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THEORY OF CONSTRAINTS IMPLICATIONS IN MARKETING. ESTONIAN CASES

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The theory of Constraints received the most attention in the middle of 1990's, when the developer of the concept Dr. E. Goldratt published his second book "It's Not Luck". In spite of impressive number of articles published and over 100 successful implementations, the marketing side of the Theory of Constraints is not much discussed. This paper focuses on providing an overview of the Theory of Constraints of the main principles and techiniques, the concept's implications for marketing and illustrates the suitability of the Theory of Constrainst for marketing management in Estonia with two cases.

Introduction

The theory of Constraints (TOC) is a systems management methodology (Dettmer 2000, p. 2) developed by Dr. Eliyahu M. Goldratt and was first introduced in 1980 at an APICS conference, with its application to manufacturing planning and scheduling (Mabin 2001, p. 171). Now the TOC methodology encompasses a wide range of concepts, principles, solutions, tools and approaches. It simplifies managing a complex environment and gives robust principles and processes for planning and implementing improvements in an organisation to achieve better fulfilment of its goals.

The relatively short history of TOC has been fruitful. In their literature Mabin and Balderstone (2000) found research over 310 published items including 32 books. TOC related articles were published in 83 different journals and magazines. Research identified over 100 successful case studies of TOC implementation. Qualitative data was gathered for 77 businesses. The great majority of applications reported in the literature were conducted in North America. A number of continental European applications were reported, with only a few cases emerging from the UK and Australasia. The types of organisations covered by these cases varied from giant multi-national corporations and industry leaders like Boeing and GM, to military organisations like the US Air Force, to small town bakeries.

For a deeper insight into TOC history and development one can refer to McMullen (1997); its major components may be found in Cox and Spencer (1998), Dettmer (1997) or Smith (2000); to applications in Noreen and Smith (1995) or Kendall (1998). For the present purpose only TOC's main principles, analytical tools and marketing applications will be discussed.

It should also be mentioned, that in order to emphasize the practicality of the Theory of Constraints, many TOC experts and consultants do not want to use term "theory" and have started to use the term "constraint management" instead. In this paper term TOC is preferred.

TOC main principles

TOC is a systems management methodology and does not depend on the size of the system (product line, factory, single business, multinational corporation etc.). In this paper, system is defined as a business organisation, servicing business-to-business markets.

TOC is based on four basic assumptions about how systems function (Shragenheim pp. 4–5, Dettmer 2000, pp. 7–8):

1. Every system has a goal and a finite set of necessary conditions that must be satisfied in order to achieve that goal.
2. A system is more than the sum of its parts.
3. The performance of a system is constrained by very few variables.
4. All systems are subject to logical cause-and-effect. There are natural and logical consequences to any action, decision, or event. For those events that have already occurred, these consequences can be visually mapped to aid in situation or problem analysis. For those decisions that have yet to occur, or which are contemplated, the outcomes of these actions, decisions or events can be logically projected into the future and visually mapped.

A goal can be described as the single objective that an organisation wishes to increase or improve. Goldratt defines the main goal for profit organisations as profitability – to make money now and in the future. There are two main necessary conditions for fulfilling this goal (Goldratt 1998, p. 263):

1) Assure a secure and satisfactory working environment for employees now and in the future;
2) Assure market satisfaction now and in the future.

This doesn't mean the organisation wants to maximize employees' satisfaction but that it must provide a minimum level of satisfaction if it wants a certain level of commitment from employees. The idea of maximization can be applied to only one entity, while all other necessary conditions have characterized by a certain level that the organisation has to satisfy.

The second assumption – an organisation is more than the sum of its parts – is based on the idea that the ability of an organisation to achieve a common goal depends on the synchronization of its parts in a combined effort. Therefore, an organisation can't be divided into independent sub-organisations (departments, divisions etc.) and achieve the same level of goal fulfilment as the whole organisation (Schragenheim 1999, pp. 4–5).

The third assumption – the performance of an organisation is constrained by very few variables – can be understood by an analogy between a system and a chain. Any business can be viewed as a chain of linked processes that transform some input into a sellable product. The most effective way to improve the strength of the chain is to identify the weakest link and strengthen it (Smith 2000, p. 32). Hence, an organisation can improve its performance ra-

pidly by focusing all its effort and resources on one or two weakest processes – constraints.

TOC defines three types of constraints (Scheinkopf 1999, p. 16):

1) Physical constraints;
2) Policy constraints;
3) Paradigm constraints.

Physical constraints are those that are physically limiting the organisation from increasing goal attainment. A physical constraint can be internal or external. Internal constraints can be machines or skilled people. The most common external constraint is market demand (although it could also be raw materials).

TOC expert Schragenheim claims (1999, pp. 8–9) that market is always demand a business constraint. Even when business capacity is fully used, it is still constrained by the market. In such a case it has two constraints: internal and external. If market demand were not a constraint, a business could sell an infinite number of unimproved products forever for the price dictated by the business itself. No monopoly can do that.

Policy constraints (also called managerial constraints) are those rules and measures that inhibit the system's ability to continue to improve. Policies (both written and unwritten) are developed and followed because people, through their belief systems, develop and follow them (Scheinkopf 1999, p. 18).

Paradigm constraints (also called behaviour constraints) are those beliefs or assumptions that cause us to develop, embrace, or follow policy constraints (Scheinkopf 1999, p. 18). Policy and paradigm constraints are very closely connected and as policy constraints have more "visible" outcomes (rules, measures). Literature often talks only about policy constraints.

For breaking physical constraints, five focusing steps are defined (Shragenheim 1999, pp. 5–6):

1) Identify the system's constraints.
2) If a constraint can be immediately removed without large investments, do it now and go back to Step 1. If not, devise a way to exploit the system's constraints.
3) Subordinate everything else to the above decisions.
4) Evaluate alternative ways to elevate one or more of the constraints. Predict the future constraints and their impact on global performance by theoretically employing the first three steps. Execute the way you have chosen to elevate the current constraints.
5) Go back to Step 1. The actual constraints may be different from what you expected – beware of inertia in the identification of the constraints.

By TOC a business must constantly keep searching for its constraints (not only physical) and breaking them. This process is called the Process of Ongoing Improvement (POOGI). POOGI is broader than five focusing steps and is based on finding answers to three questions:

1) What to change?
2) What to changeit to?
3) How to bring about the change?

TOC Analytical Tools

To answer the questions mentioned above, problem-solving tools – Thinking Processes – were developed by Dr. Goldratt and his associates in 1991 (Scheinkopf 1999, pp. 3–4). The thinking processes comprise a suite of five logic diagrams and a set of logic rules (Dettmer lists six diagrams by defining a subset of a future reality tree as a separate logic diagram (1997). The diagrams use two different types of logic. Three of the trees (current and future reality trees and the transition tree) use sufficient (cause-and-effect) logic. They are built by constructing connections between observed

effects and causes using IF...THEN... statements, and checking for "sufficient cause". Sufficiency can be of three types: "A is sufficient to cause C" or "If both A and B occur together, then they will be sufficient to cause C" or "A and B (separately) both contribute to C, and are both sufficient to cause C". The other two tools, the evaporating cloud and the prerequisite tree, use necessary condition thinking: "In order to have A we need B". The logic rules are called the categories of legitimate reservations (CLR) and have been proposed for use in validating systems dynamics models (Mabin *et al* 2001, p. 172). Based on Mabin *et al* (2001) (if not stated otherwise) a very brief overview of main features of the logic diagrams is provided next. For fuller description and examples see Scheinkopf (1999), Goldratt (1994), Noreen and Smith (1995), Dettmer (1997, 1998), Kendall (1998), Shragenheim (1999), Smith (2000).

Evaporating clouds (EC). An evaporating cloud (EC) helps to answer the question "what to change to". Unlike the trees, the EC has a set format with five boxes. The practitioner identifies two opposing wants, that represent the conflict, the need that each want is trying to satisfy, and a common objective or goal that both needs are trying to fulfil. In literature "wants" are referred to as "prerequisites" and "needs" as "requirements".

After identifying the objective, requirements and prerequisites, the practitioner surfaces the assumptions that underlie the connections between objectives and requirements, requirements and prerequisites, and in the process, uncovers the reasons for the conflict that exists in their reality and prevents them from achieving the desired objective. Goldratt states that in resolving these conflicts, managers have traditionally resorted to compromise solutions. His approach seeks to resolve the conflict altogether without resorting to compromise. The EC is intended to achieve the following purposes (Dettmer 1997, p. 122):

- confirm that the conflict exists;
- identify the conflict perpetuating a major problem;
- resolve the conflict;
- avoid compromise;
- create (win-win) solutions in which both sides win;
- create new "breakthrough" solutions to problems;
- explain in depth why a problem exists;
- identify all assumptions underlying problems and conflicting relationships (Dettmer 1997, p. 122).

A significant recent extension of the cloud method is in the development of a generic cloud (or core conflict cloud). The generic cloud is created from merging three individual clouds, each of which is based on a single undesirable effect (UDE). If the generic cloud derived is identified correctly, then the existence of the UDEs stems from this generic conflict, and the hypothesis is verified by checking whether all of the UDEs can be connected using If-Then logic to the generic cloud. If there are "outlier" UDEs that are relevant to the subject matter but which cannot be linked back to the hypothesised generic conflict, then the cloud is not generic enough and is revised (Burton-Houle 2000). A generic cloud is used to draw a new-style current reality tree.

Current reality trees (CRT). Goldratt calls an existing condition a reality. Dettmer (1997) defines a current reality tree (CRT) as a logical structure which has been designed to depict that state of reality as it currently exists in a given system – helping to find answer to question "what to change". The CRT represents the most probable chain of cause and effect, given a specific, fixed set of circumstances. It is constructed from top-down: from observed undesirable effects, postulating likely causes

for those effects, which are then tested via the categories of legitimate reservations (CLR). Dettmer (1997, p. 64) states that the CRT is designed to achieve the following objectives:

- provide the basis for understanding complex systems;
- identify undesirable effects (UDEs) exhibited by a system;
- relate UDEs through a logical chain of cause and effect to root causes;
- identify, where possible, a core problem that eventually produces 70 % or more of the system's UDEs;
- determine at what points the root causes and / or core problem lie beyond one's span of control or sphere of influence;
- isolate those few causative factors (constraints) that must be addressed in order to realise the maximum improvement of the system;
- identify the one simplest change to make that will have the greatest positive impact on the system.

The CRT also helps to identify policies, measurements, and behaviours that contribute to the existence of the UDEs (Burton-Houle 2000). CRTs generally include at least one feedback loop, which creates a vicious cycle. (Note that TOC describes these loops as negative feedback loops, while other systems methodologies would label such reinforcing loops as positive feedback loops). The existence of a loop usually opens up more possibilities for remedial action: a change within or below a loop will have a significant effect.

CRTs can become very detailed and time-consuming to prepare, and can be difficult to communicate to others because they tend to paint a very depressing picture. For these reasons, recent improvements have been made to the method of building the tree, producing a simplified and more easily communicated version of a current reality tree. This has fewer details in it, and while still constructed from the UDEs, it has at its base a desired objective that the organisation is trying to achieve. The new-style CRT generally shows how the current undesired effects arise despite organisation members' best efforts to achieve this desired objective.

The difference between the two types of CRT is that the root of the new-style current reality tree the generic cloud. This way CRT does not show that the root cause of problems is a department or a person but rather a conflicting dilemma an organisation has to solve. The new-style CRT is easier to communicate and creates a positive "we against a conflict" atmosphere instead of a "they against us" attitude.

Future reality trees (FRT). Once a solution to a root cause, called an injection, has been identified via the EC method, practitioners assume for the next exercise that it has been achieved and start to build the future reality tree (FRT). The tree is constructed and scrutinised to test the solution, once again using CLR logic rules. The FRT identifies what to change as well as considering its impact on the future of the organisation, being alert to possible negative side effects. Any such side effects are resolved in a process referred to as trimming negative branches.

Scrutinising each step of the FRT as a group minimises the probability that participants may overlook significant negative branch effects or problems. The resulting tree originates in one or more injections and ends in desirable effects, which really reflect the opposite of the UDEs in the CRT. Klein and DeBruine (1995) state that the process of synthesising the total organisation fosters and nurtures communication, understanding and acceptance. This is largely because the CLR logic rules provide guidelines for communicating any reservations

about the validity of the elements and connections within the trees (see Dettmer 1997). The FRT serves the following purposes:

- enables effectiveness testing of new ideas before committing resources to implementation;
- determines whether proposed system changes will produce the desired effects without creating negative side effects;
- reveals through negative branches, whether (and where) proposed changes will create new or collateral problems as they solve old problems, and what additional actions are necessary to prevent any such negative side effects from occurring;
- provides a means of making beneficial effects self-sustaining through deliberate incorporation of positive reinforcing loops;
- provides a means of assessing the impacts of localised decisions on the entire system;
- provides an effective tool for persuading decision makers to support a desired course of action;
- serves as an initial planning tool.

Prerequisite trees (PRT). Once practitioners have identified what to change to, the third step in TOC deals with implementing the solution. Goldratt states that one of TOC's principles is that "ideas are not yet solutions". He feels it cannot be called a solution until implementation is complete and the system is working as intended. The PRT is intended to identify obstacles that prevent the injection from the EC being implemented. Dettmer (1997) advises asking the following two questions to check whether a PRT is needed:

1) Is the objective a complex condition? If so, a PRT may be needed to sequence the intermediate steps to achieve it.
2) Do I already know exactly how to achieve it? If not, then a PRT will help map out the possible obstacles, the steps involved in overcoming them, and the appropriate sequence.

The PRT uses a different logic from the previous trees, both of which use sufficiency logic (which basically asks "Is this enough?") to establish cause and effect relationships. The PRT uses necessity logic, as does the evaporating cloud, asking instead "What is absolutely necessary?" In the case of the PRT, it is to identify the critical elements, or obstacles, standing in the way of reaching the objective.

Dettmer (1997) states that the PRT is used to achieve the following objectives:

- To identify obstacles preventing achievement of a desired course of action, objective, or injection (solution idea arising from the evaporating cloud).
- To identify the remedies or conditions necessary to overcome or otherwise neutralise obstacles to a desired course of action, objective or injection.
- To identify the required sequence of actions needed to realise a desired course of action.
- To identify and depict unknown steps to a desired end when one does not know precisely how to achieve them.

Transition trees (TT). The last tool in the TOC thinking process is the transition tree, which allows practitioners to determine the actions necessary to implement the solution. Practitioners use the effect-cause-effect method to construct and scrutinise the details of the action plan, called the transition tree. As in construction of the FRT, each step is scrutinised using CLRs for negative branches. The FRT is a strategic tool in which major changes can be outlined. The implementation of these, however, will require complex interventions needing greater detail of actions to be taken, which is the intended use for the transition tree. As such the transition tree is an operational or tactical tool.

The purpose of a transition tree is to implement change. Dettmer (1997) reports that the transition tree structure started off as a four-element tree, with a fifth element being added later. Dettmer feels that the use of the four or five element tree is situational. He states that the five-element tree is the preferred methodology when constructing step-by-step procedures and there is a need to explain to others exactly why each step is required. He outlines the original four elements of the transition tree as:

1) a condition of existing reality;
2) an unfulfilled need;
3) a specific action to be taken;
4) an expected effect of the integration of the preceding three;
5) the rationale for a need at the next higher level of the tree.

Each succeeding level of the tree is built on the previous level, with the expected effect taking the place of the unfulfilled need. These build progressively upward to an overall objective or desired effect.

The addition of the fifth element to the transition tree was devised to better assist buy-in from those from whom the TOC practitioner requires assistance. People are often inclined to resist change without a good explanation for the background to it. Also, it is important to obtain the commitment of those who have the required power to ensure implementation. The fifth element that Goldratt has added appears to address these issues.

Dettmer (1997, p. 284) states that the transition tree has nine basic purposes:

1) provide a step-by-step method for action implementation;
2) enable effective navigation through a change process;
3) detect deviation in progress toward a limited objective;
4) adapt or redirect effort, should plans change;
5) communicate the reasons for action to others;
6) execute the injections developed in the EC or FRT;
7) attain the intermediate objectives identified in a PRT;
8) develop tactical action plans for conceptual or strategic plans;
9) preclude undesirable effects arising out of implementation.

The categories of legitimate reservation (CLR) are a set of eight rules or "tests" of logic that can be used to validate a tree. They are justifiable reasons why people might have reservations about a tree. To be logically sound, a tree must pass all of the eight tests.

The eight categories are:

1) clarity;
2) entity existence;
3) causality existence;
4) cause sufficiency;
5) additional cause;
6) cause-effect reversal;
7) predicted effect existence;
8) tautology.

Dettmer (1997) states that the most important use for CLRs is to communicate disagreement with others in a non-threatening way, which promotes understanding, rather than animosity. The language used in TOC contains special terms as shortcuts for those who know the terms, but these can be translated into "everyday" language. Table 1 translates the formally defined reservations into conversational language.

Goldratt's tools, particularly the use of CLRs in group discussions, aim to get the group to share the vision, agree on common values, gain an understanding of others' views and find ways to accommodate different views, in developing an agreed upon action plan.

Table 1. **Translating reservations into conversational language**

Scrutinising trees with others knowledgeable in CLR	In conversation
I have a *clarity* reservation on ... (specify)	I'm not sure I understand. Could you clarify what you mean by...(Specify *entity* wording you find unclear)?
I have an *entity existence* reservation on ... (specify)	Maybe I still don't understand. How do we know that (specify *entity*) exists? What evidence is there to support it?
I have a *causality* existence reservation on the connection between ... (specify)	I'm not sure I see how (*cause*) leads to (*effect*). Could you please explain it to me?
I have a *cause insufficiency* reservation for (specify effect), and I think the missing element is (specify)	It seems to me there is something missing. Besides (specify *cause*), you'd need (provide contributing *cause*) to get (*effect*)
I have a *cause-effect reversal* reservation. It looks like (specify cause) is really the effect, and vice versa	I think you definitely have a connection there, but could (specify *cause*) really be the effect? And (specify *effect*) really be the cause?
I have an *additional cause* reservation about (specify *effect*), and the *additional cause* is (specify independent *cause*). An *additional cause* not only gives the same effect but contributes to the magnitude of the effect (adds dimension to the problem)	What you have there looks good. But could there be something completely separate that could give the same effect? I'm thinking of (specify additional *cause*)
I have a *predicted effect* existence reservation. If (*cause*) really leads to (*effect*) then we should also see (or not see) (specify predicted *effect*). But we do not (or do)	The cause you are proposing is a little hard to verify. It seems to me that if what you say is true, we should also see (predicted *effect*). But as far as I know it's not there
I have a *tautology* reservation about (specify *cause* and *effect*). The absence or presence of (specify *effect*) doesn't confirm (specify *cause*)	Wait a minute. Are you saying that (*effect*) is the justification that (*cause*) exists? That sounds like circular logic. Perhaps you can explain it to me (like the age-old question: which came first, the chicken or the egg?)

Sources: Dettmar (1997), p. 339

TOC Measurements

To measure the effect of the changes and goal fulfilment in for-profit organisations, three measurements are defined (Goldratt 1998, pp. 84–85):

1) Throughput – the rate at which the organisation generates money through sales (technically sales minus truly variable expenses).
2) Inventory or investment – all the money organisation invests in purchasing things the organisation intends to sell (work in process, raw materials, plant, machines etc.).
3) Operating Expenses – all the money the organisation spends in turning inventory into throughput.

By this definition amortisation and salary expenses are not considered truly variable costs and are allocated to operating expenses.

The main importance of these measurements is their order. By TOC businesses should maximise their throughput while decreasing their inventory and operating costs. Focus is on throughput and only after that on costs. The reasoning is that business can decrease its costs only to zero, but can increase its throughput theoretically indefinitely.

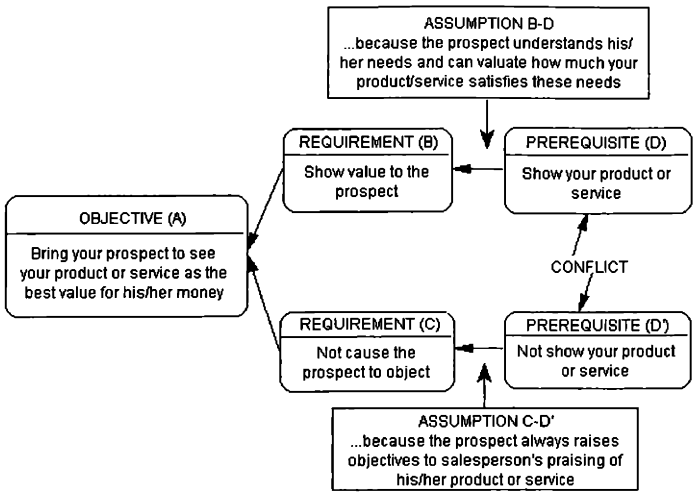

Figure 1. **Salesperson's dilemma. The evaporating cloud diagram should be read using the following logic: "In order to [OBJECTIVE] you must [REQUIREMENT (B)]". "In order to [REQUIREMENT (B)] you must [PREREQUISITE (D)], because [ASSUMPTION A–C]." For C and D the same logic applies**

TOC Marketing Principles

Dr. Goldratt uses a duck hunting analogy to explain the differences of selling, advertising and marketing. If selling were the same as shooting sitting ducks while they are eating corn by the side of the lake, then advertising would be the same as spreading corn for the ducks to see and come ashore to eat. Marketing would be figuring out that ducks ate corn in the first place.

An important difference of theTOC marketing concept is the definition of market segment. A market share is a segment if and only if the price and amounts sold do not affect sales in other segments. Otherwise all low price strategies tend to lead to price wars (Goldratt 1999).

TOC makes two basic assumptions about customers. First, customers are buying solutions to their problems. Sometimes solutions are packed as products, sometimes as services or as a combination of both. The second assumption made is that customers do not value the product or service based on sellers' effort (costs, investment, time etc.), but on the benefits they expect to derive from acquiring it (Houle 1998). So the purpose of marketing is to increase client's understanding of value over the value the producer sees in the product.

Dr. Goldratt believes that successful offers to market are based on two things (Goldratt 1999):

1. Identify the market's core problem (undesirable effects they do not want, but are forced to accept);

2. Analyse the market from the supplier's perspective – how suppliers create or support the existence of core problems for clients. If a supplier does not create / enhance problems, he / she is not able to solve them.

Usually suppliers offering the same products or services create the same type of problems. The problems come from supplier policy constraints. Therefore, the supplier changing its policies and erasing problems has a very unique offer to the market, which is hard to match by competitors. If there are no problems with an immediate client in the supply chain (wholesalers etc.), the business should look for problems within the next link. Using thinking tools is an effective way to identify the constraining policies, finding solutions and communicating the solution to the client.

Based on these assumptions a sales strategy is formed. Usually, if a salesperson talks to a potential customer about the functions, features, performance etc., of the products or services, the most common responses are concerns about how much all of this is going to cost. These types of concerns have a tendency to emerge into objections. The more objections emerge, the lower the chances to make a sale. If there is no true mismatch between offering and needs, the only other source of objections can be the salesperson. Objections tend to come either from presenting the solutions too soon or trying to close too soon (Houle 1998). The salesmen dilemma is presented on the Figure 1.

On the one hand, in order to bring a prospect to see your product or service as the best value for his / her money (A), you must show value to the prospect (B). In order to show value to the prospect (B), you must show your product or service (D), because the prospect understands his / her needs and can evaluate how much your product / service satisfies these needs (assumption B–D). On the other hand, in order not to cause the prospect to object (C), you must not show your product or service (D'), because the prospect always raises objectives to the salesperson's praising of his / her product or service.

Dr. Goldratt believes the assumption B–D to be false. Customers know only the symptoms of their problems, do not understand the true causes of their problems and are not usually able to identify the causes themselves. To break the conflict the salesperson has to bring the prospect to agree on the magnitude of his / her problems or needs, and that they all stem from one source – the source which the seller knows can be addressed by his / her product or service. It should be done in a way that does not build resistance, but builds trust. Then, and only then, is the seller in a position to show that the way to address the prospect's needs, and to get the benefits, is by using the seller's product (Houle 1998).

The effective sales process should overcome all the different resistance layers the prospect has. Dr. Goldratt identified 6 layers of resistance, which have now emerged into nine (see Table 2). The salesperson will get resistance when she moves to the next layer without taking care of previous ones. This does not mean that all layers of resistance exist or are very important to all customers, but a salesperson has to make sure they are no longer obstacles.

Developing such an offer and communicating it by overcoming 9 layers of resistance to a customer is called an Unrefusable offer (or Mafia offer). If all layers are addressed, the selling should not be a problem, because the offer truly solves client's core problem, a client understands and believes the solution.

One key aspect of Unrefusable offer is an answer to the question "who is doing the most changes". On the case of an Unrefusable offer

Table 2. **Connection of 9 layers of resistance with three improvement questions and five thinking tools**

9 layers of resistance	Thinking tool to overcome the resistance	Question the thinking tool answers
1. I don't have that problem	Current Reality Tree	What to Change?
2. My problem is different		
3. The problem is not under my control	Evaporating Cloud	
4. I have a different direction for a solution		
5. The solution does not address the whole problem	Future Reality Tree	What to Change To?
6. The solution has negative outcomes	Prerequisite Tree	
7. There are obstacles to implementing the solution		
8. I'm not clear how to implement the solution	Transition Tree	How to Change?
9. Now we have to change what we are used to...		

Source: Goldratt, R. 2000; Scheinkopf 1999

the supplier makes the most changes. Some changes are probably needed also from the customer side to make the offer truly a win-win solution, but as the presentation starts with identifying clients problems, showing that supplier takes responsibility for changing them, at the end of the presentation the customer will want the product / service so much, thats he is willing to remove all obstacles from his / her side (Houle 1998). To illustrate these ideas, two cases are presented.

Using TOC for Pricing Decisions. Kroonpress Case

The following case is based on Kull's (2001) presentation at the TOC implementers' conference in Tallinn. Kroonpress is a printing house in Estonia. Its clients are publishers, advertising agencies or businesses who want to print something. There are two major competitors in Estonia and a couple in Finland and Latvia. Revenue in year 2000 was 139 million EEK and profit 13 million EEK. Kroonpress employs 180 workers. Problems were that Kroonpress:

- needed volume to cover the investments, but their competitors already had the most profitable publishing jobs;
- had to keep and increase their profit margin;
- had problems with calculating product prices – what principles to use for allocating costs of expensive machines and big overhead to products.

Their solution was to follow TOC throughput principles and allocate to products only truly variable costs. To illustrate this concept, let's assume that they had 10 long-term clients, whose work was the same and had to be done during one month. But this still left Kroonpress with a lot of free capacity. The income from each job was 40 000 EEK, material costs were 10 000 EEK, and amortisation with overhead was 250 000 EEK (Table 3). Now let's consider that they could get the 11^{th} job, but the price would be just 25 000 EEK. As shown in Table 3 accepting the job would be very unprofitable. But this is true only on paper and only when the cost allocation method is used. As shown in Table 4, actually accepting the 11^{th} job would increase the profit and the margin.

Using throughput based pricing allows Kroonpress to include new works into budget and see, what really happens to the bottom line. All accounting and decision making is based on throughput, overhead is not allocated to

products even afterwards. This way Kroonpress avoids complicated cost allocation schemes, from which none gives absolutely correct answers and have more flexibility in pricing decisions.

The TOC throughput approach allowed Kroonpress also to win a printing job of one of Estonia's major newspapers. After a merger of two newspapers to SL Õhtuleht, the publisher looked for a printing house. It wanted a deadline for turning in its materials as late as 23.30. The problem was that Kroonpress was already printing a Postimees newspaper at that time. It was impossible to print Postimees, then SL Õhtuleht and finish on time. They were 1–1,5 hours short.

Kroonpress' solution was to cut the Postimees printing batch by half. They first printed the fast deliveries of Postimees (to islands and North Estonia), which had to be transported earlier, then SL Õhtuleht and after that the second part of Postimees newspapers. The cost of cutting batches was 2500 per day (extra printing forms and tuning machines), but throughput increased by hundreds of thousands of crowns per month.

Overall result was that the publisher had its deadline met. Cutting batches helped to decrease Kroonpress' risks of running late, and its market share and throughput increased.

Although the solution seems trivial, it is not. As most printing houses are following the paradigm of cutting costs, they would not see a solution in cutting batches. Cutting batches increases costs per newspaper and therefore is unprofitable and unacceptable for a printing house.

Unrefusable Offer. The Alas Kuul Case

Alas Kuul was formed in 1993 and sells machines and components to industries, and offers maintenance of machines. It competes in four areas: baring, industrial gear units, compressors and welding. In 1998 market share in first three sectors was 40–45 % and in the welding sector 15–20 %. Competition summed up to 40–50 major competitors. Market share of its closest competitors was around 10–15 %. Alas Kuul has its offices and warehouses in four major cities in Estonia. Its clients are most of the major businesses of the Estonian industrial sector.

The goal of the business was to offer clients complete solutions. Their client-focused offer was based on four pillars:

- everything from one place – saving clients money and time;
- availability of components – organizing supply process and storing components;
- partnership – creating fast, cost-effective, reliable, and creative solutions;
- competent service – address clients' special needs.

Table 3. **Profitability by cost allocation method**

	Variable costs	Amortisation and overhead	Profit	Price/Profit
10 jobs	100 000	250 000	50 000	12.5
1 job	10 000	25 000	5 000	12.5
11th job	10 000	250 000/11= 22 727	–7 727	–30.91

Table 4. **Profitability of 11 works**

	Variable costs	Amortisation and overhead	Profit	Price/Profit
11 jobs	110 000	250 000	65 000	15.29

The only problem they had was that clients did not seem to see the value in this. No matter how hard salespeople tried to offer value and emphasise complete solutions, clients were usually interested only in low prices. Low prices seemed to be the only value their clients seemed to understand.

In 1999 the Russian market crash hit the Estonian industrial sector and the Alas Kuul client base suffered. At the end of the year revenue increased 6 %, but clients pressure to decrease prices resulted in a 30 % decrease in profits. Alas Kuul CEO did not hope on clients changing their attitude about value by themselves and wanted to improve the business situation. He decided to implement the Theory of Constraints principles he had learned about and had found to be a solid framework for management, and improvement efforts.

The Alas Kuul management team started analysing their business by TOC rules and development of solutions with the help of consultants in August 1999. Since 2000, they are using full TOC approach organisation wide. Their constraint was and still is the market.

After analysing their business, they discovered that there were three paradigms they follow, what made a market into a big constraint for them. These where:

- **Sales policy** – belief that the best way to sell industrial products is to use product focused approach and salesmen specialised on some specific product group;
- **Batch policy** – the bigger the one time sale, the more the salesman should be awarded. Also, the bigger the order, the bigger discount the client should get;
- **Inventory policy** – belief that the best way to offer fast deliveries is to have whole warehouses in all cities they operated in. Also, the stocks should be ordered based on forecasts of future demand. Clients had to order based on their forecasts.

Sales a policy decreased communication with clients to minimum and gave no opportunity to identify client's true needs. As most salespeople were competent only in one group of components, they could not answer client questions about other components' availability, prices or quality. Clients saw of course no reason to talk to "ignorant" salesmen about their true problems. Hence, the information flow between the client and Alas Kuul was very limited or non-exist, and the supplier lacked the understanding of clients' true needs, and the ability to address them. The only common subject was ordering: price and amounts.

The second policy assured that salespeople tried to sell as big batches as possible and were not interested in creating a smooth product flow. Because of the same policy clients were also interested in big batches as this assured a lower price per unit. In conclusion, orders were big and infrequent.

Inventory policy made clients believe that ordering in big batches is less risky. Nobody could predict precisely, how much of some component will be needed in the future. As a shortage of a component could cause the stoppage of production or loss of sales, the clients were willing to order bigger batches than needed. This resulted in increasing inventory, and money was for a long time tied under stock that was not needed at the time. This created major problems as cash shortage and is a common headache for most Estonian businesses in the industrial sector.

An additional problem was the increase of uncertainty. Clients ordered in big infrequent batches and turned forecasting of demand into guessing. Chances of guessing next day's or week's demand were very little. As clients the quite often made their big orders when they were already short in some components and Alas Kuul sometimes did not have the needed quantity, they lost a sale. The client did not

have time to wait and ordered from a competitor who happened to have these components in desired quantity.

As clients knew that orders may be delivered late, they increased the order size. The logic behind it was that if they finally deliver, we would be secured for a longer time.

In conclusion, Alas Kuul was not a solution creator, but a main source of major problems. Analysis had identified the problems, now they had to solve them. Using thinking tools they developed and implemented a number of solutions. The main changes were:

- **Central warehousing** – instead of four whole warehouses one central warehouse and three intermediate warehouses were created. Instead of forecasting supplying intermediate warehouses and clients is based on replenishment, and on stock flow and bitffer management;
- **Delivery service** – components are delivered to clients two times a day for free;
- **Discount based on year sales** – discount is not any more based on the size of one order, but the amount bought throughout the year. Client buys with full price during the year and gets the discount back at the end of the year;
- **Segmenting market based on their needs** – full analysis on clients problems and unsatisfied needs;
- **Internet-based information system** – information system offers fast access to specific information about the client and products, and offers the client real time information about the stock;
- **Client-responsibility** – instead of a productbased seller the roles of client manager, product expert and salesperson were created;
- **Business risk salary and owner's profit** – business risk salary means that all employees have a chance to invest 10 % of their salary for 6 moths with yield up to 300 % if stated goals are met. Owner's profit means that at the end of the year, if Alas Kuul profit has increased as planned, all employees (with some restrictions) are included into dividing the share of profit. Last year 15 % of profit was divided among all employees.

These solutions created all the needed requirements for offering complete solutions and true value to clients. Now Alas Kuul had to communicate the changes and improved services to the clients.

The presentation about the new offer to clients started with listing the problems the clients knew very well. These undesirable effects were:

- Suppliers don't react fast enough to client requests;
- The clients must pay for components that are not used at the moment;
- Sometimes components will be delivered late;
- Sometimes the stoppage of work causes loss of production / sales;
- The purchase function must work extra and pay extra money in order to get needed components on time;
- Usually the stock of components is larger than needed.

After that the current reality tree was presented, which showed, how UDEs are related and what the causes of these problems are (see Figure 2). This got clients attention because the bottom of the tree, where the causes are, identified the supplier as the main problem creator.

The next step was to discuss the dilemmas Alas Kuul created for its clients because of the problematic policies. On the one hand, clients wanted to reduce buying costs of components (to get a good unit price), and on the other they wanted to reduce inventory carring costs

Table 5. **Alas Kuul financial measurements**

	Year 2000	Year 1999	Year 1998	Year 1997	Year 1996
Revenue growth	25 %	6 %	66 %	64 %	N/A
Gross Profit	46 %	–38 %	110 %	165 %	N/A
Net Profit	73 %	–31 %	129 %	164 %	N/A
Client debts	–12.5 %	17.3 %	98.5 %	146.9 %	133.7 %
Debts to suppliers	–30.4 %	71.7 %	37.3 %	50.9 %	75.8 %
Short term liabilities	–15 %	70.3 %	48.6 %	67.8 %	83.7 %
Inventory	–4.8 %	59 %	87.4 %	52.4 %	52 %

Source: Alas Kuul financial statements

and indirect cost related to the purchase function (to get a good service and high reliability of deliveries). The first need created the want to order in big batches and get discounts, and the other to order in small batches, decreasing costs of shortages of components.

Alas Kuul injection for breaking this conflict was to take the responsibility for the smooth and efficient work of the client purchase function. To prove this, a full solution was presented (in the form of a Future Reality Tree) in which all undesirable effects were turned into desirable effects by a small number of injections.

The results of the Unrefusable Offer: 36 major clients out of 40 signed long-term contracts. The better than 90 % acceptance was a result of the fact that competition for Alas Kuul was not price driven any more. Alas Kuul's clients didn't care about competitors' low price offers because their understanding of price was changed. They did not choose suppliers based on component prices but based on the total price of doing business with the supplier.

Clients who accepted Alas Kuul's offer saw pretty fast, that the offer did what it is supposed to do:

- the client cash-flow was increased and inventory decreased;
- communication between the client and Alas Kuul had meaning and content;
- the client got the needed components on time in 99 % of cases;
- the risk for stoppage of work because of shortage of components was almost non-exist;
- the client's purchasing function saved money and time;
- the client's chances for growing profit increased.

In addition to the financial results presented in Table 5, Alas Kuul no longer has any cash flow problems and there is no need for using short-term credit as was common before. Work processes are stable and people highly motivated. Employees are included in making important decisions and deciding on goals. At the end of the last year the strategy and goals of Alas Kuul were developed not by the CEO but by a team representing all employees. Every week a workgroup meets after office hours to discuss the present constraints of Alas Kuul and develop solutions to them by TOC principles. Their Unrefusable Offer 2 (solves clients machine maintenance problems) has been out for a year already and has been as successful as the first one. This means, that Alas Kuul's competitive edge is based on the value most difficult to match by competitors – organisation culture.

Although the economy was cooling off last year and industries suffered due to the lack of demand, Alas Kuul was able to grow twice as fast as the industrial sector.

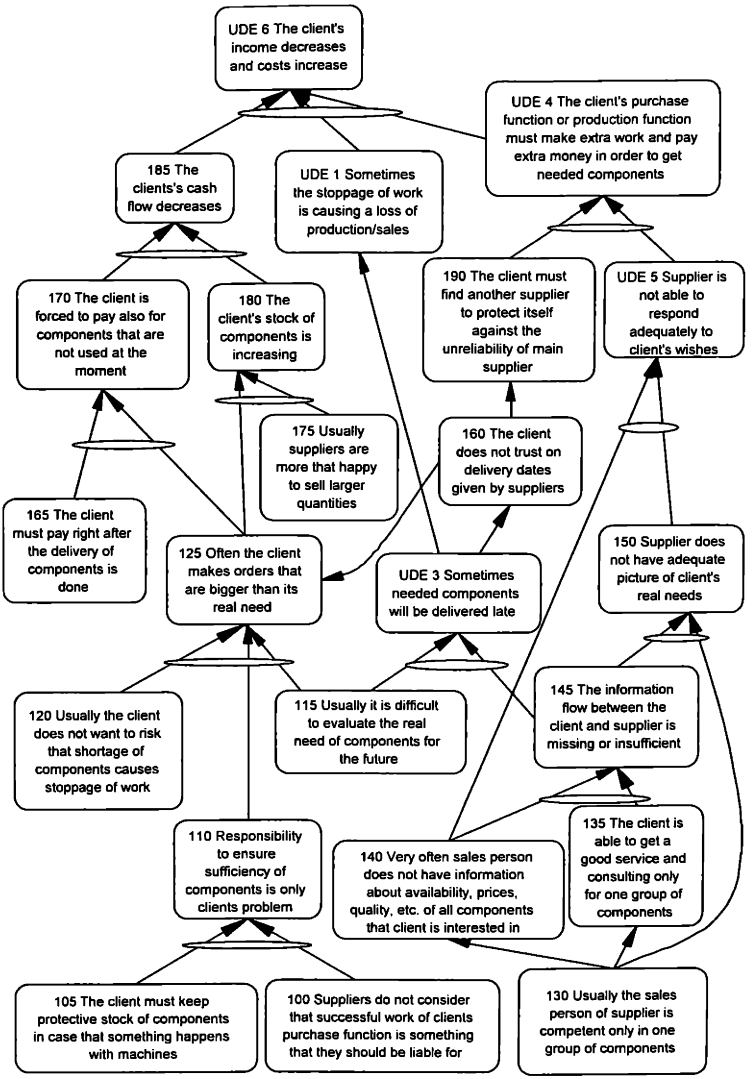

Figure 2. **Current Reality Tree of Alas Kuul clients. Should be read from bottom to top using logic "If (cause) and (cause), then (effect)"** Source: Orro 2000

Competitors have not yet understood, what is going on and have taken no action except trying to get customers back by lowering prices.

Conclusion

This paper has looked at using the management concept Theory of Constraints for marketing management. Two cases of Estonian businesses were used to illustrate these principles. Both cases are about successful implementations and serve as examples that the Theory of Constraints principles and thinking tools developed in America also hold in Estonia. But as Theory of Constraints is a relatively new concept, it the raises questions and requires deeper research.

One area of research would be comparing the Theory of Constraints marketing principles with other methods for validating it or finding weak spots.

Also, S.W.I.M. (Strategically Winning Industrial Markets – developed by Bill Hodgdon) concepts should be researched. These are based on TOC concepts, but give much more direct and focused steps for identifying market segments, developing sales and marketing strategies.

Further research should be undertaken also in analysing other cases of TOC implementation in Estonia in order to identify the prerequisites for successful implementations. There are already more than 12 businesses who have implemented TOC with different success level in Estonia. A couple hundred businesses have at least some managers who have received education on TOC principles, but have not implemented them. In conclusion, TOC has a lot to offer to marketing management, but most of it is still hidden potential and open to research and discovery.

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RIBOJIMŲ TEORIJOS PRITAIKOMUMAS MARKETINGE. ESTIJOS PAVYZDŽIAI

Kalev Kaarna, Mait Miljan

Santrauka

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