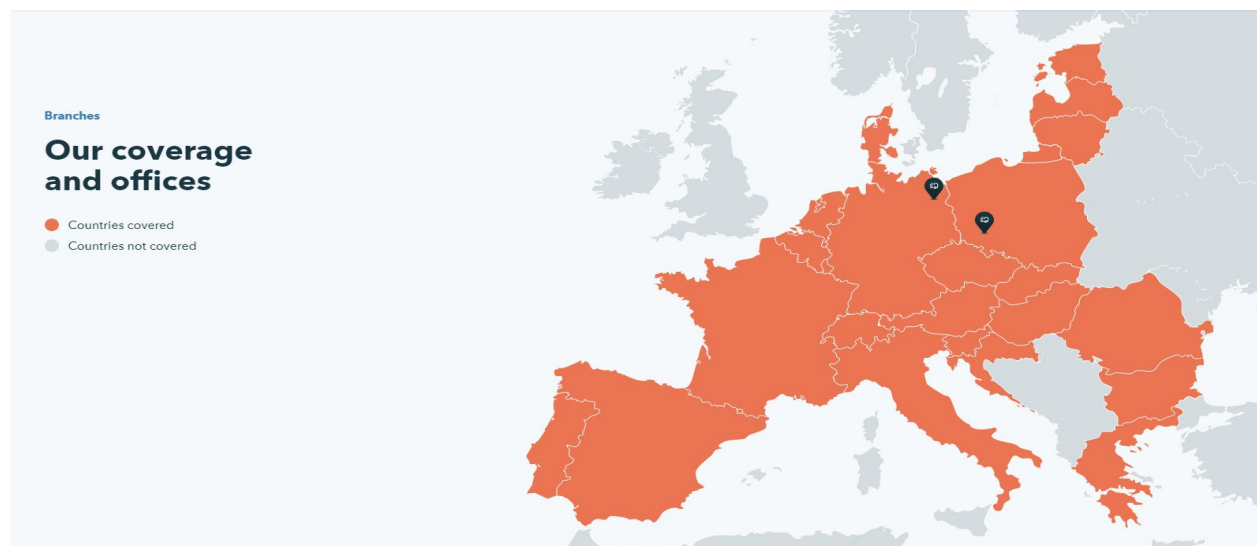


Case study SCA WiSe 2020 - Market pressure

The following document describes the case study “Market pressure” of the Department of Logistics of the Technical University of Berlin as part of the module Supply Chain Analytics.

Introduction InstaFreight

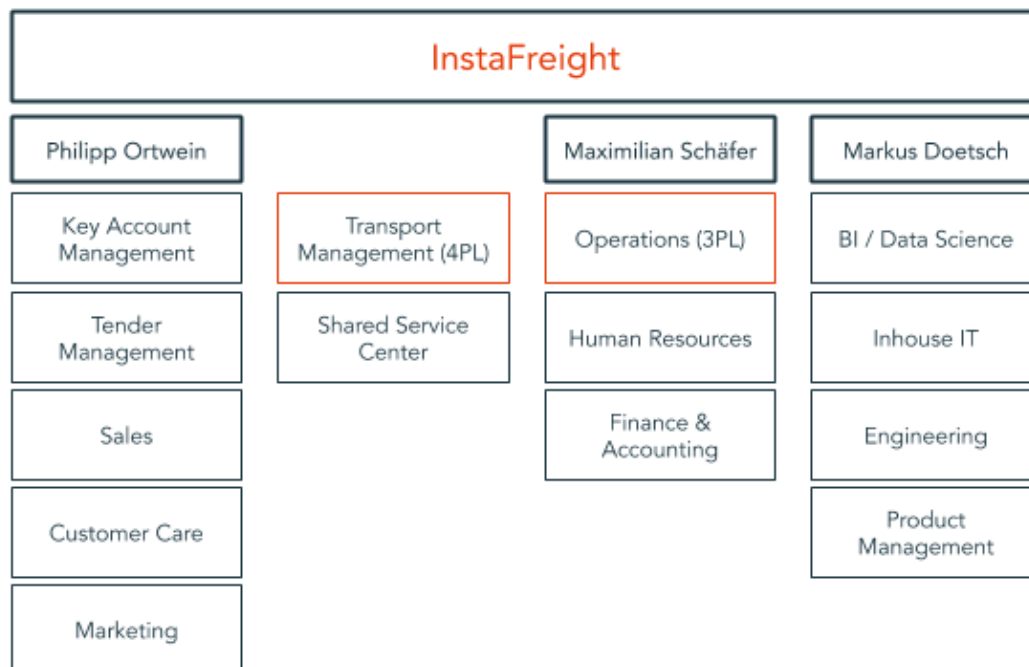
InstaFreight, formerly InstaCargo, was founded on 10th June 2016 by Philipp Ortwein and Gion-Otto Presser-Velder. Since then InstaFreight established three offices. One office is located in Berlin, Germany and operates as InstaFreight GmbH whereas the other two offices, located in Legnica and Wroclaw, operate as InstaFreight Sp.z.o.o.



The whole organization, so both companies InstaFreight GmbH and InstaFreight Sp.z.o.o., will be called “InstaFreight” in the following sections. InstaFreight is managed by Philipp Ortwein and Maximilian Schäfer as CEOs and Markus Doetsch as CTO. InstaFreight was founded as a digital logistics provider in order to create a platform for customers and carriers so that the fragmentation of the logistics industry can be reduced. This fragmentation developed because of several reasons:

1. Many small and medium sized transport companies which lead to a relatively small market share for global players (3% Schenker, 0.5% DHL, 0.2% Kühne + Nagel)
2. Many different portals and apps where transport companies can source transport orders
3. Long payment terms up to 60 days or more which lead to a high amount of capital commitment

Next to the highly fragmented logistics industry, the digitalization of the fulfillment of a transport order is also lacking some development. By eliminating the paper-based documentation and processes in all areas of a value chain, the goal is to achieve a digitalized transport logistics industry (transport logistics 4.0). Around 60% of all transport companies wish to have a digital paperless transport fulfillment in terms of transmitting a transport order, handling of freight papers and documenting the delivery. At this point InstaFreight is stepping in as a digital logistics provider for both, the shipper and the carrier. The shipper has the need to ship FTL, LTL or groupage loads (demand). InstaFreight is then sourcing a suitable carrier. Depending on the current market situation as well as extraordinary situations i.e. peak times, pandemics etc., the market is either tighter or wider (supply). Therefore, InstaFreight's mission is to win customers by offering simple solutions to complex problems, to enable carriers of today to meet customers' needs of tomorrow and to scale through digital innovation. In order to source a suitable carrier for a placed order for a certain freight price, an Operations department is needed. The Operations department at InstaFreight is split along geographical regions and customers. Within regional teams, some procure capacity and others assure the



quality of a to be fulfilled shipment. This part of the Operations department is fulfilling the 3PL business of InstaFreight whereas the Transport Management department is responsible for the 4PL business. Within this business model the Transport Management team is acting as a service

provider who coordinates the logistical processes of a particular company as a customer and its carriers. In both business models, 3PL and 4PL, InstaFreight does not contribute any own assets such as trucks (fleet) for the fulfillment of a shipment.

Problem description

Due to a change in demand for transportation by our customers, the equilibrium between supply and demand has shifted. The shift in demand has taken place because of several reasons, i.e. one being the shift in demand of certain products. This particular shift occurs on a regular basis. Therefore, some of our customers do not receive as many orders from their customers as usual to some customers who receive more orders than they usually do. When this shift is too great and hence the demand for freight transportation increases excessively, the supply of free capacity cannot cover the demand. This leads to pressure in the logistics market, when not all transports can be fulfilled with the given free capacity. This shortage of capacity can be interpreted as market pressure. A good indication for the current market pressure is the Timocom transport barometer. The current Timocom transport barometer can be accessed [HERE](#).



The higher the ratio of freight (demand) to free capacity (supply), the tighter the market and the higher the respective market pressure due to a lack of free capacity in the market. With this regular change in demand and supply, the margin at InstaFreight has decreased from a

double-digit positive range to a single-digit negative range. This change in the margin and the resulting increasing market pressure was not foreseen, which is why we are facing the challenge of identifying such an impending margin collapse due to in example events or changes, both internal and external, on the basis of comparative data. Because of that, we want to understand the data set of to be dispatched shipments and the given margins better in order to reorganize the drop of margins due to given events in the past.

Question

By which scenarios, events or changes in the market can we identify in advance a decrease of margin at a certain point in the future from a data set?

Glossary

Shipment

A shipment can be created by the customer or by an admin user of InstaFreight. A shipment can be created from a CR. A shipment comprised the load description, loading and unloading addresses and times, needed loading equipment and references such as gate references, customer order references etc.

Custom Rate (CR)

A Custom Rate can be requested by the customer, but can only be created by an admin user of InstaFreight. A CR comprises all information of a shipment except for the loading and unloading times. When creating a shipment from a CR, we refer to it as a CR shipment where the loading and unloading times need to be set accordingly to the customer's request.

Loading station

The loading station is the location where the cargo gets picked up from. The term is equally used to pickup station. In an $A \rightarrow B$ lane, A will be the loading station.

Unloading station

The unloading station is the location where the cargo gets dropped off. The term is equally used to dropoff station. In an $A \rightarrow B$ lane, B will be the unloading station.

Process description

The following process description describes the dispatching process of a shipment and integrates the terms of the data set which are also described in further detail under “data description”.

Shipment details

When the customer is entering an order via the InstaFreight booking funnel, a *shipment reference* will automatically be created and the shipment will be in the *shipment state* “new”. A shipment has a state in order to trigger certain automation workflows or to understand certain actions which happen during a certain shipment state. Depending on the shipment state, the shipment will also have a broader defined *shipment stage*. One or more states can be aggregated into one stage as follows:

Stage	States
new	new, initialized
placed	placed, managed, pending, assigned
dispatched	accepted
in_fulfillment	inFulfillment, alert_cs
delivered	delivered, toVerifyDelivery
fulfilled	toBeInvoiced, awaitingPayment, completed
cancelled	cancelByCustomer, cancelByAdmin, cancelled

Depending on the particular customer, a shipment belongs to the 3PL or 4PL *business model*. In both business models, a shipment can either be booked from an existing Custom Rate or can be booked as a single shipment (spot). We then refer to it as either *Custom Rate shipment* or spot shipment. Both types of shipments can have one of the three *fulfillment types* (FTL, LTL, Consolidated cargo). Each shipment also has a *lane domain*, which is showing in which direction the shipment is going. The lane domain is set depending on the *country lane*, so by extension from which country to which other or same country a shipment is going. Furthermore, each shipment has a beginning and an end, resulting in at least two stops up to

five stops, shown in *stops_count*. Lastly, the timestamp of when a shipment is created, is also saved in a shipment as *shipment_created_at*.

Dispatching details

The latest point for dispatching a shipment is one working (!) day before the pickup has been requested by the customer. When a suitable carrier has been found, this particular carrier will be assigned to this shipment internally and needs to accept the shipment. Only then the dispatching process is completed. This is the timestamp of *smh_accepted_first_state_change*. In case this carrier is rejecting the transport offer of this shipment, another carrier needs to be found. After sourcing for another carrier, this carrier also needs to be assigned to the shipment and needs to accept the shipment, which is then the timestamp of *smh_accepted_last_state_change*.

Time windows

When initially booking a shipment, a customer needs to provide a requested time window for the loading as well as for the unloading station. The latest possible arrival time for the carrier at the loading station is shown in the *first_stop_requested_arrival_to* with the date and the time. The date for this is separately shown in the *first_stop_requested_arrival_to_date*. The carrier is also providing his agreed latest estimated time of arrival at the loading station, which is shown in the *first_stop_agreed_arrival_to*. His actual time of arrival at the loading station is shown in the *first_stop_actual_arrival*. The customer cannot request the time for arrival at the loading station because we do not want to enable the customer to book

1. an express delivery by having a too short running time
2. a warehouse on wheels by having a too long running time

between pickup at the loading station (first stop) and unloading at the unloading station (last stop). Because of that, we calculate the requested arrival for the unloading station depending on the distance between the loading and unloading station and some additional buffer time. This is shown in the *last_stop_requested_arrival_to*. The date for this is separately shown in the *last_stop_requested_arrival_to_date*. The agreed arrival time of the carrier at the last stop is shown in *last_stop_agreed_arrival_to*. The actual arrival time of the carrier at the unloading station is shown in the *last_stop_actual_arrival*.

Cancellation of a shipment

Sometimes a shipment also might be cancelled, even after it has successfully been dispatched.

The cancellation can be caused by three parties. The shipment was cancelled because

- the customer has changed his mind or has not fully produced or packed the cargo for the shipment etc. OR
- the carrier has made a mistake in his vehicle routing planning or shift planning of his personal etc. OR
- InstaFreight has not found any suitable carrier in time

In any case, the timestamp of when a shipment will be cancelled (*sh_cancelled*) is saved as well as a reason for cancellation will be mentioned (*cancellation_reason*).

Revenue and costs

When a shipment is being booked, the transport price will automatically be shown to the customer. The customer then needs to confirm his booking with the set transport price. This price is shown under *transport_price_booked*. When a suitable carrier has been found and a price has been agreed on for this transport, this particular price will then be shown under *transport_cost_assigned*. In case the shipment is being cancelled 48 hours before the pickup of the shipment, InstaFreight charges either the customer or the carrier, depending on the accountable party. These late cancellation charges can be zero, one third of the shipment costs or the difference for the new carrier.

Therefore, the *total_revenue* can even be below zero, so that the customer owes InstaFreight money because of the late cancellation. This is especially important when the carrier charges InstaFreight any costs, which is then shown as *total_cost*, so the total amount which needs to be paid to the carrier.

Data description

Table 1: shipment_export			
A	shipment_reference	Each shipment has an individual shipment reference, starting with DESH and followed by a randomly selected letter-number sequence.	DESH13QR1G, DESH18B81M, DESH16PD1G
B	shipment_state	Each shipment has a shipment state depending on the current fulfillment status of the shipment.	new, initialized, placed, managed, pending, assigned, accepted, inFulfillment, alert_cs, delivered, toVerifyDelivery, toBeInvoiced, awaitingPayment, completed, cancelByCustomer, cancelByAdmin, cancelled
C	shipment_stage	Each shipment has a shipment stage depending on the current shipment state.	new, placed, dispatched, in_fulfillment, delivered, fulfilled, cancelled
D	business_model	InstaFreight has two business models on which it is operating, 3PL and 4PL.	3PL, 4PL

E	custom_rate_shipment	A shipment is called custom rate shipment when it has been created from a CR (1, TRUE) or not (0, FALSE).	TRUE, FALSE															
F	fulfilment_strategy	A shipment can have three different types of fulfillment. FullTruck = FTL, bulk = LTL, pallet = consolidated cargo. By extension it is the needed space in a truck.	fullTruck, bulk, pallet															
G	lane_domain	<div>A shipment has a loading and unloading station. Depending on the fact, if these are in Germany or not, we receive the respective lane domain.</div> <table><tr><td>lane domain</td><td>Loading in GER?</td><td>Unloading in GER?</td></tr><tr><td>national</td><td>1 - yes</td><td>1 - yes</td></tr><tr><td>export</td><td>1 - yes</td><td>0 - no</td></tr><tr><td>import</td><td>0 - no</td><td>1 - yes</td></tr><tr><td>international</td><td>0 - no</td><td>0 - no</td></tr></table>	lane domain	Loading in GER?	Unloading in GER?	national	1 - yes	1 - yes	export	1 - yes	0 - no	import	0 - no	1 - yes	international	0 - no	0 - no	national, export, import, international
lane domain	Loading in GER?	Unloading in GER?																
national	1 - yes	1 - yes																
export	1 - yes	0 - no																
import	0 - no	1 - yes																
international	0 - no	0 - no																
H	country_lane	A shipment with its direction of shipment, so country code of the loading station and country code of the unloading station.	AT, BE, CH, CZ, DE, DK, ES, FR, GB, HU, IT, LT, LU, NL, PL, PT, RO, RS, SE, SI, SK															
I	stops_count	The amount of stops of a shipment. In an A-B shipment with only pickup and dropoff and without any further stops, the minimum amount is 2.	2, 3, 4, 5															

J	shipment_created_at	The timestamp of when the shipment has been created.	Timestamp with date and time
K	smh_accepted_first_state_change	The timestamp of when a carrier has accepted the shipment after being assigned to it the first time.	Timestamp with date and time
L	smh_accepted_last_state_change	The timestamp of when a carrier has accepted the shipment after being assigned to it the last time.	Timestamp with date and time
M	first_stop_requested_arrival_to	The timestamp of when a customer requested the latest arrival of the carrier at the loading station.	Timestamp with date and time
N	first_stop_requested_arrival_to_date	The timestamp of when a customer requested the latest arrival of the carrier at the loading station - date only.	Timestamp with date
O	first_stop_agreed_arrival_to	The timestamp of when a carrier agreed to arrive at the latest at the loading station.	Timestamp with date and time
P	first_stop_actual_arrival	The timestamp of when a carrier has actually arrived at the loading station.	Timestamp with date and time
Q	last_stop_requested_arrival_to	The timestamp of when a customer requested the latest arrival of the carrier at the unloading station.	
R	last_stop_requested_arrival_to	The timestamp of when a customer	

	val_to_date	requested the latest arrival of the carrier at the unloading station - date only.	
S	last_stop_agreed_arrival_to	The timestamp of when a carrier agreed to arrive at the latest at the unloading station.	
T	last_stop_actual_arrival	The timestamp of when a carrier has actually arrived at the unloading station.	
U	sh_cancelled	The timestamp of when a shipment might have been cancelled.	Timestamp with date and time
V	cancellation_reason	The reason why a shipment has been cancelled.	Customer_not_ready, other, changed_mind, self_cancelled, fake_order, instafreight_carrier_not_found, booked_something_wrong, instafreight_cant_fulfill
W	transport_price_booked	The transport price, which was shown to the customer in the booking funnel and confirming the booking.	Transport price in Euro, at least 0 to positive.

X	transport_cost_assigned	The transport price, which was agreed on with the carrier and confirmed by accepting the shipment.	Transport price in Euro, at least 0 to positive.
Y	total_revenue	The total transport price, which the customer has to pay to InstaFreight, including costs for waiting time for the carrier, price reductions due to delays etc.	Transport price in Euro, at least 0, also negative value possible, when the customer owes money to InstaFreight.
Z	total_cost	The total transport price, which InstaFreight has to pay the carrier, including costs for waiting time for the carrier, cost surcharges due to delays etc.	Transport price in Euro, at least 0, also negative value possible when InstaFreight owes money to the carrier.

Table 2: margin_by_week			
A	customer_requested_arrival_end_of_window_week	The timestamp of when a customer requested the latest arrival of the carrier at the loading station - calendar week only.	2018-01 ... 2021-01
B	shipment_count_3pl	The amount of all shipments which belong to the 3PL business model.	Value is at least 0 and positive.
C	non_cancelled_shipment_count_3pl	The amount of shipments which belong to the 3PL business model AND have not been cancelled.	Value is at least 0 and positive, but less than the "shipment_count_3pl".
D	forecasted_revenue_3pl	The amount of revenue in Euro being received for all 3PL shipments, including cancelled shipments.	Value is at least 0 and positive.
E	forecasted_margin_3pl	The amount of margin in percent for all dispatched 3PL shipments, including cancelled shipments.	Value is at least 0 and positive.
F	forecasted_revenue_3pl_custom_rate	The amount of revenue in Euro being received for all 3PL shipments, which were created from a custom rate, including cancelled shipments.	Value is at least 0 and positive, but less than the "forecasted_revenue_3pl".
G	forecasted_margin_3pl_custom_rate	The amount of margin in percent for all dispatched 3PL shipments, which were created from a custom rate,	Value is at least 0 and positive.

		including cancelled shipments.	
H	forecasted_revenue_3pl_spot	The amount of revenue in Euro being received for all 3PL shipments, which were not created from a custom rate, including cancelled shipments.	Value is at least 0 and positive, but less than the "forecasted_revenue_3pl".
I	forecasted_margin_3pl_spot	The amount of margin in percent for all dispatched 3PL shipments, which were not created from a custom rate, including cancelled shipments.	Value is at least 0 and positive.
J	forecasted_revenue_3pl_spot_ftl	The amount of revenue in Euro being received for all 3PL FTL shipments, which were not created from a custom rate, including cancelled shipments.	Value is at least 0 and positive, but less than the "forecasted_revenue_3pl_spot".
K	forecasted_margin_3pl_spot_ftl	The amount of margin in percent for all dispatched 3PL FTL shipments, which were not created from a custom rate, including cancelled shipments.	Value is at least 0 and positive.
L	query_run	This is the day of when the data was pulled.	Timestamp with date and time