SYNTHESIS REPORT OF FREIGHT FLOW MAPPING – SCOTLAND PART

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Report for SEStran

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1. Introduction

- "Connecting Food Port Regions – Between and Beyond", or in short the "Food Port" project, is funded by the European Union under the Interreg IVB North Sea Region Programme with the specific aim of developing the North Sea Region as the best food cluster and hub in Europe for food products delivered via an efficient and sustainable transport system. Transport Research Institute (TRI) at Edinburgh Napier University was commissioned by SEStran (transport partnership for the southeast of Scotland), one of the 18 partners involved in this project, to undertake a review of the Scottish food freight flows movements and identify major food transport corridors across the North Sea Region.

- Food and drink is an import industry in the Scottish economy. With annual sales of £8.3bn, the manufacturing sector alone makes a significant contribution to the Scottish economy in terms of GVA and employment and shows a strong export performance. As addressed in many literatures, whisky and fish (including Demersal, Pelagic, shellfish and Salmon) are the two dominant products in the Scottish food and drink industry. The former is one of the country's biggest earners, contributing vastly to Scotland's multi-billion pound food and drink exports, while the later accounts almost 60 % of the food international trade. In addition, the retailing sector also plays an important role in the Scottish food and drink industry, which contributed about 29% of total GVA generated by the whole food and drink supply chain. Meanwhile, design of food and drink distribution systems in Scotland (UK) has been dominated by the major chain retailers (supermarkets) and wholesalers.

- This study followed a bottom-up approach by focusing on the demand side and undertaking detailed interviews or online questionnaires with key stakeholders from across the food and drink industry. Questions are specifically designed for gaining in-depth knowledge of the inter and intra regional food product flows and for receiving insights into the willingness to participate in an innovative logistics concept with its focus on (horizontal) collaboration between (competing) shippers.

- In total more than twenty interviews were carried out either via face to face discussions or online questionnaires. Interviewees are representatives from across the industry, including three trade organizations (seafood, salmon and whisky), three chain retailers, one wholesaler, eight fish and seafood processors, three logistics providers, two freight forwarders and one road haulier. One additional interview with Mr. Gavin Rose from Pantrak Transportation Ltd was also undertaken due to his extensive knowledge about the Scottish freight network and previous interview experience with major whisky companies. The authors would like to thank all interviewees for sharing their valuable time and knowledge.

2. Shippers' markets conditions in Scotland

- As identified in WP 5.1, whisky and fish (including Demersal, Pelagic, shellfish and Salmon) are the two dominant products in the Scottish food and drink industry. The former is one of the country's biggest earners, contributing vastly to Scotland's multi-billion pound food and drink exports, while the later accounts almost 60 % of the food international trade. In 2010, there were 1.06 billion bottles of Scotch Whisky exported to overseas market at a value of £3.45 billion, and the fish products, Scottish salmon in particular, hit a record high of £623 million in international sales.

- The Scotch Whisky industry in Scotland shows a very high concentration in both market structure and geographical distribution. There are totally 108 licensed distilleries in Scotland and the majority of them are controlled by the top 6 market players including Diageo, Pernod Ricard, Wm Grant & Son, Edrington, Bacardi and Whyte & Mackay (See Table 1). On the geographical distribution aspect, distilling of Scotch Whisky has strong links with rural areas, such as Islay (9 distilleries) and Speyside (49 distilleries) where primary agriculture activities take place. Operations further down the supply chain such as bottling and packaging tend to be located in urban areas, such as Glasgow, Livingston and Fife. This is further evidenced by the regional employment inequality of the Scottish whisky industry, Strathclyde accounts 56.1%, 16.9% in central & Fife, 13.6% in Grampian, Lothian 11.0% in Lothian, 4.9% with highland and Rest of UK only taking around 2%.

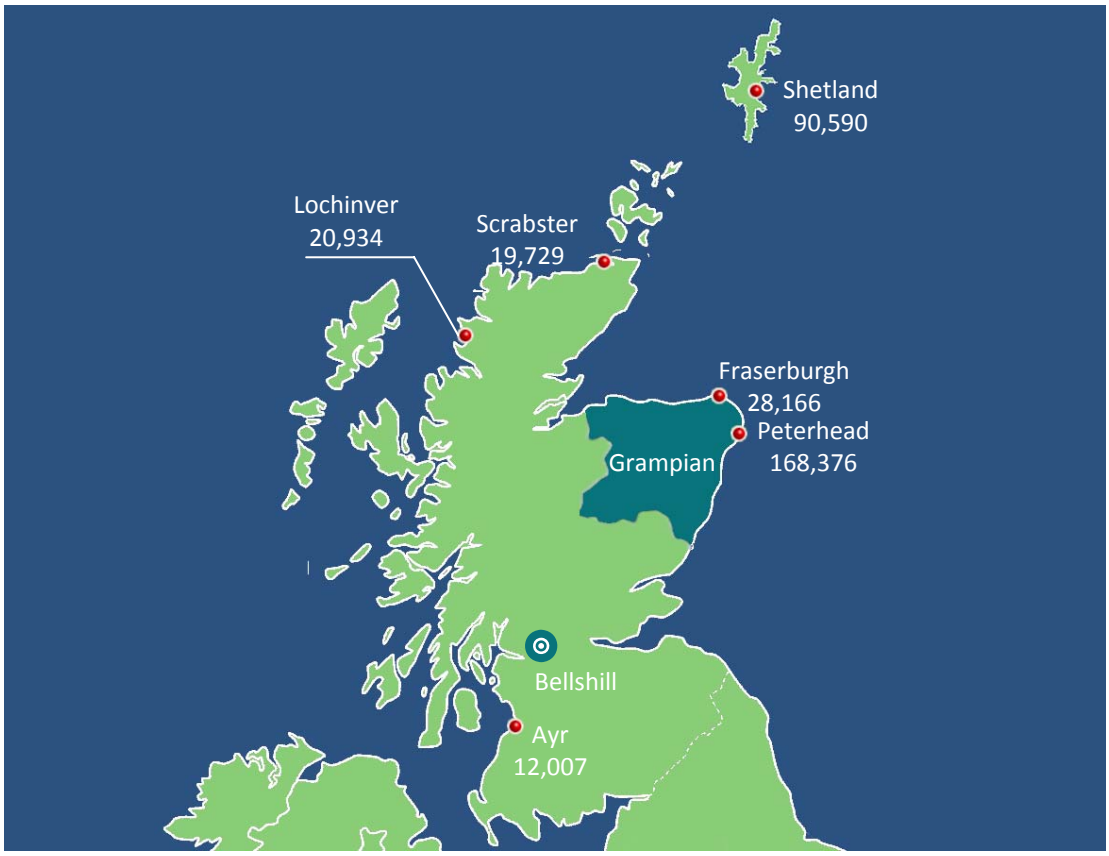
Table 1: Major whisky producers in Scotland

Company	Distillation Capacity		Bottling & Packaging Locations
	Malt Whisky	Grain Whisky	
Diageo	27%	44%	Leven Shieldhall
Pernod Ricard	18%	12%	Kilmaild
Wm Grant & Son	9%	19%	Bellshill
Edrington	8%	10%	Glasgow
Bacardi	6%	-	Glasgow
Whyte & Mackay	-	12%	Grangemouth
Others	32%	3%	-

Source: SWA (2009) and companies' individual websites

- Fish (excluding salmon) landing in Scotland is mainly completed at the ports of Peterhead, Shetland, Fraserburgh, Lochinver, Scrabster and Ayr (see Figure 1). In 2010, there were 385 thousand tonnes of fish products landed in Scotland by all vessels including both the UK's and foreign ones, where 88% were handled at the above six ports. Aberdeenshire is the predominant location for workplaces in the fish processing industry. 51% of all of the processing units are concentrated in Grampian (Aberdeenshire) and provide 62% of the employment. The highlands and Islands is the next most important in terms of employment in the processing sector and provides 16% of the processing units as well as 11% of the employment (http://www.seafoodscotland.org). In addition, Bellshill in Scotland is the most important seafood logistical centre due to its strategic location (hub of motorway network) and the development of a processing cluster at the site. As a result, it has become a particular way-station in consolidating Scottish fish products, especially fresh farmed salmon from the north and a significant volume of other seafood products from Grampian, to the markets in the south and on the continent.

Figure 1: Geographical distribution of fishing and seafood industry in Scotland

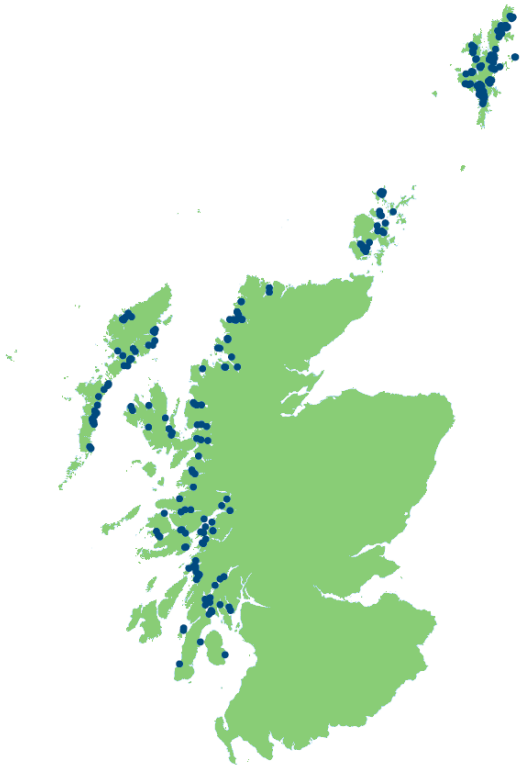


Source: Drawn by authors, based on data collected from Scottish Government (2011a)

- Scottish salmon is the most important product within the category of fish and seafood. In 2010, there was totally 154,164 tonnes of farmed salmon produced by 20 authorised and active companies with 140 sites (another ten companies remained active and authorised, although not producing salmon for harvest). It clearly indicates a highly concentrated market structure of salmon production in Scotland. Geographical distribution of the sites is illustrated in Figure 2.

- The number of salmon processing units in Scotland now stands at 43, 80% of the total processing units in the UK. Distribution of these units is very different to the concentration of general seafood processing with only 6 located in Grampian, 17 in Highlands and Islands, and 20 scattered in the rest of Scotland.

Figure 2: The distribution of active salmon production sites 2010



Source: Scottish Government (2011b)

- Finally, the retailing sector also plays an important role in the Scottish food and drink industry, which contributed about 29% of total GVA generated by the whole food and drink supply chain. Moreover, design of food and drink distribution system has been dominated by the major chain retailers (supermarkets). For example, in 2010, nearly 83% of the retail market of grocery trade in the UK was controlled by the top five supermarket retailers, including Tesco (30.7%), Asda (20.6), Morrison (15.0%), Sainsbury (7.6%) and Co-operative (8.4%). In regard to the geographical distribution of their NDC or RDC in Scotland, most of them are concentrated in central Scotland, particularly close to Coatbridge and Grangemouth:
    - ASDA (2): Grangemouth and Falkirk
    - Tesco (1): Livingston
    - Co-op (2): Newhouse and Dalcross
    - Sainsburys (1): Langlands Park
    - Morrisons (2): Bellshill and Bathgate

2.1 Business activities

- Whisky and fish industries in Scotland are mainly involved in production activities and, as a consequence, they contribute significantly to Scottish employment. As shown in Table 2, the number employed in whisky manufacturing was 8,973 in 2010, where more than 50% of them work in the bottling and packing sector. On the fishing sector, there were 5,218 and 1,064 employees worked for the Scottish fish catching and salmon farming respectively in 2010. In addition, there were about 180 fish processors in Scotland, employing approximately 8,012 people. Most of them are small, mainly primary processors.

Table 2: Key Facts of the Two Dominated Food and Drink Sectors in Scotland

	Whisky Manufacturing	Fish Catching	Fish Processing	Farmed Salmon
Number of Business Unit	108	-	180	249
Direct employment in Scotland	8973	5218	8012	1064

Source: SWA (2011), SeaFish (2011) and Scottish Government (2012)

- According to reports made by the Scottish Government (2011c and 2012), the number of retail units in non-specialised stores with food, beverages or tobacco predominating (SIC 2007 code: 4711) in Scotland was reported at 4,520 in 2010. Employment in this sector was around 107,500, about 30 % employees of the Scottish food and drink supply chain. However, again, it is a highly concentrated market where the top 5 chain retailers (Tesco, Asda, Morrison, Sainsbury and Co-Operative) account for about 83 % of total market share. Moreover, large companies (e.g. chain retailers) with more than 250 employees employed 80 % of individuals with the retailing sector, and 13 % worked in small businesses with less than 10 employees.

2.2 Logistics facts

- In 2010, there were 1.06 billion bottles of Scotch Whisky delivered to the overseas market. As highlighted in Table 3, USA, France and Spain are the top three destinations in terms of both value and volume. The East Asian countries such as Singapore, South Korea and Taiwan appear as new emerging markets, and more importantly, large potential still exists for future expansion.

Table 3: Top 10 markets of Scottish Whisky Products 2010

Countries	Exports	
	Value (£ million)	Volume (75cl bottles, million)
USA	499	113
France	422	165
Spain	268	75
Singapore	221	49
South Africa	169	44
South Korea	153	35
Germany	126	42
Taiwan	107	18
Greece	97	22
United Arab Emirates	67	19

Source: SWA (2011)

- Road is the dominant transport mode for all the inland movements and part of overseas trade (e.g. EU countries are served through the Channel Tunnel in England) during the delivery process of whisky exports. First of all, the whisky is transported by road from a large number of distilleries (mainly located in Highland, Lowland, Speyside, Islay and Cambeltown)

to a small number of bottling and storage facilities concentrated in West Central Scotland and Fife. From these locations the whisky destined for export is taken by either road or rail (e.g. Diageo using the rail service of W. H. Malcolm) transport to Grangemouth to be loaded on deep-sea container ships. At this stage, there is a serious shortage of maritime containers for whisky shipping. Finally, much of the whisky destined for European consumption is transported by road to cross the Channel at Dover, and also a less significant proportion is shipped by using ferry services between Rosyth and Zeebrugge;

- Table 4 below indicates the major overseas markets of the Scottish fish exports by using the UK trade data as a guide. Scotland remains the major region in the UK fishing industry and accounts for over 61% of all UK fleet landings. As highlighted, France and the Netherlands are the biggest markets in relation to the total trade volume. This is mainly because Boulogne in France is a key auction market for the sale of products originating from the UK, and the Netherlands (Rotterdam) serves as the major transhipment hub for exporting fish to Asia. The United States is positioned as the third biggest market with a trade value at £147,215, mainly for fresh salmon import. On the import sector, major sourcing areas are mainly concentrated around Iceland, Faroe Islands and Scandinavian countries. China and Thailand have also become important suppliers due to the shift of processing business from Europe to the Far East. In addition, Humberside is the primary landing area of the UK's fish imports due to its well developed fish processing industry.

Table 4: Fish and Fish Preparations of the UK Trade in 2010

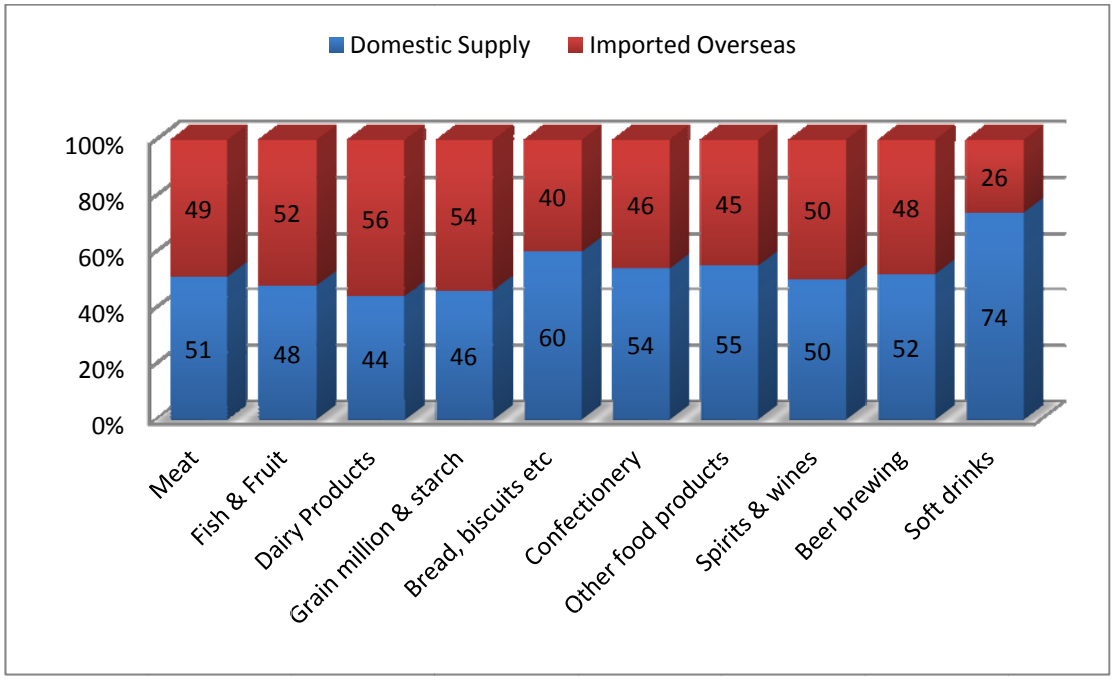
Exports			**Imports**		
Top 10 Markets	Value (£ 1000)	Volume (Tonnes)	Top 10 Suppliers	Value (£ 1000)	Volume (Tonnes)
France	353,394	87,732	Iceland	323,337	83,180
Spain	156,740	37,641	Denmark	160,785	58,034
U.S.A.	147,215	31,925	Thailand	149,161	42,597
Ireland	104,073	25,997	Germany	148,074	45,969
Italy	92,420	17,216	China	140,992	56,436
Germany	73,713	25,068	Norway	127,693	54,276
Netherlands	64,407	84,405	Faeroe Islands	113,783	36,500
Russia	54,263	46,506	Netherlands	80,071	23,942
Portugal	38,624	17,328	Canada	76,100	15,513
Belgium	35,429	6,048	Sweden	75,394	19,193
Total	**1,120,278**	**379,867**		**1,395,390**	**435,641**

Source: HMRC

- Due to the time-critical feature, fish exports to the continent are highly dependent on road transportation with specialist refrigerated vehicles and storage facilities, even though there are a small number of direct shipping exports from Shetland. Fishboxes and pallets are the main equipment for packaging. Fish export to the United States, mostly fresh salmon, is done by air freight services. Glasgow is the major airport used due to its significant service capacity (both availability and frequency) and close distance to Bellshill. Additionally, with the exception of direct transportation to the EU, much of the landed fish is further moved by road from north east Scotland to the Grismby area in England for secondary processing, and finally being transported to mainland Europe for distribution around the world.

- The Retailing sector of the Scottish food and drink industry highly relies on overseas supply, and consequently leads to a high transport demand. As shown in Figure 3, more than half (52%) of total food and drink retail sales in Scotland are products imported from overseas. However, due to the lower significance of the Scottish economy, there is no direct import to Scotland, but imported product flows through the retailers NDCs located in the midlands. As a result, the development of the supermarket's NDC, RDC and PCC networks reflects the dominance of road travel. Meanwhile, the geographical nature and size of Scotland and relative distance to its major markets, in terms of freight movement, also offers great competitiveness to road transportation rather than other modes.

Figure 3: Domestic products supply as a share of total retail sales in Scotland, 2007



Source: Scottish Government (2011c)

- In spite of road's predominance, supermarkets have recently been promoting their own trials in other modes, including barges and rail. The Scottish DCs are generally served by road from the larger DCs in England, but some supermarkets are beginning to try moving containers now by rail or sea. For example:
  - ASDA are bringing some containers by feeder ship from Felixstowe to their purpose-built import centre at Teesport in northeast England;
  - ASDA is sending some containers by rail from Grangemouth to Aberdeen;
  - Tesco is bringing some containers from Daventry (England) by rail to Grangemouth then road to the Livingston DC;
  - Tesco is sending some containers by road from Livingstone to Grangemouth then by rail to Inverness;
  - Co-op is running a trial of 2 containers per night from Coventry by road to Daventry, then rail to Coatbridge then road to their DC at Cumbernauld.

3. Freight flow mapping

3.1 Fish sector

- As mentioned before, the principle source of the Scottish fish industry is local landing and farm production at Shetland, Aberdeenshire and the North coast (Scrabster). Shetland is a major pelagic hub with significant aquaculture production, while Peterhead and Fraserburgh from Aberdeenshire account for more than half of the total Scottish fish landing. In addition, supplementary imports of whitefish from Faroes and Iceland are also landed at Aberdeen (Peterhead), where the only BIP (Border Inspection Post) for frozen packaged fishery products in Scotland is located.

- Glasgow (Bellshill) is an important logistics hub for the region's shellfish and farmed salmon. Large scale temporary chill and cold storage facilities are available on site for consolidating relevant loads before onward delivery. Meanwhile, with the demand surge from North America and Far East markets, Glasgow airport is utilized for fresh salmon and high valued shellfish exports.

- Transport of the Scottish fish products mainly rely on road haulage, both domestic movements and international exports. As illustrated in Figure 4, much of the fish landings at the North and West Coast are loaded onto trucks for transport to Aberdeenshire for further processing. On the East – West sector, in contrast, most shellfish landed on the East Coast, together with Shetland salmon delivered by the Shetland - Aberdeen ferry services, is transported to Glasgow by different hauliers. The main distribution routes on the North – South direction are toward processors and distributors in Humberside (for secondary processing or onward sale), London's Billingsgate market (mainly whitefish resale) and the continent (e.g. France, Spain, Germany and Italy). Movement within the UK is effected through distribution nodes at places such as Glasgow, Manchester, Birmingham, Humberside, London and Bristol.

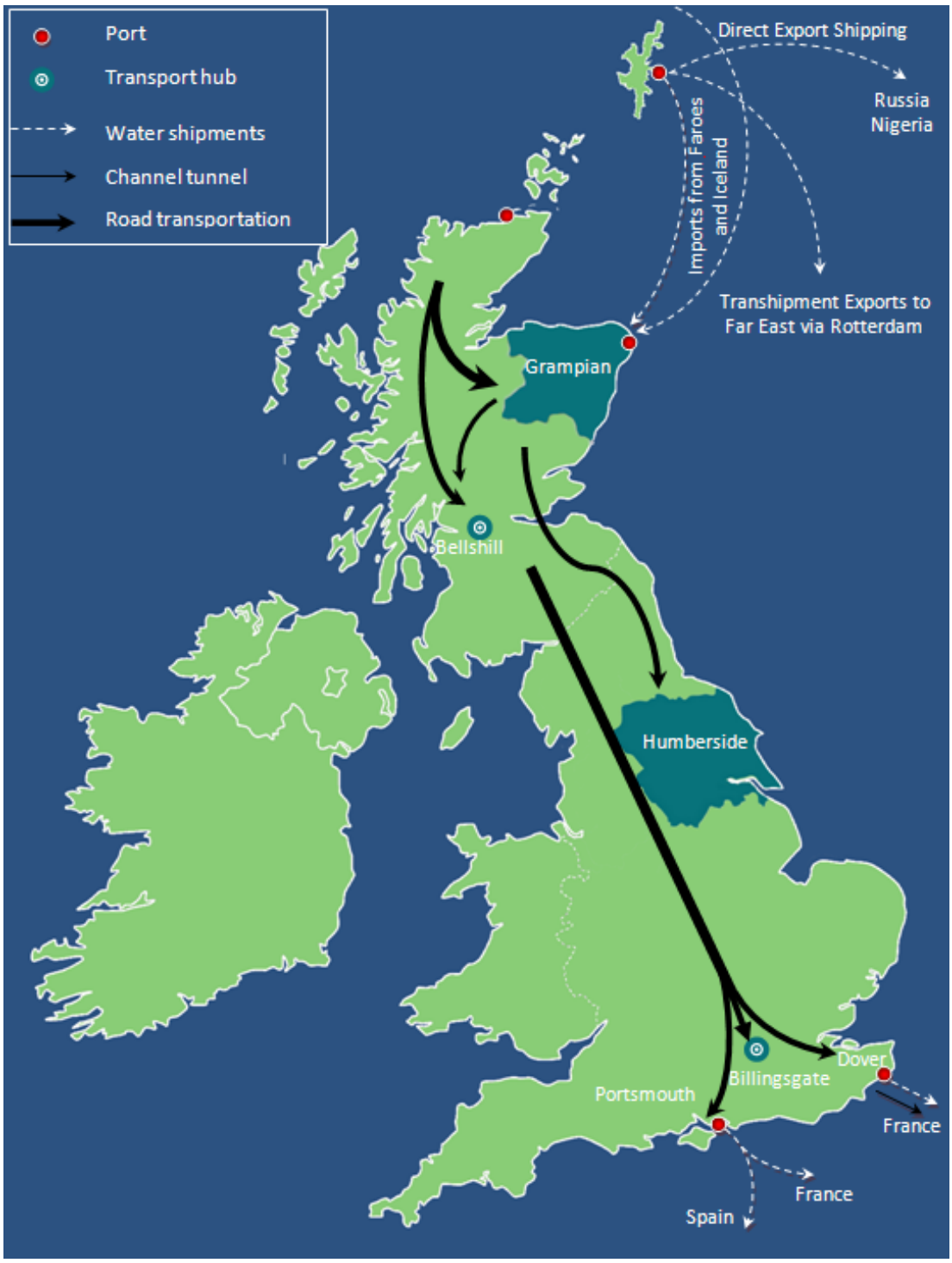
- It is estimated by the industrial association (i.e. Seafood Scotland) that more than 50% of the fish leaving Scotland is fresh headed and gutted products. It in consequence brings significant challenge to the mode/route selection. For example, interviewees who are involved in continental exports will have to deliver their shipments to customers or agents within 60 hours after dispatching. As a result, road transport is used to its maximum due to its advantage in flexibility, and the continental connections are always the shortest sea crossing, either through the Channel Tunnel or utilizing ferry services from the ports of Dover and Portsmouth. Unfortunately there is currently no volume shipped on the Rosyth – Zeebrugge route. This is because the main markets of many exporters are in France and therefore the Dover-Calais and the Channel Tunnel are regarded as preferable and perceived as cheaper. In addition, delivery time (both frequency and arrival time) of Rosyth – Zeebrugge is another barrier for fish exporters using this services.

- Destinations of frozen produce in Scotland vary depending on the species. For example, a large volume of pelagics landed at Shetland are directly exported to Russia, Nigeria and East Asia by sea. It should also be pointed out that Rotterdam is often used for transhipment of pelagics from reefer vessels from Shetland to container vessels bound for the Far East. Frozen shellfish (mainly prawn and scallops) from Bellshill consolidation centre and part-processed small pelagic fillets, pickles and marinades from Aberdeenshire are often shipped

to the continental distributors and processors respectively by refrigerated trucks with a specific temperature request at -18 °C.

- Most fish companies in Scotland are small or medium sized and their deliveries often rely on haulage services offered by seafood transport companies, especially for the long-haul transport. The major service providers include Fridgecosse from Bellshil, Peterhead Transport and Davidson & Wilson from Aberdeenshire and Shetland Transport from Shetland.

Figure 4: Illustration of fish and fish preparations flows



3.2 Whisky sector

- Unlike the full road dependence of fish transport, Scotch Whisky exports involve more than one mode of transportation, including road, rail and sea freight. The nature of the product indictates that there is not any specific condition required within the process of delivery. Temperature control for example. Meanwhile, against the increased volume produced year by year, advantages of scale economy are more significant when shifting the traffic flows from road to rail and sea. It is estimated by the SWA (Scottish Whisky Association) that average logistics expense stands about 12 % of the total production cost.

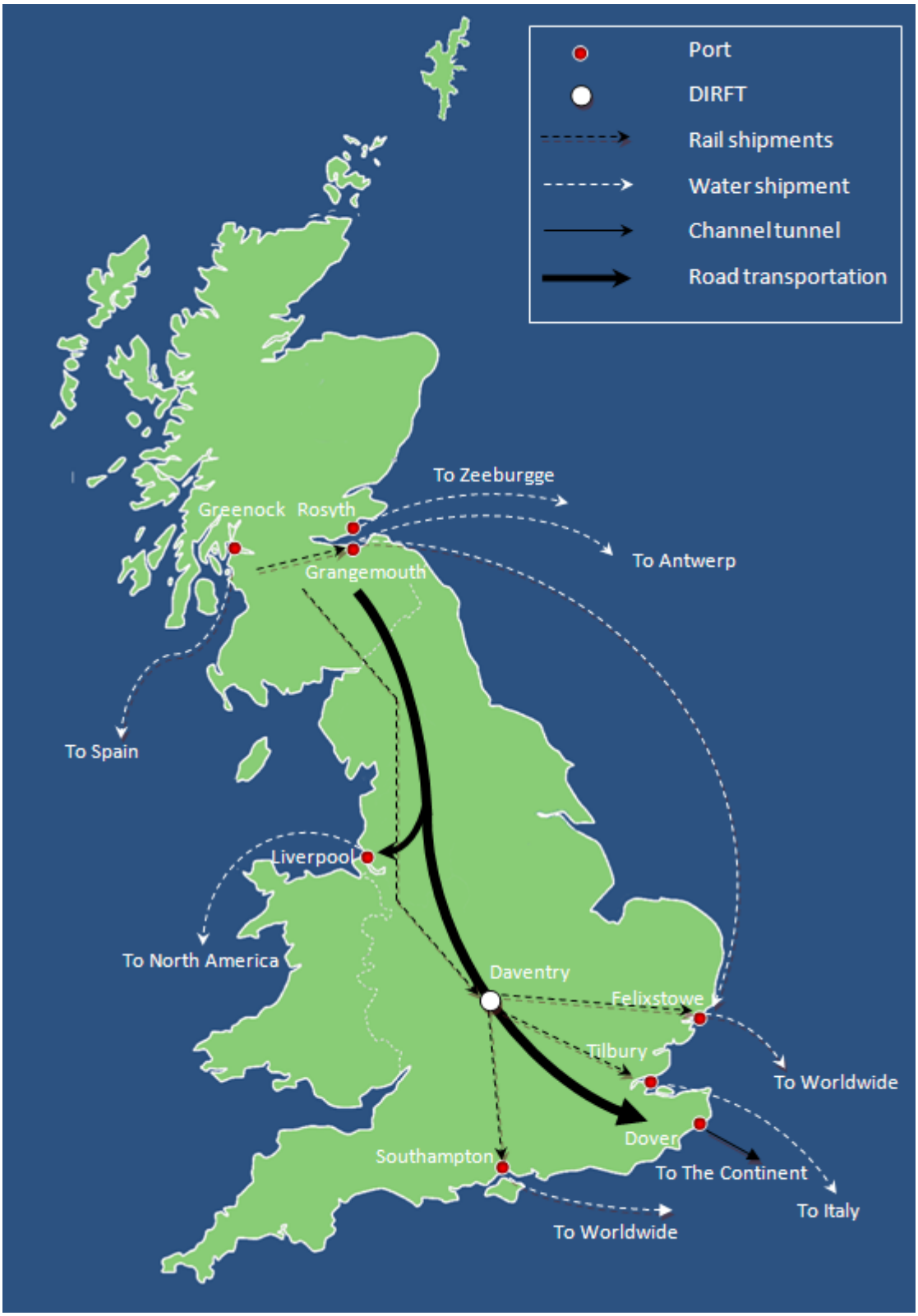
- On the sea freight sector, three Scottish ports including Greenock, Rosyth and Grangemouth greatly benefit from the concentration of bottling and packing operations in the Central Belt area. Port of Greenock is often used for traffic to the Spanish market. Exports to Germany and Eastern Europe are through Grangemouth on the Seawheel services. Rosyth – Zeebrugge ferry service also shares a small volume of whisky exports, especially bulk shipping to France. In addition, Teesport is also used by Chivas Brothers (part of Pernod Ricard) for traffic to France and the Benelux countries, with Italian traffic moving on the Geest service through Tillbury. Deep sea destinations including the Americas and Asia Pacific are served either by feeder through Grangemouth to mother ports of Felixstowe, Tilbury and Antwerp or by rail from Coatbridge to Felixstowe and Southampton. William Grant also uses the port of Liverpool for its North American shipments.

- Rail freight services play an increasingly important role in the domestic leg. For example, W.H. Malcolm offers Diageo a Linwood – Grangemouth services for moving cargoe from factory gate to port. The latter also use the Coatbridge – Daventry service to feed their distribution centre in Daventry. A large volume of exports is delivered to the English ports by rail as bigger shippers like Diageo and Chivas Brothers are looking for a time saving by direct loading to deep sea vessels. JG Russells has managed to match some flows by bringing wine from France to the DC at Magna Park, then the Costco load to Scotland, then whisky south from Scotland to France.

- Road haulage has less significance on the end transport sector of the Whisky supply Chain when compared with its extensive involvement during the process of manufacturing. Trailers are used to move some domestic shipments with a short travelling distance, and sometimes traffic to continental countries due to the lack of maritime container supply.

- Logistics operation of most whisky exports are completed on the basis of freight forwarding activities, even though some manufacturers prefer to have direct contracts with shipping lines. For example, the majority of forwarding activities of William Grant is handled by J.F. Hillebrand on a tender basis, and W.H. Malcolm offers Diageo an integrated service of inputs and outputs. The latter does 200 containers a day for Dageo, and at their Grangemouth terminal, at any given time, they have 17,000 pallets for export, 3,000 pallets for domestic, and 60,000 pallets total across all sites. In contrast, Chivas has direct contracts with shipping lines, which are operated on an annual basis.

Figure 5: Map of Scotch Whisky movements



Source: Drawn by authors

3.3 Retail sector

- Logistics chains of all major retailers consolidate traffic via their RDCs in the midlands area, which breaks the transport chain between English ports and Scotland and reduces the opportunities for feeder services. Food flows toward Scotland are therefore the dominant transport mode due to its time constraint. However, against the pressure from road congestion, fuel cost increases and environmental concerns, more and more retailers are starting to show interest in shifting traffic from road to rail.

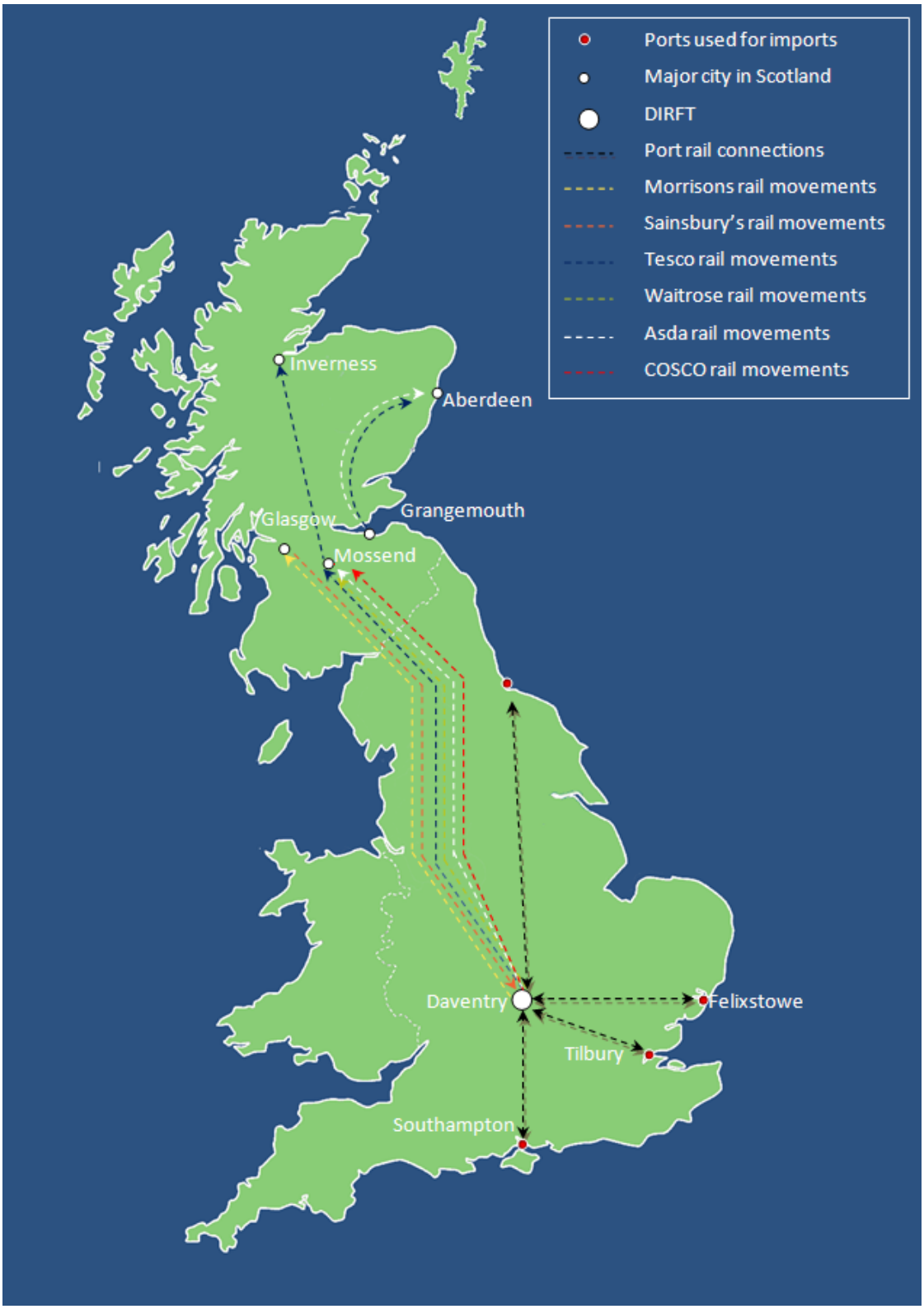
- Tesco now has four dedicated services (Daventry-Mossend, Mossend-Inverness, Daventry-Thurrock/Tilbury and the recently started Daventry-Magor). These are mostly secondary distribution except for the service from the port of Tilbury to Daventry. Tesco is about to start using the existing Grangemouth-Aberdeen service, as well as planning some more potential services, only one of which is likely to be a dedicated service.

- Sainsbury uses rail on primary hauls to bring product of Scottish suppliers to their midlands DCs, using the shared JG Russell service. Morrisons use the JG Russell service in the opposite direction to move loads of picked pallets from Northampton to Bellshill. In the past, they have trialled services between Trafford Park and Glasgow, and Coatbridge to Inverness. Waitrose uses the WH Malcolm Anglo-Scottish service, as does DHL for M&S. M&S is building its own rail-connected DC at Castle Donnington (see below for discussion). Asda also uses the WH Malcolm Anglo-Scottish service, and the DRS service onwards to Aberdeen. With the additional Tesco volume, the Grangemouth-Aberdeen service is now fully utilised and is about to extend to 7-day operation. In fact, DRS has noted that they have received additional interest from retailers due to the visible success of their Tesco trains, which is extremely encouraging. The Co-operative is currently running a trial on the WH Malcolm Anglo-Scottish service, taking 2 containers per night, 5 nights per week.

- Costco use the JG Russell service to Scotland. They send about 10-15 containers per day on the train. They also used to send the Aberdeen deliveries on this train (just to Coatbridge then by lorry to Aberdeen), but because of the timings it is actually quicker to send it by road. The train arrives early enough to suit the central belt stores but there would not be enough time to drive it up to the Aberdeen store. They have been using the intermodal service for about 5 years. They use it because it is cheaper.

- Stobart Rail runs a weekly train during the winter carrying fruit from Valencia in Spain in refrigerated containers (30 x 45ft containers) through France and the Channel Tunnel into the JG Russell terminal at Barking. The train is currently a weekly service but they want to grow it to 2-3 services per week. This would ensure better asset utilisation which would make it more economic. That is the basis on which they applied for Marco Polo funding because to get that funding the service needs to be feasible within 3 years.

Figure 6: Rail movements of major retailers in UK



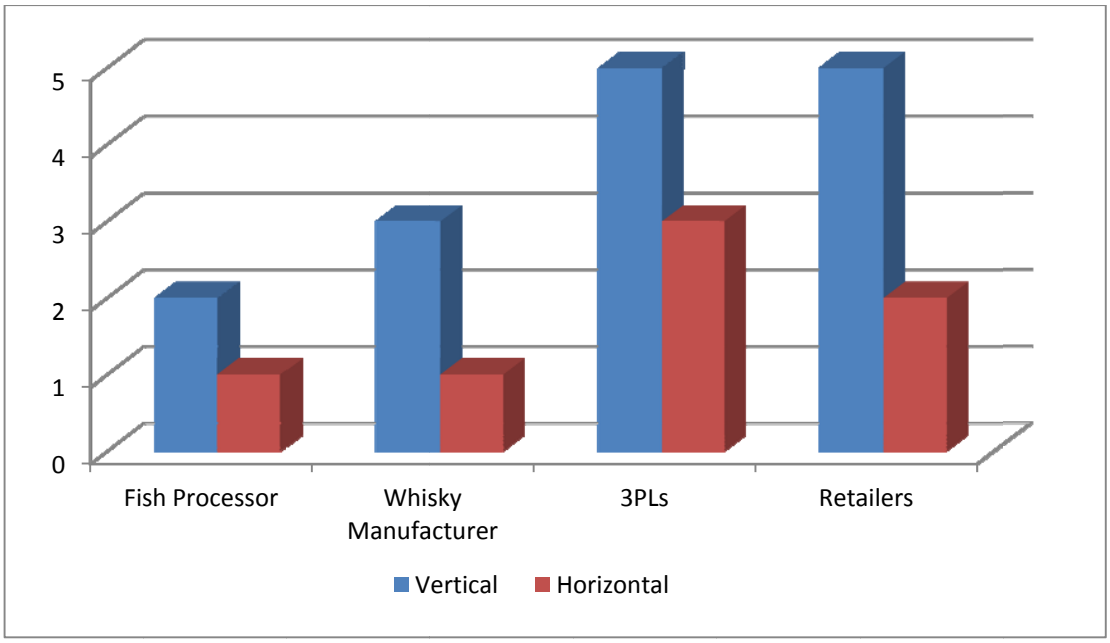
Source: Drawn by authors

4. Collaboration

4.1 Attitude and engagement towards co-operation

- During the interviews, respondents' attitudes toward logistics co-operation has been set on a scale from 1 to 5 by depending on their willingness. This willingness has been further broken down to vertical and horizontal co-operation respectively in order to better understand the scope for co-operation. Vertical co-operation is defined as co-operation between producer, logistics provider and traction provider whereas horizontal co-operation is between different producers sharing the same logistics chain.

Figure 7: Willingness for logistics co-operation



Note: Due to the difficulty for interviewing whisky manufacturers, data here is assumed on the basis of Scotch Whisky Association (SWA) and third party logistics providers (3PLs') comments.

- As shown in Figure 7, fish processors show least willingness in both vertical and horizontal logistics co-operation. As mentioned in previous section, most fish processors are small or medium sized businesses and they have less control over the whole supply chain. Their long-haul exports flows rely on the haulage services provided by major seafood transport companies, even though some of them own and maintain fleets for the delivery of loads within the UK. However, they are seeking opportunities for picking some loads like packing boxes, fruit and vegetable to avoid empty backhauls. Cost efficiency is obviously their major concern.

- Both vertical and horizontal collaboration can be observed in the operations of 3PLs and retailers, however it is vertical co-operation that is having the greatest impact so far. Most noticeable is the relationship between retailer Tesco, logistics provider Stobarts and traction provider DRS. Working closely together has allowed all parties to develop knowledge of requirements and adjust operations to suit. Turning to horizontal collaboration, this can relate to retailers sharing space, either within containers (or using each other's containers), or sharing space on trains. The former does not currently happen, but the latter is already in

evidence, with most retailers using multi-user 3PL trains as noted earlier. Other interesting collaborations occur on 3PLs sector as well. For example, last winter there was a big problem with snow and they needed to move cargo so they put together a train with DRS traction, Freightliner wagons and WH Malcolm traffic.

- It is interesting to find out that the overall evaluation of whisky manufacturers was not as high as expected. It becomes understandable when focusing on the industrial structure and corresponding market power of dominating players. High concentration of whisky manufacturing in Scotland creates massive volume for each company and therefore they would like to be as close as possible to the supply chain. As a result, they either have direct contracts with shipping companies (e.g. Chivas Brother and Diageo), or simply pay to get a service and leave the job to the forwarders to determine routing selection (e.g. William Grant).

4.2 Perceived opportunities for collaboration

- According to the interview results from the Scottish perspective, freight flow matching and modal shift become the most perceived opportunities for collaboration in future. In fact, 3PLs and retails have already started to pay such attention to their traffic flows getting in and out of Scotland. Unfortunately there is no major seafood transport company involved in the interviews. However, feedbacks from all fish processors clearly indicate that freight flow matching on their backhauls is highly demanded for the purpose of cost saving.

4.3 Motivation for collaboration and critical success factors

- Motivations for logistic collaboration vary in each food sector. In terms of fish products, utilizing specialised seafood hauliers by food processors is not merely because of the former offer a cheaper price than running their own fleet, but more importantly for achieving great service frequency, which is critical for fresh fish exports due to the nature of ‘small volume with frequent supply’.

- In contrast, whisky manufacturers, 3PLs and retailers have more concerns on service effectiveness and sustainability. First of all, road congestion problem had been mentioned by all interviewees across these three sectors and it brings them a serious challenge in cargo flow movements. For example, whisky manufacturers need to have their deliveries perfectly match shipping schedules, retailers have strict time window for loads dispatching and arriving, and 3PLs mentioned social responsibility in regard to the heavy usage of A9 by lorries. Secondly, apart from the continuous increase of fuel cost, 3PLs and all major retailers are facing great pressure from carbon targets. Tesco, for instance, has 360 boxes in the new “Less CO2” livery on their rail services, and use this as a marketing strategy.

- Finally, economic globalisation further drives all market players to seek a seamless supply chain through logistics co-operations. For example, the rapid increase of whisky market in the Far East and South America; the shifting of fish processing business from Europe to China and Thailand; and the global sourcing strategy utilised by all retailers in the UK market.

4.4 Perceived pitfalls

- Technical issues constrained by the condition of delivering products. This issue is of most concern to fish processors when talking about freight flow matching on both inbound and outbound journey. Groupage of different products needs to be carefully selected in regard to the capability of mixed loads.

- Arrival time and seasonal issue. Logistics co-operation should not be purely based on the extremely strict time requirement, but also a sustainable collaboration throughout all seasons. Again, it is a big challenge to the fish industry.

- There are also some constraints on general cargo sectors. For example, shortage of maritime containers is a very serious issue in regard to the Scottish drink exports. It is interesting to find out in the interviews that retailers and whisky distillers are discussing how to solve the imbalance issue, which would be a huge influence on intermodal flows to/from Scotland. Both sides appear to be trying to convince the other to use the same type of container and just transload the load at one end. It could be that the savings made from matching the flows would outweigh the cost of transloading. However the distillers are not keen on this idea because they don't want their high value cargo to be handled any more than is necessary, and the retailers do not feel that the extra repositioning costs paid by Scottish shippers is their problem so they have no motivation to inconvenience their operations.

- Another ongoing concern voiced by hauliers is the difficulty for small users to switch to rail, ranging from the requirement to provide their own containers to their need for door to door quotes. Access has been reduced as the UK rail industry has seen a major decline in wagonload services over the last few decades. Better information for potential shippers is also required regarding train services, timetables and wagon capacity. Due to a lack of marketing and information availability, rail is often not visible to prospective customers.

5. Action – Conclusion

- Despite the economic recession, it is clear that the Scottish food and drink sector remains strong, with sustained exports to Europe. There is definite potential for more efficient and effective transport to be achieved through collaborations from different sectors and geographical areas. Two potential projects highly relate to the Scottish food and drink exports are identified as following:

- Further utilisation of Rosyth – Zeebrugge ferry services. It has been evidenced by a number of current users that the Rosyth – Zeebrugge ferry services does offer efficiency and cost advantage over the alternative road connections between Scotland and continental Europe. However, unfortunately, it is not feasible for the time-dependent fish exports due to its later arrival, longer transit time and lower frequency. Any improvement of these sectors could produce increased interest from both food exporters and importers. Obviously, logistics collaboration would be a key tool in enhancing the usage of Rosyth – Zeebrugge ferry services in future.

- Reposition of maritime container to Scotland. It is well known that the container imbalance in the UK, in particular on the Anglo-Scottish route, is a big issue. Northbound imports to Scotland come mostly as 45ft pallet-wide road trailers or swap bodies as they are retail

movements from NDCs in the midlands. However the majority of Scotland's exports leave as 20ft/40ft maritime containers either through ports or on rail. As a result, shippers (mainly whisky exporters) have to add an extra repositioning charge to their total transport costs against this shortage. If, as indicated in the interviews, the retailers and whisky producers sort out some container re-use and transloading system, that could save a lot of money for Scottish shippers. So investigating the operations and the market has found that there may be a solution on the horizon to improve things for Scottish shippers, but interviews also showed that it will be quite unlikely that either side will be the one to make the operational concession to the needs of the other. So there may be a role for a publicly funded container transloading centre.

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Appendix 1: Foodport Interview Guideline for Logistics Co-operation

Main Goals

- Obtaining (high-level) insights into **shippers' freight flows**, with respect to the creation of **major transport corridors**;
- Obtaining (high-level) insights into **willingness to co-operate** with (competing) shippers;
- Obtaining (high-level) insights into **thresholds & opportunities** for potential (horizontal) collaboration;

Methodology

- End point of **Work package 5.1** is starting point for Work Package 5.2
- **Bottom-up** approach, with focus on the demand side (shippers);
- Starting from (high-level) insights into **specific shippers' market conditions** (business context, logistics requirements,…);
- **Freight flow mapping**, with the aim of recognizing major transport corridors;
- **Freight flow matching** important leverage for horizontal collaboration between (competing) shippers;
- A **non-disclosure agreement (NDA)** will be concluded, so confidentiality with respect to provided data can be guaranteed at all time.

General structure (first round) interviews

- Introduction interviewer/interviewee;
- Situating "Food Port project" and the main goals within the broader Interreg IVB North Sea Region Programme;
- General outline interviewed company;
- Insights into attitude towards (horizontal) collaboration;
- Freight flow mapping;
- Outlining next steps.

Introduction Food Port-project within the broader Interreg IVB North Sea Region Programme

The North Sea Region (NSR) Programme under the European Union covers an area of 664,000 km². It consists of the whole of Norway and Denmark, the eastern parts of the UK, parts of the Flemish Region of Belgium, the north western regions of Germany, the northern and western parts of the Netherlands and the south western region of Sweden. The region is connected by the large sea basin of the North Sea.

As part of the Interreg IVB North Sea Region (NSR) Programme, the "Connecting Food Port Regions - Between and Beyond", or in short **"Food Port" project**, aims to develop the North Sea Region (NSR) as the best food cluster and hub in Europe for food products delivered via efficient and sustainable transport systems e.g. "green transport corridors". Food Port brings together local authorities, knowledge organisations, food industries and ports from six countries to find practical solutions to improve the efficiency, effectiveness and sustainability of the food supply chains. These six countries are Norway, Sweden, Scotland/England, Denmark, Germany and Belgium.

The work package 5 (Enhancing market knowledge) under the Interreg IVB NSR Food Port project aims to improve the accessibility between the partner regions and to realise green transport corridors for food products.

To be more specific, and for a clear understanding of the project, the concept of "green transport corridors" is referring to **sustainable, multimodal transport corridors**, and has in this context nothing to do with "secured" customs trade lanes (cf. Authorised Economic Operator). The main focus is on reducing carbon footprint and on logistics co-operation, not on creating a customs transport corridor.

This guideline is specifically developed as a tool for gaining in-depth knowledge of the inter and intra regional food product flows and for receiving insights in the willingness to participate into an innovative logistics concept with focus on (horizontal) collaboration between (competing) shippers.

To be more precise, the main focus of the guideline is based on three actions:

1. Drawing up inventory of food product flows on a city level basis of inter and intra regional food product flows by standardised interviews with shippers;
    - A non-disclosure agreement (NDA) will be concluded, so confidentiality with respect to provided data can be guaranteed at all time.
2. Matching food product flows and mapping of potential green transport corridors for consolidation of food products with a multimodal focus (rail, inland waterway, short sea shipping);
3. Gaining insights into willingness to participate into a horizontal collaboration.

This guideline has to be seen as an important means, and certainly not as a goal on its own, to the general food port objective, namely: to improve the efficiency and effectiveness of food flow and realise the green transportation corridors for food products in the North Sea Region.

General setting company

1. Business activities

1.1 Food sector

frozen vegetables	*frozen potatoes*	*frozen fruits*	*frozen fish*	*frozen meat*	*ready-to-eat meals*
fresh vegetables	*fresh potatoes*	*fresh fruits*	*fresh fish*	*fresh meat*	*Dairy products*
Beverages	*Retail*	*Wholesale*	*Raw Materials*	*Other:*	

1.2 Specific on-site business activity?

E.g. production, distribution, wholesale,…

2. Business context

2.1 Suppliers?

Indication of the main characteristics, number of suppliers and their location

2.2 Customers ?

Indication of the main characteristics, number of clients and their location

type of customers (factory, distribution centre, auction, wholesale → B2B and/or B2C)

Used logistics systems (point-to-point, hub-and-spoke, combination of both,...)

2.3 Competitors?

Indication of the main characteristics, number of competitors and their location

2.4 Situation within the group (relationship towards parent company) – if relevant?

e.g. with respect to central versus decentral management concerning transportation/warehousing/logistics

2.5 Importance of transportation/distribution/logistics

Expressed as TDL-cost / total product cost (%)

2.6 Logistics service providers or partners?

Indication of the main characteristics, number of logistics service providers and their location

Identification of current logistics transport systems (point-to-point, hub-and-spoke,...)

2.7 General impact of exogenous factors for business activity

e.g. globalisation, sustainability, variability in demand side, sensibility for (aftermath of) financial/economical crisis, regulation, technology,…

3. Business scope

3.1 FTEs?

3.2 Annual turnover?

3.3 Other important parameters for the business scope?

4. Business SWOT (in general terms)

4.1 Strength(s)?

4.2 Weakness(es)?

4.3 Opportuniti(es)?

4.4 Threat(s)?

5. Technology

5.1 Does your company use a software system (Enterprise Resource Planning, ERP) for management of orders, invoices, goods flow etc? If “Yes” which system?

5.2 Does your company use Electronic Data Interchange (EDI)? If “Yes” in which aspects of the business?

5.3 Does your company generate data itself? For example data records from RFID or Barcode readers, fleet tracking information, electronic proof of delivery etc.

5.4 Please describe briefly any electronic, software and hardware systems your company uses for **Identification** and **Location** of goods and assets and the **Communication** systems used to transfer resulting data to the point of use (ILC).

5.5 Are the any other logistics technology systems used by your company not already mentioned?

Willingness for logistics co-operation – collaboration

1. Openness and vision

1.1 Is there any support for co-operation with respect to logistics? (on a scale from 1 to 5, where 1 is no support and 5 is major support)

[1 – 2 – 3 – 4 – 5]

1.2 In which figuration will the logistics co-operation take place? Where do you see most opportunities for logistics co-operation?

- Bundling of freight flows - inbound
- Bundling of freight flows - outbound
- Multimodality (modal shift)
- Consolidation of distribution/warehousing
- Reverse logistics
- Supporting services, which ones? (e.g. express or parcel services)
- Others?

1.3 Is there any experience regarding logistics co-operation (if so, positive/negative)?

[yes -[1 – 2 – 3 – 4 – 5]- No]

1.4 Which are the driving forces behind (horizontal) collaboration? What is the underlying motivation for logistics co-operation?

Internal drivers?

[indicate order of priority]

efficiency (costs)	*effectiveness (service)*	*sustainability (carbon footprint)*

external drivers (= exogenous factors which might enforce horizontal collaboration with respect to logistics)***?***

[indicate order of priority]

Uncertain economic climate	*Unstable market conditions*	*Stronger competition*
Globalisation	*Technological innovation*	*Shorter product life cycle*
Increasing differentiation and specialisation	*Increasing legislation*	*Highly demanding customers*

1.5 Is there any willingness by the (top) management for showing their potential engagement by drawing up a letter of intent, if all necessary preconditions are met, that subscribes the intention of logistics co-operation?
[yes– no]

2. Barriers towards logistics co-operation

2.1 Which are the (minimal) **general conditions** that must be fulfilled for considering logistics co-operation?

2.2 Are there any **veto's** (towards competitors) or exclusion criteria with respect to logistics collaboration? (strategically, technical, operational, organizational)

2.3 Which are the foreseen **challenges**?

(from a strategically, technical, operational and organizational point of view)

2.4 Which are the foreseen **pitfalls**?

(from a strategically, technical, operational and organizational point of view)

3. Preferred partners

3.1 Companies located in nearby industrial zones (geographical clustering)? Which ones?

3.2 Competing companies (clustering within your sector)? Which ones?

3.3 Preferred third parties?

4. Engagement

4.1 Which **role** would your company like to play in a potential process of logistics co-operation/horizontal collaboration?

(leader/offensive, follower/defensive or rather reluctant)

4.2 Which prerequisites or **critical success factors** does your company foresee?

4.3 What are the **essential next steps** for a successful process? Estimated throughput time?

4.4 Initial **estimation of the contribution of the company** (example given: in terms of volumes on specific trade lanes) towards logistics co-operation?

4.5 Initial estimation of the **chances of success**? (%)

4.6 Initial **estimation of the potential effects** (enhancement) on company results – savings with respect to total logistics costs?

['minimal'– a few percentages or 'breakthrough' – double digit]

4.7 How does your company see the **potential sharing of the benefits (gain sharing)** thanks to horizontal collaboration – desired model?

Freight flow mapping

An easily accessible Excel toolkit had been developed for mapping and matching all the relevant good flows (inbound/outbound) with respect to the following parameters:

- Origin (O)
- Destination (D)
- Volume (as is + to be, if possible)
- Conditions (C)
- Transport mode (current and potential)
- Logistics requirements

Relevant freight flows are flows where the company has a direct (or indirect) impact / decision power.

Furthermore, current and potential new good flows will be taken into account.

A non-disclosure agreement (NDA) will be concluded, so confidentiality with respect to provided data can be guaranteed at all time.

Next steps

After analysing the obtained freight flows from the participating companies, potential major transport corridors will be detected an further investigated for development.

Confidentiality is of crucial importance. It is obvious that the potential transport corridors will be presented on an aggregated level. No data on company level will be disclosed.

Second round conversations will be held with the participating companies who showed their interest in one or more potential transport corridors or in another form of logistics co-operation.

The main goal is to **develop a successful process towards potential scenario's** of co-operation / collaboration with respect to logistics.