Research Project 2019/20

Tutor: **Dr Stavros Karamperidis**
Student: **Samuel Thillmann**

Introduction / Summary

The research project was executed with the support of the Supply Chain Risk Industry Partnership (SCRIP) which is a group of member organisations, industry experts, law enforcement, and other industry stakeholders focussed the reduction of risk, including crime, in the supply chain.

The title of the project is mapping the true cost and impact of cargo crime in the logistics sector in the UK. The aim of the dissertation is to recognise cargo crime and identify its cost and impact areas on affected businesses and economies in the UK. Based on a case study of cargo crime, the dissertation provides solutions to relevant objectives aiming on the identification and definition of cargo crime, identifying measurable cost elements of cargo crime and to more accurately objectify and articulate the problem of cargo crime.

Based on the research objectives a literature review was created in order to build up a theoretical framework of relevant key factors and patterns. According to this framework a mono-method / qualitative method was utilised in order to collect relevant data from experts' in the field of cargo crime by means of semi-structured interviews. In this connection out of 10 interview participants, 6 were from the Cargo Insurance sector, 3 were from the Supply Chain Security / Risk Management sector and 1 participant was a retailer from the electronics industry.

The study has found relevant data and information showing the significance of cargo crime in the UK. Relevant cost and impact factors of freight crime to logistics were illustrated by publication data, real cargo crime case data and further qualitative primary and secondary data. Furthermore affected key stakeholders and most affected commodities according to cargo crime in the UK were identified. Finally mitigation measures were presented in order to minimise cargo crime, protect businesses and making the supply chain more resilient.

According to the data / respondents the method of curtain cutting is the most utilised technique by criminals for executing thefts.

The UK is suffering a lack of, or inaccurate reporting of crime, and a lack of secure parking in the context of cargo crime.

Furthermore collaborations and associations including stakeholders of industry and government have yet to be established in order to share relevant data, support each other and successfully combat cargo crime.

Defining and identifying cargo crime

In the literature and publications reviewed cargo crime is defined as economic crime including financial losses, as theft of cargo from the supply chain as well as exploitation of supply chains. Moreover, beside theft, it is associated with criminal actions like fraud, burglary or robbery. The most affected modality is the road transport industry in general and the most affected regions in the UK in 2019, according to one data source, were the East Midlands, the South East and the West Midlands. Cargo crime is also described as a continuous growing issue despite the growth of tracking / tracing systems, or other techniques such as real time locating systems.

Based on the primary data collected from the interviews, cargo crime is identified as direct theft of cargo from the supply chain during a period of storage at a location or from a vehicle during transit, theft of goods from vehicles / warehouses, theft of trailers containing cargo, deliberated loss or damage of cargo / conveyances, illegal actions against cargo or people in the movement of goods as well as physical theft, paper theft, fraud, tax customs duty avoidance and all criminal activities facilitating, supporting and leading the actual theft of cargo which also includes inside threat (bribery & collusion of staff) in order to identify and target high-value products and to plan access to these products. In this context criminal actions are also represented by cyber infiltrations in order to infiltrate IT systems to get cargo information.

Cargo crime can be identified by the carrier / cargo owner reporting an incident, or a claim by the cargo owner for non-delivery, or shortage. It could be better identified if law enforcement had a crime category relating to the specific type of theft. Presently, such thefts are categorised as theft of or from a vehicle, which could equally include theft of a purse from a car, or a car radio, and is therefore not fit for purpose.

It is not difficult to identify thefts of products in the supply chain, but it is the categorising and recording that is flawed, which is represented by a lack of, or inaccurate reporting of cargo crime incidents, with various organisations collating data to different extents, which produces inconsistent and conflicting statistics.

Curtain sided trailers, mostly at overnight parking areas, including those along motorways, are the most targeted. In this regard the most affected regions in the UK according to one of the data sources are Milton Keynes / Bedford / Peterborough, Northants, Leicestershire, Nottinghamshire, Yorkshire, Essex, West Yorkshire, Merseyside, Greater Manchester, West Midlands, Thames Valley and Cambridgeshire.

Consequently most main cities, trunk routes and the motorway networks, especially the M1, M25 circular and M4 corridor are mostly affected.

Main techniques used by criminals and most affected areas

The published data ranks curtain cutting (also called slash and grab thefts) as the most used technique, followed by lock cutting and forcing open rear doors All these activities represent the direct theft (pilferage) from a trailer.

Incidents in the UK are mostly perpetrated by attacking parked trucks and stealing from an both secured and unsecured trailers while the driver is absent, or sleeping in the cab. Moreover, hijacking, and deception / diversion, theft from a warehouse are described as potential techniques, although entering a warehouse or even hijacking are rarer in the UK.

Furthermore, techniques of stealing the whole truck and trailer are also significantly lower in the UK with a share of 3% recorded in one set of incident data.

Violence or threatening a truck driver with weapons is also rare, but this does happen.

Other extraordinary examples of cargo crime incidents, especially in the area of Greater London, relate to criminals executing thefts from moving trucks, and thefts from vehicles stopped at traffic lights. Another example would be a case in 2019 at Thames Valley where criminals were setting a container on fire and then stealing numerous pieces of equipment.

Generally criminals are repeating their techniques and procedures, as well as executing cargo thefts at the same locations. Moreover the literature states that the higher the value of the goods, the more sophisticated the technique of the criminals might be in order to execute the theft.

Organised and efficient criminal networks choose their targets with precision, focus on weak points like the vulnerability of soft sided trailers, or facilities with minimal security systems and utilise technologies such as the tracking of trucks as well as cyber criminality in order to identify transportation times and specific routes of trucks.

The interview participants evaluate truck stops, roadside stopping for overnight rests, (e.g. a lay by), motorway service areas / stations, unsecured premises, hauliers' depots, overnight parking locations along the main transit routes around larger cities and public car parks as the most affected areas. Depots, truck stops, and motorway services fair a little better however, than vehicles parked on the roadside, or in exposed locations without any form of security.

Extraordinary cargo crime incidents are represented by cases where criminals' trailer parks alongside the targeted one and goods are transferred directly across ["trojan horse"] by cutting the curtain of the targeted trailer. Other illustrated techniques occurring less frequently are the theft of the entire trailer and cargo, theft from a moving vehicle, stopping a vehicle under false pretences, theft of diesel from truck and the growing trend of deception by creating a false company and bidding for cargoes on freight exchange sites (fictitious collection / bogus haulier), or by masquerading as a purchaser of goods, deceiving a seller in to delivering cargo under credit terms to a location, where it promptly disappears.

Importance of cargo crime for logistics

In the literature and public sources the importance of cargo crime for logistics is illustrated as financial damages (one cargo theft incident causes overall supply chain costs estimated to represent between 6 and 10 times the value of the goods itself), Furthermore the logistics sector is continuously growing and providing plenty of opportunities for businesses to increase their reach, goods in transit and trade in general, but on the other hand therefore criminals have more targets and options to execute cargo crime. This is also dependent on seasonal aspects, for instance important and expensive electronics products stolen a few weeks before Christmas may have huge impacts on the whole market, as well as the annual surge in theft of alcohol goods.

According to the interview participants' data, cargo crime significantly affects the logistics industry as statistically transportation (theft while cargo is underway) is by far the most impacted sector of the logistics industry. Moreover cargo crime impacts all areas of businesses such as profitability, timeliness of goods to consumers, reputational damage, new product security, as well as the greatest impacts of financial loss of product and insurance cost.

Therefore other logistics impacts and importance factors would be lost businesses / lost contracts of carriers with big customers by suffering (multiple) losses and the risk of losing their own business (e.g. redundancies and closure), as well as decreasing confidence by customers [reputational], increased freight and insurance premiums, time and cost of dealing with the issue, repairing damages of equipment and cost of adding additional security measures.

Increase in crimes, along with other factors such as inadequate facilities, low pay etc. is seen as a key contributor for the industry in suffering an acute driver shortage, impacting industry and UK plc as a whole.

In the context of losses of market and sales, the whole supply chain is affected. The process and plan of procuring and ordering for instance seasonal goods in advance can be heavily affected by a cargo crime incident, because these products are difficult to replace due to time constraints and short selling time windows (e.g. Christmas decoration / clothing for specific season).

Cost of cargo crime in the UK

The most complete statistical data available [NaVCIS] for the UK recorded 2,708 cargo theft incidents based on 30 Counties and Scotland to a value of £69million for 2018.

The recoded figure by NaVCIS for all types of HGV, Freight and Cargo Crime was 4,365 incidents to a combined cost price loss value of £116,385,000 in 2019.

Due to constraints in data collection, information submitted of cargo crime (lack of reporting) the losses are expected to be significantly higher.

[Shortly after completing / submitting this dissertation the statistics for 2020 were reported, with 4468 incidents recorded with a value of circa £95.7m GBP, and this included a period of circa 9 months of the pandemic / lock down when such crimes were considered to have reduced.]

The most expensive theft of 2019 relates to a theft in Oxfordshire concerning a trailer including perfumes with a reported cost value of €1,987,886.00 (£1,723,954.00 GBP). The retail value of this cargo however was reported as €4,336,694.00 (or £3,760,900.00 GBP.)

Another huge case happened in Kettering concerning toys with a loss of €1,161,251.

In general financial losses and cost factors caused by cargo crime are represented by direct losses, (increased) insurance costs, reproduction costs and customer deal loss (indirect losses), as well as extra handling costs and loss of market opportunities and therefore a negative impact on the companies' reputation. The cargo transport represents the highest share in most affected companies, including especially logistics and transportation costs.

Insurance costs are based on the specific severity of the theft regarding to the amount of financial loss of the incident.

Acquisition costs in order to improve security systems would be investment, vehicle device, installation, detection equipment, communication network, operating, service providers and additional costs in order to improve recovery, arrest and theft rate as well as response and recovery time.

According to in interview participants they rate the insurance cost as an important factor, regarding to increasing claims of a company, reflecting rising insurance premiums / deductibles and therefore also operating costs.

Regarding to a cargo insurance policy, the full insured value of the stolen cargo is covered (suitable for manufacturer / cargo owner), whereas in general [but not always] carriers have in place a liability insurance policy based on the transport operators' legal liability [which can be uplifted above standard limits], and which is calculated against the weight of the cargo being carried (cost and cargo determine price factor / charged premium; theft attractive goods will be charged at a higher premium). In this context transport operators have the opportunity to incorporate standard terms and conditions in order to limit their liability of goods stolen.

For high value cargo such as electronics the insurance limit is lower [i.e. there is a cap placed on the maximum amount insured]. The insurance would also pick up legal costs associated with investigations and defence as well as the costs of handling the claim itself. Therefore also hidden costs such as societal costs, investigation costs, legal costs, judicial costs, public body costs, police intervening costs and magistrate costs might be incurred as well as consequences such as commercial reputation of the transport industry and damage to the economy at national level.

Based on the [NaVCIS] reported statistics available the combined cost price loss value of cargo and freight related crimes in 2019 in the UK, the average loss value at cost price would equate to circa £26,663.

The recorded incident data, however, also reports a lot of diesel thefts from HGVs (772 cases). Replacing a damaged tank generates costs of about £1,700 (and replacing slashed curtains about £1,200.)

Removing the diesel theft incidents and their approximate value from the reported incidents, leaves 3593 remaining losses, with a value of £115,072,600.00 – increasing the average remaining loss values to circa £32,027.00.

In the context of the case study the participants reported about several real cargo crime cases including relevant cost factors:

The first case affected a UK logistics company subcontracting the haulage of a consignment of cosmetics from Greece to UK. Due to the fact that the load was subcontracted 3 times, fraudsters managed to obtain the cargo details and steal the goods. The cargo claim was settled at £182,944.34. Investigation costs were £288. Legal fees (for the recovery) were amounted to £20,538. Finally a recovery of £165,000 was made against the carrier by cargo insurers.

Another case included internal collaboration with criminals leading to the theft of mobile phone handsets from a warehouse. The loss of goods impacted the insurance premium for the following year.

Another example is the theft of electronic computer equipment with a premium of £10,000 and a loss and claim paid of £850,000.

In a further case the shipper purchased electronic goods in China (3 container each with an invoice value of £249,000) which were delivered to Felixstowe port. Unfortunately the containers were picked up by a "bogus carrier" who had obtained the release codes probably by means of inside help.

The 3 containers of electronics were never seen again and the cargo insurers paid 3 times £249,000 plus the freight costs resulting in overall cost of about £831,700. The cargo owner could not resupply the electronics to satisfy the order. If the real carrier had picked these goods up and lost them in transit, the recovery would have been as follows: 8250kg x £1300 per ton x 3 containers = £31,175 based on contractual terms.

Finally an economic cost example case was presented. In a case with a loss of £250,000, an agreed insured cargo value up to the full retail value plus 10% would result in a pay out of £275,000.

For such a claim it would be likely that a surveyor / loss adjuster would be appointed incurring fees on a time and trouble basis, which on average for such incidents could exceed over £2000. The cargo insurer could also need to appoint a lawyer to assist in recovery against the liable party. In cases with losses of £250,000, projected defence legal costs can be extremely high [advised average of £350 per hour]. In addition management costs for the cargo insurer including time dedicated to handle the claim will be incurred, or "cost to serve." The cargo insurance policy holder will also incur management costs in gathering relevant details and documents and attending meetings with insurers and lawyers.

Whilst the cargo owner may recover the insured cost of the stolen goods, in some cases the cargo owner would also incur costs in lost profits. By focusing for instance on the clothing industry the average profit margin would be between 4% and 13%. A profit of 10% is assumed which results in £25,000 based on this example. Moreover potential costs associated with a damage to commercial reputation (not being able to fulfil customer orders) will occur as well as costs associated with their brand reputation (garments which normally retail at £100 are now being sold in the local pub at £25; people's perception of the brand will deteriorate). At renewal the cargo owner is likely to face increased insurance premiums as well as additional costs for reviewing and improving security procedures and supply chain risk management.

The cargo insurer would then attempt to recover its losses. It is likely that they will identify the liable party (freight forwarder or haulier) and seek recovery from their respective liability insurer. The liability insurer however will also incur investigative costs also, and potential legal costs to respond to lawyers acting for cargo owners, and management time costs. The liable party (haulier) will also incur a series of costs such as contributing their policy deductible [excess], management time, increased insurance premiums and reviewing and improving security procedures.

Where involved, Police investigations, potential judicial costs and impact on a business' operations and social factors could also apply. Finally a cargo loss value that was represented as £250,000 for the invoiced cargo value, could in practice amount to a figure of at least 5 times this amount.

Such costs, or heads of claim would be typical, but the extent and value of each loss would be different and need to be considered on its own merits, with some costs not incurred on some losses, and other unique costs incurred on others in relation to the nature of the product and/or the goods owners business. Ergo the scale of costs when incurred will vary depending on the complexity of the situation.

Impact of cargo crime to logistics

The second research question of the second research objective was aimed at the impact of cargo crime to logistics. Like stated before, the impacts of cargo crime have many overlapping aspects with the stated importance factors of cargo crime to logistics and the costs of cargo crime stated in the previous paragraph, as impacts of cargo crime, are definitely and highly representing costs of cargo crime.

In the literature the impacts of cargo crime to logistics are described as financial costs, hidden costs [reputation etc.] and also as social impacts such as the mental health of truck drivers involved in cargo crime incidents, leading to trucker shortages in the industry, or misappropriation and use of products for example, which could impact on a persons health or similar [i.e. supply of medicines that have not been kept / stored correctly post theft, being reintroduced in to the supply chain by criminals, affecting the integrity of such products.]

Financial cost effects are determined as losing cargo and value, non-delivery of goods on time, decreasing customer level / service / reputation / reliance (lost confidence in robustness and resilience of transportation provider), decreasing competitive advantage, lost sales costs / decreasing future sales (as manufacturing process of many goods is completed outside of the UK, turnover and sales figures / output will be affected), extra operational costs, restoring deliveries, backup operations, increased cost of goods, increasing insurance costs, decreased market share, decreasing efficiency, reproduction costs, additional time and costs as well as additional administrative costs, expedited transport times, increased customer prices, stock replacement costs and a diversion of resources from business activities.

The impact factors might also lead to a disrupted relationship between supplier and customer after a cargo crime incident. The supplier might suffer a loss of trust, lost orders, lost contracts, decreasing competitiveness and therefore a lower secured existence and decreasing financial sustainability.

Cargo crime has also an impact on UK productivity as organised crime gangs are committing cargo crime across the UK to generate proceeds to fund other criminal activity such as the importation and sale of illegal drugs, human trafficking, and weapons.

The interview participants are describing the impact of cargo crime to logistics as disruptions of the supply chain, monetary loss from stolen load, increased cost of goods, damage to equipment / property, costs of repair, insurance costs and increased insurance premium / excess as well as the management time spent dealing with cargo crimes detracting from normal business operations.

Further impacts for affected companies are a decreased customer service level / customer relationship, lost (future) sales, lost contracts, lost market share, lost competitive advantages, reputational damages, commercial damages with customers, decreasing consumer confidence and brand integrity, replacement of stolen cargo, additional / increased shipping costs, lost time and efficiency as well as increased consumer prices and a loss of intellectual property rights. Especially affected to suffer these impacts are organisations experiencing repeated cargo crime losses.

Social impacts are described identically as in the literature. Cargo crime is often used to finance other illicit trades (e.g. drugs and people trafficking), which also have an impact on UK productivity.

Furthermore the impact on UK productivity is also described as the consequence of goods which do not reach their intended market and are sold illegally on black markets in criminal networks. Therefore cargo crime impacts society. Moreover another impact would be potential counterfeit and diverted products entering the markets. Stolen products will have to be remanufactured, resupplied or even sourced again from overseas, potentially leading to a loss of market / sale and ultimately to a loss of business to a competitor for affected companies.

In general due to the risks of cargo crime incidents the attractiveness of the truck drivers' job decreases as drivers are becoming victims of crime (e.g. risks posed in overnight stops) and might also be a target for criminal organisations in terms of bribery. This is a huge problem, as the industry is already suffering a driver shortage.

In the context of the case study an interview participant reported about several real cargo crime cases including relevant logistics impact factors:

In the time before marketing launch (e.g. summer season) a cargo owner wants to ship 5000 trousers and 5000 jackets (shipped separately for security purposes). On the way to the distribution centre one of the loads is stolen. Consequently only 5000 items are remaining that cannot be sold until the other half of the suits is reordered or even remanufactured. Therefore the new season marketing, brand impact and customer loyalty are impacted negatively. Another impact factor would be the internal management commitment to investigating the loss / claim insurance and distract from normal operations.

Relevant impacts on the cargo insurance sector would be the cost of settling the claim, cost of investigating the incident, legal costs to bring the recovery claim (possibly through to trial), management costs to handle the claim and a risk of losing business through being forced to increase premiums.

Key stakeholder affected by cargo crime

In the literature and publications affected stakeholders are illustrated as insurers, operators, shippers / suppliers, private companies, retailers, manufacturers, distributors, terminal operators and transportation (third party logistics) providers as well as (end) customer, ministries, police, transport authorities and law enforcement agencies, and consumers / the public.

In the interviews the most affected stakeholders were defined as the goods owner (might be shipper, manufacturer, seller, retailer or consignee), in fact the person with legal title to the goods and the responsible, contractual party in whose care and control the goods were at the time of the loss, or who have a contractual responsibility for the goods.

Moreover further stakeholders were defined as supplier companies (companies manufacturing overseas and import to distribute and sell), insurers (paying out claims), freight operators (commercial / reputational damage and loss of contract due to theft incidents), carriers, drivers, retailers (cannot fulfil orders), as well

as police, transport authorities, ministries and public (societal challenges associated with the proceeds of cargo crime), because each suffers different impacts from any theft. Ultimately it affects the consumer as it increases the overall cost of products.

Objectifying / articulating the problem of cargo crime, justifying mitigation measures and generating knowledge of other sectors to minimise cargo crime

By objectifying and articulating the problem of cargo crime, literature and publications highlight relevant statistics in an attempt to quantify the issue. However, such statistics are biased in terms of accuracy and frequency of reporting. For example, statistically the UK appears to be the most affected country from cargo crime with a theft rate of 79% in 2019 and 86% in 2018 of all recorded cases within Europe within the data set used. However, it is known that UK law enforcement [NaVCIS] recorded and reported far more consistently than LEA's in other countries skewing the overall picture somewhat. Had more realistic data been available from other Countries, the percentage per location would be more balanced – though the UK statistics alone demonstrate the scale of the problem, from a national perspective. From one set of data reviewed, financial data was shared in just (68%) of the cases, which underlines part of the issue, as well as the fact where the value is declared it reflects only the value of the stolen goods without objectifying further costs and consequences. The issue of a lack of reporting is also combined and justified with a lack of tracking between law enforcements and carriers. Moreover in 2019 according to NaVCIS, an average rate of 12 cargo incidents per day (circa 364 per a month) occurred in the UK.

The main factor identified in all data sets however, contributing to the high frequency of incidents not just in the UK but the EU and globally, is the lack of adequate safe and/or secured parking locations for truck drivers – including formal service areas along major road networks, which have some security, but not enough to deter criminals from operating on such sites.

Thereafter, inadequate reporting and recording of incidents by law enforcement agencies, lack of investigation in most cases, limited Police resources / presence, insufficient judicial sentences for cargo crime, and the reliance on curtain-sided vehicles for operational reasons, and a perception this is a victimless crime, were all mooted as additional key factors as to the continued rise of these crimes.

Statistically however, in the UK, truck drivers should still rest on motorway service areas (lit up and busy areas, and despite issues at these sites, the percentage losses are still lower than other public parking locations), or ideally use secure parking lots (areas using safety precautions: e.g. cameras / fences) for overnight rests, but which are limited in number and ergo availability, and avoid resting at laybys or industrial estates or other non-secure public parking locations in order to decrease the vulnerability of cargo thefts. Furthermore shorter lead times and temporary storages have to be generated in order to increase supply chain efficiency. Criminals might see cargo as low risk target and truckloads are especially easy to identify in the context of parked trucks at rest areas. Moreover like stated before, soft-sided trailers are more vulnerable and highly affected by curtain cutting.

By focusing on the knowledge of other sectors (IT / security sector) track and trace systems (developed technologies / RFID / RTLS/ GPS information service / virtual fences) are evaluated as useful technique for increasing efficiency, increasing service level / customer service and securing / locating goods as well as decreasing (logistics) costs, accelerating / improving transportation process (monitoring / live information), controlling routes, identifying bottlenecks, preventing incidents and improving logistics operations. Track and trace is suitable for high value shipments, as it is associated with high acquisition costs, though it is known such systems have their limitations and vulnerabilities such as jamming and/or spoofing of the signal by criminals.

According to the targeted commodities, larger criminal organisations are focusing on more item-specific targets, whereas smaller criminal organisations concentrate on more random thefts and products. In 2019, one set of data reported most product types stolen as unknown (including unspecified and miscellaneous products (47%), agricultural / prepared products (including tobacco / alcohol / beverages (21%) whereas electronics only represented 4%. It is highly likely that this latter figure is much higher, with companies sanitising theft reports to protect their brand – hence the large amount of "unknown" entries.

Furthermore, for the first quarter reported in 2019 for this set of data, the most stolen products expressed in number of cases in the UK were as follows (top 5 categories represent 85% of all 1199 cases for Q1 in the UK):

Product	Number of cases	Percentage
Unspecified products	396	33%
Miscellaneous products	320	26,6%
Tobacco	197	16,4%
Food & drinks	72	6%
Clothing and footwear	38	3,1%

The interview experts define most affected commodities in the UK in general as food and beverages, alcohol, clothing / shoes, (high value) electronic products, household appliances and automotive products.

By objectifying the problem of cargo crime, key elements such as a conspicuously increasing cost and frequency of cargo crime, difficulties of controlling a whole depot in terms of surveillance and inside threats including driver or carrier collusion in crime as well as the vehicle parking issue due to a lack of secure parking were illustrated.

In the context of justifying mitigation measures organisations attempt to mitigate cargo losses by throwing a technical solution at the threat (smart locks on trucks, tracking devices etc.) without managing the process of deployment and ongoing management effectively and the threat remains despite the measures deployed. Moreover in this context the lack of reporting according to cargo crime incidents is illustrated again.

According to the expert respondents, the collaboration of organisations and institutions working against cargo crime is successful. On the other hand while the coordination and collaboration of security authorities / institutions LEA's and the industry persists there is no real high-level government appreciation of the cargo crime problem and therefore there is no national strategic plan to address it.

Approaches to minimise cargo crime, protect businesses and making supply chain resilient

In order to minimise and prevent cargo crime as well as protecting businesses the literature evaluates the process of information sharing / building networks (improving lack of reporting) between all stakeholders and supply chain members (e.g. manufacturer and transportation provider or law enforcement and carrier) as essential in order to counteract cargo crime efficiently, protecting goods in transit and preventing a further spread. Moreover the number of secure parking areas has to be increased in order to build a network of secured parking opportunities. Other key factors of minimising cargo crime are improving monitoring, tracking, locking and information security processes. Furthermore the awareness of cargo crime has to be increased and law enforcement engagement / funding has to be achieved. Therefore the proposal of creating regional transportation security councils was made.

Using different packaging methods in order to protect the goods and decrease cargo thefts on the one hand increases the packaging protection and decreases damage and theft in transit, but on the other hand increases packaging weight and packaging / transportation costs.

Moreover checking and screening employees thoroughly, preventing the sharing of internal company information as well as working with reliable employees, suppliers and partner is decreasing the risk of cargo crime and internal threat.

Employees such as truck drivers have to be trained, practiced, instructed and prepared for cargo crime incidents in order to create a secure atmosphere.

According to cost effectiveness it is proposed to compare the value of goods to the cargo crime risk level and use hard-sided trailers for high-value shipments, which might lead to increased costs and difficulties to identify a suitable service provider.

In order to make supply chains resilient against cargo crime the literature illustrated key factors of risk management, including the adjustment of supply chain risks, creating responsive and efficient logistics systems, developing continuous technology improvements (tracking shipments / advanced technology security), improving logistics structure, decreasing supply chain vulnerability / disruptions, ensuring the flow of products, executing regular operational changes and developing strategies to be ahead of the criminals and complicate their development and progress. Furthermore logistics processes have to be standardised in terms of defining exact delivery times at target locations to transfer goods directly (improving time scheduling). This can be also suitable for high value shipments which are especially affected.

The interview participants illustrate different approaches to minimise cargo crime such as greater police presence, private and public sector cooperation / initiatives, greater organisational planning against crime, risk assessment, greater insight into the end to end supply chain for companies, better 3PL management, greater insights and transparency throughout the supply chains, greater strategic application to mitigate cargo crime risks, preventing over-or underspending on security measures by means of security balance models and improve and develop secure parking opportunities and security measures at motorway service areas [i.e. improve existing infrastructure]. In this context police security institutions in the UK evaluated that 23,5% of all received notifications occurred on motorway service stations. In addition an expert stated that at least 20 strategically located secure parking areas for trucks would be needed across the UK.

Security organisations in the UK are creating databases including information from various stakeholders and develop cargo crime analysis reports on a monthly basis in order to draw attention to and mitigate cargo crime.

Furthermore after a cargo crime incident, investigation and route cause analysis should be conducted to identify any potential system and process failings (human / technical) in order to apply and manage appropriate mitigation measures quickly. This represents the most effective way to manage risk proactively and prevent additional incidents or costs.

Moreover cargo crime losses and impacts on the national productivity need to be appreciated by the government at a ministerial level leading to an appropriate joined-up strategy of government and industry in order to address the problem.

In this context cargo crime security associations including national police units and member organisations are setting future targets and actions to map the threat of cargo crime in the UK economy. This is done by maintaining a UK national cargo crime database of incidents and relevant statistics, liaising with UK police and intelligence agencies in relation to proactive and reactive investigation of cargo crime, as well as target operations and collaboration with the industry in order to promote cargo crime prevention, best practice and security solutions.

Concluding summary

The defined research objectives and questions were answered and discussed by means of collected and analysing primary and secondary data, which were subordinated and derived from the title of "Mapping the true cost and impact of cargo crime in logistics sector in the UK". This field of research represented a novel study in the context of cargo crime and represented a gap in literature.

Consequently a novel study based on comparing and evaluating qualitative data of literature, publications and cargo crime interview experts was executed which represented a gap in literature in the context of cargo crime.

The project included a case study of cargo crime and cost / impact factors in general and was guided by contrasting all relevant gathered qualitative data patterns based on research questions and objectives.

In this context the research project was applied to different cases in order to highlight specific, relevant and important cost and impact factors of cargo crime. Therefore, the issue of freight crime was presented from different views and statistics and data sets were sourced and identified to attribute relevant cost and impact factors. In order to connect, compare and complete the identified qualitative data of literature and publications as well as interview experts the findings were analysed by means of the Pattern Matching technique.

The aim of the dissertation of recognising cargo crime and its cost and impact areas on UK business / economy and even society was guiding structure of the study and is included in the findings of the relevant research objectives / questions.

In addition, the top ranked products stolen were presented as well as hidden costs and impacts of cargo crimes from different point of views and industries. In this context it is noticeable that unspecified products have the highest percentage of most affected products. This might underline the lack of reporting respectively incomplete reporting / data sharing in the context of cargo crime, but also reflect business protecting its brand reputation.

Future work and recommendations

In order to decrease the issue of cargo crime, useful and sophisticated tracking and tracing systems shall be used especially in case of valuable goods (considering the ratio of security measures versus potential profit). The same applies to hard sided trailers in order to prevent the most executed technique of criminals, i.e. cutting the curtains of a soft sided trailer to steal cargo.

In addition to that, security measures on rest areas and other parking / rest locations have to be improved and adapted on UK wide national standards from governmental side, to guarantee safe parking opportunities for trucks and counteract the lack of secure parking in the UK.

This requires, however, that further attention and more insights need to be drawn to the issue by building, increasing and improving collaborations of all stakeholders affected by cargo crime and communities of interest. It is therefore absolutely necessary to address the lack of reporting, the lack of a crime category relevant to cargo / HGV crime, and to create appropriate databases with as many cases and additional cost / impact factors as possible. The better analysis of past cases would help avoiding future incidents of cargo crime. In this context, a strong and large association of industry and government needs to be established in order to cooperate and combat freight crime.

As a consequence of Brexit, it is very important to maintain an efficient cooperation between British authorities and Europol / Interpol in order to prevent and combat cargo crime and to assure a strong and efficient unit on an international level.

About Samuel Thillmann – Bio

Samuel was born and grew up in Germany. After graduating from school, he studied logistics management in Venlo in the Netherlands and was able to gain experience in various internships at different logistics service providers. Finally, he wrote his Bachelor's thesis during studies at a logistics service provider for frozen food logistics and completed it in 2018. Subsequently he worked for a frozen food retailer in the area of supply chain management. Afterwards he completed a master of science in international procurement and supply chain management at the University of Plymouth in 2020 with support of the Supply Chain Risk Industry Partnership (SCRIP).

Since graduation he now works for an international logistics company.