

Finished goods and trade equipment supply chain optimization

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Abstract This report was written as a proposal for a Bachelor thesis paper. Main objective was to figure out possible cost-effective improvements for «Company A», which were able to reduce logistics costs in long term perspective. This objective was defined by supply director because of continuous reduction of annual sales and necessity to compensate losses in sales by internal costs optimization activities. This study concentrated on finding possible implementation through individual semi-structured interviews with peers, which also served for getting the perceptions of their level of applicability for the organization, estimated savings from implementation and time required for the implementation. Author analyzed current state of distribution scheme, defined areas for improvement, made a calculation to prove their cost-effectiveness and suggested the implementation plan for the organization. As the result, two improvements which might be potentially implemented, were checked for cost-effectiveness by application of excel model and suggested to supply director together with implementation plan.		
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Content

1	Introduction	5
1.1	Background.....	5
1.2	Purpose.....	6
1.3	Research objectives and questions	7
1.4	Research methods.....	7
1.5	Research limitations	9
2	As-is supply chain	9
2.1	Finished goods supply chain.....	9
2.1.1	Freight to warehouse	10
2.1.2	Freight to customer and trade channels split	12
2.2	Trade equipment supply chain.....	14
2.2.1	Freight to warehouse of trade equipment	14
2.2.2	Freight to customer trade equipment.....	15
2.3	Annual logistics costs.....	16
3	Outcomes of as-is analysis	17
3.1	Change in Trade agreements with clients	17
3.2	Change compensation policy for distributors	18
3.3	Separation of FG and TE supply chains	18
3.4	Synergy of finished goods flows with another segment of company	18
3.5	Change in minimum order size for clients.....	19
3.6	Change the loading point to reduce FTW distance	19
4	Determination of potential improvements.....	20
4.1	Survey creation.....	20
4.2	Survey result analysis	21
5	Cost savings from implementations	23

	2
5.1 Change of loading points to reduce FTW distance	23
5.2 Separation of TE and FG supply chains	28
6 Summary of plan of actions for chosen supply chain improvements	31
6.1 Change of loading points to reduce FTW distance	31
6.2 Separation of TE and FG supply chains	32
7 Conclusion.....	32
Referencies	35
Appendices	36

List of figures

Figure 1. FG distribution scheme	14
Figure 2. TE distribution scheme	16
Figure 3. Cost calculation for clients 6 and 7	26
Figure 4. Old route to market	26
Figure 5 New route to market.....	27
Figure 6 TE warehouse and movement data by DCs	29
Figure 7. The real optimization model	33

Abbreviations

«Company A» – Author's employer and main sponsor of research

E2E – End to End supply chain, logistics operation from supplier of ingredients to client.

FG – Finished Goods

TE – Trade equipment advertising materials

CDC – Central Distribution Centre

RDC – Regional Distribution Centre

MCDC – Moscow Central Distribution Centre used for Trade equipment.

SLA – Service level agreement

FTW – Freight to warehouse

FTC – Freight to customer

NDA – Non-disclosure agreement

TT – Traditional trade

NKA – National key account

OOS – Out of stock

1 Introduction

Suggested topic was based on «Company A» need, which was determined by supply director. Supply director concerned that there is potential opportunity to achieve cost saving in current supply chain of finished goods and trade equipment by re-balancing finished goods flows and applying cost-saving initiatives in terms of logistics, supply chain management and warehouse processes, which need to be figured out in terms of this thesis work.

Title: “Finished goods and trade equipment supply chain optimization”

Reasoning of topic selection was toward interest of analysis of transportation networks, especially, in such a big company, which had more than five hundred of ship-to points across Russian Federation and export routes to fourteen countries. This topic was also considered relevant for the company because of possible cost savings in terms of logistics costs, willing of the supply director to have cost-saving improvements applied across whole supply chain.

Preparation for this thesis work were made according to White, in his book, he explained in the straightforward way how to organize thesis work and which things are important to consider. Also, this book was helpful for mapping the thesis and create plan of actions. (White, 2011)

1.1 Background

«Company A» launched their operations in Russian federation in 1991 from building the factory in Saint-Petersburg. Within several years, it become leader in Confectionary and Gum categories in local market. As the market share was growing rapidly – same was happening to company, from 300 official employees in 1993 to 3700 official employees in 2015. Significant growth of the company was explained by growth of the client base what led to expansion of distribution network and bigger profit from sales as well.

Author only determined the main product categories produced in company plant and numbers of subgroups in each category. The following table 1 presents the product categories and their subgroups.

Table 1. Company A's product categories and their subproducts.

Category	Subgroups
Sugar free product	Include 3 subgroups with (in total) 18 different flavors 6 package types
Sugar product	Include 2 categories with (in total) 13 different flavors in 4 package types
Confectionary	Include 2 categories with (in total) 6 different flavors in 3 package types

Factory operated 24/7 in order to fill client's demand in these products.

With a crisis of 2014 in Russian Federations, consumers became less interesting in purchases confectionaries and chewing gums, and it became clear for board of directors that there is a necessity to launch wide variety of optimization activities to reduce cost of goods sold to keep on operating on same margin level without increase of the price of products being sold.

These activities have started from supply departments, which responsible for production, quality control, master plan of factory and by the beginning of 2017 it officially touched the physical processes of distribution of goods and trade equipment.

1.2 Purpose

This thesis work studies the ways:

- To figure out cost-saving practices and ways for optimization in distribution scheme
- To make estimations of financial effects by creating cost calculation model
- To create implementation plan

1.3 Research objectives and questions

Research objectives were set to measure either the research completed the initial goal and to understand what needs to be done during the research to answer the main question.

Main research question “How is and should current distribution scheme being optimized to reduce operational logistics costs”

However, optimization of distribution scheme had a brought meaning that is why four partial questions were formulated:

- What is the current state of company’s supply chain?
- What kind of data and information needed to conduct the proper analysis?
- Is there going to be cost saving from any possible improvements?
- How to implement improvements in organization?

The research objectives pursued to answer the research questions:

- Conduct interviews with peers, which will help to see clear picture of current supply chain state and areas for improvement.
- Determine the potential improvements which can be applicable for the organization
- Calculations of financial impact from chosen improvements

1.4 Research methods

In this thesis work, which represented by case given by «Company A», as-is state of the Company A is analyzed and several improvements will be suggested for further implementations. Because of short period of working in the organization, there was an assumption that a lot of aspects and areas for improvements might be hidden. To understand better the problems of organization and illogical spends of funds, additional study needs to be conducted in the company.

Research is about gaining additional information and knowledge, which can help to achieve the goal of the whole study.

Quantitative approach was used to get more information about as-is state of supply chain, and to figure out what kind of bottlenecks were seen from other employees' perspective. Main purpose of quantitative research was to answer specific questions and show the real picture of what was happening in the company. Other pros of collecting data in this way – Author could get insights from peers' work, responsibilities and experiences of interaction with certain logistics processes or other departments. That is why this method has been decided to use in this research.

Most of the information represented in this thesis work was collected by interviews with peers, which were written down on the paper during the meeting.

Main goals of interviews were to collect peers' ideas about possible improvements of supply chain and to get the better knowledge of current distribution scheme.

Interviews were made in semi-structured format, according to Russel, that was the most suitable format for peers involved to that process to express their views openly and prepare the answers ahead of time. (Russel, 1988)

Second part of the research was taking place in survey format and for wider auditory, since people from other departments might be thinking about details which are hidden from logistics department's routine work. Survey was prepared according to methodology provided by Susan Farrell. (Farrell, 2016) Author kept survey short, informative, with wide variety of closed-end answers represented by numeric values.

Survey aimed to figure out peers' opinion about:

- Improvement's relevance for business
- Possible financial effect on logistics costs
- Required time for implementation
- Hidden bottlenecks

1.5 Research limitations

One of the limitations of this thesis work - interviews and participation to survey were taking an effort and what is more important –peers' time. That might affected the quality and quantity of collected information.

Another limitation was data limitation (Hindle, 2015). It was to be known that quite many of transportation to clients are not properly indicated in ERP system used in the company. This fact might affected the outcomes of cost calculation model and can give certain bias from actual funds spend in new scheme.

Limitation, which had certain value in thesis work, was NDA agreement, which was made between Author and employer. Because of that, it was not possible to provide exact number in this paper, but numbers were proportionally changed so economy, or higher spends will be still visible.

2 As-is supply chain

In this chapter, as-is state of outbound supply chain is presented. This stage is vital because it will be impossible to suggest any improvement when current state of supply chain is not clear.

Since this thesis work aimed for supply chain improvements, this chapter describes only logistics, warehouse and distribution aspects and some other minor topics which worth to mention in thesis work.

2.1 Finished goods supply chain

FG term unites all the goods which are sold to company's clients, logistics of these goods is essential for company to keep on getting profit and keep performing according to service level agreement with clients, which are common and equal to 98% of case fill rate.

2.1.1 Freight to warehouse

After the product made in the plant located on the south of Saint Petersburg, it is only stored in plant's warehouse for several hours because of the limited capacity. It can only fit up to 40 pallets, what creates a need to shuttle these pellets to external Central Distribution Centre by standard truck, which can fit 33 pallets.

Worth to mention here that current distribution scheme similar to one which is described in Skjott-Larsen's book. In this book, different approaches of distribution are discussed and explained. Today also traditional distribution channel involves inventories at local distribution centres, supported by inventory held in the central distribution centre. This kind of multi-tiering channel ensure product availability for final customer. Also we can see that local distribution centres are more cross-docking terminals. (Skjott-Larsen, 2007)

Central Distribution Centre is outsourced warehouse located 20 kilometres away from the plant, and it is not only the centre for further regional distribution, but also warehouse of ingredients and package materials for production and export outbound warehouse. Since ingredients and package materials stored there – warehouse has to provide frequent shuttling to factory and in the same time pick up finished goods from factory's warehouse. It happens by the request of factory's warehouse manager and usually there are 10 shuttling operations per day.

Distributors add value to a supply chain between a supply stage and a customer stage if there are many small players at the customer stage, each requiring a small amount of the product at a time. The value added increases if distributors carry products from many manufacturers. Improvement in supply chain performance occurs for the following reasons (Chopra, 2001):

- Reduction in inbound transportation cost because of TL shipments from manufacturers to distributor.
- Reduction in outbound transportation cost because the distributor combines products from many manufacturers into a single outbound shipment.
- Reduction in inventory costs because distributor aggregates safety inventory rather than disaggregating at each retailer.

- A more stable order stream from distributor to manufacturer (compared to erratic orders from each retailer) allows manufacturers to lower cost by planning production more effectively.
- By carrying inventory closer to the point of sale, distributors are able to provide a better response time than manufacturers can.
- Distributors are able to offer one-stop shopping with products from several manufacturers.

It has been already mentioned that from Central Distribution Centre (CDC) Finished goods (FG) being send to other countries and being stored for further distribution to regions. However, there is one thing, which was not mentioned – this warehouse is also a pick-up point for clients (ship from). For these purposes, warehouse virtually divided by three areas and one of the product assigned for certain area, and cannot be moved or used as a product from other zone without logistics specialist approval.

Next step in logistics chain is to send finished goods to 7 Regional Distribution Centres (RDC). Table 2 describes the types of transport being used and their capacities.

Table 2. Types of transport used by Company A

Type	Small tonnage transport	Medium tonnage transport	Large tonnage transport	Truck
Capacity in tones	1,5	5	10	20
Capacity in pallet places	3	6	11	33

Goods never send to RDCs in equal batches, but depending on demand forecast (discussed within S&OP+ cycles) which is usually within the bias of 10%. RDCs located in different parts of Russian Federation, in order to reduce lead time to customers. This approach is also discussed in Skjott-Larsen's book, when demand on each of distribution centres is decentralised. Decisions about the distribution centre network including how many distribution centres and their location, are complex because of

many factors has to be considered. (Skjott-Larsen, 2007). Also this can be seen in this study.

Transportation between CDC and RDCs usually done by two options:

- Transportation by truck, which fits 33 pallets of finished goods – this option, is valid for RDC located not far than 2000 km away from factory.
- Transportation by railroad inside of the container, which fits 28 pallets – this option, is valid for RDC located further than 2000 km away from factory. One of the main points there – inferior quality of roads in eastern part of Russian Federation and 3PL companies, which provides transportation through that part usually set incredible high rates.

Although, several restrictions present in this option:

- Necessity to put additional layer of isothermal material to keep temperature within acceptable range,
- Due to inferior quality of railroad network in Russia, company is only able to send goods two days per week.

2.1.2 Freight to customer and trade channels split

Upon arrival to RDCs, product being stored there until order fully paid by client.

Because of terms of trade agreements, which were made with clients – «Company A» needs to provide transportation of purchased goods to client's warehouse or make a compensation for transportation. Then, there are again two options for transportation:

- By 3PL companies which provide transportation services. This option applicable only to National Key Accounts (NKA) because of specification in trade agreement. Logistics specialist orders the transport, checks if order have been paid, and then sends information to RDCs coordinator, saying that this specific order can be loaded to transport and shipped. Worth to mention, that company has only agreed delivery until NKA's central distribution centre with half of the clients, for the rest – deliveries to every local selling point, avoiding NKA's CDC.

- Self-pickup by client. This option is only valid for distributors, which should arrange transport on their own. Procedure of loading the transport is the same as with NKAs. But then, there is interesting thing about compensation, company compensates not the rates of the specific transport which was used by distributor, but compensates the part of the rate which depends on number of pallets which were bought by distributor and by this value type of transport is also classified.

Example: client buys 3 pallets of finished goods, but before coming to RDC he has another 5 companies to pick up goods from, client uses the truck, but he will receive the compensation for 3 pallets (full rate) for transportation by small tonnage transport which can be already 50% of Truck rate. It means that client gets benefits for this kind of manipulations.

Due to research of 2016 shipments from company's warehouse, current transport utilization is only 65% what considered extremely low. 35% of company's payments to transportation providers goes for transportation of empty pallet places in FTC part. Figure 1 presents food goods scheme.

When TE needs to be shipped to certain RDC, company uses the same types of transport as FG, but on this stage, these flows are still separated from each other because replenishment of RDC is made in the way so FG and TE will have full truck load and there is no sense to mix them.

2.2.2 Freight to customer trade equipment

In previous sub-chapter, it was explained that trade equipment and finished goods stored in the same warehouses. Key Account Managers (NKA channel) and Distribution Development (Distribution channel) are responsible for installation of trade equipment on time in client's selling points. When some of TE need to be installed, they send the information to client, which is saying that next order from client will be shipped together with certain amount of TE pallets and in the same time, send request to logistics specialist to provide shipment with certain TE.

TE transported together with finished goods in the same transport, and it makes it a challenge. Many times, client from distribution channel makes an order, which is equal to capacity of transport. In this situation, client will not hire the bigger transport or exclude one of the pallets of FG from his order and TE will stay in RDC until the next shipment, what can influence company's presence in client's selling point. Figure 2 presents the distribution channel of trade equipment product.

Table 4. Annual trade equipment logistics costs by categories

Annual logistics costs TE	290 million Rubbles
Factory to DC	100 million Rubbles
Warehouse and inventory cost	50 million Rubbles
DC to distributors	80 million Rubbles
DC to NKA	60 million Rubbles

3 Outcomes of as-is analysis

This chapter represents possible improvements for organization.

Their implementation can lead to achievement of main objective of the thesis work and can bring several positive side effects.

Part of the listed below improvement were collected from short interviews organised with peers, Author has send invitation, which shortly described the main objective of this study. Main information, which was covered in the invitation to meeting:

Focus of inquiry was in Finished goods and trade equipment supply chain optimization.

Expectation interview – get the perception of what kind of improvements peers have on their mind, which can help to achieve thesis' goals. Timeframe – suggestion to try to fit in 30 minutes' limit.

The current knowledge about the topic is considered somewhat better, because of variety of work responsibilities in supply chain and 7 months' experience of work in «Company A»'s logistics department.

3.1 Change in Trade agreements with clients

First potential improvement – changes in Trade agreements with clients, which require delivery to their selling points, not to their central warehouse. This action

will allow company to increase transport utilization and amount of shipment without loss in sales.

3.2 Change compensation policy for distributors

Problem which was previously determined, based on possibility of client to get benefits from buying small batches of product and get too big compensation for transportation, if actual transport used in this transportation – truck. The idea concerning that issue – change trade agreement in way, that compensation will be calculated based on actual transport used by client, which will be checked by RDC employee and later confirmed in ERP system, it will allow Distribution Development department make compensations according to actual information. It will allow to make compensation for actual type of transport loaded.

3.3 Separation of FG and TE supply chains

This step might solve several existing problems in supply chain:

- Low priority in accounting of TE by client and company's RDCs, many times acceptance was not done right by these two parties due to low priority of TE.
- TE was not picked up by distributor due to willing to load maximum amount of FG which not allowing to take TE, this fact influences presence in selling points and company misses potential sells.
- TE do not have any specific requirements as FG, but in current historically evolved scheme it stored together in A class DCs which can comply with storage requirements. That fact, affects the overall storage cost, since it can be stored in cheaper place.

While looking for opportunities to divide these two flows, it has been noticed many options, but there was only one, which fits company needs – creating of separate network of RDCs to serve only for TE distribution needs.

3.4 Synergy of finished goods flows with another segment of company

Another idea is to merge FTC flows of FG with another segment of company. There is logical explanation for this, another segment «Company B» has very similar infrastructure, meaning CDC/RDC system, but there is main difference, transport utilization rates are close to 90%, cheaper rates because of bigger volumes produced

and transported, prior type of transport used - truck. If it would become possible to merge our transportation flows, «Company A», would benefit from usage of Company B rates since these two companies have about 50% of common ship to points.

3.5 Change in minimum order size for clients

There is potential opportunity to change «Company A» minimum order size policy, which is currently not mention in Trade agreements, and it allows clients order less than pallet of FG. By peer's words, «Company A» can benefit from this change and can increase transport utilization rates, but influence on company's stock is unknown, first thing which needs to be checked – what would be the growth of our stocks of FG in RDC and on client's side.

3.6 Change the loading point to reduce FTW distance

The main outcome of one of the interviews was a suggestion for rebalancing current FG distribution network in way that FTW distance will be decreased, that might increase FTC distance, but overall result, according to interviewer words, should be positive in terms of costs. This is not acceptable for every client, but there are several of them, located just in between of two RDCs, and, for some reason, loading point for them is RDC with longer FTW distance. This innovation will require the smallest effort in terms of approaching the changes in distribution, as peer stated during the interview.

This method of decreasing overall distance to market was described in a learning book of Anikina (Anikina, 2013) which states that if in supply chain several distribution centers are represented, there should be a way to decrease costs of logistics by finding the optimal route to client through one of these distribution centers.

4 Determination of potential improvements

To determine the most applicable improvements for «Company A», Author decided to conduct internal survey and ask peers to evaluate improvements on certain criteria's:

- Relevance for business
- Financial effect
- Time needed for implementation
- Bottlenecks in implementation

Whole Logistics department and line managers from other departments, 30 people in total have received invitation to participate to survey.

4.1 Survey creation

Survey took place in online format, since the outcome do not require personal meeting and it will make it only easier to ask questions in survey. The survey, which was send to participants, can be found in the appendix. Making survey short was an intention, because it was clear from previous experiences that peers do not like to answer long surveys, which are not related to their work responsibilities. It can be also proved by the fact, that every fourth respondent, who participated to survey, filled question 4.

In order to interpret survey results right, it was referenced to Peters' article, which describes systematic process of survey creation (Peters, n.d.)

Survey has been represented in understandable format, where it was easily seen what is the size intervals and percentages of responses.

Survey participants had chance to choose one out of 5 options which were stating values with shortest applicable interval for evaluation.

4.2 Survey result analysis

Author has received 16 responses from peers anonymously, received data and responses also mentioned in the appendix.

Based on the results of survey, it has been decided to continue with two most favorable improvements, since they received most of the votes in question four and considered as most applicable for the organization in question one:

- Separation of TE and FG supply chains
- Change the loading point to reduce FTW distance

For the rest of the improvements new information has been received about possible bottlenecks, which might cause problems together with potential cost saving. Below each of the improvements which were not chosen for further development represented together with major bottlenecks.

Change in Trade agreements with clients, it was previously stated that that there is an opportunity to deliver FG to clients' central distribution center, but it became clear that supply chain would not become cheaper. According to Sales department, negotiate this improvement is not a problem and there is high chance that clients will agree, but then there is going to be a need for compensation of trade expenditure. In other words, «Company A» will start to pay to the clients for distribution of FG to clients' selling points. Of course, operation will become easier, and there is going to be higher utilization rate of transport, but then batches, which needs to be shipped, will become extremely big there is going to be a need to store them on Moscow RDC, which is currently the most expensive RDC. It will also cause stock increase on this RDC.

Change compensation policy for distributors – as it was stated previously, distributors can get higher compensations if they organize multistop transportation, use truck, and pick up goods from other manufacturers. Unfortunately, there is no way to deal with this problem, because distribution development department strictly against this initiation because of threat to lose sales in trade channel which brings most of the volumes to the market.

Synergy of finished goods flows with another segment of company – that option, of course, sounds like a good opportunity to improve supply chain on global level, but after small research, it was figured out that there are too many constraints, such as:

- Different ERP systems, transportation and storage standards
- Co-storage of FG of both segments requires big investments, because of flavour migration standard; goods need to be stored in separate blocks of warehouse with additional wall and air conditioning system.
- Overall number of common clients is only about 30%.

Change in minimum order size for clients - since compensation policy was introduced on global level, and according to Global leadership team, there should be no restrictions on order size because of company's strategy to improve customer centricity.

Based on the question two outcomes, it has been made a conclusion that if chosen options were implemented 2 % of potential annual saving can be achieved as a result. Answers for third question helped to estimate the required time for implementing improvements, and create better estimation of road map.

Question 4 was most of the time stating only the favorable improvement, but not the possible bottlenecks:

- It has not been received any bottleneck suggestions for "Change the loading point to reduce FTW distance" besides recommendation to inform Distribution Development team in advance about the changes because they need to negotiate new contract terms properly.

According to Chopra the cost of coordinating operations is generally hard to quantify. Companies should evaluate different transportation options and their cost as well as revenues. A good decision could be made when considering trade-offs between transportation and inventory costs. Also transportation cost and customer responsiveness should be considered, (Chopra, 2001).

5 Cost savings from implementations

This chapter describes in details one the most essential steps in thesis work.

Checking financial impact is critical, since decision about possible implementation will be based exactly on this data.

5.1 Change of loading points to reduce FTW distance

Before starting to work on plan of action preparation, financial effect was calculated in order to check if peers' estimations were right. A method was developed, which supposed to be applicable to both chosen innovations. Financial impact was calculated based on previous annual volumes, but new rates, which were requested by commercial department, were used in the calculations. These rates were mandatory, because optimal loading point for client meant new transportation route, which were not used previously.

In order to calculate the savings, all the data about sold FG to clients has been collected. The collected data was picking up (TT) or delivered (NKA) FG from questionable RDC. By questionable, RDC means that there were some clients, which were located in between of two RDCs, and for some reason, these clients use RDCs which considered to be with longer and more expensive FTW distance for «Company A». Then a model was developed in Excel. This model compares rates multiplied by annual volumes for FTW distance for new and old RDCs, table 5.

Table 5. FTW comparison

Client	Type	Ship to	Previous RDC	New RDC	Volumes 2016 (pallets)	Number of deliveries	previous CDC to RDC	new RDC to CDC	Delta CDC-RDC
1	TT	Elabuga	Samara 57	Moscow 70	515	18	1106469,697	369395,4545	-737074,2424
2	TT	Saratov	Samara 57	Moscow 70	177	34	380281,8182	126957,2727	-253324,5455
3	NKA	Saratov	Samara 57	Moscow 70	31	33	66603,0303	22235,45455	-44367,57576
4	NKA	Saratov	Samara 57	Moscow 70	21	13	45118,18182	15062,72727	-30055,45455
5	NKA	Saratov	Samara 57	Moscow 70	58	24	124612,1212	41601,81818	-83010,30303
6	TT	Kazan	Samara 57	Moscow 70	266	29	571496,9697	190794,5455	-380702,4242
7	TT	Kazan	Samara 57	Moscow 70	260	28	558606,0606	186490,9091	-372115,1515
8	NKA	Kazan	Samara 57	Moscow 70	128	33	275006,0606	91810,90909	-183195,1515
9	TT	GLAZOV	Samara 57	Moscow 70	239	9	513487,8788	171428,1818	-342059,697
10	TT	Omsk	Novosibirsk 59	Ekaterinburg 58	280	35	761425	592666,6667	-168758,3333
11	NKA	Omsk	Novosibirsk 59	Ekaterinburg 58	39	13	106055,625	82550	-23505,625
12	NKA	Omsk	Novosibirsk 59	Ekaterinburg 58	31	64	84300,625	65616,66667	-18683,95833
13	NKA	Omsk	Novosibirsk 59	Ekaterinburg 58	67	21	182198,125	141816,6667	-40381,45833
14	NKA	Omsk	Novosibirsk 59	Ekaterinburg 58	52	21	141407,5	110066,6667	-31340,83333
15	TT	Krasnoyarsk	Irkutsk 60	Novosibirsk 59	253	34	730537,5	688001,875	-42535,625

Table 6 compares time to market for goods sold based on historic data for old and new RDCs.

Table 6. Time to market comparison

Days In transit OLD CDC-RDC	Days In transit NEW CDC-RDC	Delta days in transit CDC-RDC	RDC-Client transit Old	RDC-Client transit New	Delta transit time for client
5	3	-2	5,5	14	8,5
5	3	-2	6	11	5
5	3	-2	6	11	5
5	3	-2	6	11	5
5	3	-2	6	11	5
5	3	-2	5	12	7
5	3	-2	5	12	7
5	3	-2	5	12	7
5	3	-2	10	16	6
18	11	-7	8,5	12	3,5
18	11	-7	8,5	12	3,5
18	11	-7	8,5	12	3,5
18	11	-7	8,5	12	3,5
18	11	-7	8,5	12	3,5
23	18	-5	13,5	10,5	-3

Table 7 compares warehousing costs based on current rates and annual volumes of both RDCs.

Table 7. Warehouse costs comparison

Client	old WH cost	new WH cost	Delta WH
1	372860	148062,5	-224797,5
2	128148	50887,5	-77260,5
3	22444	8912,5	-13531,5
4	15204	6037,5	-9166,5
5	41992	16675	-25317
6	192584	76475	-116109
7	188240	74750	-113490
8	92672	36800	-55872
9	173036	68712,5	-104323,5
10	191777,6	117866	-73911,6
11	26711,88	16417,05	-10294,83
12	21232,52	13049,45	-8183,07
13	45889,64	28203,65	-17685,99
14	35615,84	21889,4	-13726,44
15	196834	173284,76	-23549,24

And then table 8 compares the cost of last mile for «Company A» based on current transportation rates and annual volumes.

Table 8. FTC comparison

Client	Previous FTC	New FTC	Delta FTC
1	380836	864787,88	483951,88
2	626057	1055539,39	429482,39
3	415597,1887	924000,00	508402,81
4	163720,1047	364000,00	200279,90
5	302252,50	672000,00	369747,50
6	620695	721842,42	101147,42
7	327566	792878,79	465312,79
8	362353,6371	865000	502646,36
9	284800	329800,00	45000,00
10	926033	1125909,091	199876,09
11	267586,028	480000	212413,97
12	1029494,08	2240000	1210505,92
13	373117,4717	760000	386882,53
14	337802,745	735000	397197,26
15	1379507	1230790,909	-148716,09

And finally summarises all the changes and gives the recommendation either full E2E logistics for this client will become cheaper or not, table 9.

Table 9. Cost comparison

Client	total delta
1	-477919,86
2	98897,35
3	450503,74
4	161057,94
5	261420,20
6	-395664,00
7	-20292,36
8	263579,21
9	-401383,20
10	-42793,84
11	178613,52
12	1183638,89
13	328815,08
14	352129,98
15	-214800,96

Initial calculations were made for 15 clients, but calculation showed that it would be profitable for «Company A» to apply changes only for 6 of them. All of them happen to be from TT channel, it can be explained by the trade terms, in most of cases, since

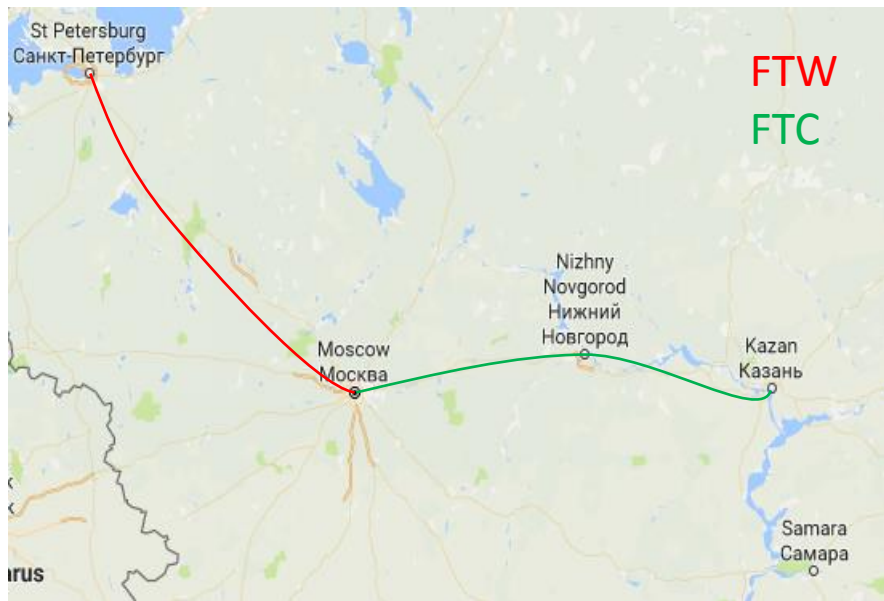


Figure 5 New route to market

Summarized effect from changing loading point for these 6 distributors equal to 1,5 Million rubbles of annual savings on transportation. All these savings will be determined in the upcoming year during post analysis. It will be seen from the same total distribution cost table, table 10.

Table 10. FG distribution cost change

	Old	New
Annual logistics costs FG	750 million Rubbles	748,5 million Rubbles
Factory to DC	280 million Rubbles	278 million Rubbles
Warehouse and inventory cost	120 million Rubbles	119,4 million Rubbles
DC to distributors	150 million Rubbles	151 million Rubbles
DC to NKA	200 million Rubbles	200 million Rubbles

5.2 Separation of TE and FG supply chains

Creation of separate distribution network is not a straightforward process, especially when you need to cover big area for distribution.

During the research about this topic, it has to be known that warehousing of TE in another segment of the «Company A» was outsourced to 3PL provider, which has 10 years of experience in this field and has warehouses in the same cities as current one, with settled processes across Russia especially made for trade equipment storage.

Since the location will not be changed, transportation costs will stay the same. If compare these rates for all seven warehouses and multiply them by volumes of trade equipment stored during 2016 we will get the annual benefit. In this exercise, MCDC stays the same, it can be explained by the fact that this distribution centre is already separated from FG and will not be affected.

This difference in rates can be explained by the fact that, according to research, FG need to be stored in minimum A class warehouses, but there are no restrictions for TE and since 3PL provider concentrates only on storage of trade equipment, company sub-rent B class warehouses in most of the cities. (Sarkisov, 2006). This approach of choosing right class of warehouse for needs of your business discussed in the book of Sarkisov "Supply chain management".

In order to conduct calculations, information about several aspects of TE logistics have been collected as follows:

- Goods in from historic data
- Average monthly storage places paid from historic data
- Goods out from historic data
- Warehousing rates for old and new RDCs

Figure 7 presents average monthly storage places paid and average monthly trade equipment moved.

	Average monthly storage places payed (pallets)	
Moscow	53077	
Saint Petersburg	4615	
Samara	5923	
Rostov	6923	
Ekaterinburg	13846	
Novosibirsk	6154	
Irkutsk	4615	
Vladivostok	5385	
	Average monthly TE movement (pallets)	
Moscow	654	in
Moscow	671	out
Saint Petersburg	60	in
Saint Petersburg	77	out
Samara	53	in
Samara	58	out
Rostov	49	in
Rostov	76	out
Ekaterinburg	200	in
Ekaterinburg	177	out
Novosibirsk	62	in
Novosibirsk	55	out
Irkutsk	45	in
Irkutsk	49	out
Vladivostok	47	in
Vladivostok	39	out

Figure 6 TE warehouse and movement data by DCs

Information about the current warehousing rates and rates of new RDCs are as follows, table 11:

Table 11. Warehousing rates comparison

	Unloading Rub/pallet	Storage Rub/day	Loading Rub/pallet
MCDC	111,69	14,82	111,69
Saint Petersburg (old)	82	12,3	82
Saint Petersburg (new)	70	11,5	70
Samara (old)	82	16,14	82
Samara (new)	69	13,6	69
Rostov (old)	73,58	10,29	73,58
Rostov (new)	70,3	10	70,3
Ekaterinburg (old)	62	11,6	62
Ekaterinburg (new)	58,6	10,25	58,6
Novosibirsk (old)	107,2	16,14	107,2
Novosibirsk (new)	89	13,2	89
Irkutsk (old)	98,3	15,7	98,3
Irkutsk (new)	87,2	12,9	87,2
Vladivostok (old)	88	16,5	88
Vladivostok (new)	83,3	13	83,3

Last step of this exercise was to compare annual costs of warehousing of trade equipment in new and old network. Table 12 presents the results of the comparison.

Table 12 Single transportation flow versus separate

	Previous annual storage costs	New annual storage costs
Moscow	11214555,51	11214555,51
Saint Petersburg	815508,9231	751550,7692
Samara	1256178,462	1058363,077
Rostov	964688,1785	935700,0923
Ekaterinburg	2207815,385	1968129,231
Novosibirsk	1343276,308	1100464,615
Irkutsk	980965,2923	813306,0923
Vladivostok	1157294,769	926273,1692
Sum	19940282,82	18768342,55
Economy	1171940,271	

Calculation shows that annual savings of the company will be equal to 1,2 Million rubbles with usage of separated network of TE.

These changes can be represented in overall distribution cost table meant for TE as follows, table 13:

Table 13 Trade equipment distribution cost change

	Old	New
Annual logistics costs TE	290 million Rubbles	288,8 million Rubbles
Factory to DC	100 million Rubbles	100 million Rubbles
Warehouse and inventory cost	50 million Rubbles	48,8 million Rubbles
DC to distributors	80 million Rubbles	80 million Rubbles
DC to NKA	60 million Rubbles	60 million Rubbles

6 Summary of plan of actions for chosen supply chain improvements

In this chapter author describes in details what assumptions he took in consideration in order to create realistic plan of action to implement chosen improvements.

Top-level implementation plan can be seen in appendix 9.3. It has been assumed that it would take 1 month to collect all the needed permission for change implementation. Based on that assumption, implementation will start in June 2017.

6.1 Change of loading points to reduce FTW distance

In order to create implementation plan for this change, help from company's personnel has been receiving. It happens to be that changes with 6 distributors are easy to implement, and approximation received in survey were close to reality.

The most important thing, which needs to be done – change in trade agreement with clients, according to current contracts, it can be made with two months' notification in prior. According to Distribution development department's specialist words (who took part in survey and liked the idea) it will not be difficult, and there is small chance that client will deny new conditions and disclose the contract as the answer to this purpose.

Second thing, which needs to be done - changes in SAP, Enterprises Resource Planning software that currently used in «Company A». It needs to be done one month in prior to allow system to generate bigger stock on new loading point (RDC) and to reduce stock on previous RDC for this client. This is also crucial step to reduce probability of OOS situation, which can affect service level.

6.2 Separation of TE and FG supply chains

In this case, estimations were not close to reality, it can be explained by the fact, that many bottlenecks are hidden from vision and therefore too optimistic deadlines for each of the sub activities were taken, but there is no chance to check it before implementation.

Plan of action has been made only regards distributor trade channel, because there will be no significant change for NKA, since there is a major difference in delivery of FG and TE for this channel. FG delivered to NKA's regional distribution centre but TE delivered to selling points. Based on that, utilization rates and terms of delivery will stay the same.

Again, there are several things, which need to be done:

- Internal agreement with sales and distribution development department about new scheme.
- Inform distributors about new loading point of trade equipment, or negotiate the contracts in a way that TE transportation will be arranged by «Company A» might take up to two months
- In the same time, current RDCs need to be informed about upcoming change to negotiate reservation of loading gates for transportation of current stocks.

7 Conclusion

Main purpose of this thesis work was to describe the way to figure out cost-saving practices and ways for optimization in distribution scheme, estimations of financial effects by creating cost calculation model and improvements implementation in organization. Main research question was “How is and should current distribution scheme being optimized to reduce operational logistics costs”.

The study appoints the necessity of periodic researches regards E2E supply chain and ideas collection, since in this exact case, many decisions were made as exceptions and then grew into the systematic approach. Periodic revision allows seeing the overall picture and determining bottlenecks parts of supply chain. This is exactly what was made in this study.

During this research, several problems were determined with a help of peers, which had overall understanding of supply chain had chance to discuss current problems freely.

As a result, it has been analysed two potential cost saving improvements of supply chain which happen to be efficient and if board of directors decide to implement these ideas, this decision can make processes in supply chain more cost effective. However, it is only a short cost calculation and more detailed and accurate result can be achieved by optimization model, for instance the model below, figure 7:

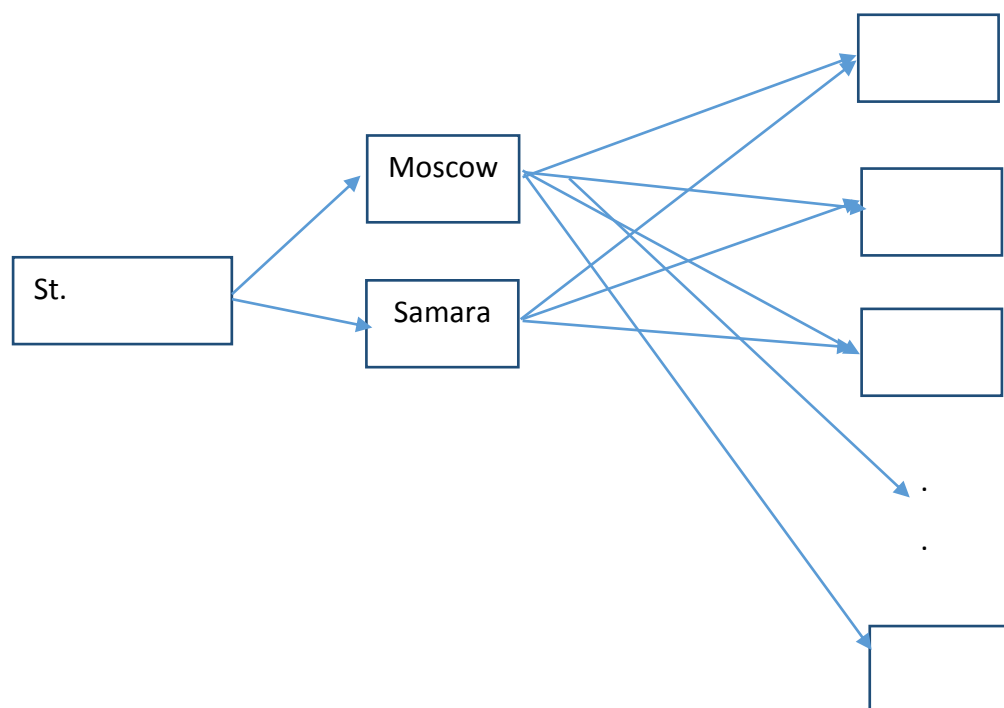


Figure 7. The real optimization model

The real model is a transshipment model and in this system Moscow's and Samara's distribution centres work as transshipment nodes. This model was not however used, because all data couldn't be found. That's why the results give only the

direction towards where the company should concentrate, when developing the distribution system.

After determining the impact, the implementation plan has been developed, which was prepared in accordance with business specifications and recommendations given by peers from other departments involved in supply chain activities.

Main outcome from this work was understanding that potential improvements described in this paper can be applicable for any business, which produces goods, and can help to reach reduction of logistics costs. Methodology of finding bottlenecks and improvements can be applicable for other departments and organizations as well.

Referencics

Anikina, B.A. 2013. *Logistics. Theory and practice.* Moskva : Prospekt Moskva., 2013.

Chopra, S. Meindl P. 2001. *Supply Chain Management: Strategy, Planning and Operation.* 3. ed. New York : Prentice Hall, 2001. p. 536. ISBN 0-13-173042-8.

Farrell, Susan. 2016. 28 Tips for Creating Great Qualitative Surveys. *www.nngroup.com.* [Online] 2016. [Cited: 2. 2., 2017.] <https://www.nngroup.com/articles/qualitative-surveys/>.

Hindle, Amanda. 2015. How to Write About Your Study Limitations Without Limiting Your Impact. *Edanz.* [Online] 01 23, 2015. [Cited: 2. 2., 2017.] <https://www.edanzediting.com/blogs/how-write-about-your-study-limitations-without-limiting-your-impact>.

Peters, Christofer. n.d.. How to Design and Analyze a Survey. *www.zapier.com.* [Online] n.d. [Cited: 3. 30., 2017.] <https://zapier.com/learn/forms-surveys/design-analyze-survey/#interpret>.

Russel, Bernard H. 1988. *Research methods in cultural anthropology.* 1988.

Sarkisov. 2006. *Supply Chain Management.* s.l. : Delo, 2006.

Skjott-Larsen, Tage, Philip B. Schary, Juliana H. Mikkola, and Herbert Kotzab. 2007. *Managing the Global Supply Chain.* Copenhagen : Copenhagen Business School Press,, 2007.

White, Barry. 2011. *Mapping your thesis.* s.l. : Aust Council for Ed Research, 2011.

Appendices

Appendix 1. Interview questions

What are the strong and weak sides of as-is supply chain, in your opinion?

Do you have any ideas how we can improve weak sides of supply chain?

What might be the changes in supply chain, which can bring cost saving in a long term?

Is there any way to improve positive things, represented in as-is supply chain, to get more economy for organisation?

Are you aware of any good examples of initiatives, which were applied in other segments or companies to reduce operational logistics cost?

Appendix 2. Survey

1. How relevant each of these improvement for our company?

	Not relevant at all	Not really relevant	Impossible to evaluate relevancy	Probably relevant	Extremely relevant
1. Synergy of finished goods flows with another segment of company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Change in minimum order size for clients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Separation of FG and TE supply chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Change the loading point for client to reduce FTW shoulder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Change in delivery policy for distributors, deliver only to clients' warehouses not to selling points	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. How would you approximate effect on logistic cost by each of the initiatives if they are going to be implemented?

	1% decrease	2% decrease	3% decrease	4% decrease	More than 5% decrease
1. Synergy of finished goods flows with another segment of company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Change in minimum order size for clients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Separation of FG and TE supply chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Change the loading point for client to reduce FTW shoulder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Change in delivery policy for distributors, deliver only to clients' warehouses not to selling points	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

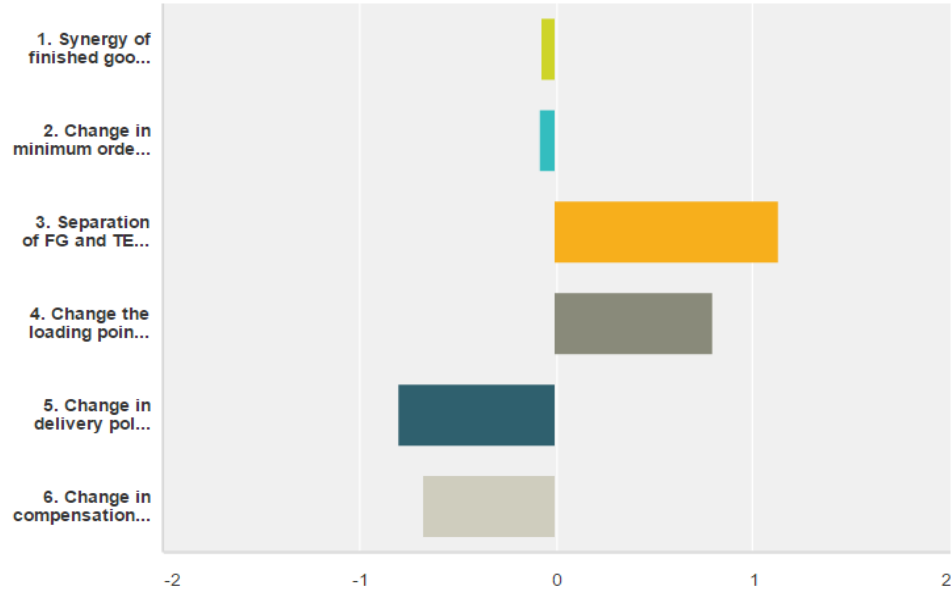
3. How would you rate the time required to implement the ideas?

	1-2 months	2-4 months	4-6 months	6-8 months	More than 8 months
1. Synergy of finished goods flows with another segment of company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Change in minimum order size for clients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Separation of FG and TE supply chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Change the loading point for client to reduce FTW shoulder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Change in delivery policy for distributors, deliver only to clients' warehouses not to selling points	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. What might be the bottlenecks in implementation of your favorable improvement? (Specify improvement's number first)

Appendix 3. Survey outcomes

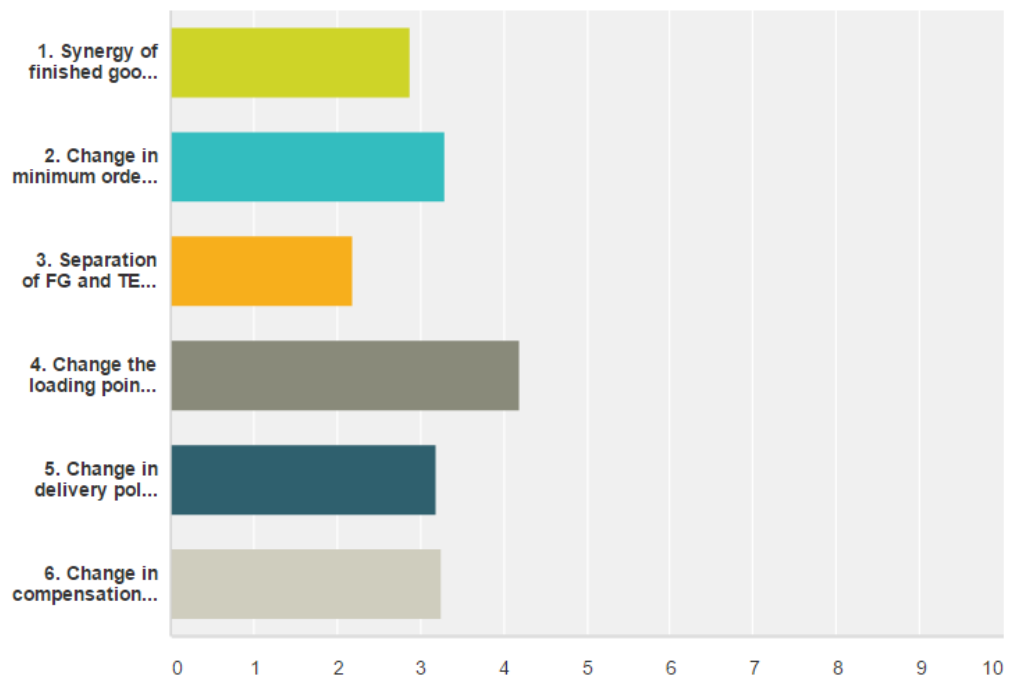
How relevant each of these improvement for our company?



	Not relevant at all	Not really relevant	Impossible to evaluate relevancy	Probably relevant	Extremely relevant
1. Synergy of finished goods flows with another segment of company	20,00% 3	26,67% 4	20,00% 3	6,67% 1	26,67% 4
2. Change in minimum order size for clients	16,67% 2	25,00% 3	33,33% 4	0,00% 0	25,00% 3
3. Separation of FG and TE supply chains	6,67% 1	13,33% 2	6,67% 1	6,67% 1	66,67% 10
4. Change the loading point for client to reduce FTW shoulder	0,00% 0	13,33% 2	6,67% 1	66,67% 10	13,33% 2
5. Change in delivery policy for distributors, deliver only to clients' warehouses not to selling points	33,33% 5	33,33% 5	20,00% 3	6,67% 1	6,67% 1
6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	46,67% 7	13,33% 2	13,33% 2	13,33% 2	13,33% 2

6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	46,67% 15	13,33% 1	13,33% 0	13,33% 0	13,33% 0
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How would you rate the time required to implement the ideas?



	1-2 months	2-4 months	4-6 months	6-8 months	More than 8 months
1. Synergy of finished goods flows with another segment of company	6,25% 1	43,75% 7	12,50% 2	6,25% 1	31,25% 5
2. Change in minimum order size for clients	21,43% 3	35,71% 5	14,29% 2	7,14% 1	21,43% 3
3. Separation of FG and TE supply chains	0,00% 0	6,67% 1	6,67% 1	86,67% 13	0,00% 0
4. Change the loading point for client to reduce FTW shoulder	75,00% 12	0,00% 0	6,25% 1	6,25% 1	12,50% 2
5. Change in delivery policy for distributors, deliver only to clients' warehouses not to selling points	13,33% 2	40,00% 6	20,00% 3	6,67% 1	20,00% 3
6. Change in compensation policy for distributors (compensation for actual type of transport loaded)	18,75% 3	43,75% 7	0,00% 0	18,75% 3	18,75% 3

