

CUSTOMER PORTFOLIO PLANNING IN THIRD PARTY LOGISTICS USING SYSTEM DYNAMIC APPROACH

Aleksandrs Kotlars¹, Mg.oec; Inguna Jurgelane-Kaldava², Dr.oec.;
Valerijs Skribans³, Dr.oec.

^{1, 2, 3}Riga Technical university

Abstract. According to resource-based view, market orientation can help companies to enhance performance. By looking at customer portfolios of global 3PL companies, certain customer sector specialization can be noticed, hence, market orientation is an asset that is valuable and provides a competitive advantage to companies that possess it. A detailed in-depth look into internal processes of 3PL companies is needed to demonstrate interrelationships between 3PL key resources, which are information, knowledge, relational and human resources. The purpose of this study is to develop a model that would demonstrate transmissions between commercial and operational processes in 3PL companies. A system dynamic approach is chosen to demonstrate these interrelations. This study is organized as follows. First, an empirical literature research is done to discover studies related to resources of 3PL companies. Second, a model demonstrating commercial and operational processes of 3PL companies is developed, based on system dynamics approach. Third, approbation of the model is done to test multiple scenarios of 3PL portfolio planning. As the result of the study, there are suggestions developed for 3PL companies' management teams addressed to improve portfolio planning process within 3PL organizations.

Keywords: third party logistics, system dynamics, resources, model.

JEL code: L90, M16, R40, R41

Introduction

In competitive environment performance measurement has proven to be a successful tool to achieve business objectives in 3PL companies. Performance measurement systems are frameworks that integrate various performance information, such as key performance indicators (KPI), in a dynamic and accessible way. Performance measurement systems provide companies with necessary tools to support planning and monitor operational process. To assess the performance factors for 3PL companies through managerial view, an analytical framework is required. There are various studies (Domingues et al., 2015; Liu et al., 2011; Jothimani et al., 2014; Kayakutlu et al.; 2011, Shin et al., 2016) dedicated to evaluation of 3PL performance.

The resource-based view (RBV) provides an assertion that market orientation can help companies to enhance performance (Ellinger et al., 2008). Hence, market orientation is an asset that is valuable and provides a competitive advantage to companies that possess it. Some 3PL companies are asset-heavy or property-based, whereas some implement light-asset policy. Such behavior can be explained by RBV theory and was studied by multiple authors (Yew Wong et al., 2010; Wong, 2008; Brah et al., 2006; Chu et al., 2010; Genchev et al., 2010).

The purpose of this paper is to develop a model that would demonstrate transmissions between commercial and operational processes in 3PL companies, that would be based on planning and management of 3PL resources. Model is based on system dynamic approach and is developed in VensimPLE environment.

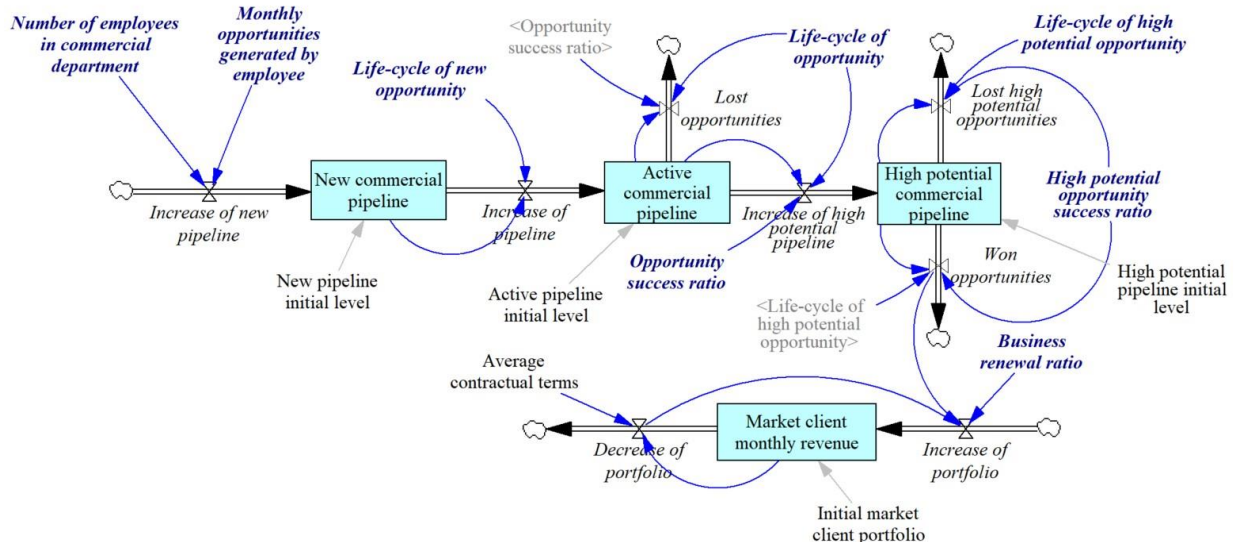
Commercial and operational processes of third-party logistics service provider (model)

Authors of this paper suggest a detailed in-depth look into internal processes of 3PL to demonstrate interrelationships between 3PL companies' key resources, which are, information, knowledge, relational and human resources. A system dynamic approach is chosen to demonstrate these interrelations. It

1 Aleksandrs.Kotlars@gmail.com
2 Inguna.Jurgelane-Kaldava@rtu.lv
3 Valerijs.Skribans@rtu.lv

provides following benefits. Visualization of the entire process with possibility to highlight main contributing elements of the system. Provision of strong focus on human factors and managerial policies. Analysis based on limited input data. Understanding and anticipation of changes over time.

Proposed model (Fig. 1) consists of two main blocks describing studied internal processes in 3PL companies, which are commercial block and operational block. Model demonstrates transmissions between commercial and operational processes and focuses on provision of key input and output indicators that will be further described.



Source: authors' own made

Fig. 1. Model of internal commercial and operational processes in third-party logistics service provider

In proposed model, commercial process is defined as follows. One of the main results of commercial activities is generation of won opportunities, or new contracts with customers. Even though commercial activities are also related to renewal of business, this process is not widely described and is included into operational part of the model. Generation of new opportunities is split into three parts.

- **First**, generation of new commercial pipeline. As a result of active commercial activities, namely contacting potential customers and generating incoming business opportunities, new commercial pipeline is being created. It is assumed that in selected time frame (24 months) number of business opportunities from external environment is unlimited, that corresponds to usual activity of a 3PL company working with customers from different industrial sectors. It was decided to extract generation of new commercial pipeline from active commercial pipeline with the purpose. This part of commercial activity demonstrates productivity of people in commercial department of 3PL company. Every new generated incoming opportunity has certain life-cycle. It is up to 3PL company's management to define value of this indicator, or time period, when new generated incoming opportunity is moved to active commercial pipeline. As it is seen in Figure 1, there is only one outbound flow ("Increase of pipeline") from volume named "New commercial pipeline". This flow is created to fulfil active commercial pipeline (volume "Active commercial pipeline") after pre-defined period.
- **Second**, generation of active commercial pipeline. Active commercial pipeline demonstrates main hub of active business opportunities in 3PL company. It has different pre-defined life-cycle, or period when opportunity shall be either transformed into high potential commercial pipeline (volume "High potential commercial pipeline"), or closed as lost opportunity. Usually, if no decision made within pre-defined life-

cycle, opportunity shall be closed as lost. For this purpose, there are two outbound flows from currently discussed volume in the model ("Lost opportunities" and "Increase of high potential pipeline"). Correct flow is chosen according to opportunity success ratio (variable "Opportunity success ratio"), that is statistical indicator usually calculated by management of 3PL company, that is based on historical activities with potential customers. This model does not discuss components of the success ratio. It is up to company's management to perform qualitative analysis of factors influencing success ratio. Those opportunities, moving through the "Lost opportunities" flow, are directed to external environment and are not considered anymore in scope of this model; however, opportunities moving through the "Increase of high potential pipeline" flow contribute generation of high potential commercial pipeline (volume "High potential commercial pipeline").

- **Third**, generation of high potential commercial pipeline. Similar to active commercial pipeline, high potential commercial pipeline has own life-cycle ("Life-cycle of high potential opportunity") and success ratio ("High potential opportunity success ratio"). Normally, among three life-cycle indicators used in this model, the one describing active commercial pipeline (volume "Active commercial pipeline"), is the longest; however, it might differ depending on 3PL company. High potential opportunity success ratio is based on historical activities and is calculated by management of 3PL company. Like success ratio describing active commercial pipeline, this model does not discuss components of the high potential success ratio, and it is up to company's management to perform qualitative analysis of factors influencing high potential success ratio. There are two outbound flows from volume "High potential commercial pipeline", that are chosen according to high potential opportunity success ratio. First ("Lost high potential opportunities") moves opportunities considered to be lost to external environment and are not used anymore in scope of this model. Second ("Won opportunities") moves opportunities considered to be won to operational block of the model.

In the proposed model, operational process describes development of market customer portfolio, which is reflected in monthly revenue generated by operational department. This part of the model is created only with purpose to support commercial block and demonstrate transmission of won opportunities into monthly invoiced business. As it is shown in Figure 1, operational block consists of one part, that is generating market client revenue on monthly basis. In this part of the model one volume and two flows are used, as well as three variables. Monthly won opportunities (flow "Won opportunities") contribute increase of customer portfolio (flow "Increase of portfolio"). In addition to that, operational block of the model foresees frequent renewal of business. After the end of contractual terms, relationships with customers are either terminated, or renewed. "Business renewal ratio" is a variable defining likelihood of business to be renewed. This variable is based on statistical data and calculated by the management of 3PL company. Business renewal together with won opportunities generate increase of customer portfolio. "Market client monthly revenue" is a volume that accumulates and keeps renewed and won opportunities for a certain period of time, defined by variable "Average contractual terms" (based on statistical information of 3PL company). Operational block of the model contains following elements.

To summarize description of the proposed model, it is needed to highlight limitations and assumptions taken in this model. This model only demonstrates transmissions between commercial and operational processes and focuses on provision of key input and output indicators with the purpose to show interrelationships between 3PL companies' key resources.

- Model describes only regular 3PL company's business activities with customers, and does not include irregular relationships, which realistically may also have an impact of internal processes.

- Renewal of business activities is not included in commercial process but kept in operational block of the model. It is done with purpose to exclude this impact on activities of employees in commercial department.
- It is assumed that inbound opportunities on the market influencing increase of new pipeline are unlimited in time frame of the model, which is 24 months.

Approbation of the model

With the purpose to discover which of previously defined essential elements of commercial and operational activities in 3PL company (number of employees in commercial department, monthly opportunities generated by employee, life-cycle of new opportunities, opportunities success ratios) have most significant impact on results of output indicators (active commercial pipeline, high potential commercial pipeline, market client monthly revenue), the model will be tested using four different scenarios, as shown in Table 1.

Table 1

Model simulation scenarios

Input variables	Simulation scenario			
	1	2	3	4
Number of employees in commercial department	4	6	4	4
Monthly opportunities generated by employee, EUR	400000	600000	400000	400000
Life-cycle of new opportunity, months	2	2	1	2
Life-cycle of opportunity, months	5	5	2	5
Life-cycle of high potential opportunity, months	2	2	1	2
Opportunity success ratio, %	15	15	15	20
High potential opportunity success ratio, %	15	15	15	20

Source: authors' own made

As it is shown in the table above, 7 essential input variables are listed. There are four simulation scenarios. The first one was considered to be the reference scenario, when number of employees is set to 4, each employee generates in average 400 thousand EUR of opportunities monthly, life-cycle of new, regular and high potential opportunities are 2, 5 and 2 months respectively, and success ratios of opportunities are 15%. The second scenario assumes increased focus on prospecting or attracting new opportunities, basically more active commercial activities by 3PL company. In scope of the second scenario, the number of employees is set to 6, each employee generates in average 600 thousand EUR of opportunities monthly, life-cycle of new, regular and high potential opportunities are 2, 5 and 2 months respectively, and success ratios of opportunities are 15%. The third scenario assumes reduced life-cycle of opportunities. In scope of the third scenario, the number of employees is set to 4, each employee generates in average 400 thousand EUR of opportunities monthly, life-cycle of new, regular and high potential opportunities are 1, 2 and 1 months respectively, and success ratios of opportunities are 15%. Finally, the fourth scenario assumes increased success ratio of opportunities. In scope of the fourth scenario, the number of employees is set to 4, each employee generates in average 400 thousand EUR of opportunities monthly, life-cycle of new, regular and high potential opportunities are 2, 5 and 2 months respectively, and success ratios of opportunities are 20%. Further results of the four scenarios' simulations will be discussed.

Results of scenario 1 (reference scenario) simulation.

To evaluate effectiveness of commercial and operational activities in scope of the first scenario, 3 indicators are evaluated, as shown in Table 2. In the first month of activity, initial value of active commercial pipeline is 5000 thousand EUR. After 24 months of activities, it increased till 7970 thousand EUR, which is 59.41% growth. Average monthly growth of active commercial pipeline is 2.07%. In the first month of activity, the value of high potential commercial pipeline was set at the level of 200 thousand EUR, and after 24 months of activities it increased till 477 thousand EUR, which is by 138.52%. Average monthly growth of high potential commercial pipeline is 3.98%. Initial level of market client monthly revenue was 500 thousand EUR, and after 24 months of activities increased till 538 thousand EUR, which is by 7.61%. Average monthly growth of market client monthly revenue is 0.33%.

Table 2

Summary of reference scenario simulation

Simulation scenario 1	First month, thousand EUR	Last month, thousand EUR	Total growth, %	Average monthly growth, %
Active commercial pipeline	5000	7970	59.41	2.07
High potential commercial pipeline	200	477	138.52	3.98
Market client monthly revenue	500	538	7.61	0.33

Source: authors' own made

In the next simulation scenarios, since input values are changed to test results of the model, possible drawbacks of scenarios shall be discussed, those are not reflected in the model, but shall be compulsory considered by 3PL companies' management.

Results of scenario 2 (increased focus on prospecting) simulation.

To evaluate effectiveness of commercial and operational activities in scope of the second scenario, 3 indicators are evaluated, as shown in Table 3. In the first month of activity, initial value of active commercial pipeline is 5000 thousand EUR. After 24 months of activities, it decreased till 1787 thousand EUR, which is -64.26% decrease. Average monthly decline of active commercial pipeline is -1.47%. In the first month of activity, the value of high potential commercial pipeline was set at the level of 200 thousand EUR, and after 24 months of activities was increased till 1067 thousand EUR, which is by 433.61%. Average monthly growth of high potential commercial pipeline is 7.85%. Initial level of market client monthly revenue was 500 thousand EUR, and after 24 months of activities increased till 964 thousand EUR, which is by 92.87%. Average monthly growth of market client monthly revenue is 2.93%.

Table 3

Summary of increased focus on prospecting scenario simulation

Simulation scenario 2	First month, thousand EUR	Last month, thousand EUR	Total growth, %	Average monthly growth, %
Active commercial pipeline	5000	1787	-64.26	-1.47
High potential commercial pipeline	200	1067	433.61	7.85
Market client monthly revenue	500	964	92.87	2.93

Source: authors' own made

Results of scenario 3 (reduced life-cycle of opportunities) simulation.

To evaluate effectiveness of commercial and operational activities in scope of the third scenario, 3 indicators are evaluated, as shown in Table 4. In the first month of activity, initial value of active commercial pipeline is 5000 thousand EUR. After 24 months of activities, it decreased till 3200 thousand EUR, which is -36.00% decrease. Average monthly decrease of active commercial pipeline is -1.84%. In the first month of activity, the value of high potential commercial pipeline was set at the level of 200 thousand EUR, and after 24 months of activities increased till 240 thousand EUR, which is by 20.00%. Average monthly growth of high potential commercial pipeline is 1.96%. Initial level of market client monthly revenue was 500 thousand EUR, and after 24 months of activities it increased till 601 thousand EUR, which is by 20.25%. Average monthly growth of market client monthly revenue is 0.81%.

Table 4

Summary of reduced life-cycle of opportunities scenario simulation

Simulation scenario 3	First month, thousand EUR	Last month, thousand EUR	Total growth, %	Average monthly growth, %
Active commercial pipeline	5000	3200	-36.00	-1.84
High potential commercial pipeline	200	240	20.00	1.96
Market client monthly revenue	500	601	20.25	0.81

Source: authors' own made

The main possible drawback of this scenario is the limited impact that a 3PL company could have to change life-cycle of commercial opportunity, as such indicators are often dependent on customers' behavior, hence cannot be controlled internally. At the same time, 3PL company's management could perform a number of actions that would force reduction of opportunities life-cycle.

Results of scenario 4 (increased success ratio) simulation.

To evaluate effectiveness of commercial and operational activities in scope fourth scenario, 3 indicators are evaluated, as shown in Table 5?. In the first month of activity, the initial value of active commercial pipeline is 5000 thousand EUR. After 24 months of activities, it increased till 7970 thousand EUR, which is 59.41% growth. Average monthly growth of active commercial pipeline is 2.07%. In the first month of activity, the value of high potential commercial pipeline was set at the level of 200 thousand EUR, and after 24 months of activities it increased till 636 thousand EUR, which is by 218.03%. Average monthly growth

of high potential commercial pipeline is 5.57%. Initial level of market client monthly revenue was 500 thousand EUR, and after 24 months of activities increased till 855 thousand EUR, which is by 71.02%. Average monthly growth of market client monthly revenue is 2.37%.

Table 5

Summary of increased success ratio scenario simulation

Simulation scenario 4	First month, thousand EUR	Last month, thousand EUR	Total growth, %	Average monthly growth, %
Active commercial pipeline	5000	7970	59.41	2.07
High potential commercial pipeline	200	636	218.03	5.57
Market client monthly revenue	500	855	71.02	2.37

Source: authors' own made

The main possible drawback of this scenario is complicated process that 3PL company shall perform to increase success ratio that would make higher number of opportunities to be successfully closed and moved to operational block of the model, hence, increase market client monthly revenue. This simulation provides purely quantitative assessment of changes that could be reached by improving success ratio. Afterwards, it is up to 3PL company's management to elaborate action plan to increase this indicator.

Summary of the model approbation

To summarize the results of four simulations and conclude which approach would bring higher impact on output elements (active commercial pipeline, high potential commercial pipeline, and market client monthly revenue), it is advised to compare average monthly growth of each output element, as well as interrelations between these elements. Table 6 provides the summary for each of four scenarios.

Table 6

Summary of simulation results

Scenario	Active commercial pipeline corresponding to high potential commercial pipeline, thousand EUR	High potential commercial pipeline corresponding market client monthly revenue, thousand EUR	Active commercial pipeline corresponding to market client monthly revenue, thousand EUR
Reference scenario	0.05	1.53	0.08
Increased focus on prospecting	0.19	1.16	0.22
Reduced life-cycle	0.05	2.50	0.13
Increased success ratio	0.06	1.62	0.10

Source: authors' own made

The highest average monthly growth of active commercial pipeline is observed in the first (reference) and the fourth (increase success ratio) scenarios. The highest average monthly growth of high potential commercial pipeline is observed in the second (increased focus on prospecting) scenario. And the highest average monthly growth of market client monthly revenue is observed in the second scenario (increased focus on prospecting). To consider this question from different angle, it is worth looking at information shown in the table above. Firstly, on monthly average, 1 thousand EUR in active commercial pipeline corresponds to 0.19 thousand EUR in high potential commercial pipeline, that is achievable, if the second

scenario (increased focus on prospecting) is implemented. Secondly, on monthly average, 1 thousand EUR in high potential commercial pipeline corresponds to 2.50 thousand EUR in market client monthly revenue, if the third scenario (reduced life-cycle) is implemented. Finally, on monthly average, 1 thousand EUR in active commercial pipeline corresponds to 0.22 thousand EUR in market client monthly revenue, if the second scenario (increased focus on prospecting) is implemented. Summarizing the conclusions done by evaluating scenarios from two different angles, it turns out that the second scenario (increased focus on prospecting) is more favourable. Surprisingly, although the second scenario foresees an increase of number of commercial employees and number of new incoming opportunities, simulation shows that the second scenario would have the lowest level of monthly active commercial pipeline, but the highest level of high potential commercial pipeline. This fact suggests that higher level of high potential commercial pipeline is more important than the level of active commercial pipeline in 3PL companies.

Conclusions, proposals, recommendations

- 1) As a result of empirical literature study, authors discovered four main groups of 3PL resources, which are: information; knowledge; relational; and human resources. It is also concluded that market orientation is a valuable 3PL asset that provides a competitive advantage to 3PL companies.
- 2) Authors of this study have presented a developed model showing interrelations between commercial and operational activities of 3PL companies. The model, consequently, contains two blocks – commercial and operational. A system dynamic approach was chosen to build the model, that provides such benefits as visualization of the entire process with possibility to highlight main contributing elements of the system.
- 3) There were four scenarios chosen to perform the test of the model, which are: reference scenario; increased focus on prospecting; reduced life-cycle of opportunities; and increased success ratio.
- 4) Values of following input variable were changed to evaluate different scenarios: number of employees in commercial department, monthly opportunities generated by employee, life-cycle of new opportunity, life-cycle of opportunity, life-cycle of high potential opportunity, opportunity success ratio, and high potential opportunity success ratio.
- 5) There were following indicators measured to evaluate effectiveness of commercial and operational activities of 3PL under four scenarios: active commercial pipeline, high potential commercial pipeline, and market client monthly revenue. These are key indicators to evaluate effectiveness of commercial activities in 3PL.
- 6) The summary of simulation results demonstrates that the highest transition from active commercial pipeline to high potential commercial pipeline (1 thousand EUR to 0.19 thousand EUR) is achievable if the second scenario (increased focus on prospecting) is implemented. Highest correspondence of high potential commercial pipeline to market client revenue (1 thousand EUR to 2.50 thousand EUR) is achievable, if the third scenario (reduced life-cycle) is implemented. Finally, on monthly average, 1 thousand EUR in active commercial pipeline corresponds to 0.22 thousand EUR in market client monthly revenue, if the second scenario (increased focus on prospecting) is implemented.
- 7) Considering model simulation results, it is possible to conclude that higher level of high potential commercial pipeline is more important than the level of active commercial pipeline in 3PL companies.

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