AGILITY IN THE SWEDISH INTERMODAL FREIGHT MARKET – THE EFFECTS OF THE WITHDRAWAL OF THE MAIN PROVIDER

Jonas FLODÉN, University of Gothenburg, Box 610, SE-405 30 Gothenburg, Sweden, jonas.floden@handels.gu.se

Johan WOXENIUS, University of Gothenburg, johan.woxenius@handels.gu.se

ABSTRACT

Based on interviews and two workshops with the main stakeholders as well as media coverage, this article analyses the changes in the market from the deregulation leading up to the Swedish market exit of CargoNet, the former monopolist provider of intermodal freight transport, and the events that followed. The analysis applies business model theory. When CargoNet left the Swedish market in April 2012, some of the traffic was absorbed by other intermodal providers and the wagon load rail system. The routes to the far north of Sweden, however, were assuming an infrastructure role for the main forwarders and road hauliers, who formed the joint venture Real Rail with CargoNet to continue traffic. The business model applied by Real Rail differed from CargoNet's and other intermodal providers, mainly by the tight connection to the customers, who guaranteed volumes.

Keywords: Case study, business models, intermodal transport, deregulation, disintegration.

INTRODUCTION

Like in most European countries, the national railway administration dominated the Swedish intermodal freight transport (IFT) market the decades after it emerged in the 1960s. In a European comparison, however, the IFT sector was affected early and significantly by the deregulation of the Swedish railway sector that started in the 1980s (Jensen*, et al.*, 1992). Although freight transport is highly contextual and generalisation between countries should be done with care, the early and extensive deregulation implies that this research effort is expected to be internationally interesting. The Swedish context might not explain but at least illustrate the phenomenon of deregulating IFT in a wider European setting.

Through a number of organisational changes, the IFT business was incorporated and

merged with the Norwegian freight railways to form the company CargoNet (CN). The Swedish state sold its shares to the Norwegian State Railways in 2010. The deregulation caused successively hardened competition in the IFT market and in October 2011, CN decided to rather abruptly leave Sweden, intending to discontinue the service only seven weeks after the announcement. At the time, CN controlled about 80% of the domestic, non-maritime-related market (Backman, 2013a), and operated a Scandinavian backbone network of shuttle trains covering both Sweden and neighbouring Norway. The withdrawal put the Swedish IFT users in terms of forwarders and road hauliers in an acute and awkward position.

About a decade ago, Bontekoning, Macharis, and Trip (2004) asserted that intermodal freight transport research was emerging as its own application field within transport research, and scientific publication has intensified significantly since then. It is now a typical topic at transport and logistics conferences, the WCTR not excluded with session track B3 devoted to IFT, it is the subject of several special issues in leading journals, and a journal dedicated to the subject has also been established. While the scientific literature on IFT is fairly extensive and articles on modal competition are plentiful, comparatively few scientific publications focus the industry structure and effects at the level of individual firms. It appears that case studies and more detailed investigations of inter-firm competition is more frequent in reports in national or EU-funded projects such as DIOMIS (UIC, 2009). This article tries to bridge the gaps between macro and micro studies of the IFT market and between scientific research and more applied investigations framed in projects.

The purpose of the article is to analyse the reasons for CN's withdrawal and how direct customers, shippers and other stakeholders reacted to and coped with this sudden withdrawal of the IFT service. The infrastructure role of the domestic IFT terminal-to-terminal service is also investigated.

Applying theory on business models and market dynamics, semi-structured interviews with the main stakeholders and an extensive media coverage review are used for analysing the changes in the market from the deregulation leading up to the former monopolist CN's market exit and the events that followed. The actors who took over parts of the business are interviewed in particular depth. Two workshops were also organised, one focusing on infrastructure and transport providers on 20 March 2012 (Kyster-Hansen, 2012a) and one focusing on shippers on 11 September 2012 (Kyster-Hansen, 2012b). The research is founded on knowledge gathered through decades of own research on the Swedish IFT system.

The following section gives the policy background in terms of the deregulation of the Swedish rail sector and the consequences for the organisation of IFT provision. The next section provides a theory section on business models while the following section provides the empirical setting of CN's withdrawal from the Swedish IFT market. The next section is devoted to the response by stakeholders such as forwarders and road hauliers in their roles as CN's direct customers, shippers and the public sector. The article is finished by an analysis and conclusions.

DEREGULATION OF THE SWEDISH RAILWAY SECTOR

The deregulation of the Swedish rail sector started in 1988. The first step was to divide the integrated Swedish State Railways (Statens Järnvägar, SJ) into infrastructure (Swedish Rail Administration) and operations (which kept the name SJ) with its freight division SJ Gods[1]. The second stage in January 2001 was to divide SJ into passenger (which kept the name SJ, but no longer as an abbreviation) and freight (Green Cargo, GC) operations, real estate (Jernhusen), vehicle maintenance (Euromaint), on-board service (Trafficare) and ICT support (Unigrid). They were all transformed into limited companies, were expected to deliver profits and became subjects to competition although SJ kept the monopoly on routes it could operate profitably. The three former companies are fully owned by the Swedish state, whereas the three latter were successively sold to private investors.

The deregulation of the IFT market started early and followed a slightly different logic. Lacking the structure with UIRR companies (like Kombiverkehr, Novatrans and CEMAT) and national container companies (like Transfracht, CNC/Naviland and Italcontainer) prevailing in most European countries, SJ's intermodal division, SJ Kombi, strongly dominated the Swedish IFT market. SJ Kombi wholesaled domestic terminal-to-terminal services to road hauliers, who in turn often were subcontractors to forwarders, but SJ Kombi required trust from the forwarders when deregulation allowed them to start IFT operations on their own accounts or jointly like a UIRR company. They were suspicious since SJ Gods also retailed rail transport to shippers (Woxenius, 1994) and they were increasingly disappointed with the service, attitude and prices raised with neither notice nor negotiations. Accordingly, the Swedish forwarders and hauliers threatened to formally file complaints of breaching the competition laws (Backman, 2013a). The compromise was that SJ Kombi was broken out of SJ Gods forming the limited company Rail Combi (RC) already in 1992. The company was separated from SJ Gods into the holding company Swedcarrier and 30% of the capital was sold to private investors, but the Swedish state bought the shares back a few years later.

The idea was that RC should be a neutral IFT production organisation wholesaling IFT services to road hauliers by operating a backbone network of terminals and routes. SJ Gods/GC was the main supplier of rail haulage. The company should carry its costs but did not aim for maximising the profits (Backman, 2013a). Hence, it aimed for a responsible infrastructure role and was constantly subject to its customers' and supplier's option to start competing operations. RC reported small but stable returns, mainly through comparatively full trains, but was in fact often accused of under-prising by road hauliers, SJ Gods/GC as well as shipping lines (ibid.). The focus was expected to be on customer service rather than sales, and a TV commercial campaign upset the customers as they failed to see why RC needed to build a brand.

In 2002, RC was merged with the entire freight operations of the Norwegian State Railways (NSB Gods) forming the limited company CargoNet (CN). NSB Gods had closed its domestic wagon load services to favour its IFT services so it was rather similar to RC, but it also offered system train services and brought in rolling stock in terms of rail engines and wagons. It was a straight merger and Norway ended up with 55% of the capital and Sweden

[1] "Gods" is Swedish for goods/freight and does not imply a belief in several supreme beings.

with 45%. Interestingly, the Swedish ownership returned to GC. The deal was, however, carried out with strong political commitment, partly since Norway and Sweden just had failed to merge their state-owned telecom firms Telenor and Telia. The political price of another failure was regarded as too high (Backman, 2013a).

GC never assumed an active ownership and CN was dominated by Norwegians although the Swedish operations were fairly independent. GC sold its shares to NSB in 2010. It was debated within the Swedish rail sector whether it was wise to run the IFT services with its infrastructure role as a limited company and even more so to enter a mixed ownership with Norwegians and finally to leave it fully to foreign ownership.

RC/CN maintained its dominating role for domestic IFT services throughout the deregulation and when most active it operated about 60 domestic trains between 14 terminals with an annual flow of some 500 000 TEUs. Nevertheless, it successively lost grounds to new entrants starting new shuttles for maritime containers to and from the Port of Gothenburg. RC/CN was affected by the cherry pickers and counter-acted by focusing less on geographical coverage and more on individual shuttle trains for semi-trailers and the wagon fleet was changed into pocket wagons only. Large customers also started operating their own-account trains, e.g., COOP. The demise of the network operations is visible from the figure below, but the final withdrawal will be dealt with further into the article.

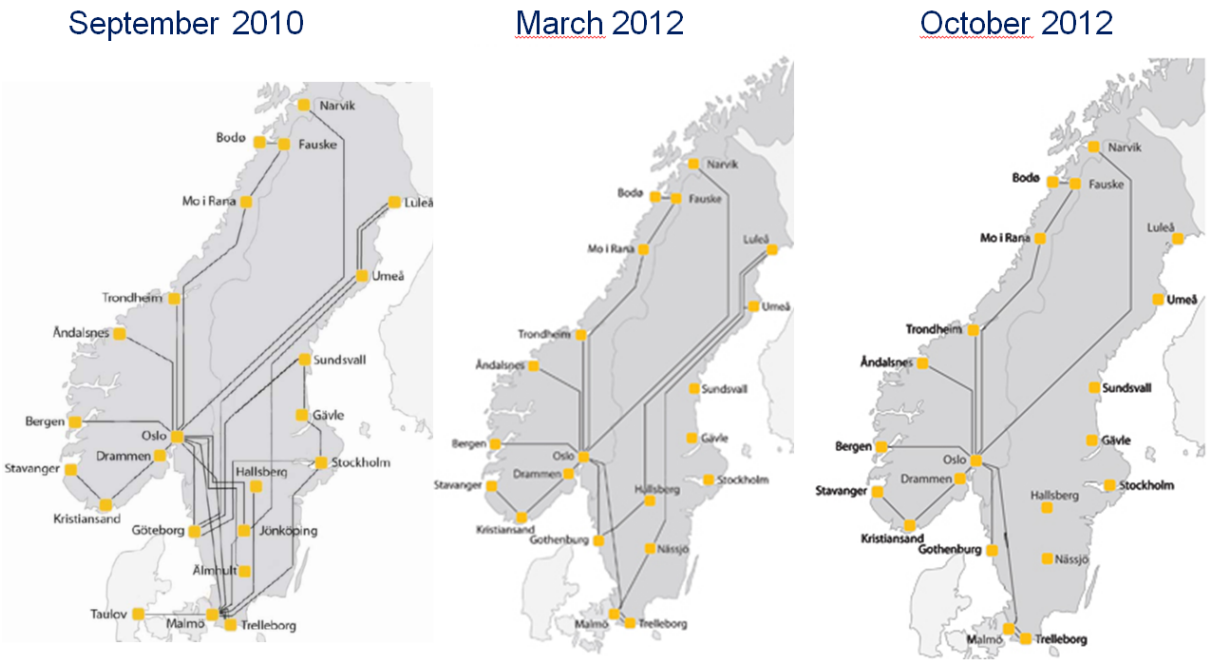

Figure 1. The reduction of Cargo Net's line network. Source: CN, webpage, 2010 and 2012.

Notably, GC also acted as a competitor to CN for IFT services despite owning almost half of the company and being the main supplier of rail haulage. It had competed a long time, SJ Gods actually kept the shipping lines as its customers already when RC was formed in 1992 although it used RC as subcontractor for moving the maritime containers (Woxenius, 1994), but tried to do it rather quietly, to not upset the market. It allowed unit loads into its wagon load system, offered full train services with intermodal technology but also operated downright IFT shuttles to and from ports. CN and GC also cooperated and in the early 2000s, 90% of CN volumes were transported in its own shuttle trains and 10% in GC wagon load

system (SOU, 2004). GC's ambitions became more aggressive as it withdrew from active ownership and finally sold its shares in CN.

Another firm with ownership relation with SJ was the IFT operator Intercontainer-Interfrigo (ICF), which was jointly owned by 26 European railways to perform border-crossing IFT services. Sweden sold its shares in the mother organisation rather early, but RC represented ICF and owned a part of ICF's subsidiary Intercontainer Scandinavia AB. ICF ceased to operate in 2010 but Intercontainer Scandinavia carried on owned by a Swedish investment firm, but filed for bankruptcy in 2013 (Transport/Logistik iDag, 2013). ICF developed into a network operator although with a focus on port hinterland traffic not fully challenging Rail Combi/CN. Its network before the bankruptcy is shown in the figure below.

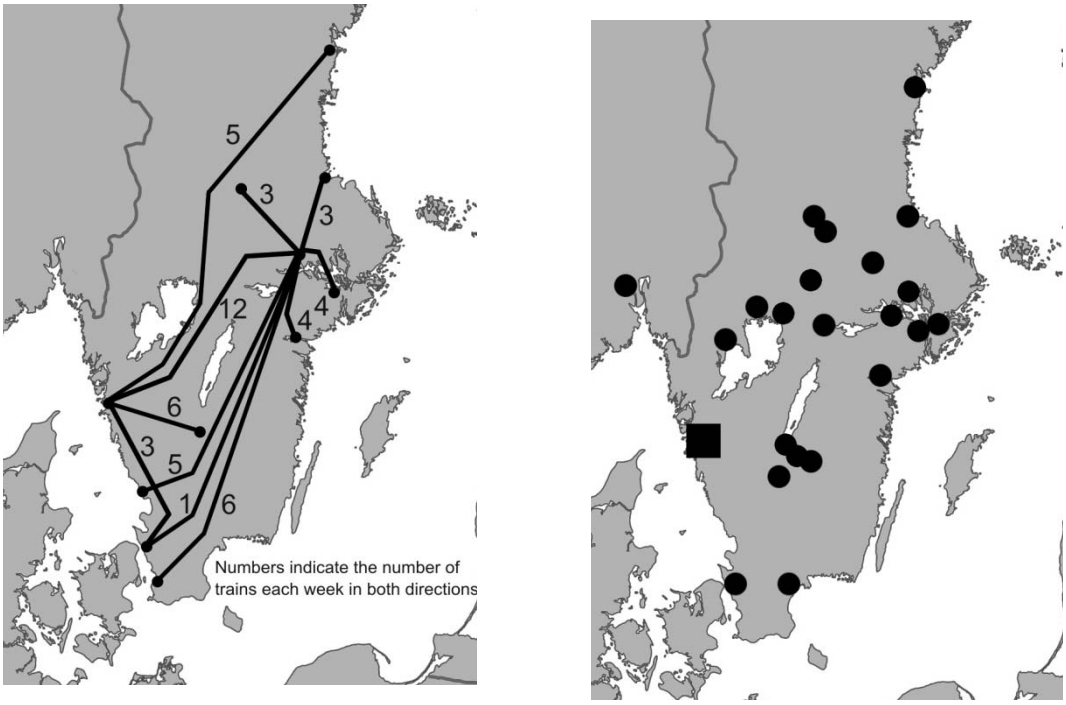

Figure 2. Left. Intercontainer Scandinavia's line network prior to the bankruptcy in February 2013. Source: Intercontainer Scandinavia, webpage, 2013 (discontinued due to bankruptcy). Right: The Port of Gothenburg rail shuttle system, September 2012. Source: Port of Gothenburg, 2012.

The Swedish rail deregulation fostered new entrants besides Intercontainer and GC. Attracted by low entry barriers, they primarily offer port hinterland services. The Port of Gothenburg's container shuttle system with its many competing IFT operators, nine in September 2012 (Port of Gothenburg, 2012), is often used as a show-case for successful rail deregulation (Roso*, et al.*, 2009).

Nevertheless, much more goods roll into Swedish ports in semi-trailers than are lifted in containers but it is stiffer competition with road haulage (Woxenius and Bergqvist, 2011). Although RC/CN focused intra-Scandinavian traffic, it kept dominating the hinterland transport of semi-trailers from the ports in Gothenburg, Malmö and Trelleborg.

CN was also affected by changes in the terminal operations business. As part of the deregulation, the Swedish state transferred the ownership of the terminals to Jernhusen that acts as a landlord. RC/CN, however, acted as principal, operated the terminals itself or through subcontracting to primarily road hauliers and ports. It was responsible to offer non-

discriminatory terminal services to everyone.

The port shuttle operators have used the 13 state-owned terminals to a very limited degree. Among the reasons are that the locations did not match the wide-spread shuttle geography (see Figures 2), that smaller terminals offered lower prices, but also that the new entrants did not expect fair treatment at the CN terminals. This led to primarily municipalities establishing a large number of smaller terminals to attract port shuttles to favour local industry but also to attract distribution centres offering jobs for blue-collar workers (Bergqvist*, et al.*, 2010).

In 2009, Jernhusen launched a new "terminal concept" specifying what terminals should offer, how they should operate and even which terminal information system to use. Contracts with CN were cancelled and Jernhusen put out the operations of each terminal on tender. In addition, Jernhusen launched a substantial investment scheme for distribution centres at the terminals. The aim was to create large and cost-efficient terminals and to guarantee neutrality; transport operators were not invited to send quotes (Backman, 2013a).

Another effect of deregulation is the appearance of firms offering a set of specialised services such as train haulage, equipment leasing and provision of train drivers. IFT services have thus changed from being provided by an integrated railway administration to a multi-layered hierarchy of narrowly specialised firms.

Finally, the deregulation has opened up for IFT services on own accounts, either as a full-fledged railway undertaking such IKEA Rail or with a long-term contract with a train operator such as the COOP train. The main features of how the IFT sector was affected by the Swedish deregulation of the rail sector are captured in the figure below.

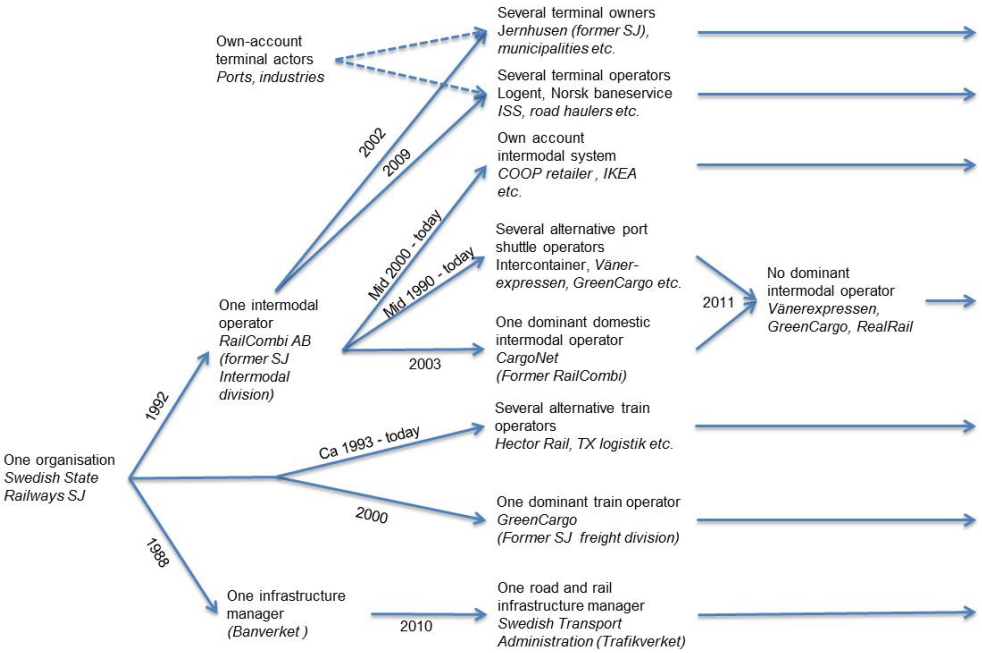

Figure 3. The Swedish rail freight market after the deregulation.

The withdrawal of CN can be seen as the fall of one of the last remains of the former state monopolist, but also as a step towards further fragmentation of the Swedish IFT market. In essence, it can be characterised as simultaneous horizontal and vertical disintegration.

BUSINESS MODELS

CN's withdrawal from the market and an apparently low profitability in the IFT industry has highlighted the need to examine the business models used, which coincides with one of the main requirements brought up at the workshops with transport and infrastructure providers (Kyster-Hansen, 2012a) and shippers (Kyster-Hansen, 2012b). Business model theory is thus used as a framework to analyse the way the IFT actors do business and the effects of deregulation.

A business model can be defined as "The set of activities *which* a firm performs, *how* it performs them, and *when* it performs them to earn a profit" (Afuah, 2004, p. 14). A business model thus concerns how a business makes a profit, not only how it generate revenues. Examples of business models in the transport industry are Ryanair's focus on low costs, Maersk's focus on economies of scale and the large forwarders' offer to meet manufacturing and trading firms' total logistics needs.

The term business model became popular during the IT boom in the late 1990s trying to identify the new business opportunities emerging in the IT age. The term was used as a "loose conception of how a company does business and generates revenue" and was criticised as "murky at best" (Porter, 2001, p. 73). Business models are often confused with individual parts of the complete business model, e.g., pricing model, revenue model, channel model, commerce process model, Internet enabled commerce relationships, organisation form and value proposition (Linder and Cantrell, 2000).

Research requires rather strict definitions and several attempts have been made to formalise the concept (Margretta, 2002). Shafer *et al.* (2005) identified 12 different definitions in a literature review with a total of 42 different components in the definitions and Osterwalder *et al.* (2005), Schweizer (2005), Osterwalder (2004), Pateli and Giaglis (2004), Voelpel *et al.* (2004), and Pateli (2002) have also contributed with reviews of concept definitions.

Osterwalder (2004) provided one of the more comprehensive analyses and compilations, which was a synthesis of different views of business models and regarded as one of the most complete (Osterwalder*, et al.*, 2005). Osterwalder (2004) divides the business model into nine interrelated building blocks in four areas, as shown in Table 1.

The Capability represents the company's in-house capabilities, which, together with resources obtained through Partnerships with other companies, are arranged in a Value Configuration (i.e., how to create and deliver value) to offer a Value Proposition (i.e., product and/or service) to the customer. Note that the pillar Infrastructure Management should not be confused with rail infrastructure management. Infrastructure in this case concerns how the company creates value through its value proposition and maintains its customer interface. Each block can further be described by a number of attributes attached to them. For a full description of the elements and attributes, see Osterwalder (2004) and for an application to intermodal transport see Flodén (2009).

Table 1. The nine business model building blocks (Osterwalder, 2004, p. 43)

Pillar	Building block	Description
Product	Value proposition	The overall view of a company's bundle of products and services that are of value to the customer.
Customer interface	Target customer	A segment of customers a company wants to offer value to.
	Distribution channel	A means of getting in touch with the customer.
	Customer relationship	The kind of link a company establishes between itself and the customer.
Infrastructure management	Value configuration	The arrangement of activities and resources that are necessary to create value for the customer.
	Capability	The ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	Partnership	A voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.
Financial aspects	Cost structure	The representation in money of all the means employed in the business model.
	Revenue model	The way a company makes money through a variety of revenue flows.

CARGONET'S WITHDRAWAL FROM THE MARKET

After setting the scene with the deregulation of the Swedish IFT industry and introducing an analysis framework with business models, this section provides a brief overview of the events following upon CN's announcement with an account of the reaction of each stakeholder.

The announcement and CargoNet's motives

In 2011 CN made a brief, 10-line-long press release announcing that its traffic would end by the time table shift on 10 December, less than seven weeks later. The reasons stated in the headline were "bad punctuality, failing results and a terminal regime that does not work as intended" (CargoNet, 2011a). In the body of the text, the reason "failing results" was replaced by "increasing infrastructure fees". CN stated that "in reality, the prerequisites for maintaining the quality and efficiency our customers demand, and we want to deliver, are not possible" and expressed a desire not to harm customers and employees. CN also opened up for transferring part of its operations to competitors. In fact, the reason that the announcement came late was that GC had promised to take over all of CN's routes, which was communicated to CN's customers already in August 2011 (Backman, 2013b). Since CN's withdrawal would only regard change of operator, it was decided that the press release could wait. However, GC changed its mind and only offered to take over traffic between Gothenburg and the far north and with a price increase of 40–70% (Backman, 2013a). This forced CN to make a rapid press release. CN's operations in Norway and trains between Sweden and Norway were not affected and CN did not go bankrupt.

CN motivated the withdrawal decision solely with external factors and there were elements of distrust in the industry regarding CN's stated reasons. RC had delivered small positive returns, but CN had seen a period of losses in the Swedish IFT operations, partly due to disruptions during two severe winters (Backman, 2013a). The last three years before the announcement, CN lost 163 million SEK (Dahllöf, 2011a), corresponding to €17 million at the time. The CEO of CN's Swedish part, Patrik Hermansson found it challenging to operate an

open network with fixed departures, where the customers decided whether to use the service on a daily basis. CN was used for the demand peaks, while the main volumes were sent by the customers' own lorries (Transportnytt, 2012). CN still considered continuing, but only with parts of the traffic, as rail haulage supplier, GC, wanted to maximise the traffic since it did not take any volume risk (Backman, 2013a).

The Swedish government raised the *infrastructure fees* for intermodal trains by 14% in 2011 (Banverket, 2010), and intended to double them by 2015 and continue to raise them until 2021. The Swedish infrastructure fees nevertheless cover only a small part of the full infrastructure cost, partly to help rail compete with the 25.25 m and 60 ton lorries allowed in Sweden. Before the increase, the fees for a 1400-tonne freight train were eight to ten times higher in Germany, seven times higher in the UK, and eight times higher in Austria (Hylén, 2005; Vierth, 2012). The infrastructure fees corresponded to 5.8% of the IFT rail haulage costs in 2010 and 7.3% in 2011 (Banverket, 2010). In June 2011, CN raised its prices by €2-3 per TEU as a direct consequence of the new infrastructure fees and published a list on its webpage specifying how the fees affected each route (CargoNet, 2011b).

Punctuality is a growing concern in the Swedish rail industry (Kyster-Hansen, 2012a). In a survey 62% of the forwarders stated that the rail system lacked capacity and 47% said that the offered quality was unsatisfactory (Godstransportrådet, 2012a). COOP claims that its own-account IFT train suffers from a delay of more than one hour every fortnight incurring contingency costs of more than €1M annually (Kyster-Hansen, 2012b). The irregularities are due to an increasingly congested rail network and some extreme storms and hard winters. For example, only ten of CN's 21 trains between Gothenburg and Luleå were on time in February 2011 (Hermansson, 2012). Mainly, this has been blamed on the infrastructure provider and lack of funding for new investments and maintenance. CN interpreted this as lacking political determination in Sweden and its view was that the Norwegian state was more supportive resulting in less winter problems (Backman, 2013a).

CN brought up *Jernhusen's new terminal regime* as a major reason for its withdrawal and previously denoted it a "new state monopoly" (Transport/Logistik iDag, 2009b). CN filed an unsuccessful complaint with the Swedish Competition Authority (Transport/Logistik iDag, 2009a) and when announcing its withdrawal, CN had gone from being the dominating terminal operator a few years earlier to operating only two terminals in Sweden. The new terminal operators minimised their costs and charged extra for each small service CN used to include and did not offer crucial services like arrival control (Backman, 2013a). This resulted in reduced flexibility (Dahllöf, 2011b) and costs passed on to those operating the trains. The CEO of CN's Swedish part stated that the terminal operators induced high costs for CN and lowered the competitiveness of IFT. One example was that CN claimed to need two extra trains for the service between Gothenburg and Luleå at an annual cost of approximately €270 000 (Hermansson, 2012). CN also accused Jernhusen to have a yield requirement "miles above" the logistics industry (Godstransportrådet, 2012b) and in Gothenburg CN left Jernhusen's terminal for a nearby terminal operated by GC. Nevertheless, Jernhusen defended the new terminal regime, claiming an open access would benefit everyone in the long run (Transport/Logistik iDag, 2011f). Other rail operators also criticised Jernhusen's dominating position (Kyster-Hansen, 2012a) and many of the initial terminal operators are now replaced, often with transport operators utilising synergies

(Backman, 2013a). Furthermore, at the time of the announcement, the Norwegian Rail Administration commissioned an investigation to follow the Swedish example and transfer the Norwegian terminals from CN to the state (Jernbaneverket, 2012) giving CN reasons to criticise the Swedish terminal regime to assert political pressure in Norway.

Stakeholder reactions to the announcement

CN's direct *customers*, i.e., road hauliers and forwarders, were shocked by the announcement (Lindberg, 2011b) and as no plans by others to take over routes were known, they had to plan for a switch to road transport in less than seven weeks. DB Schenker claimed that it alone would need 300 lorry departures per day to replace CN and estimates for a total of 700 lorries per day were issued (SVT, 2011). Nevertheless, CN's economic problems and the successive contraction of its network were well known among customers, but they were still shocked by the abruptness of the withdrawal (Sandahl, 2012) and failed to realise how dependent the Swedish IFT system was on one actor.

Between the announcement and CN's planned withdrawal in December 2011, some *shippers* established contingency plans based on all-road transport. One example is the bakery industry Polarbröd with about 1000 annual intermodal lorry loads, which already in early December stated that it had secured a contract for all-road transport (Norrbottens-Kuriren, 2011a), while at the same time being active in the Norrbotten Chamber of Commerce meetings to get continued IFT. Polarbröd made several media statements (e.g., Bodin, 2011; Intelligent Logistik, 2012a) and press releases (Polarbröd, 2011 and 2012b) in favour of IFT. There was also a concern about increasing transport costs. CN's current IFT was obviously not profitable and any new operator was expected to raise prices, nullifying IFT's cost advantage over road transport that at the time was, as an example, 15–20% on the Sundsvall-Gothenburg route (Lindberg, 2011c). Despite supreme sustainability performance shippers were not willing to pay a premium compared to road transport (Kyster-Hansen, 2012a) as clearly stated by Polarbröd (Piteå-Tidningen, 2011).

Among *competitors*, GC immediately showed interest in taking over some routes. An initial attempt in November was turned down by 38 of 40 potential customers due to a perceived high price (Lindberg, 2011a) and alleged requirement for guaranteeing transport volumes (Transport/Logistik iDag, 2011c). Customers claim to have been offered a price increase ranging from 50% (Lindberg, 2011b) to 50–70% (Norrbottens-Kuriren, 2011c) by GC, although these increases were denied to be that high by the operator (Norrbottens-Kuriren, 2011b).

The announcement was covered in major national Swedish *media* with a focus on potential increase in road transport. Headlines like "80 more lorries per day on highway E4" (Lindberg, 2011c) and "Hundreds of lorries to replace trains" (SvD, 2011) were common. The trade press focused on how the new transports should be arranged and reasons for CN's withdrawal.

Authorities and politicians reacted rather calmly. The Swedish Transport Administration is an infrastructure provider and does not interfere with commercial operations. The Transport Administration stated that it, like other stakeholders, was surprised by CN's decision and prepared in case new rail operators should apply for slot times with short notice (Arvidsson, 2012). The withdrawal did not cause any immediate major political debate. Some initiatives

occurred where local politicians wrote letters to the Minister of Infrastructure, were interviewed in the local press mainly in northern Sweden (Norrbottens-Kuriren, 2011e; Piteå-Tidningen, 2011), and wrote opinion articles (Bergström*, et al.*, 2011; Nilsson, 2011).

Continued Traffic

On Monday 5 December, hence only five days before the withdrawal, CN communicated that it will continue as previously until 31 March, 2012, since DB Schenker and DHL guaranteed sufficient and fixed transport volumes (Norrbottens-Kuriren, 2011e). CN would come back inform about the service after 31 March (Transport/Logistik iDag, 2011a). Nevertheless, this was cancelled already on 6 December as GC denied continuing to haul CN's trains. CN had cancelled the contract with GC when it announced its withdrawal in November, and GC now stated that it already had committed its locomotives to other parts of its operations (Transport/Logistik iDag, 2011c). Yet, GC claimed that CN should pay for rail haulage until the original contract expired by the end of March (Backman, 2013a). CN found it peculiar that GC claimed a lack of resources since GC only two weeks earlier offered to operate an intermodal network very similar to CN to CN's customers (Transport/Logistik iDag, 2011c). Nevertheless, CN owned the slot times but GC tried to block other operators by booking the slots CN were to abandon, however without having the customers needed to use the slots (Backman, 2013b). On Thursday 8 December, CN sent a letter to its customers confirming end of traffic on 10 December and stating that it hoped to initiate a dialog with GC to resume traffic later (Transport/Logistik iDag, 2011e). On Friday 9 December, CN's head of business development Hans Backman went home believing that it was the end of many years with RC and CN, but at 17:15 GC agreed to continue to haul some of CN's trains (Backman, 2013a). The service between Gothenburg and Northern Sweden would restart on 12 December and the service between Malmö and Northern Sweden on 15 December. CN's remaining three services would, however, be discontinued (Transport/Logistik iDag, 2011b and d). When parts of the service was prolonged, CN stated that it considered options after 31 March but not including all previous routes (Svensk Åkeritidning, 2011b). CN left the Swedish domestic market as an independent operator as of 1 April 2012.

Stakeholder reactions to the conflict between CargoNet and Green Cargo

The *customers* reacted strongly to the conflict that they perceived as unnecessary and somewhat silly. On 8 December, the CEOs of DHL Freight Nordic and DB Schenker Region North published a joint open letter to CN and GC underlining the importance of IFT and urging them to find at least a temporary solution (Transport/Logistik iDag, 2011g). According to DB Schenker's CEO, the CN withdrawal actually triggered a rare occurrence of cooperation between the rivalling forwarders but carefully adhered to competition laws (Nilsson, 2013). Filing complaints to the European Commission's Competition Directorate was among actions considered (Backman, 2013a).

Also the *shippers* exerted strong pressure on *authorities and politicians* to interfere. Arguments targeted the infrastructure fees and rail deregulation in general and claimed this hurt the competitiveness of the manufacturing industry. The concerns were particularly strong in the sparsely populated northern Sweden suffering from long transport distances. For example, the Chamber of Commerce in Norrbotten County in the far north called the situation an "emergency" and requested a meeting with the Minster for Infrastructure to

increase the political pressure. The minister agreed and cancelled an EU–meeting and went to Norrbotten (Norrbottens-Kuriren, 2011d; Svensk Åkeritidning, 2011a).

The political opposition to the conservative government criticised the deregulation and privatisation process and in particular that CN and GC quarrelled about train haulage. The Social Democrats, for example, demanded that the Minister for Infrastructure should put hard pressure on GC and CN (Svensk Åkeritidning, 2011d). The Green Party more actively requested a meeting with GC (Svensk Åkeritidning, 2011c) and debated the issue in the Parliament including demanding a halt to increasing the infrastructure fees (Svensk Åkeritidning, 2011a). The Transport Administration was concerned about the long-term survival of IFT and initiated workshops with the industry and researchers to highlight and discuss opportunities and challenges with IFT (Kyster-Hansen, 2012a and b). A conference on IFT with the industry was postponed from December to March due to the withdrawal (Godstransportrådet, 2012b).

New actors emerge

Other actors quickly tried to fill the vacant spot after CN. Intercontainer, for example, opened a new service between Gothenburg and Sundsvall on 4 January replacing the service CN closed. Prices increased by around 15%, hence less than previously feared, matching all-road transport (Lindberg, 2012). TX Logistik started a new service between Malmö and Stockholm and saw an increase in load factor on existing routes from 70% to 90% (Intelligent Logistik, 2012b). Despite the increase, much of CN's flows was lost to all-road (Backman, 2013b).

After GC's failed attempt to start new rail shuttles, GC integrated CN's flows in its existing network of wagon load traffic with close to 40 destinations. In March 2012, GC claimed to have captured 14% of CN's semi-trailer flows and more than 75% of the container flows (GreenCargo, 2012). Backman (Backman, 2013b), however, points out that CN's container flows were negligible as it did not compete on the maritime container market, and he challenges that GC actually took over as much as 14% of the semi-trailer flows. Nevertheless, GC offers the customers destinations and not fixed routes, which is shown by its use of wagon load traffic instead of shuttle trains. Other actors also reported increasing volumes. However, not all new actors were successful. Intercontainer went bankrupt one year later on 4 February 2013 (Transport/Logistik iDag, 2013) after initially claiming a high load factor (Intelligent Logistik, 2012b). Intercontainer offered a higher price than CN, similar to the road transport price, but less than GC charged on the same route (Lindberg, 2012).

CN did not completely leave the Swedish market. On March 6, it announced that it as a minority owner (40%) enters a joint venture called Real Rail (RR) together with Sandahls (60%). Sandahls is a privately owned road haulier with 400 employees and about 100M€ in turnover and DB Schenker's largest supplier of line haulage and distribution in Sweden. In addition, it also offers full load road transport to shippers and GC as well as a wide range of services to construction firms and infrastructure providers (Sandahlsbolagen, 2013). RR has a lean operation with a staff of five in a Stockholm office, mainly recruited from CN's closed Swedish operations, and administrative support from Sandahls' head office in Värnamo.

Starting on April 1, RR basically continued the two routes CN ran until March 31, although using Nässjö rather than Malmö as a southern turn-around terminal. Nässjö is 300 kms north

of Malmö prolonging the pre and post haulage distance for customers in the south, but it allows better utilisation of the rail rolling stock and avoids congested tracks in the south (Sandahl, 2012). According to Nilsson (2013), Sandahls applied its road haulage skills, including insight into the consequences of long distances for pre and end haulage, to develop this solution compared to CN, which applied its traditional rail haulage skills.

CN commented that establishing RR did not solve the underlying problems but it is a good way of sharing responsibilities and challenges (CargoNet, 2012). Transport volumes are guaranteed through contracts with main customers, DHL and DB Schenker with its contracted road hauliers, which was a prerequisite to start the company (Sandahlsbolagen, 2012). RR is even more careful not to retail to shippers than RC and CN were (Backman, 2013a). GC was contracted for train haulage during 2012, after which CN hauls the trains (Transport/Logistik iDag, 2012) since it purchased new locomotives in Norway leaving a surplus to use in Sweden. The locomotives are manned by the firm Traindrivers. With experience from the quarrels with GC, RR is now a rail undertaking and owns the critical slot times (Backman, 2013a).

With the strong unanimous commitment to its customers and knowledge of the consequences of irregularities, RR claims to commit extra resources to maintain quality. Four train sets are sufficient for lean traffic, but RR carries the costs of two surplus locomotives and wagon sets to assure timely departures. These are stationed in Luleå in northern Sweden where winter conditions obviously occur more often. According to Backman (2013a), the higher regularity and related costs motivates the 10–15% price increase compared to CN's traffic.

Some of CN's volumes are lost to all-road transport, for instance the routes Gothenburg-Stockholm, Scania (southern Sweden)-Stockholm and Sundsvall-Gävle-Scania (Backman, 2013b), but some volumes are captured by other IFT operators. RR being the only new IFT provider, although a joint venture by an IFT operator and a main customer, accounts for 50 000 TEU (Backman, 2013a), hence just 10% of CN's flows before the decline. Other IFT providers have strengthened existing services, e.g., adding an extra departure, or in some cases established new services, e.g., Intercontainer starting between Gothenburg and Sundsvall. The actors were agile and adapted their services starting shortly after CN's withdrawal. One indication of the amount of the leakage to all-road is that the intermodal terminals have suffered from declining volumes. Some terminals have really suffered, e.g., Årsta in Stockholm has seen a 50% decline, but overall Jernhusen estimates a 10% decline on its terminals (Intelligent Logistik, 2012b). This is, nevertheless, a rather blunt measure since the replacing IFT providers might use terminals other than CN did, which are terminals outside the scope of Jernhusen.

Customers welcomed the new actors but underlined the importance that the new traffic must be cheaper than road transport. Environmental reasons were stated as the main concern for their interest in IFT, but Polarbröd, for instance, also clearly stated that IFT must offer a competitive price when selecting Real Rail (Polarbröd, 2012a) instead of its already planned all-road option, although the RR-network could not cover all of Polarbröd's previous IFT destinations. The events and reactions are summarised in the figure below.

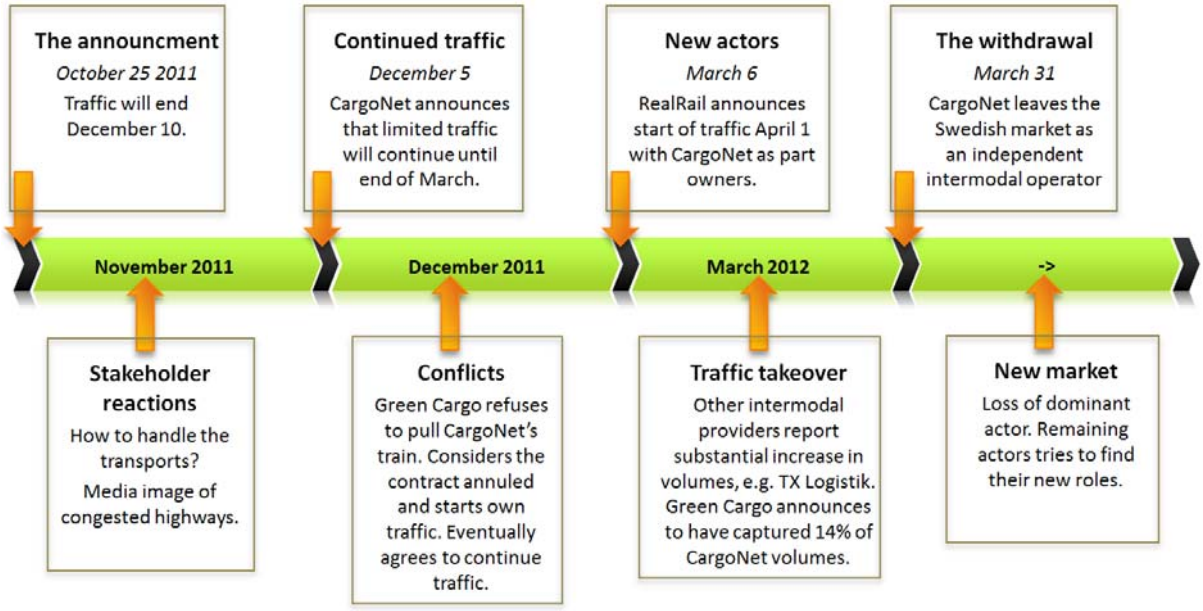

Figure 4. Timeline of Cargo Net's withdrawal from the Swedish domestic IFT market.

The Transport Administration hosts regional Freight Transport Advisory Councils (Godstransportråd), which commissioned a survey of the attitude towards IFT among shippers and forwarders in southern Sweden during January and February 2012 (Godstransportrådet, 2012a). The results (35% positive and 10% negative) are well in line with the same study performed two years earlier where 33% of the attitudes towards IFT were positive and 15% negative (Godstransportrådet, 2010). For forwarders, the results are 56% positive and 24% negative in 2012 compared to 61% positive and 3% negative in 2010, revealing a slightly negative trend. On the direct question if they noticed any of the recent turbulence and how it affected their confidence in IFT, forwarders were much more negatively influenced than the shippers. Interestingly, a very large share of both groups did not notice CN's withdrawal.

Table 2. Change in confidence for intermodal transport after the events surrounding CN's withdrawal (Godstransportrådet, 2012a).

	Noticed and positively influenced	Noticed and not influenced	Noticed and negatively influenced	Not noticed
Shippers	1%	10%	2%	87%
Forwarders	0%	15%	38%	47%

BUSINESS MODEL ANALYSIS

CN operated a traditional business model, similar to most Swedish and European intermodal companies. CN's target customer and relationship gave the forwarder/haulier the role as the channel leader. The forwarder/haulier held the end customer contact and could on a daily basis decide if IFT should be used. As most forwarders/hauliers also operate their own lorries, they would make sure to use them first and send any extra volume by CN. This resulted in fluctuating volumes and made it hard for CN to make long-term plans, illustrated by the negotiations for continued traffic in December, which depended on the forwarders' guaranteed volumes.

The increasing use of partnerships meant that CN became more and more dependent on external parties and that its cost structure changed. This was not a deliberate choice by CN but a result of outside action. The sale to Norway meant that GC became one of CN's main competitors at the same time that it were entrusted to haul CN's trains. The decision by the Transport Administration to put terminals on tender meant that CN became dependent on several external terminal operators. The relationship with GC worked generally well until the announcement to leave Sweden.

GC offers a wider value proposition that includes the option of road transport to/from the terminal and has a wider range of target customers. GC tries to gain scale advantages by utilising its large size and diversity as a rail operator to coordinate the IFT with its other rail transport operator. This puts GC in two transport channels, one as a channel leader where it holds end customers' contacts and arranges the full transport, and one channel similar to CN where it is subcontractor to the forwarder/hauliers. In its role as a subcontractor, GC is also subject to the same variations in demand as CN. This is also shown by GC's offer to take over the traffic from CN where it required guaranteed volumes.

GC is less dependent on external partners since it, as a large rail operator, has most capabilities in-house. This gives it more control over the operations and can avoid potential sourcing conflicts, such as CN problems in finding someone to haul its trains, but in turn has a cost structure with higher fixed costs.

RR has streamlined its business model with a value proposition with few routes, small distribution channel and few key customers. RR has extensive relationships where most activities are outsourced. It has also managed to secure guaranteed volumes and thereby made the forwarders a more active part in the system. Long-term contracts with guaranteed transport volumes are obviously considered of key importance for all actors. RR (and CN during its continued traffic) managed to get these volumes, by putting this as a requirement for running IFT at all. This negotiation shows that the forwarders/hauliers are willing to go far to maintain an intermodal service but that they will not give guaranteed volumes unless forced to. These guaranteed volumes are also a way of risk sharing where the forwarders/hauliers take on part of the risks with the IFT. A comparison can be made with the successful own-account intermodal services, e.g., COOP, characterised by large stable volumes and shuttle trains.

The capabilities are similar among the actors. From a technical point of view, all perform IFT in an essentially identical way with similar rail wagon, engines and transhipment techniques. The value configuration is somewhat different with the main exception being GC's use of its existing wagon load network. Wagon load gives access to a large network and fixed costs can be shared with other network users, although wagon load in general is considered a more expensive and complex production system (Symonds, 2001) than the shuttle train system used by CN and RR. However, the shuttle trains require a high load factor to maintain a cost advantage. An interesting comparison can be made with CN in Norway, where CN's predecessor NSB Goods in its role as the state national freight operator in 2003 decided to cancel all wagon load traffic and only operate intermodal shuttle trains. This led to reduced transport volumes but was considered a success leading to quality improvements, cost reductions, fewer and larger customers and economies of scale (Ludvigsen and Osland, 2007). The business models of the three main actors is summarised in table 3.

Table 3. Business models of the three main intermodal freight transport providers.

Pillar	Building Block	CargoNet (CN)	Green Cargo Intermodal (GC)	Real Rail
Product	Value proposition	Offered rail transport and terminal handling for a wide number of load unit types. CN operated a large network, although it decreased during the last years. Transport prices were fairly low compared to road transport.	Offers intermodal transport (IFT) including rail transport, terminal handling and road transport for a wide number of load unit types. Pre- and post-haulage by road is optional. Has a very large network with around 40 destinations. Not all load units types accepted to all destinations. Higher prices than CN.	Offers rail transport and terminal handling for a wide number of load unit types. Operates a small network. Somewhat lower prices than road transport.
Customer Interface	Target customer	Targeted forwarders and road hauliers and deliberately tried to avoid approaching the end customer, e.g., manufacturing industry.	Everyone with need for transport, but a focus on customers with large goods volumes such as large shippers, forwarders and hauliers.	Targets forwarders and road hauliers and does not approach the end customer.
	Distribution channel	Used a traditional sales force and had a strong brand name. A customer interested in IFT would think of CN as the first option to contact.	Uses a traditional sales force, advertising, and has a strong brand name in rail transport.	Has a very limited sales force. Interested customers contact Real Rail.
	Relationship	Had well-established relationship with its major customers, but customers' focus was on using CN for the demand peaks. Booking was generally made the same day as departure.	Similar to CN but currently tries to get guaranteed transport volumes from its customers.	Long-term relations with customers and contracts with guaranteed volumes. Main owner a forwarder with large transport volumes.
Infrastructure Management	Value configuration	Trains operated as shuttle trains. Had long experience from IFT, through its predecessors RC and SJ. CN had a traditional company structure with a local head office in Stockholm, Sweden and main head office in Oslo, Norway. In general, its structure and operations resembled a traditional rail company.	Transport performed as a part of GC's general wagon load network Long experience from rail and IFT. Intermodal business as a part of a large rail transport company (total of 2300 employees). GC has a traditional company structure with head office in Stockholm.	Trains operated as shuttle trains. Small company with a small administrative staff.
	Capability	Had the capability to perform rail transport and terminal handling and associated activities.	Has the capability to perform IFT and associated activities.	Has the capability to perform rail transport and terminal handling and associated activities.
	Partnership	An increasing part of CN's capabilities were based on partnerships. Trains were hauled by GC, which went from being a part owner of CN to a competitor. Terminals were previously operated by CN, but were later put out on tender by state-owned Jernhusen. CN was also dependent on the infrastructure provider, the Transport Administration, for access to the tracks.	Few partnerships. Trains owned and operated by itself and mainly own terminals used. Some use of external terminals and dependence on the infrastructure provider the Transport Administration for access to the tracks. Pre- and post-road haulage subcontracted to external road haulier.	Most activities outsourced to partners. Trains operated by CN. Use external terminals. Depends on the infrastructure provider, the Transport Administration, for access to the tracks.
Financial Aspects	Cost structure	Main costs were related to the train operations. An increasing part of CN's cost structure related to factors outside its control due to increasing infrastructure fees and terminal outsourcing.	Main costs are related to the train operations. Fixed costs due to limited outsourcing.	Main costs are related to the train operations. Low fixed cost due to a large degree of outsourcing.
	Revenue model	Income came from the prices customers paid for the transport, which were its single source of income.	Income from the price that customers pay for transport. Intermodal operational costs partly shared with other transport services offered by GC.	Income from the price that customers pay for transport.

The business models can be viewed as radar charts where the different aspects of the business model has been graded based on their size and importance for the overall business model.

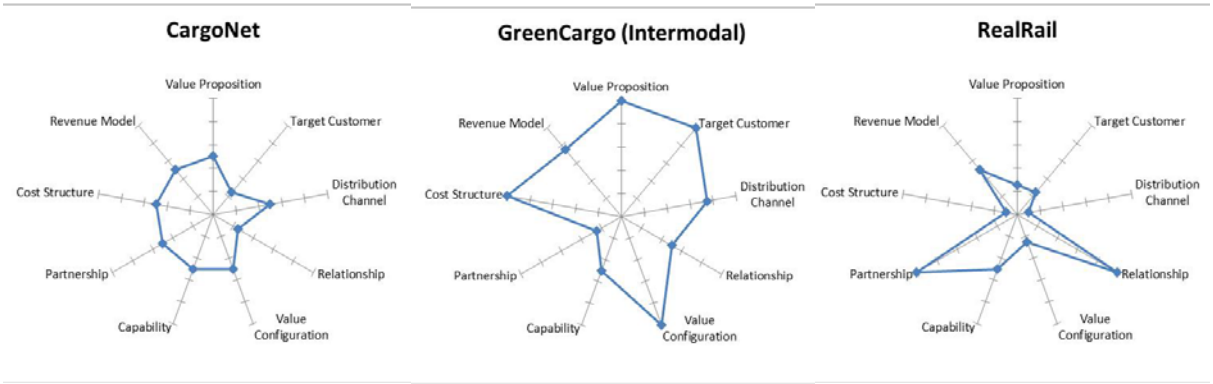

Figure 5. Radar charts of the business models applied by the main IFT providers.

GC's wide business model is well visible, particular in comparison with CN's more focused model. CN's model is balanced with medium activities in all areas, while RR's model is streamlined with a high reliance on partners and relationships. Looking at the four main pillars, the focus of the different models becomes visible. This summary shows the resemblance between CN and RR models with the greater focus of the RR model.

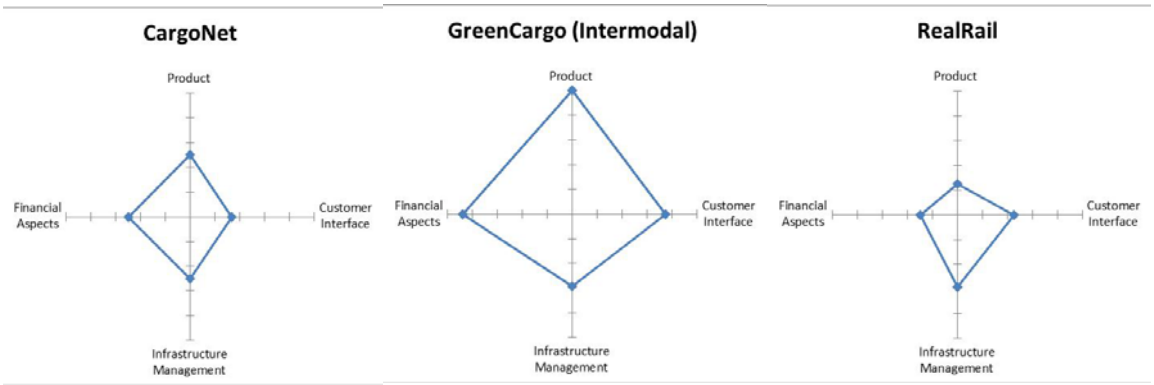

Figure 6. Radar charts focusing the four main pillars for the main IFT providers.

MARKET ANALYSIS

The Swedish domestic intermodal market has become more fragmented after the withdrawal of CN as a clear market leader and main actor. The fragmentation is perceived negatively by the customers and negatively impacts the attractiveness of IFT as the customers want simpler use of IFT. They wish a single partner or "travel agent" facilitating finding, booking and managing the IFT use (Kyster-Hansen, 2012a). The customers identify that a fragmented market lacks a responsible part (Nilsson, 2012), stating an ideal situation where shippers do not notice that their goods are conveyed by train (Kyster-Hansen, 2012a). It is clear that customers use road transport as a benchmark. The cost should not exceed road transport, quality should be so good that they do not notice they use trains and it should be as easy to book as road transport. IFT suffers from a negative image particularly among the key customer group forwarders, which has, worsened by the confusion with CN's withdrawal (Godstransportrådet, 2012a; Kyster-Hansen, 2012a).

CN provided the backbone of the domestic intermodal system, which is a function the current fragmented market lacks. GC covers all of Sweden and transports the largest volumes but has positioned itself as a diversified rail operator, rather than a focused intermodal operator. State-owned Jernhusen controls a national terminal network and has by the government been assigned to help develop the intermodal traffic (Huusko, 2009), which resulted in the implemented terminal concept. However, it has not taken a backbone role but rather further fragmented the market through the extensive subcontracting in its terminal concept.

The intermodal services offered by the intermodal operators are perceived as similar by customers and they claim the intermodal operators need a better understanding of the end customers' needs. Customers state they want more diversified services and in particular better information exchange. In general, the intermodal operators also neglect the promotion of IFT (Kyster-Hansen, 2012a).

Table 4. *Actors involved in a typical fragmented intermodal transport*

Activity	Actors involved
Sales and marketing	Intermodal operator
Road haulage	Road haulier
Terminal handling	Terminal owner
	Terminal operator (shunting and staffing might be outsourced to third party)
	Terminal capacity allocated to different users by terminal operator.
Rail haulage	Rail company (engines, staff and wagons might be leased/subcontracted)
	Track allocation by the Transport Administration
	Infrastructure maintenance subcontracted by the Transport Administration.

The fragmentation also raises concern of the efficiency and risk for sub optimisation of the sector as it increases the difficulties in coordinating all activities and adds a number of middlemen with their own goals and need for profit. Vertical integration can increase transaction costs (Panayides, 2002), but will at the same time lead to increased efficiency due to competitive pressure (Jensen and Stelling, 2007). Although there are many differences, a comparison can also be made with the deregulation of the UK rail freight market that in many studies has been seen as a failure, largely blamed on the high level of defragmentation in the market (Hilmola and Szekely, 2006). The changes in the market can be analysed based on the classical Five forces framework (Porter, 1985).

Threat of new entrants

Overall, the possibilities for new entrants have increased. CN's withdrawal leaves main freight links without IFT. This opens for new entrants, although the existing large obstacles to enter the rail market have not changed by CN's withdrawal. RR is currently the only new entrant although it can be questioned if it is a completely "new" entrant, since it is part owned by CN and mainly staffed by former CN employees. The lack of a market leader also makes it easier for a new entrant to attract customers. In particular, that customers perceive the existing services similar and demand more diversification opens possibilities for specialised IFT. However, the increasing negative attitude towards IFT is likely to deter new entrants.

Bargaining power of suppliers

The suppliers' power increased since subcontracting for rail haulage and terminals, for example, are becoming more common. Each subcontractor also often works for several intermodal operators, which make them less dependent on one customer.

The higher degree of defragmentation highlighted the importance of controlling strategic resources. The physical operations, e.g., terminal operations, train haulage etc., can be subcontracted on an open market, while the intangible assets have become key strategic assets for the intermodal operator. This includes of course having good customer contacts but also controlling the time table slot on a congested rail network, as seen when CN was forced to contract GC for haulage. The time table slot is issued to the actor holding the rail permit. If this is the train operator and not the intermodal operator, there is a risk that the intermodal operator cannot change train operator or that the train operator could decide to cancel the contract with the intermodal operator and start a competing service.

Bargaining power of customers

The customers' previously strong role is reduced, as they have been forced to take a more extensive responsibility for the system. The forwarders/hauliers' continued interest in IFT has led to a possibility for the intermodal operators to change the prerequisites on the market from being pure subcontractors to the forwarder/haulier. They have now entered into partnerships with their customers, in which they share risks, mainly by the customers guaranteeing transport volumes. The events have shown that the large forwarders are key actors in the intermodal system with large bargaining power as the intermodal operators are dependent on them for running the system. At the same time, the forwarders depend on having an IFT system and accept to make concessions to save the system. In parallel, the bargaining power of the small customers is reduced as the large customers will set the agenda. Many small customers have protested against CN's withdrawal but have not had the power to do anything about the situation.

The increased use of subcontractors reduces the fixed costs for the intermodal operator making them more flexible, which reduces the customer's power. Excess capacity can be disposed of by cancelling the subcontractor's contract.

The reduced customer power is to some extent counteracted by the absence of a market leader and by new entrants, as this has given the customers more options to choose from. Also, the increasing focus on road hauliers as main customers increases the customer power as they have the option to produce the substitute product of road haulage internally.

Threat of substitute products

The obvious substitute product is road transport, which poses a significant threat. This threat has increased since IFT has been forced to raise the price to a similar level to road transport and is more considered a fragmented option that is difficult to use. The increasing negative attitude also increases the threat that customers will switch to alternative modes.

A particular issue is the switching costs for previous intermodal customers forced to use road transport when CN withdrew. The shortage of lorries meant that hauliers/forwarders were forced to invest in lorries, hire drivers, etc., which made their solution long term and less likely to switch back.

Rivalry among existing competitors

The rivalry has increased since there is no market leader and main freight links are left without IFT. Many intermodal operators see the possibility to start new services, in some

cases utilising already existing idle equipment. This can be seen by the activity in the market and the new services starting up.

CONCLUSION

The events after CN's decision to withdraw from the Swedish intermodal market pinpointed the vulnerability of depending on one dominating actor providing the backbone of IFT, resembling an infrastructure role. When CN withdrew from the market, there was a general concern that the intermodal freight would shift to all-road transport. The study showed, however, that the industry surprisingly quickly found or created alternative intermodal solutions with new organisation forms and applied business models. Customers were forced to take a more active part in the IFT and share the risks in order to save the system. This has put the intermodal operator in a much stronger position and it can be concluded that the large forwarders/hauliers and the intermodal operators have emerged as the dominating players with closer cooperation than before.

Although the events have had a negative impact on customers' attitudes toward IFT, there continued to be a large interest in IFT among the forwarder/hauliers throughout the events. Three main reasons can be identified for this. First is the cost advantage compared to road, second are the practical issues of transferring an existing intermodal flow to road, e.g., aquiring lorries and drivers and third is the favourable environmental image. The key factor is clearly the cost advantage. Environmental issues are beneficial but second in line after the costs as no customers are willing to pay extra for it. The practical issues are only relevant in the short run, as operators easily can arrange for road transport given some preparation time. Thus, the key challenge for IFT is to maintain the cost advantage.

However, the events cast doubt over the profitability of an open IFT network in competition with an increasingly more efficient road transport system. CN offered low prices but this was obviously not profitable. Prices offered by new intermodal operators were in some cases well above road transport and turned down by customers. Other actors, such as Intercontainer, offered a moderate price increase and took over some of CN's traffic, but went out of business. RR currently offers slightly lower price than road and reports preliminary good results. It can be concluded that IFT is a very competitive industry where it is important to carefully select an appropriate business model. RR's streamlined model with much outsourcing and shared risks appears so far to be promising, which is supported by the already successful similar own-account intermodal services. A key issue is to secure guaranteed transport volumes from the customers in order to increase the load factor and simplify planning.

The market has become more fragmented, which is perceived negatively by the customers who look for simplicity. The IFT system lacks an integrator or dominating player, which reduces its attractiveness. It is too early to say if the increasing competition on all levels will lead to increased efficiency but the new IFT system has so far failed to communicate a trustworthy image to the market. Lessons learned can provide important insights applicable on other European countries with a similar structure of one dominating intermodal operator and a legal framework allowing competition.

ACKNOWLEDGEMENTS

The research is funded by the Swedish Transport Administration.

REFERENCES

Afuah, A. (2004). Business models: a strategic management approach. McGraw-Hill/Irwin, New York.

Arvidsson, T. (2012). Coordinator freight transport research, Swedish Transport Administration. Interview in Gothenburg 2012-10-09.

Backman, H. (2013a). COO Real Rail, former marketing manager at Rail Combi and head of business development at CargoNet. Phone interview 2013-02-22.

Backman, H. (2013b). COO Real Rail, former marketing manager at Rail Combi and head of business development at CargoNet. Phone interview 2013-03-21.

Banverket (2010). Underlagsrapport Avgifter i Banverkets järnvägsnätsbeskrivning 2011 (Rail user fees). Swedish Rail Administration, Borlänge. In Swedish.

Bergqvist, R., Falkemark, G. and Woxenius, J. (2010). Establishing intermodal terminals. World Review of Intermodal Transportation Research, 3(3), 285-302.

Bergström, S., Ottosson, S. and Rex, M. (2011). Gods ska köras på tåg för miljöns skull (Freight should go by train for the environment's sake), Debate article, The authors represent the Green Party. Sundsvalls Tidning, December 16. In Swedish.

Bodin, K. (2011). För billigt på landsvägen (To cheap on the road). Norrbottens-Kuriren, December 1. In Swedish.

Bontekoning, Y. M., Macharis, C. and Trip, J. J. (2004). Is a new applied transportation research field emerging? - A review of intermodal rail-truck freight transport literature. Transportation Research Part A: Policy and Practice, 38(1), 1-34.

CargoNet (2011a). CargoNet avvecklar sin intermodala verksamhet i Sverige (CargoNet discontinues its intermodal service in Sweden), Press release 2011-10-24. In Swedish.

CargoNet (2011b). Information om nya statliga banavgifter 2011 (Information about new rail user fees 2011). May 26, http://www.cargonet.no/sv/Om-oss/Nyheter/Information-om-nya-statlig, accessed 2012-01-17. In Swedish.

CargoNet (2012). CargoNet viderefører deler av virksomheten innenlands i Sverige som deleier i det nystiftete selskapet Real Rail (CargoNet enters as part owner of Real Rail), Press release 2012-03-06. In Norwegian.

Dahllöf, G. (2011a). Norska CargoNet lägger ner sin kombitrafik i Sverige (Norwegian CargoNet cancels its Swedish intermodal traffic). På Hugget, October 27.

Dahllöf, G. (2011b). Norska CargoNet lägger ner sin kombitrafik i Sverige (Norwegian CargoNet discontinues intermodal transport in Sweden), Interview with Bjarne Ivar Wist, Director of Information and Strategy at CargoNet. På Hugget, October 27. In Swedish.

Flodén, J. (2009). Business models for intermodal transport - Intermodal road-rail transport in Europe. The 9th Annual International Business Research Conference, February 13-14, University of North Florida, Jacksonville.

Godstransportrådet (2010). Kombitrafiken - Attitydundersökning godstransportköpare och speditörer (Intermodal transport - attitudes of shippers and forwarders) Godstransportrådet Skåne & Blekinge, In Swedish.

Godstransportrådet (2012a). Kombitrafiken - Attityder och trender 2012 (Intermodal transport - Attitudes and trends 2012). Godstransportrådet Skåne & Blekinge, Malmö. In Swedish.

Godstransportrådet (2012b). Kombitransporter - hinder och möjligheter (Intermodal transport - barriers and possibilities). Godstransportrådet Skåne & Blekinge, March 1, Malmö. In Swedish.

GreenCargo (2012). Green Cargo växer intermodalt (Green cargo grows intermodally), Press release 2012-03-22. In Swedish.

Hermansson, P. (2012). Erfarenheter av kombitrafik i Sverige (Experiences of intermodal transport in Sweden), Hermansson is CEO of CargoNet AB. Stora Kombidagen, 14 March, Stockholm.

Hilmola, O.-P. and Szekely, B. (2006). Deregulation of railroads and future development scenarios in Europe - Literature analysis of privatization process taken place in US, UK and Sweden. Lappeenranta University of Technology, Department of Industrial Engineering and Management, Lappeenranta.

Huusko, O. (2009). Konkurrensneutralitet och effektiv logistik - dags för nästa generations gods- och kombiterminaler (Competitive neutrality and efficient logistics - time for the next generation of intermodal terminals). VTI Transportforum, 8-9 January, Linköping. In Swedish.

Hylén, B. (2005). Banavgifter i Europa - En kunskapsöversikt (Track user fees in Europe - a review). VTI, Linköping. In Swedish.

Intelligent Logistik (2012a). Drabbas av CargoNets stopp (Suffering from CargoNet's withdrawal), Interview with Caroline Lundström, Logistics Manager at Polarbröd. Intelligent Logistik, No. 1-2. In Swedish.

Intelligent Logistik (2012b). Kombilivet efter CargoNet (Intermodal life after CargoNet). Intelligent logistik, No. 1-2. In Swedish.

Jensen, A., Sjöstedt, L. and Woxenius, J. (1992). Railway organization - A preliminary appraisal of the Swedish model. Proceedings of the 6th World Conference on Transport Research, Lyon, June 29 - July 3.

Jensen, A. and Stelling, P. (2007). Economic impacts of Swedish railway deregulation: A longitudinal study. Transportation Research Part E: Logistics and Transportation Review, 43(5), 516-534.

Jernbaneverket (2012). Utredning av overføring av driftsansvaret for jernbanegodsterminaler (Investigation of transferring the freight terminal operations). Oslo. In Norwegian.

Kyster-Hansen, H. (2012a). Results of CLOSER's intermodal workshop for infrastructure and transport providers, Gothenburg, 2012-03-20.

Kyster-Hansen, H. (2012b). Results of CLOSER's intermodal workshop for shippers, Gothenburg, 2012-09-11.

Lindberg, T. (2011a). 80 lastbilar fler per dag på E4 (80 more lorries daily on E4), Interview with Mats Hollander, Director of Communications at GreenCargo. Sundsvalls Tidning, November 30. In Swedish.

Lindberg, T. (2011b). Det kostar oss miljoner (It costs us millions), Interview with Roland Kihlström, Purchasing Manager at Akzo Nobel Sundsvalls Tidning, December 3. In Swedish.

Lindberg, T. (2011c). Hopp om fortsatt gods på järnväg (Hope for continued rail freight traffic), Interview with Jonas Nilsson, Regional Manager at DB Schenker. Sundsvalls Tidning, December 3. In Swedish.

Lindberg, T. (2012). Godstågen rullar igen (Freight trains rolling again). Sundsvalls Tidning, January 3. In Swedish.

Linder, J. C. and Cantrell, S. (2000). Changing Business Models: Surveying the Landscape. Accenture Institute for Strategic Change, Cambridge, Massachusetts.

Ludvigsen, J. and Osland, O. (2007). Variation in European liberalization of rail freight markets. European Transport Conference 2007, 17-19 October, Leiden, The Netherlands.

Margretta, J. (2002). Why Business Models Matter. Harvard Business Review, 80(5), 86-92.

Nilsson, I. (2011). Misskött järnväg hotar jobben i norr (Badly operated rail service threatens jobs in the north), Debate article, Nilsson is MP for the Social Democrats. Sundsvalls Tidning, December 14. In Swedish.

Nilsson, I. (2012). Conference Kombitransporter - hinder och möjligheter, Nilsson is CEO DB Schenker Region North. Godstransportrådet Skåne & Blekinge, March 1, Malmö. In Swedish.

Nilsson, I. (2013). CEO, DB Schenker Region North, Informal discussion, 2013-03-12.

Norrbottens-Kuriren (2011a). 1 000 lastbilar tar över (1000 lorries take over), Interview with Caroline Lundström, Logistics Manager at Polarbröd. Norrbottens-Kuriren, December 1. In Swedish.

Norrbottens-Kuriren (2011b). Allvarligt läge för tågbolag (Serious for train company), Interview with Mats Hollander, Director of Communications at Green Cargo. Norrbottens-Kuriren, November 30. In Swedish.

Norrbottens-Kuriren (2011c). Fraktbolag väljer väg före tåg (Transport firm chooses road before rail). Norrbottens-Kuriren, November 30. In Swedish.

Norrbottens-Kuriren (2011d). Kräver ministermöte (Demands meeting with minister). Norrbottens-Kuriren, December 8. In Swedish.

Norrbottens-Kuriren (2011e). Vill fortsätta men ingen drar vagnarna (Wants to continue but noone hauls the wagons), Interview with Bjarne Ivar Wist, Director of Information and Strategy at CargoNet. Norrbottens-Kuriren, December 6. In Swedish.

Osterwalder, A. (2004). The Business Model Ontology - A Proposition in a Design Science Approach. Doctoral Thesis, Universite de Lausanne, Lausanne.

Osterwalder, A., Pigneur, Y. and Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. Communications of the Association for Information Systems, 16(1-25.

Panayides, P. M. (2002). Economic organization of intermodal transport. Transport Reviews, 22(4), 401-414.

Pateli, A. (2002). A Domain Area Report on Business Models - White Paper. Athens University of Economics and Business, Athens.

Pateli, A. G. and Giaglis, G. M. (2004). A research framework for analysing eBusiness models. European Journal of Information Systems, 13(4), 302-314.

Piteå-Tidningen (2011). Lastbilar får ersätta nedlagda tåg (Lorries replace discontinued trains), Interview with Jens Hardegård, Local Manager at Polarbröd. Piteå-Tidningen, December 5. In Swedish.

Polarbröd (2011). Elmsäter-Svärd i samtal med näringslivet från Norr- och Västerbotten om CargoNets nedläggning (Minister for infrastructure in discussion with Northern industry about CargoNet's withdrawal). Press release, 2011-12-09. In Swedish.

Polarbröd (2012a). Brödet fortsätter på räls (The bread continues on rail), Press release 2012-03-13. In Swedish.

Polarbröd (2012b). Miljöpartiet träffade näringslivet i Norrbotten för att diskutera järnvägens förutsättningar för ett fungerande näringsliv (The Green Party in Norrbotten meets for rail discussion), Press release 2012-01-23. In Swedish.

Port of Gothenburg (2012). Rail services. Brochure.

Porter, M. E. (1985). Competitive advantage: creating and sustaining superior performance. Free Press, New York.

Porter, M. E. (2001). Strategy and the Internet. Harvard Business Review, 79(3), 62-78.

Roso, V., Woxenius, J. and Lumsden, K. (2009). The dry port concept: connecting container seaports with the hinterland. Journal of Transport Geography, 17(5), 338-345.

Sandahl, T. (2012). CEO Sandahlsbolagen and Real Rail, Presentation at the conference Multimodala godstransporter (Multimodal freight transport). May 4, Umeå.

Sandahlsbolagen (2012). Real Rail AB, Press release 2012-03-06. In Swedish.

Sandahlsbolagen (2013). About Sandahlsbolagen. www.sandahlsbolagen.se, accessed 2013-03-07.

Schweizer, L. (2005). Concept and evolution of business models. Journal of General Management, 31(2), 37-56.

Shafer, S. M., Smith, J. H. and Linder, J. C. (2005). The power of business models. Business Horizons, 48(3), 199-207.

SOU (2004). Godstransporter – noder och länkar i samspel (Freight transport - nodes and links in cooperation), SOU 2004:76, Swedish Government Official Reports. Stockholm. In Swedish.

SvD (2011). Hundratals lastbilar får ersätta tåg (Hundreds of lorries replace trains). Svenska Dagbladet (SvD), December 7. In Swedish.

Svensk Åkeritidning (2011a). CargoNet: Elmsäter-Svärd i krismöte med norrländska näringslivet (CargoNet: Minister for infrastucture in crisis talk with the Northern industry). Svensk Åkeritidning, December 9. In Swedish.

Svensk Åkeritidning (2011b). CargoNet: Kombitrafikens framtid är fortfarande osäker (CargoNet: Intermodal future still unsecure), Interview with Bjarne Ivar Wist, Director of Information and Strategy at CargoNet. Svensk åkeritidning, December 12. In Swedish.

Svensk Åkeritidning (2011c). CargoNet: Miljöpartiet söker dialog med Green Cargo (CargoNet: Green Party seeks dialog with Minister of infrastructure), Interview with Stina Bergström, Green Party spokesperson. Svensk Åkeritidning, December 7. In Swedish.

Svensk Åkeritidning (2011d). Det skulle gå att köra på måndag - om viljan finns (Traffic on Monday is possible - if there is will), Interview with Leif Pettersson, Social Democrats' spokesperson. Svensk Åkeritidning, December 9. In Swedish.

SVT (2011). Norsk-svensk konflikt stoppar svenska godståg (Conflict Norway-Sweden stops

Swedish freight trains). Sveriges Television, December 7. In Swedish.
Symonds (2001). A study of single wagonload rail traffic. Symonds Group Ltd for European Commission, Directorate-General for Energy & Transport, East Grinstead.
Transport/Logistik iDag (2009a). CargoNets klagan mot Jernhusen avskrivs (CargoNet's complaint agains Jernhusen overruled). Transport/Logistik iDag, October 13. In Swedish.
Transport/Logistik iDag (2009b). Jernhusen skapar nytt monopol (Jernhusen creates new monopoly). Transport/Logistik iDag, May 4. In Swedish.
Transport/Logistik iDag (2011a). CargoNet kovänder och fortsätter i Sverige (CargoNet continues in Sweden), Interview with Arne Kjensli, Chairman of the board at CargoNet. Transport/Logistik iDag, December 5. In Swedish.
Transport/Logistik iDag (2011b). Delar av kombitrafiken hänger fortfarande löst (Parts of the intermodal transport still endangered). December 12. In Swedish.
Transport/Logistik iDag (2011c). Green Cargo nobbar CargoNets tågdragningar (Green Cargo denies to haul Cargo Net trains), Interviews with Agneta Kvarnskog, acting Director of Cummincations at Green Cargo and Patrik Hermansson, CEO at CargoNet AB. Transport/Logistik iDag, December 6. In Swedish.
Transport/Logistik iDag (2011d). Green Cargo och CargoNet delvis överens (Green Cargo and CargoNet partly agrees). Transport/Logistik iDag,, December 10. In Swedish.
Transport/Logistik iDag (2011e). Kombistopp på söndag (Intermodal stop on Sunday), Newspaper article containing letter to CargoNet customers. Transport/Logistik iDag, December 8. In Swedish.
Transport/Logistik iDag (2011f). Kombitrafiken kommer på sikt (Intermodal will grow in time), Interview with Olle Huusko, Business Area Manager Intermodal Terminals at Jernhusen Transport/Logistik iDag, December 21. In Swedish.
Transport/Logistik iDag (2011g). Slå vakt om kombitrafiken (Save intermodal transport), Open letter to Green Cargo and CargoNet from Ingvar Nilsson, CEO DB Schenker Region North and Stefan Nilsson, CEO DHL Freight Nordic. Transport/Logistik iDag, December 8. In Swedish.
Transport/Logistik iDag (2012). Real Rail väljer CargoNet för tågdragning (Real Rail chooses CargoNet for train haulage). November 26. In Swedish.
Transport/Logistik iDag (2013). Intercontainer i konkurs (Intercontainer files for bankruptcy). Transport/Logistik iDag, February 5. In Swedish.
Transportnytt (2012). Otillförlitliga tåg fick CargoNet att lämna landet (Unreliable trains made CargoNet leave Sweden). Transportnytt, In Swedish.
UIC (2009). 2007 Report on intermodal rail/road transport in Europe, DIOMIS - Developing infrastructure and operating models for intermodal shift. International Union of Railways, Paris.
Vierth, I. (2012). Uppföljning av avregleringen av godstrafiken på järnväg (Follow-up of rail freight deregulation). VTI, Linköping. In Swedish.
Voelpel, S. C., Leibold, M. and Tekie, E. B. (2004). The wheel of business model reinvention: how to reshape your business model to leapfrog competitors. Journal of Change Management, 4(3), 259-276.
Woxenius, J. (1994). Modelling European Combined Transport as an Industrial System. Licentiate thesis, Chalmers University of Technology, Gothenburg.
Woxenius, J. and Bergqvist, R. (2011). Comparing maritime containers and semi-trailers in the context of hinterland transport by rail. Journal of Transport Geography, 19(4), 680-688.