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GEOGRAPHIC LOCATION AND HISTORICAL PRECURSORS OF THE DEVELOPMENT OF LOGISTICS IN EUROPE

Abstract. *The article estimates the interconnection and impact of issues, related to the development of logistics, as industry. Namely, overview builds up interrelation among North Sea waterway connections, trade, commercial alliances, military ambitions. Paper discovers how labor diversification, technological progress formed the initial function of transshipments within the Europe. A treatise considers little Ice Age, juridical aspects of trade and the epidemic in the medieval commodities transshipment, in the timescale from Roman Empire (27 BC) to the World War 2 (1945 year).*

Keywords: *transport, logistics, development of logistics, medieval transportation*

Research questions

How waterway connections to the sea enhance transportations in the medieval world?

How plague reformed world trade centers?

How trade alliances and military campaigns facilitated innovations in logistic infrastructure?

Methodology

In order to perform analysis of the factors, following methods have been implemented: comparative historical research, world systems analysis.

Concepts:

1. Military campaigns forced society to develop better transport infrastructure and strategy, namely road, vehicles and routes
2. Sea access influenced formation of first trade centers.
3. Epidemy of plague restructured commercial points and trade routes in Europe.

Sea productivity dominance, that influenced dominance in trade, that led to financial dominance and re-investment of funds back into the transport of trade capitals.



Figure 1. Chain development of logistics from world-systems perspective

INTRODUCTION

Since Roman Empire logistics was a key tool for supplying military provision to invade new territories. This function gradually has been transformed into competitive market advantage for a trade, once formation of independent trade centers began. Before the industrial revolution, invention of railway and rise of automotive industry first trade cities were always allocated near the sea or rivers, that facilitated transportation of heavy cargo for long distance

commerce. After the revolution, railways were established across the mining and manufacturing centers far from the water. Therefore, usage of geographic position was decisive for trade, welfare and logistics facilities of country. Along with the benefits, due to poor supplies regularly occurred, as plague, cholera and smallpox, that affected medieval Europe. Is it possible to say, that certain events in history determined further development of transportation industry? This question is to be answered.

PART 1: MILITARY CAMPAIGNS FORCED SOCIETY TO DEVELOP BETTER TRANSPORT INFRASTRUCTURE AND STRATEGY, NAMELY ROAD, VEHICLES AND ROUTES

Ancient campaigns. At Indian Campaign of Alexander the Great.

Innovation	Role
Mobile constructions.	Army used specially-constructed pontoon bridges and ships, that could be easily disassembled after crossing rivers or sea gulfs, transferred to the new location or reused for the defense purposes
Warehouses	Formation of new cities and mints along the roads Alexander's troops for keeping treasury and troops' movement without slowing down.
Route planning	Alexander's marches moved along food sources, sometimes they had to avoid wide territories to keep close to fertile lands.

Medieval times

Innovation	Role
Outsourcing	An outcome of policy to force knights to provide themselves with provision was a decision to lead a war at the enemy's cost, hence, to demolish and to devastate cities, looting food storages. In 17 th century, owing to French military reforms arrays were provided with daily meals by cost of state and during campaigns troops were granted special supply convoy. That preceded to establishment of shops across the France to sell products directly to knights.

American Revolutionary War (1793–1794)

Innovation	Role
Transatlantic shipments, shipbuilding industry	As Americans prevented procurement at the mainland, British learned how to wage war and deliver provision through Atlantic ocean.

Napoleonic wars (1807–1812)

Innovation	Role
Military “train”	Trains regiments with cattle, that focused on rapid shipment of goods. Napoleon preferred to keep all provision outside of the state, so that it was easier to attack opponents in a flash

American Civil War (1861–1865)

Innovation	Role
Military railway	This war first time to use railway for military purposes, branched network of rails was built for transport of personnel and weaponry.

WW1 and WW2

Innovation	Role
Military aviations	These wars catalyzed emergence of aviation from zeppelins to jet-fighters, maritime cargo, production infrastructure and runways and paved roads for them.

PART 2: SEA ACCESS INFLUENCED FORMATION OF FIRST TRADE CENTERS

Amber Road (since 1300 BC)

Amber Road is an ancient trade route, that was initiated for amber trade from Baltic to the Mediterranean states and it is important route for both Southern and Northern Europe, as the network was connected with 3 seas: North, Mediterranean, Baltic. Besides the direct connection between Baltic coast and modern Italy and Spain. Amber from Baltic coast was also transported to the Silk Road, once it reached Black sea. Each country on the Amber Road’s path has developed internal infrastructure, namely Germany got high number of small cities and trade points along the river sleeves, especially concentrated near Hamburg and Lubeck, that lead to Brenner Pass, proceeding southwards to Brindisi, modern Italy and Ambracia, that is a territory of Greece. Amber became a subject of commerce since 3000 BC, and Amber Road remained the only long-distance trade route, till the Roman Empire.

At the times of Roman Empire and emperor Tiberius Caesar Augustus paved roads according to the highest urban standards and for a century it was an engine for civilization until the Danube and Dniro rivers attained popularity and majority of investments have been done there, that eclipsed the Amber Road’s success.

Western Roman Empire (395–480 AD)

Germany shares its history with Roman Empire, that had great road and maritime connections between its parts. Three modern German cities were originated under auspice of Roman Empire, such as Ara Agrippinensium=Cologne, Augusta Treverorum=Trier, Mogontiacum=Mainz. The imperial routes were divided into 4 categories: road, coastal sea, river and open sea tracks. Anticipated fastest time of travel via Roman routes from Cologne to Roma in summer or winter is 35-36 days, but the cheapest track takes 56 days. According to the Stanford Geospatial Model cost of transportation in denarii per kg of wheat by donkey: 40 (\$144.8), by wagon:

50 (\$181), per passenger in a carriage: 1931 (\$6990), if we take 0,99 pure silver, when 1 denarius = US\$3.62.

Holy Roman Empire (800–1806)

1. Germanic wars. They took place throughout centuries and resulted into secession of Holy Roman Empire. The subjects of Empire's trade were jewelry, coal, sweets, wine and fruits. This is notable that Holy German Empire used camels for a trade nearby the Black sea and along the Silk Road. Unfortunately, it was impossible to reach further countries via Silk Road, for instance northern Africa or Trans-Saharan area to get salt, ivory, and gold from there, so Romans had to invent new ways for merchandising, as usage of Overland Silk Road, when in the northern Iran, the Silk path connects with roads to Caspian Sea and the Persian Gulf ports to proceeded to modern Syrian land.
2. Crusades. The medieval's military ambitions and regular crusades let warriors face the problem of forage not only for themselves but for horses. The practice "supply-yourself-on-your-own" put warriors more and more into traps, forced them to hold negotiations about barter exchange of resources with local citizens and to face a threat of poisoning in hostile states. Management of army resources reached improvement of this issue once the rule "5-10 miles per day" has been adopted. That meant army will move forward not more than 5-10 miles a day through the terra firma, meanwhile special troops will divide the surrounding territories into stripes and harvest as much grass and forage for animals as they can in order to return to the troop in the shortest time.

3. Hundred Years' War. Holy German Empire was involved into Hundred Years' War between 1337 and 1453 and Great Northern War from 1700 to 1721. In the first battle it served as intermediary for French army supplies in the Northern sea coast. In case of Great Northern War Army of the Holy Roman Empire learned how to organize provision in the low temperature, also, it can be considered as military outsourcing, as Army of Holy Roman Empire was not a regular entity, but was mobilized and equipped only at the times of threats.

Hanseatic league

The merchant position of Germany rocketed once the Hanseatic league was established. Newly-made connections with Baltics and Scandinavia opened door for a trade to Kievan Rus. One of the common characteristics of cities-members of league is independence and legal autonomy, so each of them has own rules for export and import and often specialize on certain industry. Lubeck and Danzig had a strong focal field-ship building, that allowed Hansa union to control shipbuilding market and compete with Dutch. To improve own position in the rivalry Hansa limited all possible leakage of ship building technologies outside of union, but even with such efforts a cost of cargo transportation with Dutch facilities was lower. The Hanseatic Kontore had their own treasury, court and seal, like the guilds, the Kontore were led by „eldermen“. In 1347, the Kontor of Brussels modified its statute to ensure an equal representation of the league's members. To that end, member communities from different regions were pooled into three circles. The merchants from their respective Drittel would then each choose two eldermen and six members

of the Council to administer the Kontor for a set period of time. After unification of Duchy of Burgundy and rise of Swedish Empire Amsterdam overtook key position of Hanseatic union for export of Polish and Baltic grain, lost control over Baltic sea and internal struggles after Protestant Reformation demolished alliance and officially only Lubeck, Hamburg and Bremen remained Hanseatic and call themselves as such till now.

PART 3: HOW PLAGUE REFORMED WORLD TRADE CENTERS?

Chinese merchant cities at the 1300 years already have been infected and active trade with China via both Silk Road and maritime connections brought Black Plague to Italian sea ports together with rats. The epidemy reached Germany in 1349. The spread of the bubonic plague and the collapse of the Mongol Empire made Overland Silk Road, mentioned in the Part 2 more dangerous than before, therefore, trade flows from Western Europe gone from Asia to Africa due to high risk of infecting, as outcome of the epidemy, Cairo became a commercial center for mariners from Italy.

Not only trade is the reason of plague in European continent. Because of different weather conditions, welfare of territory, intensity of import-export operations and many other factors speed of spread of plague varied. Second wave of epidemy in Europe lasted long enough, from 1345 till 1840. Northern War, that covered Scandinavian region and Prussia, was a catalyzer for a new splash of diseases. Especially tragic this time was for Bremen and Hamburg, where war refugees were allocated and already existed epidemy of a smallpox, the plague was brought by Danish ships. The

first victims of that happenings were not single refugees, but armed forces, in this condition malady was a “brake factor” for further invasion of military arrays. To keep the rest of country safe Hamburg blocked any movement of vessels at Elba river. Interesting, that castle in the case of Kiel city, played role of isolator and saved illness within castle and did not let it spread to the rest of territory. The other two outbreaks are in Silesia under Habsburg Monarchy. The logistics of this case takes beginning in Constantinopol, from where infection was delivered to Southern Poland, and later on to German lands. Baltic states at that wave did not suffered so massive, due to previous experience in 14th century, so German cities, that were located closely to Baltic coast stayed most safe. Background factor of plenty similar ailments was a famine during Little Ice Age.

PART 4: TRANSFORMATION INTO THE CORE NATIONS

Till the beginning of 19th century vivid trade resulted into harsh labour differentiation and occupation dynasties with solid experience of doing particular kind of products, that is called a highly skilled labor force. According to historical precursors one region was good in defined range of goods, that was achieved with a help of a good educational system. Geographic, ethnic and religious differentiation only facilitated this process, as landowners and farmers stayed in the east and the heavy industry workers moved to the west, since 1750. Overall welfare and consumption capacity in internal market was in a good shape, that stimulated demand for innovations. International treaties as customs union Zollverein made fruitful grounds for

surplus trade outside of German territory. Innovations appeared firstly in the valleys of rivers Ruhr, Inde and Wurm, as it was place for rich natural resources as coal, coke and gas. This was an impetus for entrepreneurial activity nearby mining points, especially in ironwork industry and as it was cheap and fast to ship in the countries of customs union. Ruhr region used mine carts „Hunde“ since the 1556 and new flow of investment in 1700th transformed it into wagonway horse-drawn connection of mining spots with the Ruhr river.

Lack of own technological background was no more a boundary, once British invented steam engine and locomotives in 1804. Germany quickly imported technical blueprints, hardware and trained personnel just in the railway shops in central cities. Till 1850 Germany was able to meet own demand and produce equipment for railway construction. The state political strategy only supported construction of railway nodes, as it meant to stimulate interchange between provinces and big cities, thus, encourage local spirit. At the beginning railway companies belonged to the regional owners and one enterprise covered limited number of routes, as The Rauendahl Incline in Bochum, Schlebusch-Harkort Coal, Deilthal Railway. Later, Central European railway made an efforts to connect Silesian lands, Berlin and Southern states. After unification of Germany in 1871 within The Länderbahn era, state endeavored to nationalize private companies and fully control connection of Hamburg and Bremen ports with Ruhr mines together with earning revenues from passenger and cargo transportation. This approach was beneficial for the state treasury and for the infrastructure construction in agricultural peripheries, but not for the entire economic development.

PART 5: WORLD WARS AS ENGINES OF NEW TRANSPORT MODES GROWTH

WWI

1. Since the beginning of war the supplies were done through the horse-drawn wagons, but weather conditions, mud, cold and absence of wet roads led to impossibility to fulfill the plans and evolution of transport facilities. Progress in technology gave world firearms and back in the days artillery was heavy, especially equipment for mortar fire in trenches, that was responsible for 75% of casualties, so horse power was not in use anymore. Beside the simple transportation mode railways performed defense function, particularly in the coastal areas, as most severe weapons for long-distance fire were installed directly on the platforms based on the rails. At the Figure 2 is depicted booming number of passenger transportations at the WW1 and WW2, that was performed due to significant enlargement of fleet.
2. Meanwhile, at the middle of WW1 German technological progress reached production and exploitation of submarines.
3. Among the challenges logistics faced in 1914-1918 was insufficient length and size of rails for a tremendous-sized German army, as alternative for rails, special trench railways were built at the battlefields, that allowed to deliver provision to the frontlines. However, German provision as for civilians as for troops was generally imported and coming primarily from USA, so UK's Navy blockaded German provision coming through Atlantic ocean lead to massive starvation of population and Germany's failure in WW1, also Germany could not use U-boat (submarine) facilities for supply delivery, due to North Sea Mine Barrage.

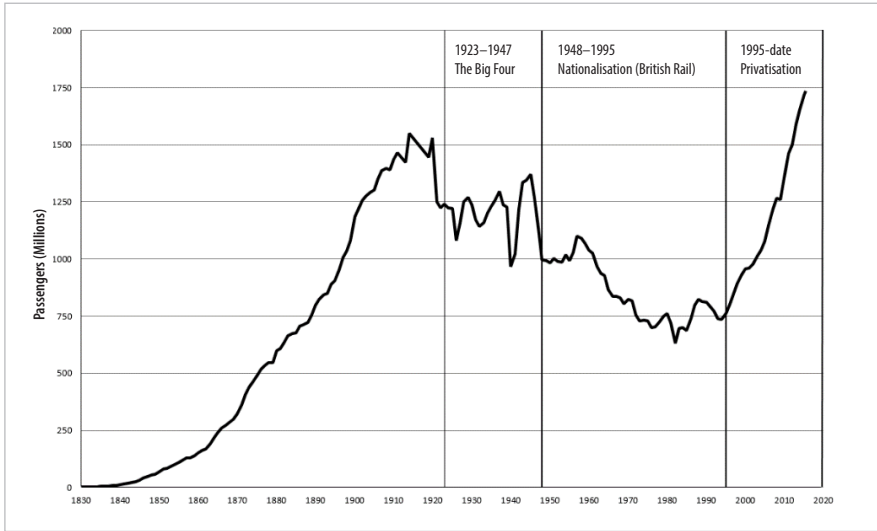


Figure 2. Record number of passenger were transported in Great Britain exactly at the times of WW1 and WW2

4. Aviation. German zeppelins were often use for bombing raids of British and French cities, but they had cons as vulnerability to the artillery if they fly in low altitudes, also it made successful navigation for bombing of certain cities difficult, so zeppelin bombs rarely reached targets

WW2

1. Mechanization and car production lift up military supplies to the new stage. German army was well equipped by the high cargo capacity trucks, so delivery was faster, also it pushed improvements in road infrastructure in Germany, to use full potential of military trucks. However, for far-flung attacks it was a bad idea to rely on trucks, as Polish and Russian territories were full of mud, rains and snow, that decreased speed of Hitler's forces and sources of fuel were not determined in advance, so fuel problem was one of the most crucial.

2. Railways. German army expected to focus supply volumes on locomotives. Initially, fuel for trucks, ammunition and weaponry had to reach Russian frontlines in outskirts via rail, but it was not the case, as the railway system varied and German locomotives could not be used in Russia and vice versa, so choice was between upgrading own wagons or Russian, that did not seem possible in a short terms.

3. Airpower. Due to described above struggles air forces undertook function of main transport mode for delivery to the surrounded army units or cities, as it was with 6th army in Stalingrad. Allied forces endeavored to block inland connections as bridges and railways, but as Germany was more powerful in terms of air transportation in majority cases it only limited own supplies of enemies. In the WW2 German aviation reached progress in supply aviation along with military, by means of creation of bombers and jets, and getting more experience in the instant air forces' operations.

4. U-boats took revenge in WW2 in terms of strategic utility. As UK and USA used numerous cargo ship convoys to deliver resources via Atlantic German took an advantage of underwater superiority and significantly threatened hostile ships.

CONCLUSION

Geographical location near the Northern sea indeed was precious and valuable advantage for settlement of trade centers in Northern-Western Germany since BC ages. Second historical factor, that facilitated trade and logistics was establishment of independent legal system in the Cologne, Hamburg and Bremen, so merchants rely on stable trade conditions. Hanseatic alliance determined future of Germany, as it let Lubeck have own ship building industry, that later transformed into military ship

building for colonization and defense purposes, and also attracted high-skilled labour to the German coastal cities. Combination of geographic location of coal and coke mines nearby river sleeves of Ruhr, Inde and Wurm set a soil for manufacturing of steel, iron industry and machinery.

Mining introduced to Germany first prototypes of wagons and wooden or later even iron rails, that in a century, when Germany brought British innovations into state transformed into railway infrastructure, but with connection not only with rivers but with a sea ports as well. Wars forced Germany to adapt to instantly changing environment. WW1 and WW2 were catalyzers of long term supply management with consideration of different risks and, significant part of infrastructure, built at the war times, as road and railway infrastructure is used for modern transport today.

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