolia in the second part of the 13th century as part of the massive nomadic Turcoman migration from Central Asia. This migration started because of harsh climatic and economic conditions in Central Asia. Turcomans first came to Iran and Eastern Anatolia. After the defeat of the Seljuks by the Mongols in 1243 they migrated farther west, eventually settling on the frontier between the Byzantine and Seljuk Sultanate [2]. Under the leadership of patriarch Ertuğrul *bey* (chief) they established a principality (*beylik*) in Söğüt in north-west Anatolia as the Seljuks their suzerain.

After Ertuğrul's death his son Osman Gazi (holy warrior) (c. 1290-1324) became the leader. At the time, central and western Anatolia was partitioned by several principalities, all of which were Turkic origin and Muslim [3]. Ottoman principality became a state after Osman's 1302 defeat of Byzantine troops in Baphaeon. This victory increased Osman's fame resulting in gazis from various parts of Anatolia gathering under his banner. The ideal of *Gaza*, continuous holy war and expansion of Islamic land, formed the foundation of frontier society and culture [2].

However, Ottoman sultans were pragmatists; they followed a rational strategy when it came to dealing with Christian or Muslim states. *Gaza* (holy war) was neither the

ultimate objective nor it was a strategy to destroy Christian and Jewish societies but to subjugate them. They were more complex than simple holy wars, sometimes Muslims and Christians joined forces and shared the booty in raids [4]. Sometimes, Ottomans established alliances with Christian rulers against other Christian states as well as against Muslim states. At the same time Ottomans became the protectors of the Orthodox Christians. They guaranteed the lives and properties of Christians and Jews. These communities were free to exercise their religions and live according to their traditions. However, they were required to pay a poll tax to the state.

Furthermore, Ottomans pursued a policy of volunteer submission of non-Muslims before resorting to warfare. As a result, the Ottoman state became a multi-religion, multi-ethnic, and multi-cultural society. An example to the success of this tolerant policy is the Greek frontier lord Mihal Gazi's voluntary conversion to Islam and cooperation with the Ottoman military [2]. Other Greek (Evrenos Gazi) and Serb nobilities (Malkoçoğlu; Serbian Malković), who both became Muslim, played significant roles in Ottoman campaigns. Also, the relationship with regional kings or potentates were not always warlike. These sometimes took the form of intermarriages between families of rulers. For example, Sultan Orhan Gazi (1326-1362) married Theodora, the daughter of John V. Cantacuzenus, a claimant to the Byzantine throne [2]. Another wife of Orhan was the daughter of Byzantine Emperor Andronikos III (1328-1341) [1]. Bayezid I (the Thunderbolt, 1389-1402) married Princess Olivera Despina, sister of the Serb despot Stefan Lazarevic (1389-1427) [1]. Furthermore, Lazarevic allied with his brother-in-law by fighting alongside him in the battles of Nicopolis (1396) and Ankara (1402) [5]. Of course, probably the most famous and influential wife was the wife of Süleyman the Magnificent, Russian slave Roxalana (Hürrem Sultan).

Upon the death of Osman, his son Orhan Gazi (1324-1362) became the leader of the Ottomans. Orhan's reign included a series of important conquests, one particularly important was the annexation of Anatolian principality Karesi (1344) whose lands provided a crossing point at Dardanelles from Asia to Europe [3]. Ottoman incursion into Europe began with the capture of Gallipoli (Gelibolu, 1354) and Adrianople (Edirne, 1361); this could be considered as significant as conquering Constantinople [6]. In addition, they transported Turcoman nomads to the newly occupied lands where they founded Turkish villages, thereby establishing a firm presence on the European soil [2].

Despite some occasional setbacks, expansion of territories both in Anatolia and the Balkans by conquest continued during the reign of Murad I (1362-1389) who conquered Sofia, Bulgaria, southwestern Anatolia, and Ankara. Murad I died in the battle of Kosovo. His son Bayezid I took over and continued the campaigns. However, Ottomans experienced a major defeat inflicted by Timur (1336-1405) in the battle of Ankara and Bayezid I was taken prisoner. This was an existential threat to the

Ottoman state. What followed was more than ten years of struggle among the sons of Bayezid I for the throne. Eventually Mehmed I (1413-1421) succeeded by defeating his brothers. During his reign, Mehmed I had to deal with several revolts both in Anatolia and the Balkans, his success in suppressing them was largely due to well-trained and supplied Janissaries [2].

Three years of crisis resulted from the death of Mehmed I. The Janissaries and the *ulema* (members of the learned class, educated in Islamic law) supported Murad II (1421-1451) against his uncle Mustafa's claim to the throne [2]. Although Murad II experienced some defeats such as failure to capture Belgrade, between 1430 and 1444 he made some important conquests including Thessaloniki, Smyrna (Izmir), and Smederovo. Murad II abdicated in favor of his 12 year old son Mehmed II after signing treaties with his European and Anatolian rivals in 1444 [2].

Ecumenical Council of Ferrara-Florence ended in 1439 with the union of the Greek and Latin churches. Although this was a short lived union, the important result for the Ottomans was the resurgence of a desire to launch a crusade against the Turks [7]. In the same year of Murad's II abdication, a crusading army composed of troops from Hungary and Transylvania, crossed the Danube and marched towards the Ottoman capital Adrianople (Edirne).

Upon this looming threat viziers urged Murad II to lead the army to save the Ottoman state. Ottomans defeated the crusaders sealing the fate of the Balkans and Byzantine Empire. In 1446 Grand Vizier Çandarlı Halil engineered a Janissary revolt, removed Mehmed II from the throne and brought back Murad II to power [2]. In his second reign, Murad II turned his attention to the Balkan vassals who revolted during the 1444 crisis. He successfully subdued these vassals thereby completing the Ottoman Empire's recovery from the disaster of 1402. Mehmet II (1451-1481) became the sultan after Murad's death in 1451. At first he focused on establishing friendly relationships with his western enemies such as Venice, Byzantium, Transylvania, and Serbia.

These developments created the conditions for him to turn his attention to the conquest of Constantinople. The city was captured on May 29, 1453 after a siege of 53 days. This conquest created shockwaves across Europe and marked the end of Byzantine or Eastern Roman Empire [8]. The city was renamed as İstanbul and became the capital of the empire.

After the conquest of İstanbul, Mehmed the Conqueror continued to expand Ottoman territories, conquered Peloponnese in 1460, engaged in a long war with Venetians from 1463 to 1477 which ended with Venetian defeat and loss of Shkodër (Scutari), Lemnos, and lands in the Peloponnese. In the east, he conquered major ports on the Black sea, and made Crimea a vassal state, practically gaining the control of Black Sea [8].

Next, he turned his attention to the southwest Anatolia, where a powerful rival was posing a threat to the Ottomans:

Uzun Hasan, the ruler of Iran and eastern Anatolia, was trying to gain the control of the principality of Karaman as well as the entire Anatolia through Venetian assistance. In 1473 Mehmed's army inflicted a crushing defeat upon Uzun Hasan and ended the principality of Karaman [8]. Then he turned on Venice to punish it for her collaboration with Uzun Hasan. Mehmed was victorious again, as a result Venice agreed to pay an annual indemnity of ten thousand ducats [2]. Mehmed II died in 1481 on the way to another campaign. At the time of his death, the Ottoman Empire extended from the lands between the Danube and Sava in Europe, Peloponnese in the southern Europe, to the Black Sea coast in the northern Anatolia and to the Euphrates valley [3].

A Janissary revolt and a struggle for the throne between Bayezid and Cem, the two sons of Mehmed II, followed his death. With the support of Janissaries Bayezid II claimed the throne [8]. At the beginning of his reign Bayezid II (1481-1512) reversed most of his father's unpopular policies, then to please his troops and consolidate his authority launched a campaign against Moldavia. He was successful, Ottomans captured Akkerman and Kilia in 1484 [2].

Bayezid II signed a peace treaty with Hungary in 1503. At this time Ottomans were facing another threat in the east. Shah İsmail, head of Safavids of Iran, proclaimed that he would make Anatolia part of his empire. In 1511 powerful nomadic Turcoman, known as *kızılbaş* (red head, due to the red head gear they wore), revolted, with support from Shah İsmail, posing a serious threat to the Ottoman rule. At this time Bayezid II was aged, ailing and unable to handle the threat. Sensing that his end was near, his three sons were engaged in a power struggle. In the end, the youngest son Selim won the support of the Janissaries and forced his father to abdicate in 1512 [2].

Selim I (1512-1520) started his reign by eliminating his brothers to secure his claim to the throne. Then turned his attention to Safavids. He marched against this significant threat and soundly defeated Shah İsmail's forces at the battle of Çaldıran in 1514 [8]. Selim's next target was the other powerful threat: Mamluks. In August of 1516 he completely destroyed Mamluk forces near Marj Dabiq, near Aleppo. He continued to the south capturing Aleppo, Damascus, and Egypt. Probably, the most significant result of this campaign was that he received the title "Servant of Mecca and Medina," the holy cities of Islam [2]. Yet another, may be more important, result was his receipt of caliphate from the Abbasid caliph as well as the standard and cloak of the Prophet, becoming caliph and leader and protector of Muslims all over the world [9]. At the time of his death (1520) the size of the Ottoman Empire was twice the size he inherited.

Succession of Süleyman I (1520-1566) to the throne was peaceful since he was the only son of Selim. His first major victory was the capture of Belgrade in 1521. Next year Ottomans conquered Rhodes. In 1526 he launched a campaign against Hungary and defeated the Hungarian army at Mohacs and captured the Hungarian capital Buda

[3]. Right after this victory, he had to return to İstanbul to deal with several uprisings in Anatolia. In 1527 Ferdinand of Austria took Buda. A crisis involving Hungarian throne brought Süleyman back to Hungary, recaptured Buda, and laid siege to Vienna, but was not successful. The conflict ended in 1533, an agreement was reached with Archduke Ferdinand and the Hungarian king Szapolyai; they would rule their respective territories as Ottoman tributaries [3].

The rest of his reign was occupied with alternating campaigns in the east against Safavids and in the west, against Austria and Hungary. Many conquests were made in the east, including Tabriz, Basra, Georgia, Tripoli, Nakhchivan and Erivan, and Ethiopia. However, most of Süleyman's campaigns were in the west. Some of the major conquests included the islands of Naxos, Andros, Paros, and Santorini, annexation of Hungary, conquest of Valpovo, and Siklos in Croatia. The Ottomans' siege of Malta and Corfu ended in failure (1565). An important development in the Ottomans' naval affairs was the assignment of Barbary corsair Khairaddin Barborossa (Hayrettin Barbaros) to the admiralty of the Ottoman Navy in 1533. Barbarossa not only conquered Tunisia and Algeria for the Ottomans, but also won a major victory at Preveza in 1538 against allied navies of Pope Paul III, Holy Roman Emperor and King of Spain Charles V, Ferdinand of Austria, and Venice under the command of Andrea Doria. The consequence of this victory was the conversion of the Mediterranean into an Ottoman lake [9].

Süleyman's last campaign was in 1566 against the city of Szigetvár, he died a day before the capture of the city. At the time of his death, the Ottoman Empire was at its zenith; its lands extended from Mediterranean coast of North Africa, including Algiers, Tunis, Tripoli, and Egypt, to the south east Iraq including Baghdad and Basra, Syria, Mecca, Medina, and Yemen, in the east to Iran, in the northeast Georgia, to the north and northwest Vassal states of Crimea, Moldova, Transylvania, and Wallachia, and finally in the west, to Hungary, Bulgaria, Serbia, Albania, Croatia, and Greece. The zenith was also the beginning of a long decline of the Ottoman Empire.

3. Military organization of the Ottoman Army

In the early years, the Ottoman army consisted of cavalry of tribal nomadic warriors, *Gazis*, and *azabs* (literally bachelors) were volunteer light infantry from Turkish villages. *Azabs* were supported by their communities. The effectiveness of these troops was limited, especially in siege warfare; hence, around 1325 Ottomans formed an army of *yayas* (foot soldiers) and *müsellems* (cavalry) all paid from the treasury and recruited from Turkish villages [10]. After the mid-15th century, they were assigned to support services such as road building and repair, transportation, fortress construction, and ship building [1].

As the Ottomans expanded their territories the need for a larger military force became clear. The result was the establishment of a standing army of *kapıkulu* (salaried palace troops) and *tumar* holding cavalry (See the sidebar

Timar System) around the 1370s. *Kapıkulu* consisted of prisoners of war and *devşirme* boys (Christian boys gathered through child levy system) (See sidebar *Devşirme*). *Kapıkulu* had two divisions: infantry, including Jannisaries, and cavalry, *Sipahs*. *Kapıkulu* soldiers were called slaves of the Porte, “however, they were neither ordinary slaves, nor freemen.” [11] It should also be pointed out that Ottoman sultans considered themselves as slaves of Allah [2].

3.1 *Kapıkulu* infantry

3.1.1 *Acemi Ocağı* (Hearth of novices).

According to the Ottoman law soldiers were entitled to own young Christian prisoners of war they captured as slaves. Another law required one out of five sturdy captives to be given to the Palace [10]. These youngsters were first circumcised and converted to İslam then placed in Turkish peasant families to learn Turkish and Muslim traditions and culture.

Another source for the *Acemi Ocağı* was the *devşirme* system (See the sidebar *Devşirme* System). Boys between ages of 8 and 18 collected from Christian villages also followed the same route as captives [2]. However, the smartest ones were directly sent to the various palace schools for education. Those who completed their internship in Anatolia or in the Balkans were transferred to *Acemi Ocağı* with a daily stipend of one *akçe* (Ottoman monetary unit). Again, those who exhibited high intelligence were, instead, sent to one of three palace schools for education. In *Acemi Ocağı* they received military training, they were also assigned to various jobs such as public construction projects, ship yards, and gardens of palaces [15]. When vacancies occurred in *kapıkulu* ranks they were filled from *Acemi Ocağı*. This institution was the supply source for *kapıkulu* soldiers and future military commanders and top bureaucrats.

3.1.2 *Yeniçeri Ocağı* (Janissary Hearth) (*Yeniçeri*: new soldier).

This unit was established in 1363 together with *Acemi Ocağı*. It was the first standing infantry army in Europe [16]. They were organized into *ortas* (corps). The number of *ortas* increased through time reaching 196 during the reign of Bayezid II and remained constant until their abolishment in 1826. The number of Janissaries also varied through the years; on average it was 10 thousand, but reached 16 thousand during the reign of Süleyman I [2]. They were paid two *akçes* a day every three months and bonuses; the salary of a Janissary increased with service. They also received clothing, and the food they purchased was subsidized by the state [10]. Originally, they were not allowed to marry, however, this rule was changed later. When they retired, they received a decent pension and families of the fallen soldiers were taken good care of by the state. Janissaries trained regularly; three days a week in the use of various weapons and accompanied the Sultan during campaigns. Their peacetime duties included firefighting and policing the city [1].

TIMAR OR DİRLİK SYSTEM

The main purpose of the *dirlik* system was to provide financial support to provincial cavalry and government officials in lieu of a salary. Although it was called the *timar* system, actually, there were three classes of *timar*: *has*, *zeamet*, and *timar*; these were parts of the *dirlik*. *Dirlik* and *timar* are sometimes used interchangeably. *Has* lands had annual income of hundred thousand *akçes* or more. The size depended on the status of the recipient. For example, *has* assigned to grand viziers had an income of 1.2 million [1]. Also, sultan, and his immediate family members (mother, wife, daughters, and sisters) would have *has* lands. Sultan’s *has* income went to the state treasury. Another group that received *has* was viziers and provincial governors. Lands with an annual income of between twenty and hundred thousand were called *zeamet* and assigned to high ranking commanders. Lands with annual income of between three thousand but less than hundred thousand were assigned to provincial cavalry according to their rank and bravery [1].

Provincial cavalry (*sipahi*) received *timar* land in return for military service. *Timar* holding did not mean ownership, only the right to collect taxes from peasants they were supposed to pay the state. A timariot would lose his holding if he failed to perform his duties or exhibited cowardice. Government officials would also lose their holdings if they lost their position.

The main obligation of a timariot was to join the army during campaigns and bring a prescribed number of *cebelis* (retainers) with their required weaponry, all financed by the timariot [5]. When a campaign was ordered, the cavalry gathered first under the local then the regional commander’s banner. The number of retainers was determined based on the income of the land; one fully armed horseman for each 3,000 *akçe* income [2]. The weaponry of the timariots consisted of a coat of mail, mail coif, bow, arrows, javelin, shield and a slightly curved sabre [5]. In peace time timariots had the duties of maintaining law and order in their neighborhoods. *Has* and *zeamet* holders were also required to maintain a cavalry force and send them to war commensurate with the income of the land holdings.

Timariots consisted of Muslim Turks and the Christians of Byzantine Slav origin. In 1430s 18 percent of all *timars* in Albania and 17 percent of all *timars* in Tirhala district of Greece were in the hands of Christian *sipahis*. For a Christian to be eligible to hold a *timar*, he must be of military origin, and he

3.1.3 *Cebeci Ocağı* (Hearth of Armorers).

This was one of the technical branches of Janissaries, it was also a very important part of the supply chain and logistics of the army. They were in charge of making, repairing, maintaining, storing weapons and transporting them to battle, including bows, arrows, rifles, gun powder, muskets as well as equipment for digging trenches. *Cebecis* were organized in 38 regiments and divided into four specialized units: weapon manufacturers, repairmen, gunpowder specialists, and combat equipment makers [10] with a roster of 500 in mid 16th century [1].

3.1.4 *Topçu Ocağı* (Hearth of Cannoners)

A second technical unit of the army was *Topçu Ocağı*. This branch of *kapıkulu* consisted of five specialized units:

1. *Topçular* (Gunners)
2. *Top dökümcüler* (cannon casters)
3. *Top arabacıları* (artillery wagoners)
4. *Humbaracılar* (bombardiers) in charge of making bombshells cast from iron or bronze.
5. *Lağımçılar* (miners or sappers) were tasked to dig tunnels leading to the walls of a fortress being sieged; they would place explosives to destroy fortress walls.

3.2 *Kapıkulu Sipah(i)* (Palace Cavalry)

Like the Janissaries, this military unit was the Sultan's personal salaried cavalry. It was more prestigious than Janissary troops. Their members were selected from among Janissaries who demonstrated exemplary service, graduates of the palace school *Enderun* (See sidebar *Enderun*), and from schools of other palaces, according to their talent, merit and age. *Sipahs* were organized into six regiments; their numbers varied around 8 thousand, but exceeded 11 thousand in Süleyman's last campaign [1]. They accompanied the sultan in campaigns and were responsible for protecting the sultan [10]. In peacetime *sipahs* were assigned to bureaucratic jobs. These units were called *sipah* to distinguish them from *sipahis*, provincial cavalry.

3.2.1 *Provincial Forces*

3.2.1.1 *Tımarlı Sipahi* (*Tımar* holding cavalry)

As explained in the sidebar, the *tımar* system included three types of land holdings: *tımar*, *zeamet*, and *has*. They were all assigned to soldiers and government officials in lieu of salary and they were all obligated to join the army in times of war with their retainers. They collected taxes from peasants as their income, taxes peasants normally paid to the state. Depending on the size of the land holding, they had to bring with them a certain number of fully armed, mounted, and trained *cebelus* (retainers) to the campaign; one retainer for every 3 thousand *akçe* income if the land was in Anatolia and 5 thousand if it was in Europe. These forces constituted the largest segment of the Ottoman army [5]. Their numbers varied through the years but no reliable sources exist about exact numbers; historian Murphey

must have proved himself loyal to the sultan; in conquered Christian states military class fief holders were given *tımars* and became *sipahis*. Some *tımar* holders were soldiers of slave origin from the Sultan's household [5]. During the reign of Süleyman I timariot cavalry numbered close to 100 thousand [12].

DEVŞİRME SYSTEM

After the terrible defeat at the battle of Ankara in 1402, Ottoman expansion and conquests stopped and with it the flow of prisoners of war. A law was enacted by Murad II (1421-1451) to institutionalize the process of *devşirme* (child levy). This process was applied every three, four, or seven years mostly in Balkan countries. When the Janissary commander made a request and the sultan approved it, officials would travel to preselected areas to collect youngsters between the ages of 8 and 18 [1]. According to the law, the process included some strict rules to be followed. According to these rules, only Christian boys were to be collected; the only exception was Bosnians who earlier converted to Islam. Jewish, Russian, or Gypsy boys were exempt, but Serbs, Bulgarians, Greeks, Albanians, and Croats were preferred [13]. Also exempt were families with only one boy. Only one boy per forty households could be collected. Families of these boys were exempt from some taxes. Girls were not subject to *devşirme*.

The law clearly defined the characteristics of the boys to be collected: from well known, respectable families and sons of priests, who were good looking, healthy, medium height, and with no physical problems. Boys who were extremely short or tall, orphans, artisans, circumcised, and those who spoke Turkish were not collected [13].

When collection officials arrived at a location, people were notified and asked boys of between 8 and 18 years old to come to a central location with their fathers and priests and bring their baptismal certificates. Officials then examined the documents and selected the boys that met the requirements and recorded very detailed relevant information in two separate ledgers, one of which was kept by the collection official and the other was given to the

estimated the total number of *tumar* holders and their *cebelus* as about 89,608 in 1527 [12]. Another historian, İnalçik had an estimate very close to this figure [2].

3.2.1.2 Auxiliary Forces

Auxiliary forces were probably the least understood, and largely ignored troops of the Ottoman army. Their numbers actually exceeded the standing corps but they remained in their shadow [10]. Ottoman army had significant help from some auxiliary forces in their campaigns. At the time of Süleyman I these auxiliary troops numbered 30,180 [17]. There was a wide variety of these forces; the most important ones are listed below.

(a) *Tatars*.

Tatars were a very effective combat group utilized by the Ottomans; they were Turkic-speaking peoples who converted to İslam in the 14th century. They were superb horsemen and archers. There were two groups of Tatars in the Ottoman service both light cavalry. The first group came to Anatolia with the Mongol invasion and settled in Eastern and Central Anatolia. Some of them later relocated to the Balkan lands [14]. The other group consisted of troops sent by the Crimean Khans to support the Ottoman army in campaigns. In their three hundred years of service, the Crimean Tatars contributed more to the Ottoman military than did any other of the ethnic group [18]. Their main service was in carrying out forward probing raids behind enemy lines. The main objective of these raids was to relieve pressure on Ottoman army while at the same time disrupting the enemy access to all potential sources of food and forage [12].

(b) *Akıncılar (Raiders)*.

These were the light cavalry consisting of only Turks operating on borderlands. They would march a couple of days ahead of the army for reconnaissance and establish the security of roads. They served the Ottoman state in exchange for the war booty [12]. Their numbers changed through the years; they numbered 50 thousand during the reign of Mehmed II and more than 50 thousand in Süleyman's time [1], [12].

(c) *Deliler (Crazies)*.

These were also light cavalry operating on borderlands consisting of mostly Turks but also converted Bosnians, Serbs, and Croats. They were known for their extraordinary bravery and fearlessness in attacking enemies.

(d) *Azabs (Bachelors)*.

They originally formed the first line of the Ottoman army on the battle field and therefore the first to come into contact with the enemy, later they were assigned to fortress duties.

(e) *Cerahors/Serahors* (irregular enlisted soldiers).

official who would be escorting the boys to İstanbul [2].

Upon their arrival, they were examined again, their identities were confirmed, circumcised, converted to İslam, and given Turkish names. Exceptionally bright and good looking lads were sent to various palace schools for education, the rest was sent to live and work in Turkish peasant families, learn Turkish and İslamic culture and customs. Those who were collected from Anatolia were sent to the Balkans and Balkan collections to Anatolia. When there were vacancies they were transferred to *Acemi Ocağı*.

Devşirme system started to break down towards the end of 16th century. One of the main reasons was admittance of the sons of *kapıkulu* soldiers, commanders and high level bureaucrats, and Muslims, usually through bribery, making *devşirmes* less important for filling the ranks of the *kapıkulu* [3]. Another reason could be a general resistance to foreigners' rising to very high levels of the government [14].

From the conquest of Constantinople to the end of Süleyman I's reign 34 of the grand viziers out of 38 were *devşirmes* (i.e. slaves). Some of them were appointed more than once [1].

Originally, *cerahors/serahors* were paid soldiers recruited from frontier Muslims and Christians in times of total mobilizations; every four or five households had to provide one soldier with weapons and provisions [10]. Later on they had become a support group, recruited only from Christian populations. They were in charge of opening and repairing roads, clearing forests, draining swamps, digging trenches, and transporting army's equipment [1].

4. Supply chain of the Ottoman Army

The Ottoman state had a very efficient and effective supply chain and logistics system for its army compared to its contemporaries in Europe and Asia. They also had most of the challenges today's supply chain and logistics systems face. The most important task of the Ottoman supply chain was the provisioning of the *kapıkulu* soldiers, horses of *sipahs*, and animals that carried the army's all sorts of supplies for a period of up to six months.

The logistics system faced the challenge of delivering what is needed, where it is needed, and when is needed. The supply chain also faced challenges such as determining the number of supply depots to set up and where to locate them (distribution centers, DCs, in modern world); how much food, weapons, gun powder, and equipment to store at these DC's and how and when to restock them (inventory

management); how many pack animals and their kinds, and carts will be needed, and how many had to be rented; when and where to use alternative delivery modes, such as over land, river, or sea (transportation planning). Finally, how to perform all these functions at the minimum possible cost.

One big difference between the Ottoman supply chain and logistics systems and the modern ones was that they did not operate in a free market economy; state frequently determined the prices at which merchants and peasants must sell foodstuff; also they levied special taxes to be paid in kind and/or in cash to support the army during a campaign.

4.1 Procedure for launching a campaign

Once the sultan decided to launch a campaign he would convene a war council consisting of grand vizier, *şeyhülislam* (top religious leader), viziers, commanders of *kapıkulu*, top level bureaucrats, scientists, and experienced military officers. After hearing witnesses and reports about the hostile activities of the potential enemy and opinions of the participants, the sultan would ask their decision. Inevitably, the council would decide for war. Finally, *şeyhülislam* was asked if the decision was consistent with the rules of *şeria* (the Islamic law), upon his approval war would be declared onto the enemy [21]. A critical issue considered during the deliberations was the shortage or abundance of wheat, rice, and barley in the Ottoman lands.

One of the most significant aspects of Ottoman campaigns was that the state bureaucratic organization was an integral part of the war effort; it would accompany the army to the battle front, including the top bureaucrats. This was necessitated because of the critical role the bureaucracy played in the supply and logistics of the Ottoman army [22]. “*The critical importance of the bureaucratic structure which intervened to meet supply demands even before they were yet sensed or even foreseen by forces in the field was critical to the success of the Ottoman military enterprise. Military administration and general bureaucratic skills form the most hidden (and therefore underrated) dimension of Ottoman military strength.*” [12].

4.2 Acquisition & flows of funds

The next step would be *defterdar*’s (head of the treasury) calculation of the amount of money and reserves required to be in the war chest. One of the main sources of campaign financing was the transfers from the Inner Treasury. These were not regular contributions and they were made at the sultan’s discretion. Major portion of these funds were used to purchase equipment and provisions for the *kapıkulu* [12].

In the Ottoman state population was divided into two main groups: the *askeri* (military and administrative class), they were tax exempt, and the *reaya*, consisting of peasants, merchants, tradesmen, and artisans who paid taxes [1]. The Ottoman state had various tax and revenue sources but the greatest amount of tax revenue, 48 percent of the total budget, came from the poll-tax Christian population paid;

ENDERUN

Enderun is a Persian word meaning “inside,” specifically, for the Ottomans “inner section of the sultan’s palace.” When Orhan Gazi (1324-1362), and his son Murad I (1362-1389) after him started to organize the military, they also started a palace organization. Bayezid I (1389-1402) and Mehmed I (1413-1421) further developed it to its splendor. The Ottoman palace, *Topkapı*, had three segments: *enderun*, *birun* (outside), and harem, living quarters of sultan and his family. *Enderun* is used also to refer to the palace school. The objective of *Enderun* was to educate and train sultan’s slaves for the highest bureaucratic and military ranks with absolute loyalty to the sultan; in that sense, it could be considered as part of the supply source for manpower of the Ottoman military and bureaucracy. *Enderun* was one of a kind, there was not any institution like it anywhere in the world at the time.

As mentioned in the paper and side bar *Devşirme* System, young Christian boys captured in wars and collected from Christian families would go through internships. Internships were for working in agriculture and learning Turkish and Muslim traditions and culture in Turkish peasant families for at least three, at most eight years. After this internship, they would go to *acemi ocağı* where they were assigned to various work projects, they received a stipend. Then, they would go through another evaluation and selection. While bright ones are sent to one of the palace schools or *Topkapı* Palace, the rest were enrolled in Janissary corps [2].

There were three secondary palaces of the sultan where *acemis* received further education; these were prep schools before *Enderun*. Curriculum in these schools included Turkish and Moslem culture as well as sports for physical and mental development of the students. After the completion of their education and depending on need, they would go through another evaluation and testing; intelligent and skilled ones were sent to *Enderun* as palace pages, others were placed in *kapıkulu sipah* corps [19].

Education in *Enderun* progressed in stages. There were six *odas* (rooms) in increasing order of rank and prestige. Pages’ stipends also depended on this rank and all of their needs were

European lands provided 81 percent of all poll-tax revenues in the later part of the 15th century [23]. Another major revenue source was the tributes paid by the Christian vassal states.

However, the treasury would not be able to cover the total cost of war, therefore, additional sources of revenue were needed. For this, the government would levy *avariz*, an extraordinary temporary tax to supplement the war budget in obtaining food for men and animals [21]. *Kapıkulu* soldiers would buy foodstuffs they needed from the army with their salaries; however, prices charged to soldiers were significantly below the purchase cost. Consequently, the difference was paid from the state treasury, and the proceeds would be used to purchase replenishments [24].

The largest portion of the war expenditures was the salaries, bonuses, and rewards paid to *kapıkulu* soldiers and frontier fortress guards. The rest of the war budget was spent for buying food for men, barley and hay for animals, weaponry and equipment [24]. At the end of a campaign surplus provisions, if any, would be sold to the populace at the same fixed prices they were purchased [12].

4.3 Supply of Manpower

As explained above and in side bars *Devşirme* System, *Timar* system, and *Enderun*, these institutions were the three main sources of bureaucrats, commanders, viziers, grand viziers, grand admirals, *kapıkulu* soldiers, and provincial cavalry for the Ottoman army.

4.4 Information Flows

Tatars and *akıncıs* acted as the reconnaissance units of the army. They would ride to the enemy territory one or two days ahead of the main forces to continuously collect and supply vital information to the army command, such as identifying vulnerable targets for attack. When they captured enemy soldiers they interrogated them for information. With this information commanders could make better decisions as to the optimal mix of cannons and other siege equipment to deploy. For effective reconnaissance they had to move very fast, and to accomplish this, Tatars would have several horses in tow [12].

Another component of the information system was the *menzilhane* network, which was also part of the supply chain and logistics system. There were two types of *menzilhanes*: one for official communication and one for storing foodstuff and supplies; storage *menzilhanes* will be discussed in the logistics section.

The Ottoman Empire extended to three continents and covered 335,000 square miles by the death of Mehmed II in 1481 and increased to 978,000 square miles by the end of Süleyman I's reign. [25]. Communicating with the far reaches of the empire effectively and efficiently was a crucial challenge for the Ottomans, especially during a campaign. Communication *menzilhanes* were established for meeting this challenge. They were exclusively for official state communications between the center of the government and provincial governors, *kadıs* (judge and

met by the sultan. In addition to receiving education, they all performed various services to the palace and the sultan. Pages started their education in the first two *odas*, which were of equal rank. Upon completing their education in these *odas*, they were evaluated again; those who excelled in performance were transferred to one of the next three *odas*, the rest were placed in *sipah* corps [1].

The curriculum in consisted of five areas:

1. Islamic knowledge: Qur'an, lessons on religion, Arabic, Islamic law, history of prophets.
2. Humanities: Turkish language and literature, Persian language and literature, poetry, arithmetic, geometry, algebra.
3. Fine Arts: Music with instruments, ornamentation, calligraphy, military and civil music.
4. Physical training, sports, and military skills: Horsemanship, use of combat weapons such as swords, maces, spears and arrows and sports activities such as wrestling, weight lifting.
5. Vocational training: Maintenance and preparation of clothing, craftsmanship, leather works, construction, ornamentation, jewelry, preparation of various medicines and ointments and strength pastes.

Those who had special interests could get additional education in those areas. One of the principles of *Enderun* was strict discipline and order. Not every student could finish the entire curriculum and they would be assigned to *sipah* corps. Promotions were strictly based on knowledge, skills, and performance, no one received special treatment. Students' lives were strictly programmed; they would get up in the morning about two hours before the sunrise, bathe, perform morning prayers, have breakfast, then attend classes and performance of various duties, lunch, dinner, evening prayers, and sleep. They lived as bachelors, did not have any outside contact, and lived in the palace until they were twenty-five or thirty [2].

It is interesting to note that, female slaves of the sultan, there were 400 of them in 1475, went through a long period of education and training similar to what pages received in *Enderun*, plus sewing, embroidery, dancing, singing, playing musical instruments, puppetry or story-telling according to their capabilities. Most of the Palace girls went as wives to the palace pages when they left the Palace for outside appointments [2].

administrator) in towns and frontiers. In the early days of the Ottoman state there was the *ulak* system; *ulaks* were Tatar couriers delivering important documents to regional governors, *kadıs* and all levels of government offices. In addition to the documents they carried, they were given a sultanic or vizirial courier order authorizing him to change their horses wherever and however they could.

However, in time *ulaks* started abusing their authority; they were inflicting a great deal of suffering on the *reaya*. Consequently, the system was abolished. [26], [27]. Instead, *menzilhanes* were established along the three major routes both in the East and the West. Distances between *menzilhanes* were not equal, they depended on geographic and terrain conditions, however on average they were 35-40 kilometers [28]. Couriers would change horses and if necessary, stay the night, and eat free of charge at a *menzilhane*. Town or towns in the vicinity of a *menzilhane* were responsible to acquire, care and maintain sufficient number of horses; *kadıs* supervised them. *Menzilhanes* operated year around and 24 hours a day. Number of horses at these locations and the number of *menzilhanes* were increased temporarily during campaigns [27].

4.5 Acquisition & supply of foodstuffs

Although it was called an extraordinary tax, there were three types of taxes under *avarız*; *nüzul*, *sürsat*, and *ıstıra*. All three were levied for the food supply of the army. *Nüzul* could be considered as a direct contribution to the treasury. It was certain amounts of foodstuffs, mostly flour and barley, households were required to give to the government; the other two were purchases. *Sürsat* required people along the campaign route to bring and sell to the army all sorts of foodstuffs at fixed prices at predetermined halting places. *İstıra* was the law for the army to purchase a variety of foodstuffs at locally fixed market prices [24], [29].

All the food acquired through this system was brought to storage *menzilhanes*. It is clear that the Ottomans acquired food items in an orderly and organized way. One of the main concerns was the fair treatment of the *reaya*; so much so that foraging or taking anything without paying was prohibited, violators faced with a possible death penalty [29].

When a decision was made to launch a campaign, orders were issued to *kadıs* of the towns along the route of the march to supervise the collection of the quantities required by *avarız* and deliver to storage *menzilhanes* [30]. Similarly, foods for animals, such as barley and hay would be brought to *menzilhanes* and stored. Months before the onset of a major campaign large stocks of provisions were also made at strategic fortresses close to the battle field [17]. It should be noted that the army's supply of food for men was only for the salaried *kapıkulu* troops; the total number of soldiers to be fed and supplied daily was about 19 to 24 thousand. Provincial soldiers, timariot cavalry, were responsible for their own provisions; they had their own kitchens for feeding their soldiers [5]. Food supply for animals was also only for those owned by the army;

Like some other institutions of the Ottoman Empire, *Enderun* system degenerated through time and finally was closed in 1909. It can be safely said that *Enderun* achieved its objective of educating and training slaves of the sultan for high level bureaucratic and military assignments.

Tayyar-Zade Ata, an Ottoman historian and poet, a graduate himself, lists in his five volume of the history of *Enderun*, 60 grand viziers, 3 *şeyhülislams* and 23 grand admirals of the Ottoman Navy, who were the graduates of *Enderun*. There were also 19 grand viziers and 13 grand admirals who were educated and trained in other parts of Topkapı [20]. To understand the significance of these numbers we have to understand the power of a grand vizier. Mehmed the Conqueror described the grand vizier as follows:

“Know that the grand vizier is, above all, the head of the viziers and commanders. He is greater than all men; he is in all matters the sultan's absolute deputy. In all meetings and in all ceremonies the grand vizier takes his place before all others.” [2].

It is clear that, for hundreds of years, the Ottoman Empire was run by former Christian slaves and graduates of *Enderun*; they were so powerful that a few of them even deposed the reigning sultan.

timariot cavalry, and owners of rented animals were responsible for feeding and care of their animals.

The Ottoman Empire was known for its meticulous planning for acquisition of food for its soldiers and army animals. When a war was imminent, all exports of grains were prohibited. The Ottomans knew troop morale and discipline was directly influenced by the degree their nutritional and dietary needs were met [12]. Main food items were bread, flour, hardtacks, bulgur, rice, mutton, beef, and chicken. Each *kapıkulu* soldier was entitled to two loaves of bread (1.3 lbs. each) per day. Rice was the basic food because of its durability [17]. On a campaign march, army was accompanied with sheep and cattle purchased

along the campaign route [12]; about 750 sheep were slaughtered daily to supplement the diet of *kapıkulu* soldiers [31]. Sheep-breeders/drovers (*celeps*) were responsible for supplying the soldiers with meat, mainly mutton, acquired from the Balkans, Moldavia and Wallachia and sometimes from the nomads of Anatolia [30]. In addition, other food items such as honey, butter, corn, yogurt, and chicken could be purchased at halting points from *orducu esnafı* (craftsmen and tradesmen).

When the sultan was the commander in chief in a campaign a broad variety of palace staff, such as doctors, surgeons, clerks, and artisans would join the campaign to serve his needs and the needs of *kapıkulu* soldiers. *Orduca esnafı* was a different support group serving all soldiers. This group consisted of artisans, craftsmen, merchants, and tradesmen to sell a whole variety of items, services, and food to soldiers. When a decision was made to launch a campaign, orders would be issued to *kadıs* of cities and towns on the march route as well as to *kadıs* of major cities, including İstanbul, Bursa, and Edirne to organize *orducus* of prescribed trades; the order would include the number and specialty of master artisans and tradesmen needed and the number of tents (i.e. stores, stands) they should set up. For example, 154 master artisans belonging to 23 İstanbul guilds joined Süleyman the Magnificent's Austria campaign in 1532 [33].

Kadıs would work with representatives of guilds to select the members to be included in the *orducu* group. Each guild would decide who would be joining the campaign and how much money they should have for buying the materials they would be using or selling. The necessary capital would be contributed by the guild members and members of related guilds who were not joining the campaign. The result of these preparations was the setup of a market at each halting point that met practically any and every need of a contemporary soldier. In a way *orducus* can be considered as a form of outsourcing the provisioning of the army.

4.6 Supply of weapons, gunpowder, raw materials, and equipment

As mentioned earlier, *Cebeci Ocağı* was in charge of making, repairing, maintaining, and storing weapons, including bows, arrows, rifles, gun powder, muskets as well as equipment for digging trenches. In peacetime, these were normally kept in storage at the barracks of the *kapıkulu*. During a campaign they would be carried to the battle ground using camels, mules, and wagons [1]. Weapons and equipment were distributed to the Janissaries only at the battle field and were collected after the battle was over.

Casting of cannons, cannon balls, bombshells, and explosives for destroying fortress walls was the responsibility of *Topçu Ocağı* [1]. Within their territories, the Ottomans had ample sources of raw materials to manufacture cannons and cannonballs (copper, iron, and lead), and gunpowder (saltpeter, sulfur, charcoal, and fuel wood); the only metal they had to import was tin, which was imported from England [16]. Copper, iron, and lead were the most strategically significant raw materials. Most of the cannons of the army were cast of bronze, whose main raw material was copper. For small-caliber cannons, however, iron was the main ingredient. Iron was also needed for cannon balls, picks and axes used in digging trenches [34].

The Ottoman state had rich copper and iron deposits in its Balkan and Anatolian provinces. The Ottoman state had designed an elaborate supply chain by assigning the extraction and manufacture of specific materials to these

provinces. Also, in times of need, it procured the necessary materials from civilian manufacturers and craftsmen [10].

The Ottomans had a well-designed supply network for gunpowder production and cannon casting facilities. Gunpowder was supplied by İstanbul gunpowder works and sixteen others in Anatolia, Arab provinces, and the Balkans [34]. The main cannon casting facility also was in İstanbul, however, just like gunpowder works, they had seventeen cannon foundries in their territories. The scattered nature of these facilities created an advantage to the Ottomans; it greatly facilitated the fast deployment of military hardware in both the European theater and Anatolia and beyond [34]. These facilities were able to meet the needs of the army for hundreds of years. Ottomans also had the capability to cast cannons of intermediate size at the battlefield or nearby regional ateliers [12], [21]; this was their way of postponement of the production of weaponry.

The Ottomans had developed a wide variety of cannons, one of these was the first of its kind: mortars with parabolic trajectories. Historians agree that it was first used in the conquest of Constantinople to sink enemy ships in the Golden Horn [5], [21]. Some historians credit Mehmed II for the invention of the mortar.

5. Logistics of the Ottoman Army

5.1 Transportation

Feeding thousands of soldiers and a variety of animals was one of the most critical tasks of the supply system of the Ottoman army. However, a much more critical task was delivering, not only food for soldiers and animals, but also all the weaponry and war related equipment such as gunpowder, siege equipment, cannons, and cannon balls, etc. The following quote gives an idea about the size of the army in a typical campaign that the supply and logistics systems of the army had to serve:

"The campaign of Mehmed II against Uzun Hasan in 1473 mobilised 100,000 men-at-arms, a body of men which included 64,000 timariot sipahis, 12,000 Janissaries, 7,500 cavalry of the Porte, and 20,000 azabs. The central imperial budget dated 1528 numbered some 120,000-150,000 members of the regular units, including 38,000 provincial timar-holders, 20,000-60,000 men-at arms brought to the campaigns by the timar-holders, and 47,000 mercenaries (including 24,000 members of the salaried troops of the Porte and 23,000 fortress guards, martalos and navy). These figures do not include the various auxiliary troops." [12].

Transportation of provisions, acquired through *avarız*, to *menzilhanes* and fortresses was the responsibility of the *reaya*. Transport of almost everything, such as additional food for men and animals, weapons, cannons, tents, siege equipment, etc. was mainly done by camels. Horses, mules, and carts pulled by oxen were also used but on a limited scale. There were several reasons for preferring camels. First of all, a camel can carry about 540 lbs. (250 kg.) while

a horse's capacity is about 300 lbs. (136 kg.). Second, care and feeding of camels was less expensive. Third, each cart needed one driver, while a camel driver could manage six camels on the road. Finally, camels were able to traverse difficult terrain better than wagons. Without the camel, transportation costs would have been astronomical.

The Ottomans preferred to rent most of the camels they needed rather than owning them, because the cost of feeding and care, including the cost of their drivers, year around was much more than renting them for the duration of a campaign [10]. Each ten Janissaries were given a horse to carry their personal belongings [24].

The Ottoman palace maintained a sufficient number of camels for transporting the sultan's baggage. However, the army had to hire tens of thousands of camels and nomadic drivers for a campaign [17]. The following quote provides an idea about the number of camels needed for carrying animal food:

"If we assume a daily minimum of 500 camel loads of grain to represent the average consumption of the mounts of that part of the army entitled to a supply from central stores, the carrying of provisions sufficient to last two to three months in the field implied the transport services of no fewer than 30,000 – perhaps as many as 50,000 – camels just to transport barley rations. (...) The troops' own daily dietary requirements (...) required 105 camel loads for a force of 20,000 Janissary and Sipahi actives." [12].

Sea and river transportation was less expensive and was used whenever possible; Tigris and Euphrates rivers in the East and Danube and its tributaries in the West were used for transport [35]. *"In the European theatre the Ottomans were favored by geography, since it was possible to make grain deliveries via the Danube waterway to within a few days' march of any prospective front."* [12].

5.1.1 Roads and bridges

Ottomans' road system was partly inherited from Romans and Byzantines in the Balkans [15] and from Seljukids in Anatolia [12]. Months before the start of a campaign orders would go out to *yayas*, *müsellems*, and *derbencis* in villages and towns on the march route to repair and maintain roads, bridges, and fortresses [10]. *Derbencis* were farmers recruited for the tasks mentioned as well as the security of passages and *menzilhanes*; they were exempt from various taxes [21]. *Cerahors* were also tasked for opening and repairing roads, clearing forests, draining swamps, digging trenches, and transporting army's equipment as well as performing various engineering works [1]. Other groups that helped with emergency road repair and guarding convoys and baggage trains were *Yörüks* (nomad Turks), *Eflaks*, *Voynuks*, *Martoloses* (Orthodox Christian militia) [10].

Ottomans constructed permanent bridges on some of the main as well as secondary roads mostly for civilian use,

however, only few of them were on march routes. Army often had to cross major and minor rivers on the march both in European (Danube and its many tributaries) and Asian lands (Euphrates and Tigris). River crossings were both difficult and risky. Ottoman army built pontoon bridges wide enough for three carts to pass for fast river crossings. These bridges would be disassembled and carried to the next river crossing [12]. For bridge construction the army needed about 500 architects and water engineers supported by about 250 infantrymen with tools [36].

5.1.2 Cannons

Ottoman army preferred transporting midsize and small cannons to battle field rather than very large ones. This was due to the difficulty of carrying them and the fact that they reduced the maneuverability and flexibility of army's movements. They were transported to battle field only when there was a definite need for them.

Transportation of large cannons was the duty of *top arabacıları* [12]. They were also tasked to make the wagons and repair them. Another way cannons were made available at the front was to cast them when they were needed. Also, it should be recalled that the Ottomans had cannon casting facilities and gunpowder works in both the Balkans and eastern Anatolia. Their existence reduced the distance and time for transporting them to the front. Transporting heavy cannons and armaments was a challenge, therefore sometimes they were left at convenient storage places behind the front. This allowed the army a greater flexibility to advance quickly and engage the enemy when there was an opportunity [12].

6. Marching and Halting

The Ottomans started their march at the beginning of the growing season of crops and especially grass. Ottomans' road system had three main routes in Europe and three in the East: Right, center, and left. All routes started in İstanbul for western campaigns and Üsküdar (on the Anatolian side), İstanbul for eastern campaigns. European right ended in Crimea; the center route in Belgrade, and the left in Adriatic and Morea. Eastern right ended in Mecca, the center in Baghdad and Basra, the left ended in Tabriz.

Halting points were selected before the start of a campaign. The most important criterion for the selection was the availability of drinkable water. Also, *menzilhanes* or places close to them were preferred. Murphey estimated the pace of army march as 13.5 miles (22 km) per day; baggage trains' pace behind the army, however, was estimated at 2 mph [12]. Marching during a campaign started very early before the sunrise and ended before the heat of the day took a toll on soldiers and animals; under normal conditions they would march about four and a half hours per day [12].

Support troops would march ahead and pitch tents at the halting place for the sultan, commanders, and *kapıkulu* soldiers before their arrival. When the army took a break from the march, tents of various sizes would be pitched for sleeping, state treasury, bathing, latrine, praying, pantry,

kitchen, bakery, laundry, armaments, hospital, and executions [21]. The Ottomans paid great deal of attention to hygiene and cleanliness of its soldiers and camp sites. Ogier Ghiselin de Busbecq, ambassador of Habsburg Emperor Ferdinand I to the Ottoman Empire during the reign of Süleyman I, made the following observation at an army camp:

“Moreover, there was the utmost cleanliness, no dungheaps or rubbish, nothing to offend the eyes or nose, everything of this kind being either buried by the Turks or else removed from sight. The men themselves dig a pit in the ground with their mattocks and burry all the excrement, and so keep the whole camp scrupulously clean. Moreover, you never see any drinking or revelry or any kind of gambling, which is such a serious vice amongst our soldiers, and so the Turks know nothing of the losses caused by cards and dice.” [37].

All tents would be placed according to a well-designed pattern with the sultan’s tent in the center surrounded by the tents of grand vizier and commanders. Of course, all *orducus*, those who came with the army and *orducus* of the neighboring towns of the halting place, would have their tents and stalls set up in a separate area before the army’s arrival. Camp place would look like a market of a large city ready to meet almost any need of the soldiers. The types of artisans and tradesmen in *orducus* is just too long a list to give here. The following is a small fraction of them, a few of the expected and not so much expected ones: barbers, grocers, greengrocers, coffee makers, bakers, candle makers, butchers, spice sellers, fragrance sellers, fabric sellers, tailors, boot makers, shoemakers, saddlers, blacksmiths, and flea marketers.

One of the basic and favorite foods of the soldiers was bread; the importance of freshly baked bread for the soldiers cannot be overestimated. The Ottomans made sure that the soldiers would get freshly baked bread at halting places. This was accomplished by support troops marching ahead of the army and setting up mobile bakeries. However, army’s bakeries would not normally have the capacity to bake enough bread for all *kapıkulu* soldiers; the rest would be supplied by *orducu* bakers and from bakeries of nearby towns [33]. All soldiers could buy bread from *orducu* bakers. Also, cooks and butchers would be ready to prepare meals.

In addition to these, the army had its special support service groups, such as, doctors, surgeons, executioners, grave diggers, *lağımçılar* (miners, sappers), and sewer crews. *Lağımçılar* were indispensable at sieges, they would dig tunnels leading to the underbelly of fortress walls, place explosives and ignite them to destroy walls. They were also very skillful in building trenches. Another indispensable support troop was *sakalar* (water carriers); they distributed drinkable water to troops during march or at the battle ground. *Sakalar* also distributed water for bathing and laundry at halting points. They would fill their leather pouches from clean water sources, load them on their horses and walk around the troops and dispense water [21].

6.1 Mehteran (Mehter troops)

A discussion of the supply chain and logistics system of the Ottoman Army would be incomplete without mentioning the *mehteran* or *mehter bölüğü*, Ottoman military marching band, also known as Janissary band in the West because it consisted mostly of Janissaries. It is known as the oldest military band in the world, and it still exists, performing at ceremonies and special occasions. It was established very early during the reign of Osman Gazi. It can be considered as a moral support group to the army; they played martial music in battles, marches as well as in ceremonies. Their music was loud and exciting to get the adrenaline going, giving soldiers courage and strength of will, at the same time creating fear in enemy soldiers.

8. Conclusions

Whether in defense of one’s country [38] or for conquest, the successful completion of a military campaign depends to a large extent how well it is planned, how well troops are trained, provisioned, and given the right weapons and tools. [39]. What is true today was also true during the time of this study. Historical events and records indicate that the Ottomans excelled in all of these; they had very efficient and effective supply and logistics systems. It didn’t mean they were successful in every campaign, but they were successful enough to conquer lands in three continents and became the most powerful empire during the time of this study.

An excellent example of how a superb supply and logistics system works with primitive technology was the conquest of Constantinople (İstanbul) in 1453. There had been numerous attempts to capture the city before, several times by the Ottomans, none was successful. The major reason was probably the almost indestructible and impenetrable fortifications of the city as well as the ineffectiveness of existing artillery technology. Preparations lasted more than two years, including building a fort on the European side of the Bosphorus across from the one on the Asian side to control navigation through the strait, and development and casting of a giant cannon with the aid of Hungarian engineer Orban. However, probably the most amazing supply and logistics achievement was moving about 70 ships over land and over a hill directly into the Golden Horn bypassing the chain barrier installed at the entrance. This was done in a very short time, by opening a passage through the forest, constructing a road of three miles, and dragging ships over logs oiled with animal fat and olive oil. Some sources mention that even sails of the ships were used to help the move [1]. It was a critical move in the siege of the city because the Byzantine fortifications on the Golden Horn side were the weakest, it also prevented any aid ships entering the inlet.

Most historians agree that in addition to well-trained soldiers, the supply chain and logistics systems of the army were the greatest factors in the success of the Ottomans in many campaigns. They also had most of the challenges of modern ones; so the question is “Can the modern supply chain and logistics systems and their managers learn anything from the Ottomans?” I believe the answer is “yes,”

it confirms that basic principles today's excellent supply chains and logistics systems and their managers are using were the same in the Ottoman army. That is, advance planning, preparing for disruptions, clear communication, information sharing, hiring well educated and trained managers and members for the team, assigning them clear responsibilities, and rewarding good performance. Also, the Ottoman experience shows that great achievements are possible even with the use of primitive communication, supply, and transport technologies. So, it is possible to build and operate an effective and efficient supply chain and logistics systems even under adverse conditions; specifically, the failures of many modern supply and logistics systems in the time of Corona virus scourge of 2019-2020 has shown that these systems still need a lot of improvements, preparedness, and resilience for unknown unknowns [41].

To the best of this author's knowledge, there is very little research on the supply and logistics systems of armies and navies of other countries during the middle ages. What is presented in this paper may serve as an encouragement for others to study them. It also serves as a case for comparison for future works on other military supply and logistics systems.

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