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Hvordan kan Schlumberger Norge AS gjennomføre den kommende anskaffelsen av innenlands transport for å forbedre dagens situasjon?

Engelsk tittel:

How can Schlumberger Norge AS conduct the upcoming procurement of domestic transport services in order to improve the present practice?

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1 ABSTRACT

Schlumberger Norge AS is conducting a procurement of domestic transport services in the near future. The company aims toward establishing an automated logistical process in the future. However, the writer found that certain barriers must be eliminated in order to achieve that goal, some of which could be solved during the next procurement process. Thus, the problem statement is: “How can Schlumberger Norge AS conduct the upcoming procurement of domestic transport services in order to improve the present practice?”

The objective of the thesis is to provide the company with a theoretical and analytical foundation on which said procurement process could be based. While the theoretical foundation is constructed from relevant procurement, supply chain and project management theory, the analytical part of the thesis is based on extracted data from the current logistical system. In other words, the writer has made an effort to provide general suggestions regarding the conducting of the procurement process in addition to an analysis of the current practice, with subsequent improvement suggestions.

The results indicate that Schlumberger Norge could benefit from making a few changes in advance of the upcoming procurement process. Two major bottlenecks in the logistical process are identified, both of which can be solved in the upcoming procurement process. First of all, the amount of contracted shipments could be heavily increased by requesting a few additional requirements to be included in the contracted agreements between Schlumberger and its suppliers. Secondly, the pricing model of said contracts should arguably be changed to a simpler version that eliminates the current high deviation between estimated transport costs and actual invoiced costs. These identified bottlenecks are direct barriers toward an automated logistical process. Furthermore, suggestions regarding the general procurement process are stated.

2 INTRODUCTION

Schlumberger is a global organization that supplies the industry's most comprehensive range of products and services. [1] Along with the competency of the personnel, these products and services are relevant from exploration through production and make the company one of the world's leaders in their field. Schlumberger Norge AS is the division of the company that supplies the Norwegian continental shelf with its products and services. The company's operations naturally lead to a need of land transport of a range of equipment and materials from Schlumberger locations to various bases along the Norwegian shore during mobilization, and from bases to Schlumberger locations during demobilization.

The Domestic Logistics Team booked 12 898 shipments in 2019. These shipments were planned and booked in response to transport requests from the various Product Lines in the company. The requests were received by the Domestic Logistics team and subsequently booked with, if applicable, the relevant contracted supplier on the particular route. The suppliers of these shipments are on three-year contracts on the most frequent routes. These contracts are approaching expiry and a new tendering process is consequently scheduled for the first quarter of 2021. Evidently, it is vital for an organization like Schlumberger, who seeks for continuous improvement, to assess the current model and the performance of the current contracted suppliers and to evaluate areas of improvement before the scheduled tendering process of all domestic land transport.

Schlumberger Norge AS is at the same time approaching a substantial change of the internal way of working. The company's aim is to reduce the interface between its integrated Product Lines by implementing a mutual ERP system in order to increase efficiency. In addition, the aim is to make the logistics process more automated in the future. Today's suppliers and the contracts they operate under do however not reinforce this aim, much rather the opposite. Analysis of internal reports from 2019 arguably show that a very small amount of shipments could have been automatically processed from invoice to final payment, due to a large degree of mismatch between the actual invoice from the supplier and the cost estimated by the Schlumberger Logistics Specialist.

Being a part of the Domestic Logistics team in Schlumberger for a few years, the writer has utilized the current contracts in the planning of shipments as described above. The present model makes it challenging for the team to estimate the cost of some shipments, as the contracts arguably lack the required details to do so. See Figure 1 below which highlights the percentage of shipments of 2019 whose cost were wrongly estimated by the Logistics team. One can see that almost half (48%) of the shipments of 2019 suffered a difference between invoiced cost and estimated/planned cost of more than 10%. For this reason, many shipments need to be manually controlled before the invoices can be approve and subsequently payed.

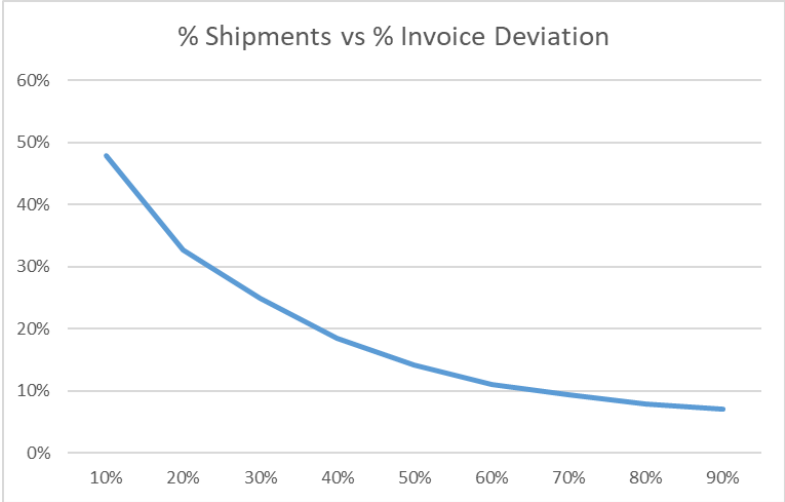


Figure 1: Invoice Deviation 2019 [2]

This observation made it clear for the writer that Schlumberger can benefit from an assessment of the current practice in light of the forthcoming procurement of domestic transport services. Hence, the problem statement for the thesis is as follows:

“How can Schlumberger Norge AS conduct the upcoming procurement of domestic transport services in order to improve the present practice?”

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3 SCOPE, OBJECTIVES AND LIMITATIONS

The aim of the project is to assess the current performance of the contracted supply of domestic transport services with respect to certain areas, in light of the forthcoming procurement of all domestic transport services. Said focus areas are elaborated below along with objectives and limitations of the areas and the thesis as a whole.

A perfect balance between the cost of transport and the quality of the suppliers is arguably the recipe for a successful procurement of such. Nevertheless, the writer will not make an attempt to identify this balance as it is more efficiently done by a multidisciplinary team with experience from the industry. The quality of the suppliers may be measured by factors such as health and safety, vehicle fleet management, documentation or service quality, and will thus be excluded from the scope of the thesis. All tasks that require knowledge and expertise on the new ERP system that is scheduled to be implemented is also excluded from the scope.

The attention of the thesis will be targeted towards areas the writer identifies as highly relevant with respect to the forthcoming procurement process and Schlumberger's goal of a more automated logistics process. In a low-margin industry such as the freight transport sector, intensified focus on obtaining lower cost of transport will arguably not make a substantial difference on Schlumberger's bottom line. Increased efficiency and automation of the logistics process, on the other hand, is likely to have a greater impact in the longer term. Thus, the focus will be aimed at the current barriers to obtain an automated logistics process as well as suggestions on how to conduct the upcoming procurement process of domestic transport services in order to support this aim.

In addition, the writer will identify general proposals of improvement in terms of the overall conducting of the procurement. Such proposals will target the general procurement process with respect to relevant theory. In conclusion, the thesis will serve as a preparation for the procurement within selected focus areas as stated above.

4 THEORY

4.1 PROCUREMENT IN SUPPLY CHAIN

The strategic importance of supply chain management has received increased attention during the past decades, and is today considered a vital part of any medium or large organization's ability to deliver profits. The procurement of goods and services, being an integrated part of the supply chain, is evidently an important function with regard to company results. Traditionally, the procurement department has acted as an intermediary between the company and its suppliers while at the same time ensuring that agreements are fulfilled. This role, however, has been changing rapidly over the years. Procurement and supply managers in leading-edge companies are today taking much more strategic roles and responsibilities in their respective organizations with increased focus on improving supplier performance. A common change that occurs in strategic procurement departments is the fact that they seek to spend more time on tasks and initiatives that are closely linked to the long-term goals of the organization. Such strategic initiatives can be spend analysis, implementation of a strategic sourcing process, supplier relationship management, technology implementation, forecasting or process optimization to name a few. [3]

In addition to the change described above, the future is expected to hold an increased focus on environmental-related issues. With globalization, a company's supply chain might be comprised of not only its own organization, but many other organizations around the world as well. Consequently, this makes it very difficult for organizations to monitor and influence their own environmental impact. The following will provide an overview of the procurement process in an organization while shedding light on such important matters.

4.1.1 THE PROCUREMENT PROCESS

The process of procurement includes all activities required in order to meet a need of products and/or services or a combination of them. The process itself may be separated into smaller steps in different manners with differing interfaces between the specific steps. Nevertheless, the procurement process has generally the same input and output, regardless of differing definitions.

The differing terminology in the procurement literature is as evident in the process steps as it is in procurement theory as a totality. As example, Procurement processes can be subdivided as follows (in chronological order): --

- 1) According to a project management-based approach: [4]
 - a. Requirements Planning: Define the need and specifications.
 - b. Solicitation: Decide which potential providers/suppliers to approach and subsequently invite to a tender.
 - c. Awarding: Establishing a contractual relationship.
 - d. Contract Administration: Managing the contractual relationship.

Or

- 2) According to another project management-based approach: [5]
 - a. Vendor Solicitation: Prepare documents for solicitation.
 - b. Vendor Evaluation: Evaluate offers based on defined evaluation and awarding criteria.
 - c. Vendor Selection: Select best vendor based on b.
 - d. Vendor Contracting: Decide type of contract and establish a contractual relationship.
 - e. Vendor Management: Monitor performance and manage the vendor throughout the project.

Or

- 3) According to a Supply Chain Management approach:
 - a. Determining the Specifications.
 - b. Supplier Selection.
 - c. The Purchasing Contract.
 - d. Ordering and Expediting.

These are merely a few examples of how the procurement process can be defined. They do not however include the importance of the preparation, planning and analytical work that occur prior to the requirements planning and determining the specifications of the procurement. Nor do they include relevant internal and external analysis, which creates the foundation for the procurement. The following chapter will make an effort to gather relevant procurement theory in addition to the strategical and analytical work that lays its foundations and present it in the following manner:

- 1) Strategy Development.
- 2) Contract Establishment.
- 3) Contract Management.

1: STRATEGY DEVELOPMENT

REQUIREMENTS DEFINITION AND NEEDS ASSESSMENT

To properly define and assess the requirements and needs of a procurement is crucial in order to obtain the product or service that meet all required criteria. In project management, this is called scoping and can be defined as the process of establishing and agreeing with all the stakeholders what the project will involve and where its boundaries are. The deliverables or output of a specific project that must be met in order to accomplish a successful project is called Critical Success Factors (CSF's). Henceforth, the objectives can be defined and the required activities can be planned. Many projects, for example procurements, can suffer from lack of time and resources spent on initiating and planning a project. These phases in a project are where the possibility of influencing the project outcome is at its highest, while its consumption of resources lowest. [4]

It is normal to distinguish between *needs* and *wants* in defining the desired outputs of a project, as resources limit all organizations. A want is defined as something that is wanted as a part of the output, although it does not contribute in a large degree to the long-term performance or goal. A need, on the other hand, is something that directly contributes to the desired output of the project by closing the gaps between the current condition and the desired condition. Evidently, two questions must be answered: *Whose needs/wants will the project address?* and *what kind of needs will the project address?* [6] The former implies a need of a stakeholder analysis and the latter a need of defining the

scope and specifications of the project, which illuminates the fact that the different tasks in the procurement process are often intertwined and with unclear interfaces.

STAKEHOLDER IDENTIFICATION AND ANALYSIS

Identifying all relevant stakeholders can be a challenging task. Different adaptations of brainstorming exercises are suggested in project management science in order to perform the task. Next is establishing what the identified stakeholders need and want. Communicational issues are linked to this process, as some stakeholders may find it hard to articulate what they need. Another aspect of this process is to identify whether or not there are conflicting expectations from different stakeholders and subsequently address the potential conflicts. The analysis can further on be done by mapping the stakeholders in relation to for example their likely impact on the project, power to influence the project or predictability of their behavior. [4]

SUPPLY MARKET ANALYSIS

A market analysis is necessary in order to get an overview of the supply of the specific need one is to acquire. One should understand the balance of supply and demand in the market as well as the current capacity, quality and price. This task may be performed utilizing different methods, some of which are elaborated in the following.

In the subject of environmental analysis, a prerequisite for effective analysis is to distinguish the vital from the merely important in terms of the potential for making profits in a specific industry. The core of a business' environment is comprised of the participants: Competitors, customers and suppliers. The most commonly used tool for analyzing competition within industries is the Michael Porter's five forces of competition framework. This framework is designed in order to provide an overview of the entire industry and its competition. The five forces that make up the framework is competition from substitutes, competition from entrants, competition from established rivals, the power of suppliers and the power of buyers (see Figure 2 below).

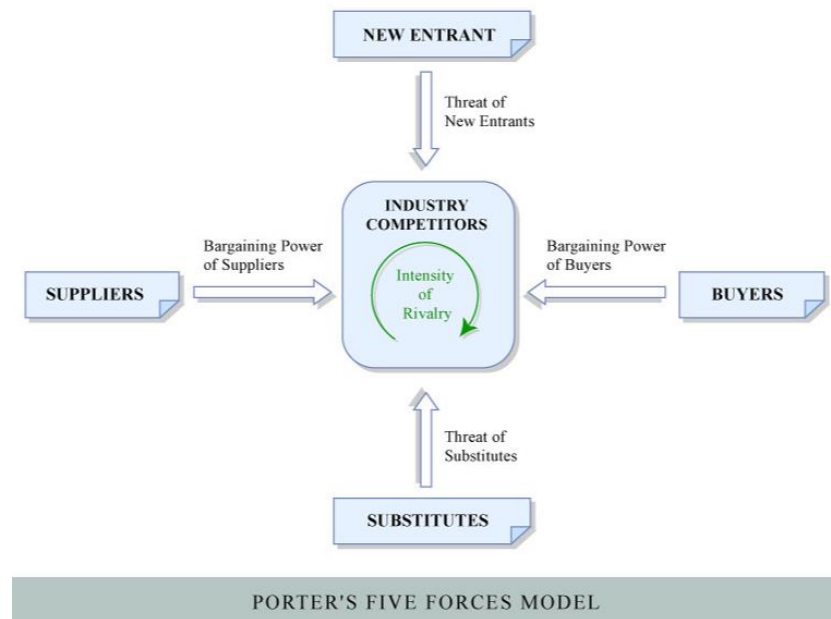


Figure 2: Porter's Five Forces Model [7]

The *competition from substitutes* is a highly relevant factor related to the price the customers are willing to pay for a product or service. An absence of products or services that would serve the same utility will influence the price in an upward direction. On the other hand, the existence of a close substitute will drive customers toward this substitute in response to a price increase and thereby decrease demand (demand is elastic with respect to price).

An industry's profitability will influence the *threat of entry* of other participants. In general, a sector's profitability will increase with its threat of entry, as price levels will decrease with increasing supply. The threat of entry will be determined by the many potential barriers to entry, some of which are described in the following:

- Capital Requirements: Large capital requirements for starting an organization will prevent the entry of many smaller firms.
- Economies of Scale: In some industries, efficient operation requires a large volume of customers, due to the decreased variable cost of production with increasing volume. This serves as a barrier to entry for smaller firms.
- Governmental and Legal Barriers: Some of the most effective barriers to entry are those created by the government. This could be required licenses, patents, copyrights and the like.

The *rivalry between established competitors* is the major determinant of the overall competition within an industry. Different industries compete in different manners: On one hand, firms will compete aggressively on price, even to the extent that the organizations lose money on their sales. On the other hand, firms may compete only by advertising and innovation. The intensity of price competition among established companies is the result of interactions between six factors:

- Concentration: This refers to the number and size distribution of the competing firms in a market, commonly measured by the concentration ratio. The probability that a firm initiates price cutting in a market is dependent on the amount of competitors present. Price coordination becomes difficult with an increasing amount of firms, and the probability of such an event will consequently increase.
- Diversity of Competitors: The ability of rival firms to make agreements on price levels depends on the similarities in the competing firms' origins, objectives, costs and strategies.
- Product Differentiation: Firms with similar products or services will more easily suffer from high price competition.
- Excess Capacity and Exit Barriers: The combination of excess capacity (e.g. in a market with cyclical demand) and high barriers of exiting the market might highly influence the price levels and consequently the profitability in the industry.
- Cost Condition: Scale Economics and the Ratio of Fixed to Variable Costs: The extent of price reduction in price competition due to excess capacity is determined by the cost structure in the industry. Low marginal costs (e.g. taking an extra passenger on a flight) will imply reduction of prices at excess capacity scenarios, while industries with high marginal costs are less likely to take part in excessive price competition.

The profit margin earned by the companies in an industry is related to, among other things, the *bargaining power of the buyers*. The customers will do what they can in order to obtain lower prices and their ability to do so depends on two factors:

- Buyers' Price Sensitivity: The extent to which the buyers are sensitive to the prices. This sensitivity is related to the following:
 - Price sensitivity will increase with the proportion the product/service has of buyers' total costs.
 - The buyers' are more capable of negotiating lower prices if they are well informed about the supplier's prices and costs.

- Backward integration: Buyers can reduce their dependency of suppliers by so-called backward integration, where the buyers would acquire the product/service by making/performing the product/service themselves.
- Relative Bargaining Power: The balance of power between the two negotiating parties depends to a large degree on the relative costs that each party would suffer from in the event of a holdout. The following factors are relevant in this respect:
 - Size and concentration of buyers relative to suppliers.
 - The information available for the buyer: If a buyer has more information regarding the supplier's prices and costs, they increase their bargaining power.

The buyers' counterpart in negotiations obviously have power too. The *bargaining power of suppliers* is precisely analogous to analysis of the buyer power elaborated above. [8]

2: CONTRACT ESTABLISHMENT

CONTRACT SELECTION

The procurer has the option to procure a product/service with a single contract or with several contracts. The former, sometimes referred to as turnkey subcontracting, will award the entire assignment to a single supplier. The latter, on the other hand, sometimes referred to as partial subcontracting, will split the assignment into several lots and award to several suppliers. [9] In analyzing this choice, it is important to specify the goal of the procurer: this could be minimizing procurement costs, achieving the most efficient supplier or a combination of both. When deciding the number of lots, the procurer should consider the following issues:

- The cost structure of the firm: The main reason to bundle several lots is to exploit the reduction of total costs a supplier is exposed to with its scale advantages.
- Number of bidders: In a situation with few bidders competing for several lots, one can increase the competition among them by bundling the lots, even if the bundling provides no possibility for reduced costs for the suppliers.
- The degree of heterogeneity of participants and aftermarket trade: It is important to consider this fact when strategically selecting to bundle or not, because bundling lots might

exclude some of the participants from the competition due to their limited capacity or degree of specialization.

Procurement contracts differ among types of procurements and its choice is dependent on several factors. There are in general three broad types of contracts:

- Cost-reimbursement contracts: In this contract, the buyer agrees to reimburse all documented production costs related to the project and to pay an additional fee for supervision. Consequently, the procurer is fully protected against cost overruns. However, this does not provide the supplier any incentives to undertake cost-reducing efforts. This type of contracts does generally perform well in scenarios where contract flexibility is valued from the procurer's point of view and is often recommended where quality is non-verifiable, because the supplier will not have a good reason to cut costs by reducing this quality.
- Fixed-price contracts: This is an agreement in which the supplier is paid a fixed price for performing the assignment within certain limits of predetermined verifiable quality. If such quality is achieved, the supplier typically does not receive a bonus, however a penalty is normal in the opposite scenario. Such penalties have to be of substantial value relative to the contract value to be efficient. The supplier carries the risk of cost overruns and enjoys the benefit of cost reductions. In summary, fixed price contracts are suitable for assignments of relatively small complexity and uncertainty in terms of costs and verifiable quality.
- Incentive contracts: A type of contract that lies the incentive contracts. It generally included a target cost, a target profit and a profit adjustment formula which is customized for the specific contract. This solution is suitable in procurements where there is a substantial level of procurement risk and uncertainty.

The procurer should favor fixed-price contracts when the suppliers are not faced with large risk in terms of costs and quality delivered and where the suppliers are relatively homogeneous in their ability to control the costs. On the other hand, when procurement risk is vital and the supplier is quite sensitive to it, an incentive contract should be favored. Lastly, when vital procurement quality is non-verifiable, a cost reimbursement contract could be beneficial for the procurer. [10]

COMPETITION PROCESS

In order to obtain a product or service at a desirable price, competition among suppliers is undeniably important. The choice of award procedure is undoubtedly important in that respect: The choice between competitive tendering and a negotiation process. The former is a process where invited suppliers submit their best offer on a product/service with specified evaluation criteria. The latter is a negotiation process between the procurer and a single supplier. The following elaborates relevant topics in the competitive tendering process, which is found to be relevant for this thesis.

It is important to consider the bidding strategies of the participating suppliers. If the product/service includes a good deal of uncertainty for the suppliers and their related earnings, they may adopt a very careful bidding strategy: Underbidding. Thus, it is important to keep in mind that a properly defined product/service will increase the likelihood of receiving satisfactory bids. Suppliers sometimes find themselves in a situation where they underbid, due to differing reasons. The supplier may be inexperienced and consequently underestimate the related costs of the project. It may also be in a desperate financial situation, where it is dependent on short-term liquidity, even if that leads to a loss in the longer term.

The simplest way of awarding a supply contract is when the cost of supplying each contract is independent of which other contracts the supplier is serving. In reality, however, this may not be the case. The costs often depends on how many, and which, other contracts the supplier is awarded. More often than not, such positive complementarities occur for suppliers when the cost per contract of serving a multitude of contracts are less compared to serving only one. Negative complementarities, which is the opposite scenario, is not as common and usually related to capacity issues for the supplier. Thus, the procurer should make strong efforts toward identifying such possible positive complementarities in the procurement and subsequently allow for each supplier to bid for a group/package of contracts and thus receive more cost-effective offers. [10]

4.1.2 SUSTAINABLE PROCUREMENT

Sustainability is becoming increasingly important in supply chain. It is moreover challenging to keep track of a supply chain's performance in terms of sustainability, due to a progressively globalized world. A supply chain may consist of a great deal of participants from differing nations, and the majority of their greenhouse gas emissions will often occur outside of the company. Regulations for companies in terms of greenhouse gas emissions will undeniably increase with time, as our society depends on emission reductions. Thus, companies are likely to benefit from immediate increased attention to their own sustainability, and carbon footprint in particular.

A supply chain's approach toward achieving control over its own sustainability can be managed in different manners. Some companies opt for general industry certification, like the ISO 14000 family or the ISO 26000 guidelines. The former covers environmental management systems (EMS) and offer guidelines in terms of labeling, performance evaluation, life cycle analysis, communication and auditing. The latter addresses seven subjects of social responsibility: human rights, labor practices, environment, fair operating practices, consumer issues and community involvement. A supply chain that implements such standards in their procurement and purchasing, will achieve increased control over their suppliers' environmental impact- and by consequence- their own.

Most companies utilize specific indicators in order to evaluate performance within areas that are found to be operationally critical. These are often called Key Performance Indicators (KPIs) and should be used to evaluate suppliers when aiming to achieve increased control over suppliers' environmental impact. Such environmental KPIs could include, but not be limited to, green house gas emissions, natural resources used (water, fuel, land, etc.) and waste reduction/recycling.

The goal in logistics management has always been to minimize costs; however, the trend is that supply chains allocate more time and resources toward sustainability- related goals. The fact is that purchasing/procurement and logistics activities play one of the most crucial roles in improving the sustainability of an organization. [11]

4.2 SCHLUMBERGER LOGISTICS

The following will provide an overview of the current logistical process for Schlumberger Norge as well as an elaboration on relevant areas. The company will implement a mutual ERP system for all product lines in order to increase efficiency and reduce interfaces. As a part of that transformation, the logistics team will change from using Transport Management System (TMS) to using Oracle Transportation Management (OTM), which is fully integrated with the mutual ERP system SAP. The overview that follows will be based upon the new way of working.

4.2.1 SHIPMENT VARIABLES

The majority of the shipments are in the form of pallets, baskets or containers. Nevertheless, there are several variables that may induce additional costs of any shipment. The following will provide an overview of the most common types of shipments on Schlumberger projects and how they induce various additional costs.

Table 1 below (retrieved from internal documents in logistics) lists the different standardized package types in which the majority of Schlumberger equipment and materials are transported. If a cargo does not fit in any of the types, it is transported as a free object.

Table 1: Standardized Package Types

Standardized Package Type	Length(m)	Width(m)	Height(m)
Pallet	1.20	0.80	0.55
8ft	1.60	1.87	2.88
10ft	2.99	2.44	2.60
12ft	4.00	2.44	2.60
14ft	4.50	2.44	2.60
16ft	5.10	2.44	2.60
20ft	6.10	2.44	2.60
Side door basket	3.70	1.50	1.60
6m	6.30	1.20	1.00
8m	8.30	1.20	1.00
10m	10.30	1.20	1.00
12m	12.30	1.20	1.00
13m	13.30	1.20	1.00
14m	14.30	0.90	1.00
16m	16.30	1.20	1.00
18m	18.30	1.20	1.00

The following list will provide an explanation of what kind of shipments will induce supplementary costs in addition to the costs per LDM Weight.

1) Express cost

Suppliers of transport operate with certain lead times on the lanes they operate. It evidently takes some amount of time to plan and execute any given transport. Thus, the suppliers operates with a lane-specific booking deadline with a predetermined deadline of delivery. If Schlumberger needs the particular shipment to be transported in less time than suggested by the lead time, and/or fail to meet the booking deadline, the company must pay an express fee and a full truck cost for any truck needed for the shipment (regardless of the size of the shipment).

2) Additional driver

A driver is required by regulations to rest minimum 45 minutes for every 4.5 hours of driving. [12] In a situation where the required delivery date and time is impossible to manage for one driver due to reasons of rest regulations, additional drivers may be added.

3) Dangerous Good (ADR)

According to regulations regarding transportation of dangerous/hazardous goods (ADR), the supplier and driver must hold the correct certificates/approval in order to transport the goods. [13] Consequently, it is common to claim additional costs for transporting dangerous goods.

4) Oversized goods

An agreement with a supplier is evidently dependent on the size and capacity of their trucks. The most common semi-truck has the dimensions 13.6 x 2.4 x 3.0 m and can carry approximately 24000 kg. When an item exceeds the dimensions of the standard truck, it will induce extra costs.

5) Callout

If a transport is ordered outside of normal working hours, a callout fee is charged.

6) Follow car

Transport of some oversized cargo will require a follow car due to transport regulations [14] and will for that reason induce additional costs.

4.2.2 OVERVIEW OF SCHLUMBERGER LOGISTICAL PROCESS

An inbound or outbound delivery is created by an employee at an arbitrary product line location. The logistics team is notified that an Order Release is created in OTM, upon which they verify the OR's details and plan shipment accordingly. See Figure 3 and Figure 4 below for process illustrations. As most shipments are according to contracted prices/rates, OTM automatically calculates the price within certain limits (see limits at chapter 6.2 SCHLUMBERGER LOGISTICS). When ready, the shipment is tendered and the particular transporter is notified. The system estimates the cost of the shipment (additional costs are added by the logistics team), which need to match the invoice within a certain tolerance in order to be approved. If a deviation/difference is identified, the evaluation and subsequent validation is assigned to a Level 1 or Level 2 logistics approver, depending on the approval level set up.

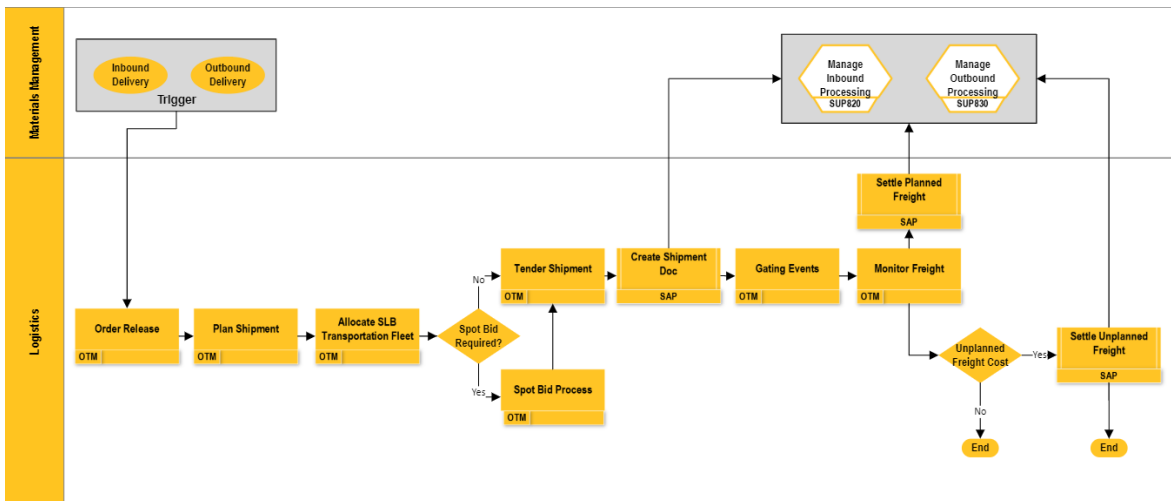


Figure 3: Logistics High-Level Process Domestic Shipments [15]

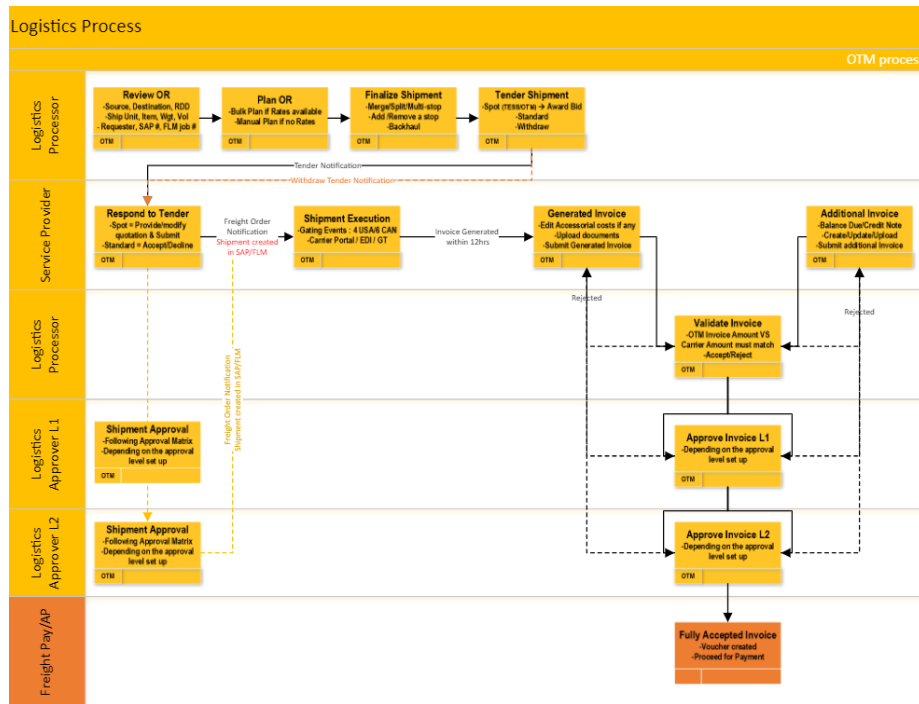


Figure 4: Logistics Approval Process [15]

The current logistical process is somewhat similar to the new one, however requiring a good deal of manual input by the logistics team during the planning of the shipment. In the current supplier agreements, the base cost of the shipments (on most lanes) are calculated by the system. The base cost represents the cost of the shipment before any additional costs are manually added. Also, the base cost is never more than the cost of one full truck. If a shipment is more than 13.6 loading meters or above a maximum capacity weight stated by the supplier, the system only calculates the full truck price. Thus, the price of the remaining cargo must be estimated by the logistical planner. Additionally, the logistical planner must identify the potential variable costs of the shipment which is not identified by the system (express cost, cost of Dangerous Goods transportation, oversized cargo etc.).

4.2.3 CONTRACT SITUATION

DISTRIBUTION OF LANES

The following will provide an overview of some key areas of the current agreements between Schlumberger and its three contracted suppliers Bring, SR Group and Greencarrier Shipping and Logistics.

Schlumberger Norge AS has chosen to award contracts on certain lanes. Table 2 on the right shows how the lanes are distributed among said suppliers. Bring and SR Group share some of the lanes, illustrated by the differing colors in the table, due to an agreement between Equinor ASA and Bring. The agreement indicates that Bring is entitled to arrange transport on all shipments for Equinor ASA. Ergo, Bring will arrange transport on the highlighted lanes in the table if Equinor ASA is the client on the particular project, while SR Group will arrange transport in any other case.

Table 2: Lanes and Contracted Suppliers [2]

LANE		SUPPLIER
Tananger	Tananger	BRING
Tananger	Bergen	BRING
Tananger	Mongstad	BRING
Tananger	Florø	BRING
Tananger	Kristiansund	BRING
Tananger	Sandnessjøen	BRING
Tananger	Hammerfest	BRING
Bergen	Tananger	BRING
Bergen	Florø	BRING
Bergen	Kristiansund	BRING
Bergen	Sandnessjøen	BRING
Mongstad	Bergen	BRING
Mongstad	Tananger	BRING
Mongstad	Lillestrøm	BRING
Mongstad	Kristiansund	BRING
Florø	Tananger	BRING
Florø	Bergen	BRING
Florø	Mongstad	BRING
Kristiansund	Tananger	BRING
Kristiansund	Bergen	BRING
Kristiansund	Mongstad	BRING
Sandnessjøen	Tananger	BRING
Sandnessjøen	Bergen	BRING
Sandnessjøen	Mongstad	BRING
Hammerfest	Tananger	BRING
Hammerfest	Bergen	BRING
Hammerfest	Mongstad	BRING
Tananger	Sandnessjøen	BRING
Bergen	Sandnessjøen	BRING
Mongstad	Sandnessjøen	BRING
Florø	Sandnessjøen	BRING
Kristiansund	Sandnessjøen	BRING
Lillestrøm	Sandnessjøen	BRING
Flesland	Sandsli	BRING
Lillestrøm	Bergen	SR GROUP
Lillestrøm	Stavanger	SR GROUP
Lillestrøm	Kristiansund	SR GROUP
Lillestrøm	Florø	SR GROUP
Tananger	Tananger	SR GROUP
Tananger	Bergen	SR GROUP
Tananger	Florø	SR GROUP
Tananger	Kristiansund	SR GROUP
Bergen	Tananger	SR GROUP
Bergen	Florø	SR GROUP
Bergen	Kristiansund	SR GROUP
Florø	Bergen	SR GROUP
Florø	Mongstad	SR GROUP
Florø	Kristiansund	SR GROUP
Kristiansund	Tananger	SR GROUP
Kristiansund	Bergen	SR GROUP
Kristiansund	Florø	SR GROUP
Tananger	Hammerfest	GREEN CARRIER
Bergen	Hammerfest	GREEN CARRIER
Mongstad	Hammerfest	GREEN CARRIER
Kristiansund	Hammerfest	GREEN CARRIER
Hammerfest	Hammerfest	GREEN CARRIER

The standard unit of measurement of cargo for transport by truck is called Loading Meter (LDM). One Loading Meter is defined as one meter of loading space of a trucks length, and calculated as follows:

$$1 \text{ LDM} = \frac{l * w}{w_t}$$

, where:

l = length of cargo

w = width of cargo

w_t = width of truck

When the transporter calculates the LDM and subsequently the price of shipment, the weight must also be considered. It is standard practice to use a conversion factor that converts the LDM to a weight as follows:

$$\text{LDM} * \text{conversion factor} = \text{LDM Weight}$$

The conversion factor is normally 2000 kg/LDM for European trucking companies and represents the maximum weight per loading meter the truck can carry. After calculating the LDM weight, the largest value of LDM Weight and actual weight is utilized to calculate the price of the shipment. [16] [17]

A cost per loading meter is a common technique used by most transporters. However, there are also other types of agreements in the sector. Schlumberger has, for instance, agreements of hourly rates locally in Bergen and a fixed price per shipment locally in Stavanger/Tananger. In other words, the procurers may request the cost model most suitable to their strategy.

CURRENT SUPPLIER AGREEMENTS

The suppliers that operate under contract with Schlumberger have offered their prices in price matrices with a specific price either per shipment, per ton (LDM Weight) or per hour. See the excerpt from the current agreement between Schlumberger and a supplier in Figure 5 below. For the respective lanes, there are a price per shipment or per ton, which is based on the sum of the LDM Weights. Additional costs are also listed as a fixed fee, hourly rate or as a percentage- based addition.

From	To	Equipment Group	Transit Time (hours)	Minimum Charge	Per Shipment	Per Shipment	Per Shipment	Per ton	Per ton	Per ton	Per ton	Per shipment	Per Shipment
					0-100 KG	101-500 KG	501-1000 KG	1001-5000 KG	5,001 - 10,000 KG	10001 - 15000 KG	15001 - 20000 KG	Full Truck Load >20 t to 27 tons	Express Cost
LILLESTROM	BERGEN	Oil & Gas	28	NOK 72.00	NOK 800.00	NOK 688.00	NOK 807.50	NOK 740.00	NOK 740.00	NOK 740.00	NOK 740.00	NOK 14,585.00	NOK 16,260.00
LILLESTROM	STAVANGER	Oil & Gas	28	NOK 72.00	NOK 800.00	NOK 688.00	NOK 807.50	NOK 740.00	NOK 740.00	NOK 740.00	NOK 740.00	NOK 14,585.00	NOK 18,385.00
TANANGER - Semi Trailer	TANANGER - Semi Trailer	Local		NOK 650.00									
TANANGER - Lorry Trailer	TANANGER - Lorry Trailer	Local		NOK 550.00									
BERGEN - Semi Trailer	BERGEN - Semi Trailer	Local		NOK 750.00									
BERGEN - Lorry Trailer	BERGEN - Lorry Trailer	Local		NOK 650.00									

1. Timepris for lokalkjøring fart inn på "Minimum Charge". NOK 72,- tilkommer for hver oppdrags.
2. For bulk tilkommer kostnader for vask.

From	To	Per shipment	Per shipment	Per Shipment	Per Shipment	Per Shipment	Per Shipment	Per Hour	Per Shipment
		Additional driver	New Transit Time (hours)	DG - ADR (except 1 and 7) Surcharge	DG - ADR 1 and ADR 7 Surcharge	Call out charge	Escort Car	Stand By	Extra dimensions (Height, Length or Large) - Oversized Cargo
LILLESTROM	BERGEN	NOK 1,675.00	12	25%	50%	NOK 1,804.00	NOK 11,668.00	NOK 550.00	20%
LILLESTROM	STAVANGER	NOK 3,800.00	14	25%	50%	NOK 1,804.00	NOK 11,668.00	NOK 550.00	20%
TANANGER - Semi Trailer	TANANGER - Semi Trailer			25%	50%	NOK 1,804.00	NOK 1,200.00	NOK 550.00	40%
TANANGER - Lorry Trailer	TANANGER - Lorry Trailer			25%	50%	NOK 1,804.00	NOK 1,200.00	NOK 550.00	40%
BERGEN - Semi Trailer	BERGEN - Semi Trailer			25%	50%	NOK 1,804.00	NOK 1,400.00	NOK 550.00	40%
BERGEN - Lorry Trailer	BERGEN - Lorry Trailer			25%	50%	NOK 1,804.00	NOK 1,400.00	NOK 550.00	40%

Figure 5: Pricing Table [18]

4.2.4 TRUCK DEMAND

Schlumberger is dependent on transportation services, between their locations and different bases located along the Norwegian continental shelf, in order to provide proper services to its clients. The quality of the service is vital, because delays are unquestionably costly in the upstream production of oil and gas. The following will provide an overview of the present situation and transportation demand in the company from the last five years with aim to illustrate and quantify the transportation demand to which Schlumberger's operations lead.

Schlumberger has the recent three years ordered between 800 and 1600 shipments per month, which is illustrated in Figure 6 below. The demand has been 1101 shipments per month on average in the period, with arguably some degree of seasonality. One shipment, though, does not necessarily require one truck, because it depends on the amount of cargo on the specific shipment. In order to be able to estimate a future demand in quantifiable and suitable terms, the demand should undeniably be stated in a number of required trucks. The Schlumberger internal reports does

unfortunately not state the amount of trucks per shipment. It is nevertheless entered manually by the Logistics Planner. Due to reasons of time consumption and lacking data, the writer chose to identify the number of trucks per shipment for a sample of Q1 2019. The results can be viewed in Table 3 below. The number of trucks is between 18 and 32% higher than number of shipments, averaging 24% per month. Because of a large degree of repetitive operations requiring the same equipment packages in the field of extracting oil and gas, and the relatively small variance in the sample of Q1 2019, the writer find this sample to be a viable assumption for all company logistics. 1.24 trucks per shipment will consequently be used throughout the thesis.

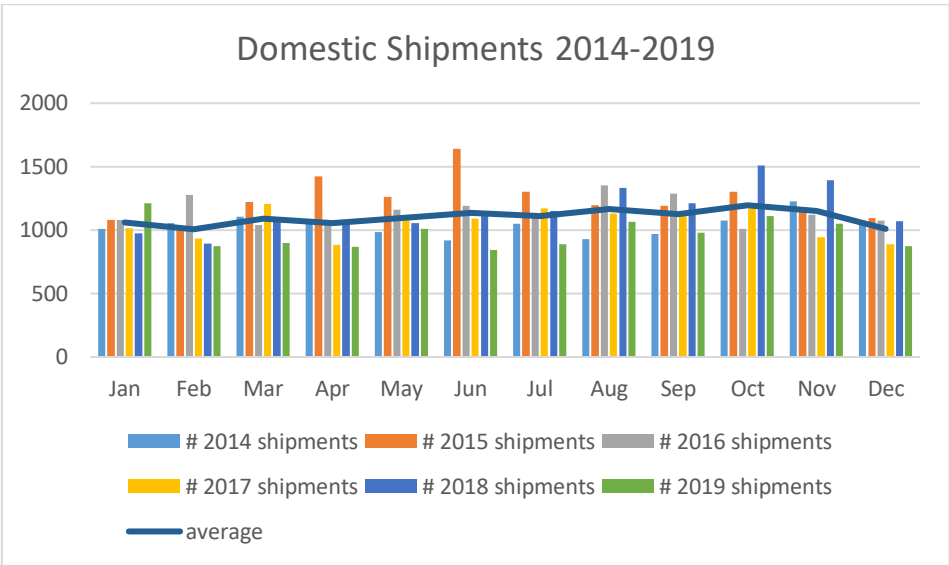


Figure 6: Domestic Shipments 2014-2019 [2]

Table 3: Shipments v.s. Trucks [2]

2019	Shipments	Actual Trucks	Increase%
January	1214	1466	21%
February	875	1034	18%
March	899	1189	32%
April	869	1082	25%
Total Q1 2019	3857	4771	24%

Number of shipments reached its top in this period in 2015, after which a two-year decline occurred. Last year the monthly average was 974 shipments, compared to 1240 in 2015 (see Figure 7 below). Even though the market has been through an oil crisis during 2014 through 2016, the number of

shipments has not decreased by extreme levels. The standard deviation of the monthly average shipments during this period is only 96.9 (less than 10% of the average monthly shipments). Also, one can see that the number of shipments peaked in 2015, even though the “oil crisis” started in the summer of 2014. The Schlumberger activity declined the two following years, highlighting the fact that the reduced production and investments on the Norwegian continental shelf (as described on page 30) in the aftermath of the “oil crisis” does not affect Schlumberger activity instantly, due to years-lasting agreements signed with clients in peak periods.

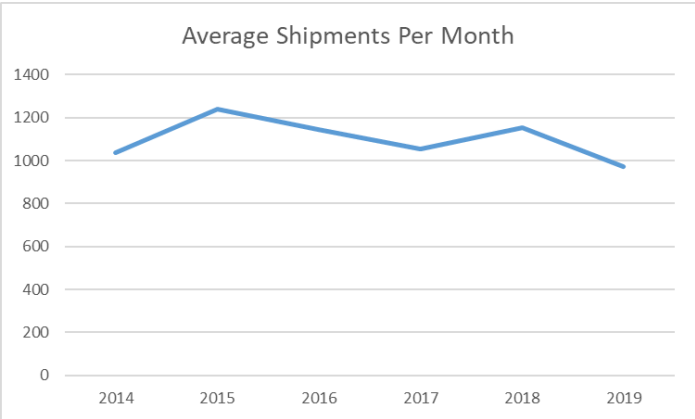


Figure 7: Average Shipments per Month [2]

The time of writing is a period where the oil and gas market suffers from an extreme reduction of the oil price. The writer argues that the next three-year period of transport services will not be a new peak period similar to 2015, due to reasons mentioned above. The demand of trucks for domestic transport is arguably likely to decrease during the next period of three years, probably with a lagging effect. Exact demand for transport in quantifiable terms is impossible to estimate and the writer will not attempt to do so, however a conservative estimate is advantageous for a procurement of such transport services, because rewarding a transport contract to a supplier with an insufficient truck fleet will arguably come with a cost.

An estimation of demanded trucks is evidently an important part of the procurement process. A supplier of transport will not bid for a contract if not certain that its truck fleet is of adequate size. Similarly is the distribution of these required trucks among the locations of importance to the process.

Schlumberger’s transport demand is largely dominated by a few lanes, which can be seen in Figure 8 below (lanes that represent less than 0.5% of total shipments are gathered in the category “other”). Local transport in Tananger holds the largest portion of shipments with between 35 and 40% of the total, while shipments between Stavanger/Tananger and Mongstad/Bergen usually represent between 25 and 35%.

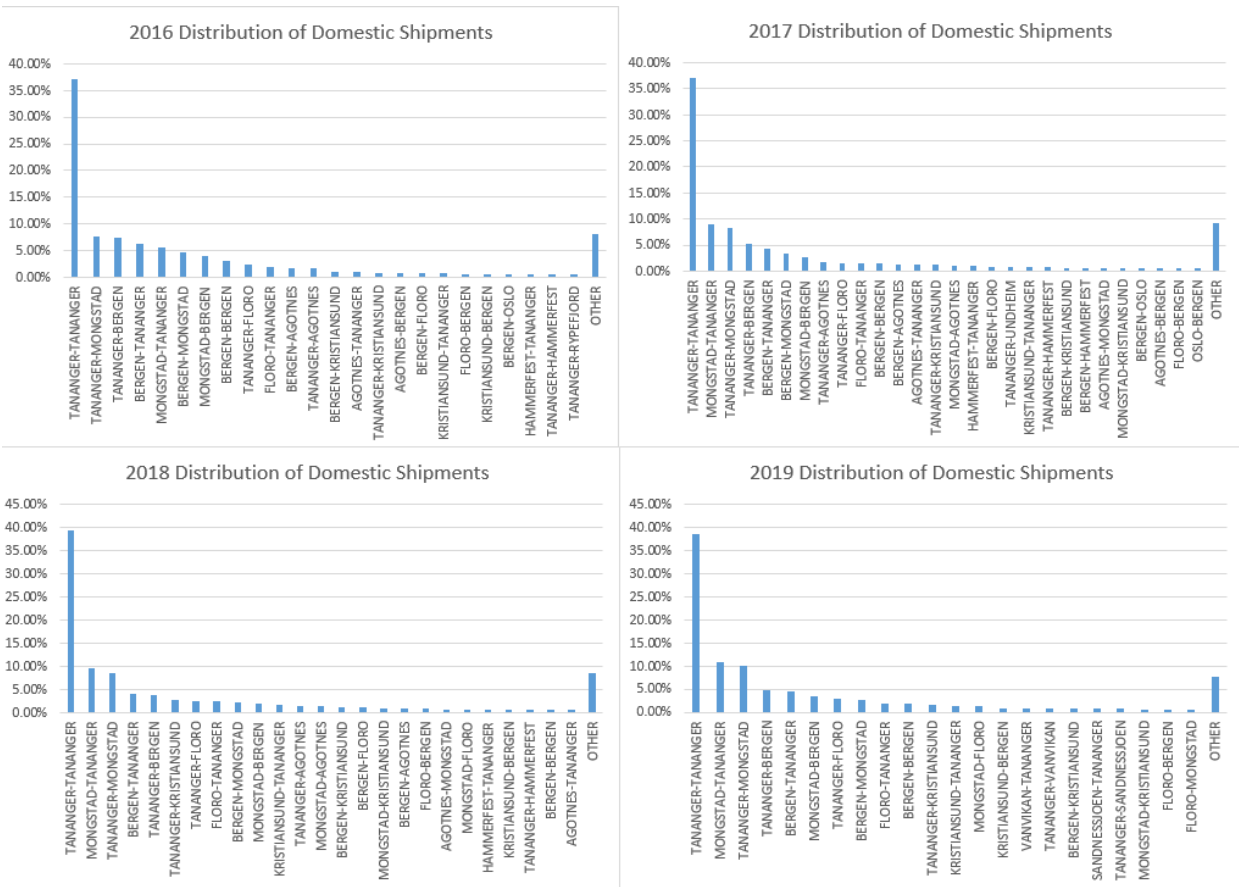


Figure 8: Distribution of Domestic Shipments 2016-2019 [2]

The following figures (Figure 9 and Figure 10) illustrate the estimated number of trucks demanded by Schlumberger per lane in 2017-2019 (assuming one shipment on average requires 1.24 trucks). It is important to keep in mind, however, that the internal reports on which the illustration is based does *not* provide data on how much cargo one shipment included. Thus, one shipment being estimated to 1.24 trucks can in reality be one pallet. This fact obviously decrease the accuracy of the estimation. Nevertheless, the estimation is for this reason a conservative one and may therefore be used in the definition of demanded trucks in the procurement of transport services if its assumptions are carefully explained.

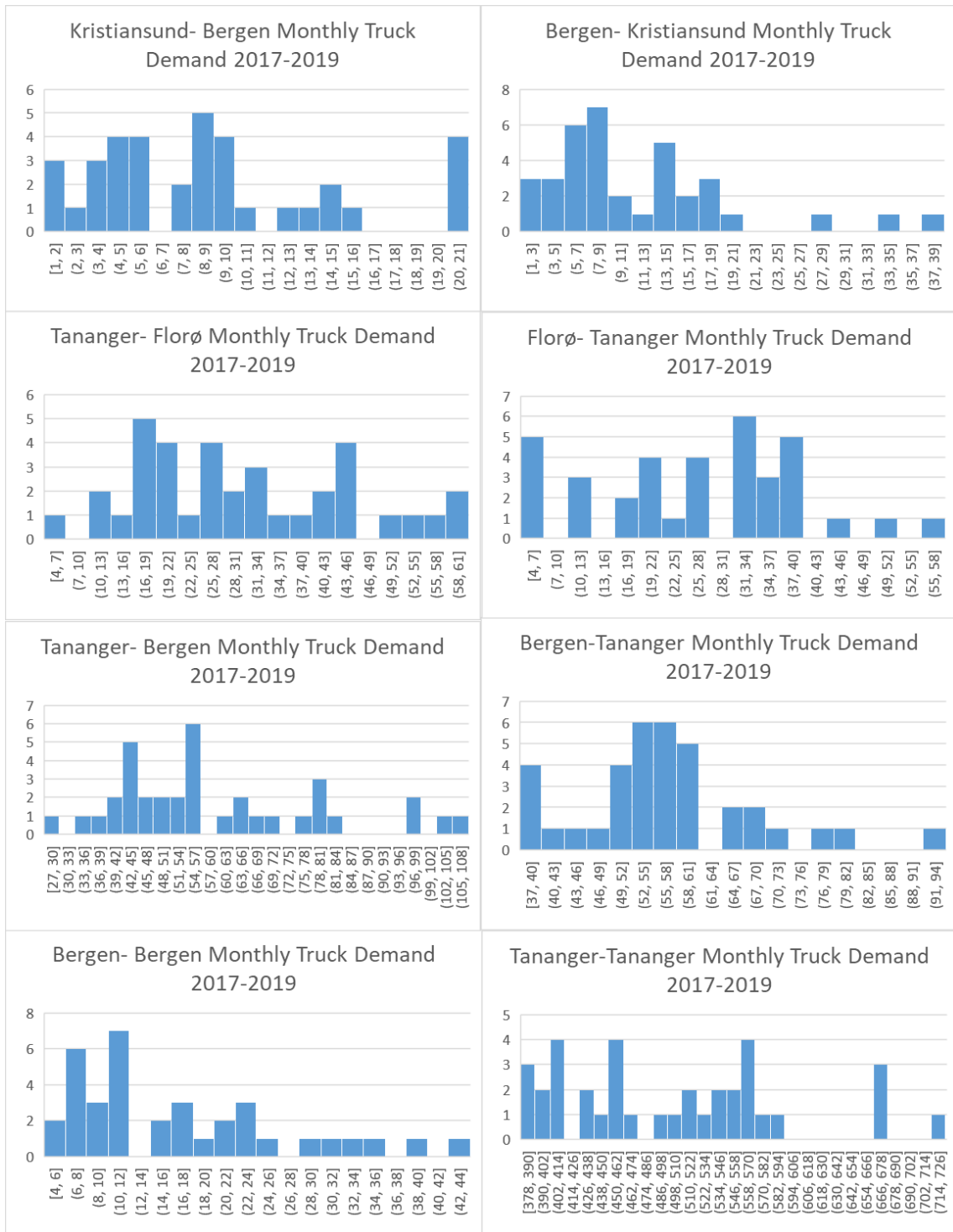


Figure 9: Estimated Monthly Truck Demand A [2]

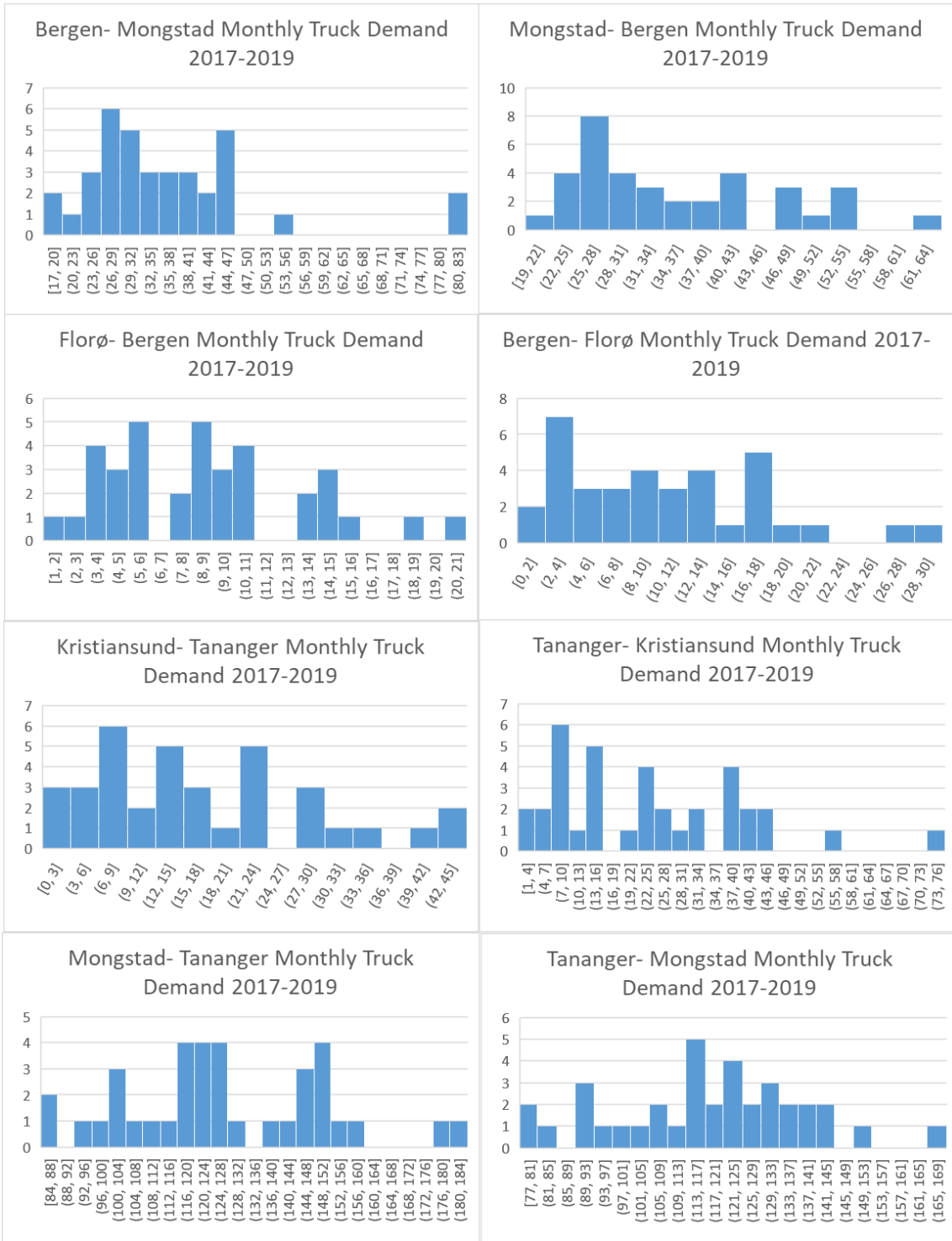


Figure 10: Estimated Monthly Truck Demand B [2]

4.3 ACTIVITY ON THE NORWEGIAN CONTINENTAL SHELF

The level of investment activity and production activity on the Norwegian Continental Shelf is without question a contributing factor to the amount of Schlumberger projects and subsequent demand of domestic transport. An estimate of the transport need in quantifiable terms is a useful prerequisite before the procurement of such transport services. There is moreover no denying the fact that the oil price crisis and the economic effects of the pandemic COVID-19 in time of writing will influence the level of activity in the forthcoming time. It is evidently very difficult to estimate the future demand of domestic transport, but it could be useful to review historical data on Schlumberger domestic transport in time of such previous crisis. Thus, the following will provide knowledge and statistics concerning the most recent dramatic drop in activity on the Norwegian continental shelf, namely the “oil crisis” that started with a steep drop in the oil price in 2014.

Most experts agreed that the fall in the oil price (Brent Crude) from 115.19 USD/BBL in June 2014 to 46.7 USD/BBL in January 2015, a fall of 59.5%, was mainly caused by increased supply from American shale oil production in combination with OPEC’s failing ability to agree on reduced production. This period was followed by a slightly more optimistic period, where the price increased to 67.5 USD/BBL in May 2015, until it again dropped to the lowest point of the “oil crisis” of 28.4 USD/BBL, which constituted a drop of 75.3% from the top. [19] See Figure 11 below for price developments.

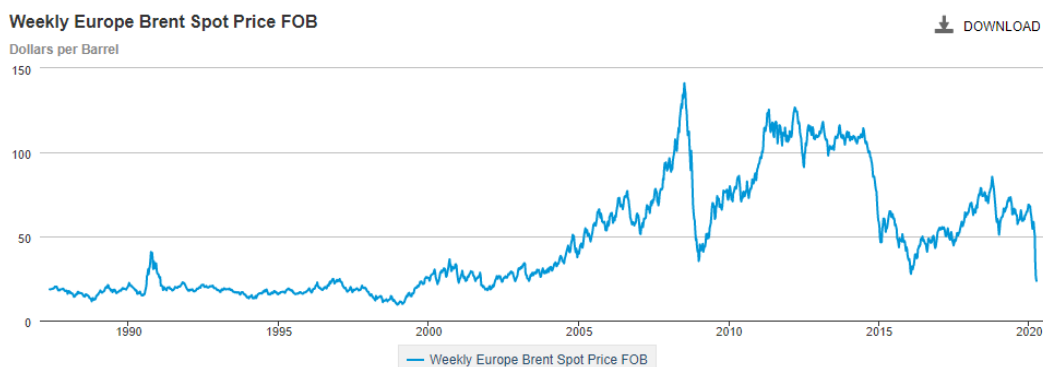


Figure 11: Weekly Europe Brent Spot Price [20]

The dramatic events of the oil price influenced the activity on the Norwegian continental shelf in the years thereafter, as seen by Figure 12 below. One can see that the mentioned drop in the oil price was followed by a reduction in gross production value (of both oil and natural gas) by 19% from 2014 to 2015 and another 18% the following year, before it started to increase. The total investments made, on the other hand, decreased by 10% from 2014 to 2015, 17% the following year and 10% from 2016 to 2017, before its comeback thereafter.

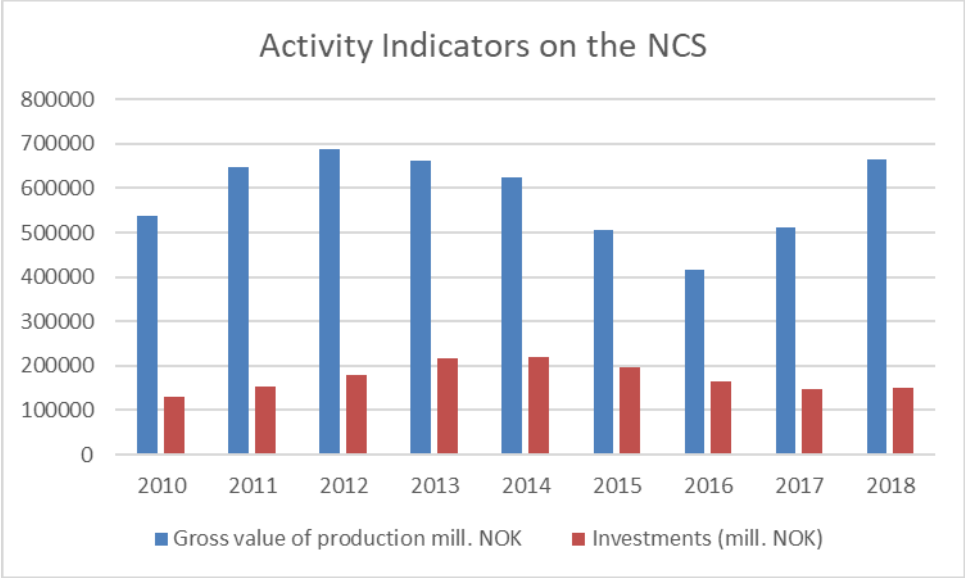


Figure 12: Activity Indicators on the Norwegian Continental Shelf [21]

5 METHODOLOGY

5.1 GENERAL APPROACH

The writer has approached the problem with an aim of providing the company with a theoretical and analytical foundation on which the upcoming procurement process of all domestic transport services can be based. The theoretical foundation is based on a combination of supply chain theory and project management theory, and the analytical foundation is based on extracting, filtering and interpreting raw data from the internal logistical planning system TMS. In addition to the theoretical and analytical foundation, the writer has made an attempt to identify problems or challenges from the present practice, and provided suggested improvements based on available literature on the subjects of procurement, logistics and project management.

5.2 ANALYTICAL APPROACH

As mentioned above, all analytical work on Schlumberger's current practice is based on unfiltered data from the system in use called Transport Management System (TMS). The writer has extracted and filtered the required data in the specific analyses, which is elaborated below. Where necessary, the writer has made assumptions and simplifications in a conservative manner. These are mentioned throughout the thesis in relevant chapters.

The applicable filters used throughout the thesis are listed below for replication purposes.

- Figure 1: Invoice Deviation 2019
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - INV COST WHEN CREATED
 - INV COST ADDED LATER

- Figure 6: Domestic Shipments 2014-2019
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE

- Table 3: Shipments v.s. Trucks
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - SERVICE TYPE (To obtain actual trucks)

- Figure 7: Average Shipments per Month
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE

- Figure 8: Distribution of Domestic Shipments 2016-2019
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - LANE

- Figure 9: Estimated Monthly Truck Demand A
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - LANE
 - SERVICE TYPE (To obtain actual truck)

- Table 4: Estimated Monthly Truck Demand 2019
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - LANE

- Table 7: % Contracted Shipments
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - CONTRACT DETAIL = CONTRACTED

- Figure 14: 2019 Non-Contracted Shipments Distribution
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - LANE
 - CONTRACT DETAIL = NON-CONTRACTED

- Figure 15: Invoice Deviation Analysis
 - ORDER BASE TYPE = GENERAL CARGO DOMESTIC
 - SH CREATION DATE
 - SERVICE TYPE (to separate between additional requirements)
 - INV COST WHEN CREATED
 - INV COST ADDED LATER

6 RESULTS

6.1 PROCUREMENT PROCESS

6.1.1 STRATEGY DEVELOPMENT

REQUIREMENTS DEFINITION AND NEEDS ASSESSMENT

As this stage is crucial in a procurement process in order to obtain the required service quality, and should be performed by a multidisciplinary team as well as include all relevant stakeholders, the writer will not make an effort to perform it singlehandedly. Nevertheless, the writer will provide inputs that are found to be relevant for the scope of this thesis.

Assuming also that the amount of monthly truck demand is normally distributed over a three-year period, an estimate of future demand/need of transport services can be calculated by use of a confidence interval. The minimum and maximum number of trucks demanded monthly per lane with 90% certainty are listed in Table 4 below in addition to its 3-year average. Moreover, the estimates are arguably conservative due to reasons elaborated on page 30 regarding activity levels on the NCS in light of the oil price and ongoing pandemic COVID-19 in time of writing. In summary, the transportation contracts ought to be awarded to suppliers that, among other things, are able to supply the demand in Table 4 below.

Table 4: Estimated Monthly Truck Demand 2019

Lane	90% Minimum	90% Maximum	3- Year Average
Tananger- Tananger	386	621	504
Bergen- Bergen	3	30	16
Bergen- Tananger	41	72	57
Tananger- Bergen	34	86	60
Florø- Tananger	9	43	26
Tananger- Florø	12	49	31
Mongstad- Bergen	17	40	28
Bergen- Mongstad	19	55	37
Kristiansund- Bergen	2	15	8
Bergen- Kristiansund	1	23	12
Bergen- Florø	1	20	11
Florø- Bergen	3	15	9
Kristiansund- Tananger	0	30	14
Tananger- Kristiansund	3	46	24
Tananger- Mongstad	91	144	118
Mongstad- Tananger	97	158	127

The requirements definition and needs assessment should lay the foundation for the award criteria in the procurement process of all domestic transport services. In the previous procurement process, on which the current contracts are based, the award criteria were price and Q-HSE- related factors. These Q-HSE criteria, whose importance were weighted by 50 %, consisted of Legal & General Information, Health and Safety, Vehicle Fleet Management, Audit & Documentation, Information Reporting and Service Quality Challenges. Price and Q-HSE should evidently be a part of the award criteria. The writer argues, nevertheless, that the ITT and- by consequence- the award criteria should lay the foundation for the company's strategic goals, especially that of increasing efficiency in the logistics department by transforming it to an automated one. This subject is elaborated in chapter 6.2 SCHLUMBERGER LOGISTICS.

Additionally, suppliers' performance and control in terms of their own environmental impact and carbon footprint should evidently be included in the award procedure. Schlumberger is currently running an internal project, which makes an effort toward obtaining control over its own carbon footprint. This project would benefit from, as would the company in the long term, including such important matters in the renewed upcoming procurement process.

STAKEHOLDER IDENTIFICATION AND ANALYSIS

The procurement team should identify all relevant stakeholders and analyze their expectations and potential conflicts in the upcoming procurement process of domestic transport services. After working in Schlumberger Logistics for some time, and consulting with the team, the writer is under the impression that the logistics team who actually plans the transport by interpreting the contracts, were not included in the last procurement process. Schlumberger would unquestionably benefit from including such relevant personnel in the next procurement process.

SUPPLY MARKET ANALYSIS OF THE TRUCK FREIGHT INDUSTRY

The following section will contain a brief analysis of the domestic truck freight industry that Schlumberger depends on in their everyday operations. Porter's Five Forces will lay the foundation of the analysis, which will include only four suppliers of truck freight. The analysis' purpose is to serve the thesis with relevant analysis, and should not, due to its narrow spectrum, be used in the forthcoming procurement process of such transport services. This analysis is not the central output of this thesis and is consequently simplified. The four participants are the ones that currently provide transport services, by contract or otherwise, to Schlumberger Norge: Bring, SR Group, Greencarrier and Merkesdal.

COMPETITION FROM SUBSTITUTES

The truck freight industry is an industry with relatively few substitutes present. Due to the size and weight of much of the cargo, the substitute options are limited. Possible substitutes are transport by sea or air, however the former is more expensive, and dimensions and weight naturally limit the latter. Thus, none of them is viable substitutes for normal cargo transport. The procurer may consider the option of managing transport themselves by purchasing a truck fleet, and the price of the transport services might be somewhat limited by that. In conclusion, the writer argues that the suppliers are not noteworthy influenced by the competition from substitutes.

THREAT OF NEW ENTRANTS

Firstly, the industry attractiveness in terms of its profit opportunities must be considered. The truck freight industry is generally characterized by low margins. Some relevant accounting data are listed below in Table 5 along with the calculation of the Return on Equity (ROE). Bring, which is the company with the largest volumes, has an average ROE of 2.88 % the previous four years, while the same number is 7.15 and 10.48 % for SR Group and Green Carrier, respectively. In conclusion, the industry is arguably not particularly attractive in terms of profit due to its low margins.

Efficient operation in the industry is arguably dependent on volumes and scale. Needless to say, truck freight of a larger volume will decrease a company's variable costs and consequently serve as a barrier to entry for smaller firms.

It also requires a great deal of capital in order to start a competitive organization in the industry, which also is a barrier to entry. As an example, SR Group has 150 large truck in their truck fleet in Norway. [22]

Lastly, there exists some governmental and legal barriers to entry as well. The transport suppliers are required to have updated licenses for their drivers in order to transport various goods.

In conclusion, the industry has relatively large barriers of entry and does not suffer from a great deal of threat of new entries.

Table 5: Return on Equity for Current Contracted Suppliers [23]

BRING 1000 NOK	2015	2016	2017	2018	Average
Revenue	kr 1,701,878	kr 1,468,008	kr 1,683,711	kr 1,681,061	kr 1,633,665
Annual Result	kr 9,847	kr 36,536	kr 59,396	-kr 2,473	kr 25,827
Equity	kr 863,039	kr 884,597	kr 907,262	kr 855,011	kr 877,477
ROE	1.14%	4.13%	6.55%	-0.29%	2.88%
SR GROUP 1000 NOK	2015	2016	2017	2018	Average
Revenue	kr 493,965	kr 505,110	kr 431,133	kr 479,636	kr 477,461
Annual Result	kr 5,366	-kr 406	-kr 9,149	kr 13,474	kr 2,321
Equity	kr 30,940	kr 30,534	kr 27,443	kr 29,327	kr 29,561
ROE	17.34%	-1.33%	-33.34%	45.94%	7.15%
GREEN CARRIER 1000 NOK	2015	2016	2017	2018	Average
Revenue	kr 1,212,159	kr 1,180,926	kr 1,324,373	kr 1,225,507	kr 1,235,741
Annual Result	kr 18,218	kr 941	-kr 120	-kr 664	kr 4,594
Equity	kr 43,717	kr 43,076	kr 42,221	kr 40,185	kr 42,300
ROE	41.67%	2.18%	-0.28%	-1.65%	10.48%

RIVALRY BETWEEN ESTABLISHED COMPETITORS

The three suppliers in question are relatively similar in terms of objectives, costs, strategies and business model, and there are small differences in terms of service quality and HSE- related matters.

Due to the low diversity among the suppliers and their delivered service, they compete mainly on price, assuming equal capacity. In conclusion, the conditions in the market rivalry is arguably influencing the profitability in a negative manner.

THE BALANCE OF BARGAINING POWER

Schlumberger, being the buyer, should arguably have some bargaining power due to its company size and shipment volume relative to that of the suppliers. Additionally, Schlumberger has learned about the suppliers' prices and costs during the contracted years, which will increase the bargaining power. The suppliers, on the other hand, would see their bargaining power increased if Schlumberger distributes the shipments into larger and fewer contracts. Thus, Schlumberger should arguably consider the size of the relevant suppliers when dividing the procurement of transport services into several contracts (lanes), in order to control their own bargaining power in negotiations. In other words: Fewer and larger contracts limits the number of possible suppliers due to reasons of capacity constraints, while at the same time increases the bargaining power of the remaining applicable suppliers.

A current agreement between Bring and Equinor, which implies that all Equinor- related shipments should be transported by Bring, will arguably reduce the bargaining power of Schlumberger in a drastic manner. Thus, Schlumberger could benefit from investigating the possibility of avoiding assigning all Equinor- related shipments to Bring. This would possibly ensure that the company acquires transport services, which are in line with Schlumberger strategic goals, rather than that of Bring or Equinor.

6.1.2. CONTRACT ESTABLISHMENT

Schlumberger has the option to divide the procurement into a given number of lots or as a single contract. The latter is highly unlikely, because it will exclude many participants from the competition due to capacity limitations. The decision on number of bundles should be carefully considered by the procurement team with respect to the capacity of the participating competitors. Such information could be obtained by a Request for Information, if not available on the respective websites.

Furthermore, the writer argues that Schlumberger should invite the participating bidders to bid for both a bundle of lanes, and as single contracts. These are cases where the suppliers might have a positive complementary effect by being awarded a particular bundle of contracts/lanes, as opposed to only one of them. The suppliers are likely to decrease their variable unit costs as well as risk, if they are invited to make an offer for a bundle of complementary lanes. This, in turn, would evidently decrease their offered price. An example of such a scenario could be as follows:

- 1) The ITT indicates that the suppliers shall make an offer for lane A and B as independent and single contracts.
- 2) The ITT indicates that the supplier shall make an offer for lane A and B, assuming that the supplier is awarded both contracts.

The writer has identified some high-activity lanes that could be influenced by this effect in Table 6 below. As an example, Tananger- Florø and Bergen- Florø could produce this effect because a truck that drives the lane Tananger- Florø could -without too much inconvenience- drive through Bergen. In conclusion, the writer argues that this approach would benefit all parties in the upcoming procurement of domestic transport services.

Table 6: Possible Complementary Lanes

LANE(S)	POSSIBLY COMPLEMENTARY LANE(S)
TANANGER-MONGSTAD	TANANGER-BERGEN
BERGEN- FLORØ	MONGSTAD- FLORØ
TANANGER- FLORØ	BERGEN- FLORØ, MONGSTAD- FLORØ
TANANGER- KRISTIANSUND	BERGEN- KRISTIANSUND, MONGSTAD- KRISTIANSUND
TANANGER-HAMMERFEST, BERGEN-HAMMERFEST, MONGSTAD- HAMMERFEST	TANANGER- SANDNESSJØEN, BERGEN- SANDNESSJØEN, MONGSTAD- SANDNESSJØEN

A variant of the fixed price/lump sum type of contract is arguably the best choice in this situation, because service quality is quite verifiable and measureable, the supplier’s costs are relatively stable and predictable, and contract flexibility is not particularly necessary. The fixed price contract would not induce an additional bonus if the predetermined level of quality is achieved, but conversely induce a penalty in the opposite scenario. This is the current contract model in Schlumberger Norge, and the writer offers no suggestions to improvement in that respect. Nevertheless, the writer argues that a change is made in the contract pricing, which would make the transformation toward an

automated logistics process much easier. This topic is elaborated in chapter 6.2 SCHLUMBERGER LOGISTICS.

Furthermore, there are a few things to consider in light of the competition process. First, Schlumberger should arguably choose a competitive tendering, rather than a negotiation process. This would ensure equal and fair treatment for all participating suppliers and make offers more comparable, which would subsequently give Schlumberger the most desirable agreement.

The procurement team must carefully formulate the ITT in a manner that eliminates all (if possible) uncertainty for the suppliers, as this will prevent the suppliers from underbidding due to uncertainty. Moreover, a supplier might underbid because of a desperate financial situation or inexperience in terms of estimating costs. The procurement team should arguably identify the risk of such incidents in advance of the competition, e.g. in the analysis of the supplier market. A supplier that underbids, and will not make their required earnings while serving the contract is likely to seek loophole opportunities to reduce their costs or increase their earnings. The service quality is likely to decrease in such scenarios, and Schlumberger should consequently consider the risk of awarding contracts to underbidding suppliers.

6.2 SCHLUMBERGER LOGISTICS

The following section will evaluate the logistical process in terms of efficiency and potential of automation. The process will be illustrated and bottlenecks identified. Additionally, relevant topics will be further analyzed and improvements suggested.

6.2.1 PROCESS EFFICIENCY

A simplified version of the Logistical Process in Schlumberger Norge can be viewed in Figure 13 below. The writer argues that the process has two major bottlenecks, one of which is currently somewhat avoided. The activities in the process is not very time demanding, and depends to a large degree on the system in use. If the foundations were in place, an adequate system would perform the entire process (except from the bottlenecks and waiting on the invoice) in the matter of seconds.

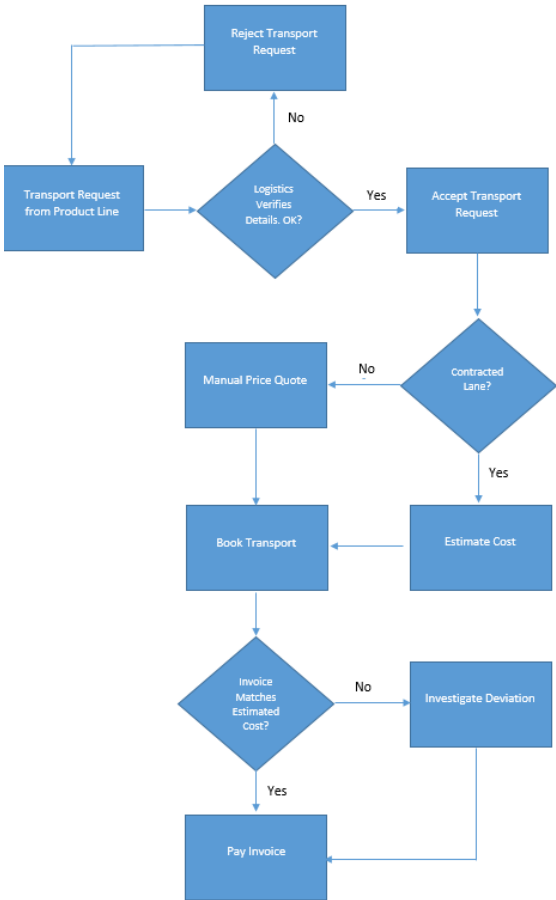


Figure 13: Logistical Process Chart

A program can perform all activities in no time, except from the following bottlenecks:

- 1) Manual Price Quote: All transports that cannot be assigned a transporter based on a contracted agreement must be quoted and booked accordingly. Such a manual price quote may take between 0.5 hours and an entire working day, depending on the time that the suppliers take in responding and truck availability. In addition, if received price offers are very high, the logistical personnel might try to delay the particular shipment and thus receive improved offers. Interestingly, as Table 7 below illustrates, Schlumberger has increased the ratio of contracted shipments the last years. The writer is unaware of the strategic reason for this; however, it is arguably not unlikely that it is linked with the goal of an increased automated logistical process. In conclusion, a fully efficient process that lays the foundation for an automated process has 100% contracted shipments.

Table 7: % Contracted Shipments [2]

Year	2017	2018	2019	YTD 2020
%Contracted Shipments	0.04%	30.03%	86.04%	89.49%

- 2) Estimate Cost: The estimation of the cost of a contracted shipment is today somewhat automatic, however with some strong weaknesses. The weaknesses, which are elaborated in the next chapters, makes this estimation very challenging for the logistical personnel. As illustrated in Figure 1 on page 1, the amount of shipments whose costs are incorrectly estimated are surprisingly high. This creates a major bottleneck in the process, and acts as a direct barrier against a fully automated process. If this bottleneck could be removed, it has the potential to reduce the process with the activities that is required to investigate the deviations and, consequently, one or more headcounts.

6.2.2 PROCESS ANALYSIS

1) Manual Price Quotes

In order to reduce the bottleneck of manual price quotes, Schlumberger procurement should aim to keep the ratio of contracted lanes to an absolute maximum. It is evidently difficult to maintain a 100% ratio because changes in terms of locations occur on a regular basis. Schlumberger is currently at between 85 and 90 % with an upward-looking trend. The writer argues that Schlumberger should have an ITT Template for the potential new lanes that see increased activity in the future, in order to reduce the amount of time and labor it takes to include new lanes as contracted agreements. If such a template is sufficiently detailed, Schlumberger procurement could make contracted agreements with suppliers in a short time and thus keep the ratio of contracted shipments to a high.

It is moreover interesting to analyze what types of shipments make up the 10-15% non-contracted ones. How can Schlumberger ensure that the ratio of contracted shipments are increased after the next procurement process?

One can see in Figure 14 below that the majority of the non-contracted shipments of 2019 were actually on contracted lanes. In fact, the contracted lanes make up 75.8 % of the non-contracted shipments. Thus, the majority of the non-contracted shipments fall outside the agreements due to specific requirements in the shipments. There are no data available to obtain a view of what details that cause the contracted lanes to be non-contracted shipments. Nevertheless, the writer argues that, based on experience from planning transport within the team, the majority of such shipments are non-contracted due to the requirement of a closed truck, as opposed to the open truck on which the contracted agreements are based. In addition, many shipments to a specific location at Sandsliåsen requires a small truck, which is outside the scope of the contract for that lane. Schlumberger should arguably include closed trucks and other recurrent requirements in the contracts where possible in order to reduce the non-contracted shipments.

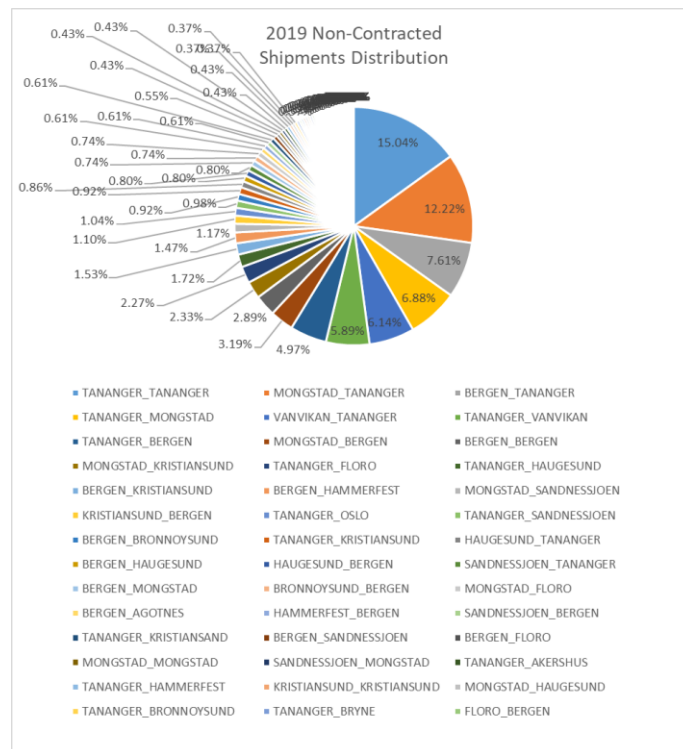


Figure 14: 2019 Non-Contracted Shipments Distribution

2) Estimate Cost and Investigate Deviation

As the introduction touches upon on page 1, Schlumberger logistics has a challenge regarding the estimation of the cost of a shipment, which also acts as a bottleneck in the logistical process. The deviation between estimated costs and invoices, as illustrated in Figure 1 on page 1, creates surplus work later on in the process. The following will analyze this bottleneck with aim to suggest a solution.

The writer will divide the contracted shipments into the following for clarification purposes:

- a. Less than a Truck Load (LTL): A shipment that includes cargo that will fit on one regular semi-truck or less.
- b. More than a Full Truck Load (FTL): A shipment that includes cargo that will not fit on one regular semi-truck.

Prior to the analysis, the writer offers a few hypothesis regarding the deviations:

Hypothesis 1: The deviation increases if the shipment requires more than one truck.

The reason for hypothesis 1 is based on how the contracts are constructed. The present system (TMS) automatically calculates the price on the shipment up to and including one full truck (FTL). If

the shipment requires several trucks, the logistics personnel must anticipate how the supplier distributes the cargo among the trucks and subsequently estimate how much the price exceeds one FTL. This makes the estimation challenging. Moreover, this reasoning also supports that the deviation should decrease with express shipments. Schlumberger must, according to the contracts, pay for a FTL per truck occupied for express shipments (regardless of the size and amount of cargo), making it easier for the logistics personnel to estimate the cost.

Hypothesis 2: The deviation increases if the shipment has additional costs (ADR/Dangerous goods, Oversized goods, Additional Drivers)

The system does not add additional costs automatically. Ergo, correct estimation is dependent on manual input from the logistics personnel. Moreover, the contracts need to be interpreted correctly in order to add the correct costs. Figure 5 on page 23 shows a pricing table from a contracted agreement between Schlumberger Norge and one of its suppliers of transport. One can see that additional costs are stated as percentages per shipment. However, what if one has a combination of several additional costs, such as an express shipment carrying hazardous goods. Is the ADR cost based on the shipment as a normal shipment, or as an express shipment? The lack of detail in the contracts makes it challenging for the logistics planner, and increased deviation is therefore arguably likely.

Hypothesis 3: The deviation is substantially reduced for shipments that require less than one truck (LTL) and has no additional/special/extra requirements.

The system will automatically calculate the cost for these shipments and the logistics personnel do not estimate any costs. This eliminates the possibility for human errors and interpretation errors. The deviation should in theory be 0 % (of course, it will not be zero, because shipment changes sometimes occur after the shipment is planned and booked, which influences the invoiced price).

Figure 15 below shows the percentage of shipments in 2019 (on vertical axis) that has a deviation between estimated cost and invoice of more than 10-100 % (horizontal axis).

- Average: Almost half of the shipments had a deviation of 10 % or more. The average is used as a baseline for comparison purposes.
- ADR: Shipments carrying hazardous goods suffer from increased deviation. Nearly 60 % see a deviation of 10 % or more.

- FTL + Shipments: These shipments require one full truck (FTL) or more. One can see that deviation increases, with about 56 % of the shipments saw a deviation of 10 % or more.
- Oversized goods: Deviation increases for shipments carrying oversized/specialized goods. Approximately 56 % of the shipments saw a deviation of 10 % or more.
- Only LTL: These are shipments whose price are automatically calculated by TMS, as they occupy less than one truck and see no additional requirements and incurred costs. The deviation decreases for these shipments. About 46 % of the shipments saw a deviation of 10 % or more.
- Express: The deviation decreases for express shipments. Approximately 45 % of the shipments saw a deviation of 10 % or more.

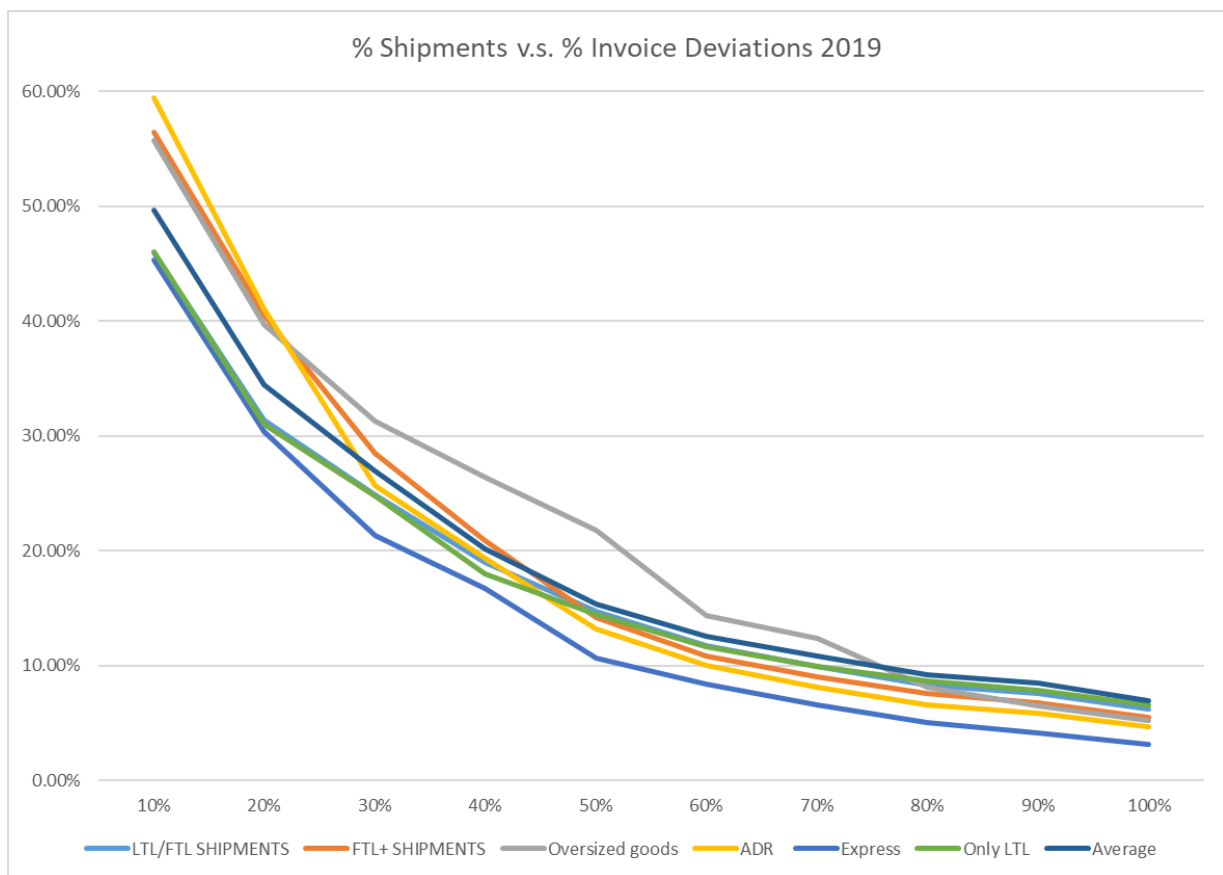


Figure 15: Invoice Deviation Analysis

Hypothesis 1 and 2 proved correct. The invoice deviation does in fact increase with both additional requirements and costs, as well as with the requirement of more than one truck. Hypothesis 3, however, did not prove correct. Although the system calculates the price without human

intervention, about 46 % of the shipments still see a deviation of 10 % or more. The writer argues that a viable explanation may be that the system in use is not able to handle the complexity of the current pricing model, and consequently calculates the price incorrectly.

The current pricing model is approximately the same among all contracted suppliers. If one studies Figure 5 on page 23, which illustrates the pricing model, one can see that the price varies between a per shipment based price, and a per ton based price for different LDM Weights. This might make it challenging for the system to calculate, if it has certain limitations in terms of programming opportunities.

Schlumberger should arguably seek a solution that eliminates the entire bottleneck that is created by the incorrect price estimations. First of all, the new ERP system's opportunities and limitations should be carefully considered before making a radical change. However, the writer argues that a complete change in the pricing model as follows would solve the current challenges:

Pay per cargo/item based on its LDM Weight, regardless of the size of the shipment or size of the cargo. This type of pricing model would inevitably make it a simple calculation for any shipment and require no estimation by the logistics personnel. Such a change should be carefully explained in the award criteria, and it would then be up to the suppliers to make offers that suits Schlumberger's way of working.

7 DISCUSSION

The aim of the thesis was to lay the theoretical and analytical foundation for the upcoming procurement of domestic transport services for the company. Furthermore, it aimed for identifying challenges with the present practice and subsequently suggesting improvements. The thesis has arguably provided the company with some relevant procurement theory, identified weaknesses in the current way of working and suggested changes that could benefit the company in the upcoming procurement process.

One of the main findings in the thesis was that Schlumberger could benefit from creating an ITT that ensures supplier offers that supports the strategy of the company. The current contracted agreements between Schlumberger and its suppliers are designed to support the strategic goals of the suppliers, rather than the other way around. Whether or not it is possible to make this drastic change and simultaneously maintain a high-level competitive bidding process, is dependent on the bargaining power of the company relative to that of the suppliers. The answer to this question is not obtained by the narrow supplier market analysis, and the writer suggests that further investigation is performed on the topic.

The suggestion of trying to avoid the agreement between Bring and Equinor is arguably heavily linked with several other suggestions. If the agreement cannot be avoided, and Schlumberger thus is forced to use Bring for all Equinor-related shipments, the main findings in this thesis is to some extent not feasible nor achievable. The agreement is arguably an obstacle in Schlumberger's path toward a more efficient logistical process and- eventually- an automated one.

The suggestions regarding the overall conducting of the procurement process is not completely adequate, because such a task is not efficiently done by one person alone. Albeit, the writer has suggested a few things based on the impression of today's way of working that is found to be sufficiently done by the writer alone. Further, the writer suggests that a thorough procurement process is performed by a well-chosen and multidisciplinary team.

Due to the fact that some of the suggested improvements would induce a change in the suppliers' way of working, it is likely to increase the uncertainty in their bidding. They would be moving into new territory with increased revenue risk, which might result in higher price offers in the competition. Even though this is the case, Schlumberger would inevitably benefit in the longer run when an automated process is established.

8 CONCLUSION

In light of the upcoming procurement of domestic transport services, and based on the identification and analysis of challenges in present practice, the writer wishes to conclude with the suggested improvements. First of all, suggestions related to the procurement process in general are given. Secondly, the identified challenges related to the logistical process and its efficiency will be offered a suggested solution.

As mentioned previously in the thesis, obtaining lower transport prices will arguably not make significant differences to Schlumberger's bottom line due to the low margins under which the supplier business already operates. Conversely, the company should utilize the procurement process to obtain contracted agreements that support the predetermined strategic, long-term goals of the company. When the time comes, the procurement team should formulate the ITT in a manner that gives the suppliers no option but to provide offers that fit the needs of Schlumberger, rather than that of the supplier. In addition, suggested improvements in the scope of the thesis are as follows:

- Include sustainability parameters among the award criteria, especially that of carbon footprint.
- Perform a thorough stakeholder analysis and include relevant stakeholders in the next procurement process. The logistics personnel should inevitably be included, as they can provide important knowledge and input.
- Investigate the possibility of avoiding the agreement between Bring and Equinor (elaborated in the supply market analysis on page 10). First, the agreement reduces the bargaining power of Schlumberger. Second, it acts as a barrier in the road toward automated processes, because Schlumberger is forced to book transport services in the manner that fit Equinor/Bring, rather than a manner that suits the company's own strategic goals.
- Invite the participating bidders in the competition to bid for both a bundle of lanes, and as single contracts. This should be done for lanes where suppliers might have a positive complementary effect by being awarded a particular bundle of contracts/lanes, as opposed to only one of them. In a low-margin industry, this may be an opportunity to obtain slightly lower prices through a win-win agreement.

- Include all identified recurrent additional requirements in the contracted agreements (closed truck, small truck etc.) with aim to reduce the ratio of non-contracted shipments on contracted lanes.
- Change the pricing model to a much simpler version that eliminates a major bottleneck in the logistical process: Payment per LDM Weight, regardless of the size of the shipment or cargo.

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