Challenges and solutions for finished vehicle logistics in South Russia

Survey research

Southern sea ports in Russia are increasingly highlighted as crucial entry gates for finished vehicle logistics due to increasing export from Turkey and reducing transport distances to dealerships. With a view to restraints and poor infrastructure in the Azov-Black Sea basin for the transshipment of vehicles, the paper aims to research challenges and solutions for a logistics provider.
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Abstract

Russia’s automotive market is reported to be the second-largest in Europe with significant growth potential. Southern sea ports are denoted as crucial entry gates for finished vehicle logistics participants due to increasing export from Turkey and reducing transport distances for consumers to save on logistics costs. Given the restraints and poor infrastructure in the Azov-Black Sea basin for the transshipment of vehicles, the paper aims to research challenges and solutions to be considered in the corporate strategy of a logistics provider.

Challenges and solutions, being categorized as strategic and operational, are outlined as per literature overview and further validated through research. The research is undertaken with the use of a survey strategy as part of a case study, including interviews and questionnaires within port authorities, car trucking companies, sea carriers and freight forwarders.

Findings corroborated that insufficient RoRo port capacity remains a critical challenge for South Russia. Furthermore, a multi-tier parking concept was viewed by respondents as a leading strategic solution. The findings on operational solutions are found to be consistent with previous studies and observations. Respondents tend to highlight Novorossiysk as the most attractive RoRo facility despite the construction of new ports in Kavkaz, Gelendzhik and Taman regionally.

Investments in intermediate solutions in Novorossiysk port are believed to be more efficient compared to time-consuming projects elsewhere in the region that potentially represent a practical implication of this paper for TMBCL as a logistics service provider.
1. Introduction

Roll-on Roll-off (RoRo) technology admittedly represented a crucial innovation in the logistics of the 20th century, being driven by the evolution and expansion of the international automotive industry at the end of 50s (Stopford 2009, p.493). The rapid cost competitive service reduced the need for double-handling and transshipment of goods, along with the low risk of cargo damage and minimum packaging expenses they successfully competed with conventional services utilizing crane operations (Rushton et al. 2010, p.339). The appearance of RoRo designs benefitted ship owners enabling them to “maintain pace with the changes in land based transport” discovering new markets for transportation, from motorbikes to vehicles (Moses 2010, p.106). According to Dias et al. (2010) the inter-modality concept of the automotive supply chain management would not exist without the invention of RoRo technology. Morales-Fusco et al. (2012) further contends that RoRo ships represent one of the best options for integrated supply chains with competitive door-to-door cost per unit and lead time being of the same magnitude order as road-haulage transportation chains in respect of the EU, as an example.

It is not surprising then that modern concepts of maritime logistics and supply chain management are intrinsically connected with RoRo transportation and the automotive industry. Song & Panayides (2012) specifically states that maritime logistics enlarges a definition of maritime transportation by a process of “planning, implementing and managing movement of goods and information”, i.e. maritime transportation alone no longer remains sufficient to generate an added value for customers. Furthermore, both operational efficiency (reduced lead time and business costs) and service effectiveness (flexibility, responsiveness and reliability) shall not be viewed without the integration of RoRo transportation (shipowners, ports and freight forwarders) into the automotive supply chain (Dias et al. 2010).

An automotive supply chain, like any supply chain, includes suppliers (OEM – original equipment manufacturers), logistics (LSP – logistics service providers) and customers and concerns about physical and information flows from raw materials through to the final distribution of finished vehicles (Rushton et al. 2010). The present paper is intended to evaluate the logistics of finished vehicles (FVL), i.e. outbound logistics, placing primary focus on sea ports, integration in the supply chain and solutions for the South Russian market.

The choice of Russia overall has many justifications. Russia’s automotive market is reported as the second-largest in Europe with significant growth potential (Ernst & Young (CIS) B.V. 2012). Demand-supply factors and Russia’s WTO accession are noted as crucial determinants, so that a pre-crisis level of sales is achieved in the medium term with 2/3 of new vehicles imported from
overseas. Ernst & Young (2012) estimates that by 2018 customs dues for imported vehicles will be reduced from 30% to 15%, strengthening the market position for foreign brands and creating prerequisites for an automotive supply chain expansion (App I). Another piece of evidence is provided by Ludwig (2013a), viewing the Russian market as booming, with a forecast annual increase of 10-15% to 3m in light vehicle sales in 2012. Coia (2013a) denotes that Russia was the only market in Europe to grow despite the recession in the euro zone elsewhere.

The question remains why the paper concerns South Russia FVL, despite the fact that over 50% of Russian import-export is traditionally routed via North-Western ports with vast capacity in terms of RoRo terminals at Ust-Luga, S.Petersburg and Kaliningrad ports.

Firstly, there is a trend among OEM to use Russian ports rather than foreign ports in Latvia, Estonia, Finland and Ukraine (Coia 2013a). The reasons for the use of Southern ports can be traced back to a reduction of transport distances between entry points and dealerships, although experts acknowledge a lack of infrastructure and shipping services. Secondly, sales of new vehicles outside of Moscow and S.Petersburg increased from 51% in 2010 to 57% in 2012 with particular growth in the Urals, Siberia and South Russia. Saving costs and lead-time are cited as major contributors for such strategies of OEM. Finally, the role of Turkey heightened significantly: Wheatley (2012) specifies that latest forecasts from IHS Automotive expect stable growth of the Turkish automotive industry and its exports into Eastern Europe and Russia via Southern ports.

The line of argument has been further developed by Ludwig (2013b) emphasizing that “Russia has a long way to go towards improving its supply chain, logistics here is arguably more important than elsewhere”. Experts agree that logistics already represent a real competitive advantage in Russia. Thus, successful logistics in the relatively new niche for FVL in South Russia will be a key success factor for carmakers (Ludwig 2007). It is difficult to escape the conclusion that a study of the challenges and solutions for FVL in South Russia will bring value to LSP, particularly in the case of TMBC Logistics Ltd of Novorossiysk (TMBCL).

As will be argued in the next sections, the research on challenges and solutions for FVL will address the following questions:

1. What are the crucial challenges for FVL in South Russia?
2. Which solutions are worthwhile developing to bring added value to OEM from a logistics company perspective?
3. What successful strategies are to be implemented to offer an efficient and effective service offer in FVL given the lack of infrastructure in the Azov-Black Sea regions of Russia?

It is worth pointing out that the research is conducted on customers and stakeholders of TMBCL. The company portfolio includes port forwarding services to FVL participants in Novorossiysk port, the largest deep sea water port in the South of Russia.
2. Background of the project

Mention should be made of experts describing the development of the Russian automotive industry “along the processes of internationalization, integration into production systems, and insertion into global value chains” (Volgina 2011), highlighting that cross-border trade and trade via sea ports will become progressively more important. Still, there is no denying that the development of lean and agile supply chains for the automotive industry in Russia reflects a long term demand trend (Hilmola et al. 2010).

According to TMBCL, in the last 3 years multiple logistics providers (Gefco, Rolf, Autologistics, BLG etc) attempted to develop sustainable solutions via South of Russia due to the continuous economic growth of the region and proximity to dealerships. The key point to note is that natural constraints prevented LSP from entering the only regional deep sea water port Novorossiysk as a consequence of low attractiveness of vehicles as a commodity for stevedoring companies, lack of RoRo infrastructure and the absence of alternative nearby deep sea water ports with sufficient land for storage of vehicles.

In 2012, TMBCL attempted to devise a temporary solution for PSA-owned Gefco/France via one of the local terminals with a limited storage compound of 15000 sqm. The compound area is located in proximity to the future container terminal of Timber port, a long-expected project which is postponed due to a deteriorated container market outlook and troubled cash flow of the terminal as a result of a recession in the EU, a key trade partner of Russia. It should also be noted that recessionary times affected cargo turnover of terminals in Novorossiysk enabling deployment of temporary storage facilities for transshipment of vehicles as a substitute commodity.

Again, as noted already in the previous section, forecasted growth of the Russian automotive market implies that the automotive logistics market will also be expanding. Growth of cargo flow and structural changes of modern Russia in 1991-2013 did not preserve conditions where logistics infrastructure followed at the same pace. It was cited as a major challenge for overall logistics and automotive logistics especially (Morstroytechnology 2012). Morproekt noted disparity in sea port capacity within 3 crucial areas of Russia’s automotive logistics (Fig 1):

- Black Sea (South Russia) – 80000 CEU
- Baltic Sea (North-West Russia) – 1180000 CEU
- Russian Far East – 450000 CEU

1 CEU – car equivalent unit, a measure of port capacity for vehicles
Furthermore, Novorossiysk is claimed to be the largest deep sea water port over combined turnover (dry and liquid cargoes) with little diversity due to zero competition regionally. Despite demand for deliveries from the EU and Turkey, South Russia has remained irrelevantly fitted for the import of vehicles until very lately (Morstroytechnology 2012). This is not to say that lack of sea port infrastructure development impeded container and RoRo port developments in Russia in general (Korovyakovsky & Panova 2011).

2.1. Challenges of FVL

Within the challenges of the Russian automotive industry, Myller (et al. 2011) emphasizes excessive lead time and high logistic expenses making the supply chain “more variable” with reliance on buffer warehouses with less focus on just-in-time delivery. This is one of the most important reasons why OEMs generally view logistics as a competitive advantage in Russia. What this means is long standing problems, including infrastructure constraints, ageing equipment, delays and high customs costs according to the research of Ludvig & Williams (2012). Underinvestment in infrastructure is attributed to such status.

2.1.1. Crucial challenges

The infrastructure problem was further illustrated in the survey on Russian automotive logistics by Coia (2008a) with 58% of respondents highlighting infrastructure as the most significant challenge and 22% on customs related issues (Fig 2):
Figure 2: Survey results on needs and challenges of the Russian automotive market (Coia 2008a)

The key point to note from this survey is that the biggest challenge for FVL is *lack of sea and port capacity* with 60% of respondents followed by underdeveloped rail transport (20%). What is also remarkable is 46% for *better partnership between LSP and OEM* as a suggested way to improve logistics in Russia. Indeed, it is plausible to argue that a better partnership between logistics providers and car makers will trigger solutions for infrastructural roadblocks across the industry. Yet, another piece of evidence suggests that competition between manufacturers predisposes development of independent logistics solutions by OEM, as noted earlier by Ludwig (2013b, 2007).

Nothing can detract from the central fact that Russia is generally challenged by limitations in port capacity compared to the demand by exporters and importers (Brodin 2000). Nonetheless there is a need to not underestimate the importance of *customs*. Ludwig (2009) opines that it has been evidently rated among the most challengeable issues of the Russian market “causing longer waiting times at borders and adding considerable cost to the supply chain”.

Unlike containers, cars require labour intensive handling and cannot be stacked, resulting in larger yards compared with container terminals (Cordeau et al. 2011). A classic illustration is often demonstrated by TMBCL: port terminals at Novorossiysk are not willing to accept finished vehicles over a long period due to relatively low revenues compared to other commodities, e.g. containers. Indeed, a typical transshipment terminal for vehicles takes enormous space justified by a vehicle stock (D.C. Mattfeld & Kopfer 2003). Take yet another illustration demonstrated by...
Biederman (2007) on US ports: rising containerized imports have been forcing U.S. ports to limit terminal space for RoRo and other break bulk cargoes, since ports generated better revenue per square meter from containers. To put it simply, even in developed economies RoRo carriers and terminals might struggle to find land for expansion of existing or new FVL terminals.

Similarly, the arguments on reliable logistics networks and, specifically road networks, shall not be ignored discussing the issues on outbound logistics. Coia (2008b) believes reliable logistics networks in Russia are the main challenge, referring to the point that road transport is not reliable due to the poor state of road networks.

A comparison of challenges in Russian Baltic ports studied by Tiskin (2006) with problems in the Black Sea will not be misleading: absence of specialized car terminals and specific customs procedures limiting PDI (pre-delivery inspection) were considered as major factors restraining growth of the transshipment of a volume of vehicles. It is worth noting here that Finnish ports were used as an alternative entry point into Russia a decade ago, until extra capacity was built locally. Southern car flows into Russia were routed via the alternative ports of Iliychevsk and Sevastopol also.

2.1.2. Impact of Turkey and distance to dealers

It is usually asserted that the location of a RoRo port terminal is important to market dealers (Dias et al. 2010). The impact of Turkey on FVL in South Russia might arguably be given as another crucial factor supporting raising the importance of Southern ports.

An example of this is given by Cullen (2011) contending that Turkish RoRo ports benefitted due to their excellent geographical positions as transshipment hubs for traffic of finished vehicles to Russia. Ludvig (2011) has observed, for instance, Toyota’s efforts to explore opportunities for their Turkish exports via Novorossiysk in 2012; nevertheless quoting the dissatisfaction of the OEM on the availability of well-developed facilities, at least compared to terminals in Ukraine. Again, Tiskin (2006) mentioned that car flows to Novorossiysk were 100% constituted from Turkish-made vehicles, i.e. a closeness of the port location to manufacturers was the sole prerequisite, regardless of missing RoRo infrastructure.

More controversial is the question as to whether the choice of Novorossiysk and nearby ports is largely now predetermined by the close proximity of new consumers in Russia.

Jones & North (1990) convincingly argues that most car importing ports in the UK are located close to market distribution centers and have close national motorway links. Interestingly, they identified three key sets of factors impacting a port selection decision including ‘foreland’
factors (traffic origin, technological and organizational characteristics of the car trade, availability of alternative RoRo services), ‘hinterland’ factors (access to motorway network, opportunities for rail distribution and proximity to centres of demand) and, lastly, ‘in-port’ facilities (exclusive user RoRo berths, areas of for vehicle storage and establishment of pre-delivery inspection facilities). Their research ranked all said factors concluding that in-port facilities are highlighted by customers as being critical followed by motorway accessibility, labour relations and, importantly, location of ports in relation to sales centers (Table 1):

Table 1: Rating of RoRo port selection factors by customers in the UK (Jones & North 1990)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Firms mentioning factor as major reason for port selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-port facilities (berths, storage, rail connections)</td>
<td>10</td>
</tr>
<tr>
<td>National motorways accessibility</td>
<td>7</td>
</tr>
<tr>
<td>Labour relations (flexibility, co-operation)</td>
<td>7</td>
</tr>
<tr>
<td>Market distribution (location in relation to pattern of sales)</td>
<td>5</td>
</tr>
<tr>
<td>Shipping costs, sailing frequencies</td>
<td>3</td>
</tr>
<tr>
<td>Proximity to PDI facilities</td>
<td>4</td>
</tr>
<tr>
<td>Proximity to franchise administration centre</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
</tr>
</tbody>
</table>

It is interesting to speculate if the fading interest of car makers in Ukrainian specialized RoRo terminals (Iliychevsk and Sevastopol), as alternatives to Russian ports in the South, was directly connected with a so-called solely ‘hinterland’ factor as exemplified in the UK. Of course it could be argued that in-port facilities play a dominant role with port capacity trouble in Russia only exacerbating the choice of Iliychevsk for FVL. Nonetheless, events show us that OEM are getting increasingly enthusiastic about saving land costs through entry points in South Russia (Ludwig & Williams 2013).

2.2. Solutions for FVL

Solutions identified in the literature overview have been respectively classified as strategic and operational to elicit corporate strategy implications for a logistics provider. We further suggest that strategic solutions identified shall be further reviewed by potential investors and principals of TMBCL as the volume of investments required cannot be disposable for the company. On the other hand, operational solutions are viewed as a catalyst for TMBCL efficiency potentially formulating a short-/medium term action plan.
2.2.1. Strategic solutions

As has often been pointed out by Ludwig (2013b), Russia’s automotive supply chain has a lot to change and improve. Considering infrastructural problems it is expected that the value of logistics in Russia is higher than elsewhere therefore innovative logistics solutions undoubtedly contribute to competitive advantages for both LSP and OEM. This is why car manufacturers in Russia are not cooperating in logistics. The same author (Ludwig 2009) argues that a better partnership between manufacturers and logistics providers would likely lead infrastructure into a more sophisticated level meeting quality standards and customer price expectations (Fig 3):

![Figure 3: Survey results of logistics providers for automotive industry in Russia (Ludwig 2009)](image)

As Fig.3 demonstrates, a survey held within LSP companies has revealed a gap in partnership between members of the supply chain. Not surprisingly, respondents called for a better partnership between LSP and car makers (56.34%) as a crucial way to improve logistics for the automotive industry.

It is quite true to view a better partnership between OEM and LSP as a noticeable attribute, yet in reality the most important factor likely relates to a lack of capacity of Southern sea ports in Russia. Evidence of this is getting even more obvious after a review of the Russian media on developments of Southern ports (RZD Partner 2013, Shipilova 2013, Chernov 2010, Transport SPb 2008). Three prospective RoRo terminals are scheduled to be built in South Russia in 2013-2018: data on investment volumes is displayed below in comparison with the recently constructed Ust-Luga RoRo terminal on the Baltic Sea (Table 2):
Table 2: Investments in new RoRo ports in Russia

<table>
<thead>
<tr>
<th></th>
<th>Taman²</th>
<th>Gelendzhik</th>
<th>Kavkaz</th>
<th>Ust Luga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total investment</td>
<td>228 billion Rub</td>
<td>9.5 billion Rub</td>
<td>3.3 billion Rub</td>
<td>1.5 billion Rub</td>
</tr>
<tr>
<td>portfolio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State investments</td>
<td>115.5 billion Rub</td>
<td>5 billion Rub</td>
<td>2.6 billion Rub</td>
<td></td>
</tr>
<tr>
<td>Private investments</td>
<td>112.5 billion Rub</td>
<td>4.5 billion Rub</td>
<td>0.7 billion Rub</td>
<td></td>
</tr>
<tr>
<td>Compound capacity</td>
<td>Not identified</td>
<td>Around 5 Ha</td>
<td>25 Ha</td>
<td>65 Ha</td>
</tr>
</tbody>
</table>

As can be seen, Ust Luga - being a state-of-the-art FVL terminal in the Russian Baltic, contributed 1.5 billion Russian Rubles or $44 millions. Construction of similar ports on the Black Sea is estimated to be many times more expensive.

Building new RoRo ports on the Azov-Black Sea segments will without a doubt be a challenge despite governmental investments. As demonstrated, the lion’s share of investments in every case is attributed to the erection of breakwaters and infrastructure to protect berths from sea swell. Delays in Taman and Kavkaz ports are rumored to be contributing to the delaying of the allocation of state finance. Accordingly, the only alternative in the medium term is possibly connected to Novorossiysk port, the only deep sea water port in South Russia.

Related to these arguments is the dry port concept. The concept reflected growing containerized transport as a trend towards full utilization of economies of scale in 60s (Song & Panayides 2012, p.179); consequently a lack of space at sea port terminals and growing congestion on access routes attributed to the expansion of container trade. Therefore, it was suggested to increase existing terminals on account of hinterland facilities linking them to sea ports by roads or railways. Roso et al. (2009) further views a dry port as an “inland intermodal terminal directly connected by rail to seaport(s) where customers can leave/pick up their units as if directly to a seaport”. Jaržemskis & Vasiliauskas (2007) have further argued that seaports struggle to expand their space inside metropolitan areas, as this triggers environmental and land use conflicts. The crucial question may therefore be if a dry port concept can be successfully applied for FVL and sea ports in South Russia as a response towards insufficient port capacity.

² Investments for construction of Taman port are estimated for all commodities including liquids.
The following example of Barcelona RoRo terminal may be taken as evidence of a dry port. Coia (2007) illustrated that since a berth there is far from the compound, Renault has to shuttle vehicles by truck to and from the storage area. Another illustration is demonstrated in Italian ports. The possible flaw of this is that it implies extra handling increasing the potential for damage. Essentially, avoiding damage to vehicles during transportation is of top priority (D.C. Mattfeld & Kopfer 2003): manufacturers are normally unwilling to accept moves in ports other than required for storage and retrieval with an acceptable damage level under 1.0%.

Further discussion on reshaping of existing sea port facilities, e.g. Novorossiysk for FVL in South Russia, is exemplified by Parker (2008). He contends that a sole focus on RoRo terminals is not sufficient. Alternatively, mixed-use terminals are suggested as a solution to Russian port capacity shortfalls. The concept offers a solution for both containers and vehicles assuming to mitigate back-loading problem and reduce costs per voyage. Interestingly, reduction of costs is also considered with cars and containers unloaded simultaneously in lower ship-in-port time. Arguably, building mixed-use terminals will allow responding flexibly to the growing automotive industry demand. A fundamental objection to this idea is that existing fleet of car carriers and container carriers are not suitable for the cargo operations in question. So, all in all, substantial capital investments ought to be provided for both terminals and ships; thus making the concept too difficult to materialize.

There are other ways in which we might attempt to tackle the problem of insufficient port capacity. Multi-tier parking is another example typified by Mattfeld (2010, p.29). With a view to assess a port’s suitability to vehicle transshipment, Mattfeld introduced 3 critical factors:

- Accessibility: location of a port in respect to manufacturers and/or dealers; connections to highways and railways; accessibility of berthing facilities and their distances to open sea.
- Extensibility: disposability of storage space; quality of storage facilities.
- Facilities: availability of added-value services, quality management and IT integration into port management.

In the case of extensibility, multi-story car parks were demonstrated as a solution in Bremerhaven in order to provide sheltered storage, enhance disposability of land and reduce vehicle access times for parking located nearby berthing facilities. For instance, BLG terminal in Bremerhaven is said to operate multi-storey park decks for more than 30000 vehicles, moreover apart from capacity enhancement, park decks ensure high productivity of operations (Mattfeld 2010, p.42).
It is often assumed that *feeder services* or so-called hub-and-spoke concept appears to be effective as a distribution model associated with large hub ports (Song & Panayides 2012, p.195). Such ports serve to consolidate shipments on a large scale and to redistribute smaller shipments to destinations via feeders. Accordingly, no port in South Russia could explicitly be qualified as a hub port, given the capacity restriction for FVL. At the same time it could be argued that Russian river ports might extend extra RoRo capacity, such as the shallow drafted Rostov port. Despite challenges of trade to shallow rivers, RoRo river shipments are exemplified on the Danube River by Intershipping Ltd (n.d.). Mostly catamarans (2500 sqm capacity) are utilized for such services although its navigation in part of the Black Sea shall be deeply questioned (Viadonau n.d.). Feeder services are widely used by car makers in the European Union. However its popularity is contributed by environmental reasons, as illustrated by Coia (2007) in the case of SEAT in the Netherlands and Italy. In other words, short sea shipping is increasingly a growing alternative to road transportation to alleviate congestion. In the outbound logistics for vehicles it takes a large niche with car carriers capacity slightly under 1000 vehicles (Mattfeld 2010, p.25).

### 2.2.2. Solutions affecting operational effectiveness


The task of vehicle transshipment in a sea port will generally be two-fold (Mattfeld 2010, p.4-5):

1. A customer expects time effective operations; the dates of vehicle delivery expectations are to be met.
2. Operations must be cost effective, whilst avoidance of damage has to be pursued in priority.

Admittedly, these goals might be contradicting. Thus, management techniques and approaches of a vehicle transshipment terminal shall be studied concurrently with strategic solutions for FVL.

Essentially we need to look at the facilities of a typical vehicle terminal. Mattfeld (2010, p.29) classifies requirements to such terminals as three-fold:
1. Added-value services are to be offered (assembly of vehicle equipment, de-waxing, pre-delivery inspections (PDI), repairs and reconditioning).

2. Operations shall comply with quality management standards to maintain a damage level under 1%.

3. IT systems have to be incorporated for tracking and tracing of vehicles.

There is no doubt that added-value services in ports are typically related to specialized terminals of which PDI is one of remarkable features according to researchers and analysts. Apparently, PDI activities further deepen integration of a sea port into an automotive supply chain. For instance, port of Antwerp offers additional PDI services including repairs, assembling, washing and second stage manufacturing (Antwerp port Authority n.d.). Chow (2010) demonstrated an example of Haitong's (Shanghai) facilities with the capacity to store 7000 cars being fitted with customs inspections facilities, PDI and battery charging services. In such an approach, specialized car terminals serve to improve logistics efficiency. It must be emphasized that existing facilities at the largest RoRo terminals on the Black Sea are not yet equipped with PDI facilities; as such neither Iliychevsk (Ukraine) nor Constanta (Romania) are said to offer such packages to customers being described by Coia (2007) rather as “parking lots”.

As noted already by Coia (2013b), specialized terminals represent an extension of a car maker, modifying vehicles with accessories according to dealer orders. For example Toyota Logistics services in the US, added-services of ports include installation of post-production options, final quality assurance, processing and regulatory labelling. Coia (2013b) surprisingly contends that whilst no terminal in Russia is yet offering PDI services; albeit in Brazil, another growing economy of BRIC, almost one-third of PDI takes place in sea ports.

It is also important to realize that quality management and damage control remain in the core of a service package of vehicle transshipment terminals. Apart from quality standards, little attention in literature is yet paid to management decisions. Mattfeld (2010, p.47-60) categorizes such as:

- Strategic decisions (long-term strategies on infrastructure, processes, market niche).
- Tactical decisions (ship scheduling, berth allocation planning, storage space positioning, storage area layout and personnel planning).
- Operational decisions (storage space allocation and gang scheduling).

As long as quality management standards are widely enforced at terminals in accordance with ISO9000 standard (Mattfeld 2010, p.29), there is, arguably, still a lack of standards in FVL across the reporting, payment, tracking and scheduling systems of LSP, according to Wheatley...
(2010). Accordingly, it results in greater costs, complexity and confusion in the finished vehicle supply chain process.

As a particular case of effective operations management Mattfeld & Kopfer (2003) innovated planning and scheduling system for vehicle transshipment terminals. For a study on Bremerhaven port operations being characterized by short term reaction, researchers suggested reshaping operational management through a planning and scheduling system. Efficiency gains were reported by comparing productivity measures and transshipment volumes in 2002 compared to manual planning. The system integrates customers into the planning process supporting supply chain oriented negotiations. Similar direction was studied by Fischer & Gehring (2005) supporting the planning of transshipments of imported finished vehicles. A so-called multi-agent system was suggested to improve integrated storage allocation and personnel scheduling: operations from ramp to storage compound were specifically distributed between ‘area agent import’, several ‘shift agents’ a ‘planning coordinator agent’. Similarly, Maksimavičius (2004) focused on timely processing of cargo at RoRo terminals highlighting factors of better interaction between terminal and shipping line, improved storage layout and operational management issues.

Integration of IT systems to support automotive terminal operations leads to increased terminal performance according to Mattfeld (2010, p.139) who distinguishes importance of electronic data interchange (EDI), tracking operations details by means of enterprise resource planning systems (EPR) and planning & scheduling of operations as discussed above.

Importantly, Leskova (2011) noted the role of IT technology to “schedule information from multiple customers in multiple regions with various production systems accurately and consistently into a supplier’s internal business systems to streamline processes”. The author called for cultivation of comprehensive and secure information systems by OEM and LSP. Integration of terminal IT systems with their transport providers exemplified by Coia (2007): interfaces with EDI brings about reduction in lead time. Integration of information coming from individual systems and linking the supply chain to provide better visibility of Hyundai and Kia vehicles from ports of entry to dealer compounds further have been demonstrated in the case of Glovis Europe (Wheatley 2013).

At the same time, it could be argued that radio frequency identification tags (RFID) technology could have been implanted into FVL. Barker (2008) contends that the fitting of every car with a RFID tag will ensure visibility of the car’s location through every stage of a supply chain.
Precise delivery dates and better customer/dealer service strategies are named within the advantages; apart from that carbon emission monitoring is enabled.

As discussed above, we outlined a number of challenges and solutions for vehicle logistics in Russia according to the literature overview. Although qualitative data encompass the Russian FVL market entirely, we will attempt to validate suggestions for the South Russia niche by using interviews and survey questionnaires.
3. Methodology

3.1. Research design

We mostly follow a qualitative research approach, an inductive research process, as supply chain management research is a well-established discipline “but needs modification with respect to emerging markets and particularly Russia” (Hilmola et al. 2010). A single case study research approach is employed with an aim to collect primary data on challenges and solutions for outbound logistics in South Russia.

According to K.Yin (2009, p.5), a case study method is found meaningful for organizational and managerial processes. It focuses on contemporary events and requires no control on behavioral events. It would seem reasonable to note that sticking to one research approach might be “unduly simplistic” (Saunders et al. 2009, p.141); therefore our research is undertaken with the use of a survey strategy as a part of the case study. Accordingly, it includes interviews and questionnaires and represents a cross-sectional study conducted within a one month period.

3.2. Data collection

Survey questionnaires and personal interviews have been conducted within stakeholders of South Russia outbound logistics including port authorities, car trucking companies, sea carriers and freight forwarders (LSP). Both the survey and interviews were intended to collect primary data on FVL on the Azov-Black Sea segment to juxtapose with secondary data collected according to the literature overview.

Secondary data analysis on challenges and solutions in FVL displayed the following factors which are further being validated through interviews and questionnaires:

1. Challenges of FVL: lack of port capacity, poor partnership between OEM and LSP on logistics, poor road/railways connectivity with sea ports, insufficient land for expansion of RoRo terminals, customs issues, absence of specialized car handling terminals.

2. Strategic solutions for FVL: hinterland dry ports, better partnership between FVL participants, mixed-use terminals, feeder service to shallow drafted river ports, use of floating storage facility, multi-tier parking.

3. Operational solutions for FVL: integration of IT systems into terminal management, adoption of planning and scheduling systems, PDI services and RFID technology.
3.3. Interviews

Focused interviews have been used to corroborate facts as established during the literature overview (K.Yin 2009, p.107). Invitations for interview were sent to major stakeholders of TMBCL with a request to share individual opinions on highlighted factors on challenges and solutions, as described in chapter 3. The list of interviewees contained the most active participants of FVL regionally, such as: Neptune Lines (the largest sea carrier in Mediterranean segment), Catoni (agents of the largest RoRo carrier NYK in Turkey), Kavkaz and Taman ports (the most expected RoRo terminals to be built in the near future locally), Gefco (the largest LSP in the European and Russian markets, exclusive logistics provider for PSA\(^3\) and GM\(^4\)) and Vehnet (the leading IT specialist in automotive logistics).

Admittedly, interviewees gravitated towards approval of factors outlined by our research. Nevertheless, some important remarks have been noted, to name just a few:

1. Apparently, lack of terminal capacity and land for expansion of sea ports regionally are named as major contributors inhibiting growth of vehicles imports via the South.
2. Building of new RoRo ports and terminals is considered a challenge due to exceptionally high capital investments required in hydro engineering works, such as break water erection, protecting harbors from sea impact.
3. Governmental subsidies for new RoRo terminals in the South have been allocated ever since 2007; however, progress of construction of Taman and Kavkaz vehicle transshipment terminals are next to zero due to finance allocation delays from the state.
4. A floating parking facility was recommended as an extension of the existing RoRo capacity in Novorossiysk port; nonetheless, double transshipment was called as a primary shortcoming for such innovation.
5. A consolidation center (or hub port) can be pushed back to a location outside of Russia, such as a convenient hub in the Turkish Marmara region, to be regularly connected through short-sea tonnage with frequent shuttle services to Russian shallow drafted ports.

\(^3\) Peugeot and Citroen alliance  
\(^4\) General Motors
3.4. Survey questionnaire

A survey questionnaire was developed on the grounds of the literature overview and was reshaped after conducting a set of interviews. An extra factor (strategic solution group) was added into the research scope, i.e. floating storage facility suggestion. As can be seen from Appendix II, said factors were measured by statements based on a Likert-style rating scale (Saunders et al. 2009, p.378): 7 rating questions were intended to ask opinions of respondents on the validity of each statement from “strongly disagree” (least important) to “strongly agree” (most important). Additionally, respondents were requested to rank questions on strategic solutions and choice of most attractive RoRo terminal in South Russia in the medium and long term.

The questionnaire was set as self-administered and internet-mediated (Saunders et al. 2009, p.362) and being pre-tested by 5 experts from the automotive logistics market to make sure that expressions were clearly articulated.

After a subsequent revision, it was further facilitated via on-line research software QuestionPro at: http://questionpro.com/t/AIyQnZQgdm.

The survey was addressed only to individuals of senior manager positions responsible for strategy in their companies within FVL participants. No more than 2 respondents from each company were involved to avoid bias. The survey was officially conducted between 15\textsuperscript{th} of December 2013 and 15\textsuperscript{th} of January 2014. To maximize the response rate, the survey administering strategy included (Saunders et al. 2009, p.396-397):

- Respondents were promised incentives in terms of research findings distribution after the survey was completed and analyzed.
- Cross-posting (sending e-mails to multiple mailing lists) excluded.
- Survey invitations forwarded personally by e-mail only to those respondents within FVL with whom a researcher had previous communication.
- Survey invitations were allocated at various LinkedIn groups on automotive logistics. Particular e-mails were sent to group members to encourage participation in the survey.

A representative sample of 187 respondents in the outbound supply chain within automotive logistics was chosen for survey invitations. 80 respondents out of 171 individuals have completed the questionnaire representing a 59% response rate (Fig.4). Saunders et al. (2009, p.222) considers 35% as a reasonable response rate for academic studies involving organizations’ representatives.
Notably, respondents from 17 countries constituted a representative sample including Russia (49.25%), Turkey (16.42%), France (5.97%) and Ukraine (5.97%), i.e. most active participants in the Azov-Black Sea basin. Importantly, 36.00% of freight forwarders (LSP) contributed to this research with sea carriers (25.33%) and car makers (14.67%) in all making up a 76.00% share of respondents (Fig.5):

Figure 5: Respondents’ type of activities
4. Results and discussions

Overall, most of the respondents agreed that the Southern region lacks port capacity (36.49%) and appropriate infrastructure similarly to a study of Coia (2008a) viewing port capacity as a challenge for Russia generally (Fig.6). It is tempting to argue that 2 other factors, as such absence of specialized vehicle terminals (16.22%) and no land for expansion of existing terminals (12.66%), are similarly attributed to a crucial issue increasingly inhibiting developments of FVL. There is undoubtedly no entry point on the Azov-Black Sea basin meeting the expectations of outbound logistics participants. Importantly, despite other notable factors affecting supply chain efficiency respondents made little focus on customs and road/railway challenges which are likely to be primary inhibitors of supply chains for other commodities than vehicles (Asakaite & Celik 2008, p.224).

<table>
<thead>
<tr>
<th>Answer</th>
<th>Count</th>
<th>Percent</th>
<th>20%</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Russia and Azov-Black sea ports lack port capacity for vehicles</td>
<td>27</td>
<td>36.49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics service providers and carmakers have poor partnership</td>
<td>7</td>
<td>9.45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is underdeveloped rail transport connection with sea ports</td>
<td>2</td>
<td>2.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road transport is not reliable because of the poor state of the road networks</td>
<td>2</td>
<td>2.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro-ro carriers and ro-ro terminal operators are struggling to find land for expansion</td>
<td>9</td>
<td>12.16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customs has long been rated among the most difficult aspects of the Russian market</td>
<td>2</td>
<td>8.11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are no specialized car-handling terminals with pre-delivery inspection and other supplementary service for vehicles</td>
<td>12</td>
<td>16.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>12.16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>74</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: Critical challenge for FVL in South Russia

As long as survey questions were shaped as per Likert scale data, findings are further analyzed at the interval measurement scale. Descriptive statistics is employed analyzing Likert-type items on solutions for FVL including the mean for central tendency and standard deviations for variability (H. N. Boone & D. A. Boone 2012).

4.1. Strategic solutions

Results of the survey on strategic solutions were tabulated according to mean and standard deviation data (Table 3). Answers based on 7 Likert scale (Appendix II) were facilitated through Question Pro software to demonstrate an average (tendency) and standard deviation (variability)
for respondents’ opinions. Accordingly, answers coded “1” are relevant to “strongly disagree” with code “7” being attributed to “strongly agree”, the code “4” as being “not certain”.

Table 3: Findings on strategic solutions in FVL

<table>
<thead>
<tr>
<th>Statement of questionnaire</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea of dry ports in the hinterland provides appropriate opportunities for expansion of existing capacity of Novorossiysk for finished vehicles</td>
<td>4.254</td>
<td>1.317</td>
</tr>
<tr>
<td>Better partnership between logistics service providers and car makers enables to improve existing capacity of Novorossiysk for finished vehicles</td>
<td>4.423</td>
<td>1.499</td>
</tr>
<tr>
<td>Feeder services from Black Sea ports to Russian shallow river ports will substantially increase RoRo capacity retaining competitive costs and quality</td>
<td>4.000</td>
<td>1.779</td>
</tr>
<tr>
<td>Mixed-use terminals (container + vehicles) are a more appropriate solution to Russian port capacity shortfalls (re-designing container terminals)</td>
<td>4.194</td>
<td>1.607</td>
</tr>
<tr>
<td>Use of a floating storage compound in deep seaport Novorossiysk is a competitive solution</td>
<td>3.681</td>
<td>1.450</td>
</tr>
<tr>
<td>Building of a multi-tier parking inside port of Novorossiysk represents an effective direction for expansion of storage capacity for vehicles</td>
<td>5.057</td>
<td>1.667</td>
</tr>
<tr>
<td>There is no alternative for auto makers rather than waiting a construction of specialized RoRo terminals at Taman, Kavkaz or Gelendzhik in 2017-2018</td>
<td>3.941</td>
<td>1.884</td>
</tr>
</tbody>
</table>

What is really remarkable is that the multi-tier parking concept is perceived by respondents as a leading solution counting 5.057 mean and as illustrated in Fig 7.

Still, a sizeable proportion of respondents agree that dry ports, a better partnership between OEM and LSP and mixed use terminals deserves the attention of investors as a plausible way to cope with challenges of the automotive supply chain in the South (above point 4).
Figure 7: Respondents perception of the multi-tier parking idea at Novorossiysk port

An interesting question remains as to perception differences between leading groups of respondents, such as freight forwarders, sea carriers and manufacturers. Accordingly, mean data from these groups tabulated (Table 4) to give a rise to a hypothesis that the dry port concept is viewed as important by forwarders albeit sea carriers still consider container/RoRo terminals deserving a secondary focus.

Table 4: Choice of strategic solutions categorized by groups (mean data)

<table>
<thead>
<tr>
<th>Statement of questionnaire</th>
<th>Freight forwarders</th>
<th>Sea Carriers</th>
<th>OEM (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea of dry ports in the hinterland provides appropriate opportunities for expansion of existing capacity of Novorossiysk for finished vehicles</td>
<td>4.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better partnership between logistics service providers and car makers enables to improve existing capacity of Novorossiysk for finished vehicles</td>
<td>4.65</td>
<td>4.60</td>
<td></td>
</tr>
<tr>
<td>Feeder services from Black Sea ports to Russian shallow river ports will substantially increase RoRo capacity retaining competitive costs and quality</td>
<td>4.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed-use terminals (container + vehicles) are a more appropriate solution to Russian port capacity shortfalls (re-designing container terminals)</td>
<td>4.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of a floating storage compound in deep sea port Novorossiysk is a competitive solution</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Building of a multi-tier parking inside port of Novorossiysk represents an effective direction for expansion of storage capacity for vehicles

<table>
<thead>
<tr>
<th>Year</th>
<th>Rating 1</th>
<th>Rating 2</th>
<th>Rating 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-2018</td>
<td>5.28</td>
<td>5.65</td>
<td>4.30</td>
</tr>
</tbody>
</table>

There is no alternative for auto makers rather than waiting a construction of specialized RoRo terminals at Taman, Kavkaz or Gelendzhik in 2017-2018

4.30

Interestingly two suggested solutions on feeder services and floating storage facility in Novorossiysk perceived by respondents as uncertain, graded below 4 (i.e. between “not certain” and “slightly disagree”). Admittedly, the idea of floating storage, i.e. a car carrier ship being berthed in the vicinity of the main storage area, can be deeply questioned with a view to double transshipment, high running costs and available berth space according to notes from interviewees. On the other hand, as stated in answers to open-ended questions, the feeder service concept must not be underestimated: a variety of answers displayed options with hub ports in Derince (Turkey), Constanza (Romania) and Iliychevsk (Ukraine). It is certainly hard to see a plausible alternative to Novorossiysk port; however, Iliychevsk hub could indeed play by far a more intense role connecting ocean RoRo ships with shallow drafted Rostov port.

According to data, the evidence seems too strong to suggest that a better partnership between manufacturers and service providers might bring about aggregate advantages in terms of efficient and effective operations and appropriate quality management. A fundamental objection to this argument was provided earlier by Ludwig (2013b, 2007) contending that logistics in Russia itself represents a competitive advantage. This is further exemplified in the case of Toyota and Gefco, building their own vehicle terminals at different spots in Novorossiysk, despite a myriad of shortcomings due to adjacent and often harmful stevedoring activities with bulk cargoes.

Although arguments on mixed-used terminals have some merit, a number of qualifications need to be made. Judging by infrastructure requirements - sealed ground, travel ways, berthing facilities, park decks according to Mattfeld (2010, p.47) – it may be reasonable to concede that existing container terminals demonstrate a feasible option for FVL actors. The validity of the proposition needs a careful assessment subject to sustainability of quality operations of both container and RoRo facilities. As exemplified by TMBCL, a subcontractor of Gefco in Novorossiysk, its 20000 sqm compound in Novorossiysk Timber port shares terminal space with a large container facility. Not surprisingly those container activities are reported to be prioritized by port authorities (berthing schedules, space allocation) on the grounds of higher revenue justification. The evidence of critique on mixed-use terminals is even more obvious in the case
of the Toyota terminal at Novorossiysk KSK port: adjoining grain silos lead to contamination of park decks with corn and similar substances attracting birds and rats. It cannot be argued that quality is mismanaged in such a case (Fig. 8).

Ultimately, a discussion on the dry port terminal concept versus the multi-tier parking solution lays in the cost issue. Both solutions have merits and shortcomings; the latter is connected with greater mileage or double transshipment for dry ports and complexity to allocate third-party investments in port terminals for multi-tier parking. Undoubtedly, costs for building of such facilities are incomparably lower than for new terminals: according to the TMBCL viewpoint, investment for a dry port or multi-tier parking can be curbed by $3-4 million extending existing space by 2-4 Ha. As pointed out earlier, extensive costs for building of new RoRo terminals at the Azov-Black Seas (e.g. Kavkaz) are justified by enormous hydro engineering work, despite their being funded by the state. For instance, let us simply juxtapose investment volumes per hectare of space for a new projected RoRo facility at Kavkaz and dry port project at Novorossiysk:

- 3.3 billion Rubles ~ $97 million for 25 Ha ~ $3.88 million per Ha in Kavkaz port;
- $4 million for 4 Ha ~ $1 million per Ha in Novorossiysk port with dry port facility.

The numbers speak for themselves and induce us to admit that an intermediary strategic solution in Novorossiysk deserves more thorough attention of practitioners.

Figure 8: Mixed-use terminal of Toyota at Novorossiysk

As mentioned, there is a degree of truth to the view that the building of new RoRo terminals on the Russian Black Sea is perceived as unnecessarily long, uncertain and time-consuming,
especially given delays with state finance. Kavkaz port was reported to be commissioned by 2012 (Expert 2010); constructions has not commenced at this time (Fig.9).

![Kavkaz RoRo terminal construction](image)

Figure 9: Kavkaz RoRo terminal construction – status as per August 2013

4.2. Operational solutions

The findings on operational solutions are found to be consistent with previous studies and observations (Table 5).

Table 5: Findings on operational solutions in FVL

<table>
<thead>
<tr>
<th>Statement of questionnaire</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT systems to market demands is an essential part of managing vehicle terminals</td>
<td>5.542</td>
<td>1.288</td>
</tr>
<tr>
<td>Services like pre-delivery inspections (PDI) and accessories, IT connectivity is an important part of a terminals overall service offering</td>
<td>4.958</td>
<td>1.458</td>
</tr>
<tr>
<td>In order to improve the efficiency and reliability of work processes, a planning and scheduling system has to be developed to integrate mid-term capacity planning and short-term scheduling</td>
<td>5.580</td>
<td>1.104</td>
</tr>
<tr>
<td>The terminal management systems need interfaces with electronic data interchange (EDI)</td>
<td>5.771</td>
<td>1.024</td>
</tr>
<tr>
<td>Adoption of radio frequency identification tags (RFID) is ultimately important</td>
<td>5.014</td>
<td>1.409</td>
</tr>
</tbody>
</table>
In Mattfeld (2010, p.47), for example, port operators are called third party logistics providers for vehicle manufacturers, offering added value and vehicle inspection services besides traditional transshipment. Such activities “bind customers with integrated logistics functions into long lasting contracts”.

Accordingly, all suggested ideas perceived by respondents over 4 points, to say the least that majority of the solutions rated over 5 emphasizing “agree/slightly agree” interval. Only the PDI solution is rated considerably less, although FVL actors do not view this function as highly important under the circumstances of terminal capacity restraints. It is worth pointing out that no terminal on the Black Sea is yet offering PDI services to customers.

4.3. Strategy implications

Fig.10 displays opinions of respondents in respect to alternatives to Novorossiysk port for FVL in South Russia. As can be seen, perceptions vary almost equally for groups accepting the statement (42.64%), disagreeing (41.2%) and being uncertain (16.18%).

Nonetheless, for a ranking question on the short/medium term outlook respondents tend to choose Novorossiysk (38.89%) as the most attractive RoRo facility for FVL despite governmental programs on the development of Kavkaz, Gelendzhik and Taman dry ports (Fig.11). What it says to us is that market participants no longer believe in solutions associated with complex projects and state investment programs.
We further note that Novorossiysk is not perceived as the most attractive port only by car manufacturers (Table 6); instead they consider Kavkaz (45.45%) facility. The main reason for this was that car manufacturers naturally tend to demand the highest quality standards compared to other participants. In a particular example of Kavkaz, investors visualized a package solution solely for the automotive industry or RoRo liners never crossing adjoining stevedoring activities, so that intentions would meet the highest quality standards. As highlighted above, construction of this terminal is being postponed for a 4th consecutive year due to state finance reasons. Therefore any forecasting remains not much better than a guess.

Table 6: Most attractive RoRo terminals in South Russia categorized by respondent groups
5. Conclusion and recommendations

This paper has sought to determine crucial challenges for outbound automotive logistics in South Russia and respective solutions devised by a logistics company to preserve efficient and effective service to car manufacturers aiming to expand their trade routes. The central line of the research has been built around the role of sea ports and solutions for RoRo logistics in ports as expectedly reflecting the main concerns of the finished vehicle market. A respective literature overview identified challenges and solutions in finished vehicle logistics of Russia and we further aimed to validate them through a case study method combining a survey research.

The findings of interviews and survey questionnaires held within stakeholders of TMBCL of Novorossiysk suggest that port capacity in the Azov-Black Sea basin remains a critical concern curbing progressive growth of finished vehicles import through Southern gates, despite the upbeat outlook for sales in Russia overall, being the 2nd largest market after Germany in Europe. This finding is consistent with survey research by Coia (2008a) on the Russian finished vehicle market. The findings further highlighted Novorossiysk port as the most attractive for RoRo logistics in the medium/long term despite the announcement of three promising projects on vehicle terminals locally at Taman, Kavkaz and Gelendzhik ports. In addition, the building of multi-tier parking in Novorossiysk has been noted as a primary solution for extending the RoRo compound in the South. Discussions on findings further reflected the importance of a vehicle dry port in Novorossiysk as an alternative to the multi-tier parking idea, with some critique displayed over the current mixed-use terminals of Toyota and Gefco. Investments into intermediate solutions in Novorossiysk port are believed to be efficient compared to time-consuming projects elsewhere in the region which potentially represents a practical implication of this paper for TMBCL as a logistics service provider.

Some strategic policy implications can be drawn from the research findings. First, it is important to continue elaborating on solutions of land expansion for the RoRo terminal in Novorossiysk with a view to attract investors. Furthermore, we assume that demand from car manufacturers will keep growing on the assumption of Russian macroeconomics whilst construction of new deep sea water ports will continue to be delayed regionally. This is illustrated and advocated by Mattfeld (2010, p.48) contending that vehicle transshipment terminals are typically built in already existing sea port infrastructure. Lastly, various added value and vehicle inspection services are recommended to be introduced for existing RoRo compounds in Novorossiysk including IT systems with tracing and tracking capabilities.
Although the survey research has been limited to a sample of port forwarders and sea carriers with limited participation from car makers and port authorities, further research shall be conducted within stevedoring companies to outline practical ways how to successfully extend space within existing sea terminals in Novorossiysk. A particular focus shall be given to the business projection of multi-tier parking and dry port terminal construction with the purpose of a project feasibility assessment.
References

Andreasson, L. & Liu, S., 2010. European RoRo short-sea shipping – What can ship operators do to unleash its potential?


Appendix I: Russian light vehicle production forecast

Key drivers of light vehicle production in the next few years will include:

- Creation of new production capacity
- Changes in the industrial assembly regime
- Trade policy promoting domestic production
- Recovery of the Russian economy and, to a lesser extend, the economies of the US and EU
- Russia's development strategy until 2020 will be aimed at replacing imports with domestic production

Source: LMC Automotive
Appendix II: Survey questionnaire – FVL in South Russia

Dear Participant,

You are invited to participate in a survey on finished vehicle logistics in South Russia. Over 500 respondents will be asked to complete the survey that asks questions about challenges and solutions for automotive logistics in Russia. It will take approximately 5 minutes to complete the questionnaire. Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact Alexander Bulygin at +7-9887-650211 or by email at the address given below. Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

- Please specify type of activities
  1. Sea carrier
  2. Port terminal
  3. Freight forwarder (3PL)
  4. Car maker (OEM)
  5. Trucking company
  6. Other

- Please point out the critical challenge for finished vehicle logistics in South Russia
  1. South Russia and Azov-Black sea ports lack port capacity for vehicles
  2. Logistics service providers and carmakers have poor partnership
  3. There is underdeveloped rail transport connection with sea ports
  4. Road transport is not reliable because of the poor state of the road networks
  5. Ro-ro carriers and ro-ro terminal operators are struggling to find land for expansion
  6. Customs has long been rated among the most difficult aspects of the Russian market
  7. There are no specialized car-handling terminals with pre-delivery inspection and other supplementary service for vehicles
  8. Other

- Please rate the following statements on strategic solutions as suggested by author

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly disagree</th>
<th>Not certain</th>
<th>Agree</th>
<th>Slightly agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea of dry ports in the hinterland provides appropriate opportunities for expansion of existing capacity of Novorossiysk for finished vehicles</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>Better partnership between logistics service providers and car makers enables to improve existing capacity of Novorossiysk for finished vehicles</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>Feeder services from Black Sea ports to Russian shallow river ports</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>☑</td>
</tr>
</tbody>
</table>
will substantially increase RoRo capacity retaining competitive costs and quality

Mixed-use terminals (container + vehicles) are a more appropriate solution to Russian port capacity shortfalls (re-designing container terminals)

Use of a floating storage compound in deep sea port Novorossiysk is a competitive solution

Building of a multi-tier parking inside port of Novorossiysk represents an effective direction for expansion of storage capacity for vehicles

There is no alternative for auto makers rather than waiting a construction of specialized RoRo terminals at Taman, Kavkaz or Gelendzhik in 2017-2018

- Please rate the following statements on solutions affecting operational effectiveness as suggested by author

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly disagree</th>
<th>Not certain</th>
<th>Agree</th>
<th>Slightly agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT systems to market demands is an essential part of managing vehicle terminals</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Services like pre-delivery inspections (PDI) and accessories, IT connectivity is an important part of a terminals overall service offering</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In order to improve the efficiency and reliability of work processes, a planning and scheduling system has to be developed to integrate mid-term capacity planning and short-term scheduling</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The terminal management systems need interfaces with electronic data interchange (EDI)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Adoption of radio frequency identification tags (RFID) is ultimately important</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Given a federal investment program into development of RoRo facilities at Gelendzhik, Taman and Kavkaz ports in 2014-2018, please rank the most attractive terminal for finished vehicle logistics in the medium/long term:

1. Novorossiysk (40000 sqm now)
2. Taman (250000 sqm in 2018-2020)
5. Other
Appendix III: Survey overview – FVL in South Russia

Survey Overview

Please specify type of activities
Please point out the critical challenge for finished vehicle logistics in South Russia

Please rate the following statements on strategic solutions as suggested by author
Idea of dry ports in the hinterland provides appropriate opportunities for expansion of existing capacity of Novorossiysk for finished vehicles

Better partnership between logistics service providers and car makers enables to improve existing capacity of Novorossiysk for finished vehicles
Feeder services from Black Sea ports to Russian shallow river ports will substantially increase RoRo capacity retaining competitive costs and quality

Mixed-use terminals (container + vehicles) are a more appropriate solution to Russian port capacity shortfalls (re-designing container terminals)
Use of a floating storage compound in deep sea port Novorossiysk is a competitive solution

Building of a multi-tier parking inside port of Novorossiysk represents an effective direction for expansion of storage capacity for vehicles
There is no alternative for auto makers rather than waiting a construction of specialized RoRo terminals at Taman, Kavkaz or Gelendzhik in 2017-2018.

Please rate the following statements on solutions affecting operational effectiveness as suggested by author:

1. IT systems to market demands is an essential part
2. Services like pre-delivery inspections (PDI) and a
3. In order to improve the efficiency and reliability
4. The terminal management systems need interfaces wi
5. Adoption of radio frequency identification tags (R
IT systems to market demands is an essential part of managing vehicle terminals

Services like pre-delivery inspections (PDI) and accessories, IT connectivity is an important part of a terminal's overall service offering.

In order to improve the efficiency and reliability of work processes, a planning and scheduling system has to be developed to integrate mid-term capacity planning and short-term scheduling.

The terminal management systems need interfaces with electronic data interchange (EDI).
Adoption of radio frequency identification tags (RFID) is ultimately important.

Given a federal investment program into development of RoRo facilities at Gelendzhik, Taman and Kavkaz ports in 2014-2018, please rank the most attractive terminal for finished vehicle logistics in the medium/long term.