

CUSTOMER PROFITABILITY ANALYSIS WITH TIME-DRIVEN ACTIVITY-BASED COSTING. THE CASE STUDY OF POLISH LABORATORY DIAGNOSTICS MARKET'S ENTERPRISE

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Abstract:

The article covers the customer profitability analysis using Time-Driven Activity-Based Costing in a case study of the Polish enterprise operating on the laboratory diagnostics market. Time-Driven Activity-Based Costing provides the possibility to reveal unused production capacity or the potential of the current involved resources. It provides accurate information concerning involved resources and costs their use as well, allowing their precise allocation to specific services, products, distribution channels or customers. The purpose of the paper is the identification and analysis customer groups in researched enterprise, which allow for the verification of hypotheses posed in the case study. The first part of the article contains the characteristics of the researched company and describes the Time-Driven Activity-Based Costing method used to determine customer profitability. The primary aspect of the paper presents research results and cost analyses conducted in the case study using Time-Driven Activity-Based Costing. Authors structure profiles of the researched enterprise's customers and present the accrued income deriving from the service using a whale curve. The last part of the research contains the analysis of the chosen client from each predetermined in the study profitability group. Authors also provide the interpretation of characteristic costs from each group. Conclusions cover Time-Driven Activity-Based Costing as a measurement of customer profitability. Moreover, the article is the first - a comparative basis for the further research - of the three parts, planned by authors, will be crowned with the results of the research of another modern method of customer profitability analysis using cost accounting - Cost-to-Serve.

Keywords: cost accounting, cost management, Activity-Based Management, Time-Driven Activity-Based Costing, customer profitability analysis, case study

1. INTRODUCTION

In nowadays economy, if the enterprise wishes to survive they need to track a relations between a demand for their products or services and their supply. The more important, however, is that such enterprises need to understand the structure, levels and trends in their incurred costs. Thus, the appropriate cost accounting method is important and information expected from it has to be complete and reliable, allowing for an accurate decision making process.

Business environment is rapidly evolving, which forces companies to adapt their organisational and management activities – at present it decides of a competitive advantage. In this case, there are many possible methods allowing for it. In the category of cost accounting various modern approaches have been created, with Activity-Based Costing (ABC) as a milestone. Time-Driven Activity-Based Costing is a variation of ABC approach - more simple, less expensive and much more powerful than the conventional ABC method (Kaplan & Anderson, 2007, p. 20). Its implementation should be considered as an improvement in functioning of the company.

Business practice shows that cost keeping, especially in SME sector, does not usually correspond management purposes. Sales, distribution and marketing costs have a significant impact on meeting not only customer demand but also distribution channels. However, traditional costing systems do not assign costs to specific customers. A large group of customers requires different logistics and sales solutions, thus it is important to analyse its influence on costs and profitability of particular customers products or services.

2. TIME-DRIVEN ACTIVITY-BASED COSTING IN CUSTOMER PROFITABILITY ANALYSIS

2.1. Time-driven activity-based costing (TD ABC)

Activity-Based Costing was presented in the mid-80s of the twentieth century in the United States of America, mainly for manufacturing corporations. At that time, American accounting standards were inaccurate, so ABC was a reply to them. Activity-Based Costing is known to be a proper method for shaping customer profitability (Kuchta & Troska, 2007, pp. 18-21).

However, traditional Activity-Based Costing is a complex and requiring method. R. S. Kaplan and S. R. Anderson in 2004 presented a new method – Time-Driven Activity-Based Costing. It was presented as a revolutionary method in the field of cost calculation and it was created to overcome the difficulties, which the traditional ABC method contains (Kaplan & Anderson, 2004).

Time-Driven version of the ABC uses time equations. The principle of this method is based on the transformation of cost drivers to time equations, which expresses the time essential for performing the activity, as the function of drivers. Those characteristics are called *time drivers* because they reflect the time consumption of an activity. Time-Driven Activity-Based Costing captures the different characteristics of an activity by time equations in which the time consumed by an activity is a function of different characteristics. This equation assigns the time and the cost of the activity to the cost object based on the characteristics of each object. The unit cost of used resources and time required to perform an activity are two parameters for this method (Monroy et al., 2012, pp. 12-13).

Application of Time-Driven Activity-Based Costing consists of the following steps (Bruggeman et al., 2005):

- A. Costs assessment by particular spent sources on the one available capacity.
 1. Identifying the group of sources, which have performed the activities.
 2. Costs estimation for every sources group.
 3. Practical time capacity estimation for each group of sources.
 4. Costs calculation of the group of sources by dividing total costs of sources group by their available capacity.
- B. Assessment of the time essential for required variation of performing activity.
 1. Identifying factors, which have the influence on the time period of appropriate activity (time driver), determining the factors for every real variation of activity.

2. Processing time equations, which expresses the influence of elapsing time of activity on all factors. Then, recognising values of factors and calculation total time consumption for each specific variation of an activity.
- C. Multiplying unit costs of particular sources by total time consumption of the specific variation of running process and summarising costs for each consumption source.

Time-Driven Activity-Based Costing has certain advantages comparing to the traditional cost accounting techniques or even an antecedent of the Activity-Based Costing method. TD ABC assigns overheads in one time equation encompassing all specific aspects of an activity chosen from enterprise's database. The allocation of costs to appropriate activities, customers, region and products in Time-Driven Activity-Based Costing is better and more accurate. Moreover, it allows to discover unused capacity, which enables operational improvements and it takes interactions between time drivers into account, leading to the detection of valueless process (Dejnega, 2011, p. 9).

2.2. Customer profitability analysis with time-driven activity-based costing

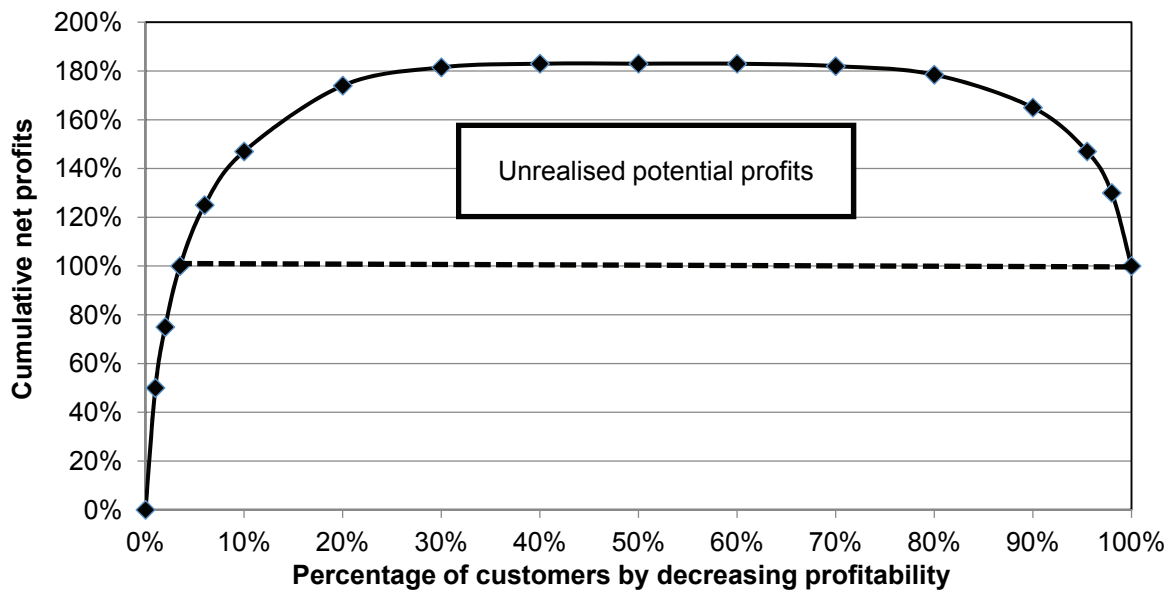
In the beginning of researches and analyses covering CPA, it was claimed that loyal customers who tend to buy products in large quantities are the most profitable group. It is not necessarily true. Even the finest customer may prove to be unprofitable, if certain costs associated with sales, custom ordering process, purchase, storage, and delivery process are taken into account (Barrett, 2005). Therefore, price and discount policy becomes incredibly important.

The primary role of price and discount policy is not only sales promotion but most of all motivation and rewarding customers for the appropriate behaviour towards sales and distribution system of the company. Thus, the proper creation of such system is one of the most difficult tasks managers have to face. This is due to a concern that too strict system will deter and discourage customers. However, precise information of costs and profitability derived from the Activity-Based Costing system allows to make the right decision.

It is important to find out, who provides the funds for the enterprise to finance its operation. They are lenders, shareholders and the most important group – customers. Each group has different objectives. Shareholders and lenders seek possibilities of returns on capital but customers expect an adequate level of services and products supply to ensure their added value. In the long run, customers finance the operation of an enterprise, providing shareholders and lenders with returns on capital at the same time.

However, there is an ongoing concern of whether all customers are profitable on the appropriate level or not. Numerous companies adapt their products and services to customer requirements to increase their purchasing satisfaction. Unfortunately, it is a common phenomenon that such actions are periodically connected to income decrease or even generate loss at times. For many enterprises above-standard range of services are: smaller and more frequent deliveries, direct deliveries to the customer, managing differentiated and individualised pricing and discount schemes, producing and storing more diverse products. Such activities encourage excessive growth of indirect costs.

Figure 1: Whale curve of customers



Source: Own elaboration.

Customer profitability in Time-Driven Activity-Based Costing may be illustrated by the whale curve of customers. The whale curve in the aspect of products profitability presents the situation, when enterprises are making profits on the small part of sold products, while losing great amount of income on the rest products. Such phenomenon may be interpolated on the customers perspective, thus the whale curve of customers presents the situation, when enterprises are making profits on the narrow group of clients, while losing a great amount of income on other customers. Figure 1 presents the whale curve of customers.

Horizontal axis represents customers by decreasing profitability and vertical axis represents cumulative net profit. The left part of the chart with a positive slope depicts the most profitable customers, while the right part of the chart with a negative slope identifies unprofitable customers generating loss. The maximum of the whale curve presents customers, whose service is break-even. It is interpreted as a maximum potential profit (in this case 180%), which is possibly achieved, if unprofitable customers will be led to the break-even level.

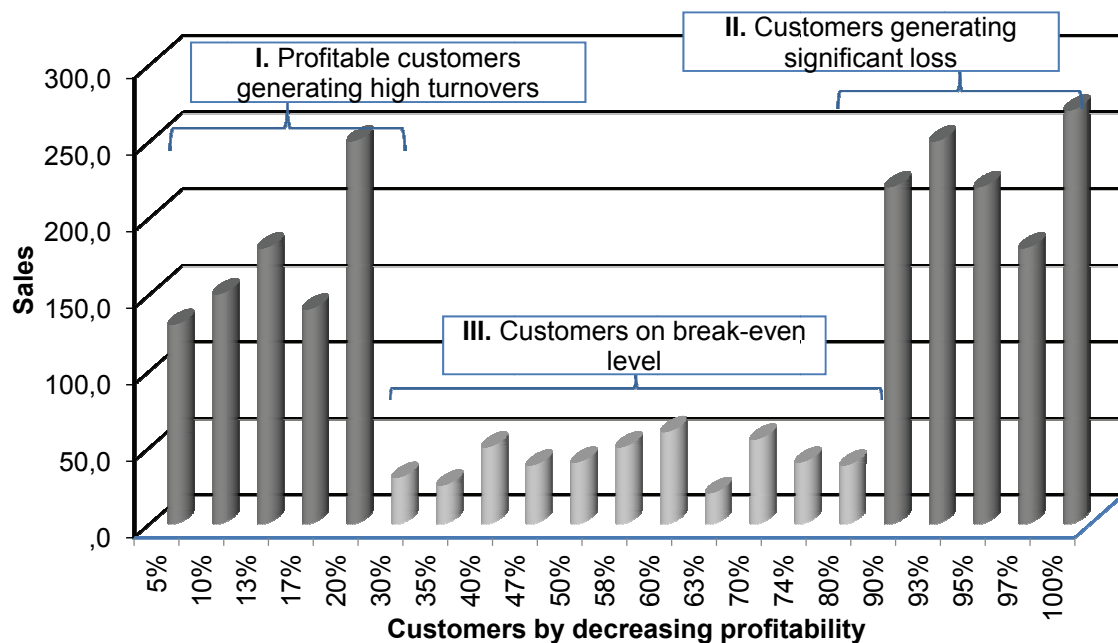
Figure 1 shows that 20 percent of customers generate 180 percent of profit, while 80 percent is on the break-even point, or generate 80 percent loss in profit. The final profit level turns out to be 100 percent.

It is worth noticing that the part of the biggest customers proves to be unprofitable. This is due to the immense turnover realised with them, which translates to either great profit or great loss. The conclusion, which may be drawn from such a phenomenon is that key customers are either highly profitable or highly unprofitable – they are never supposed to be on the break-even level (Kaplan & Narayanan, 2001).

Time-Driven Activity-Based Costing may be used to identify profiles of profitable and unprofitable customers, which allows to implement managerial solutions making unprofitable customers move from the right to the left part of the whale curve. The enterprise, which is able to calculate the value of a particular customer or customer segment has an advantage of over 99% of its competition (Selden & Colvin, 2003).

Figure 2 presents sales profits in customers cross-section. Comparing it to the whale curve from figure 1, it is possible to analyse the profitability of customers according to profits they generate. It is important that those high sales-effective customers can be found on both left and right side of the whale curve.

Figure 2: Sales profits by customers



Source: Own elaboration.

Figure 2 presents three groups of customers:

1. *Group I* – highly profitable customers generating high sales turnovers. Profitable customer profile.
2. *Group II* – customers generating high turnovers, while generating significant loss.
3. *Group III* – customers generating low turnovers located on break-even point with the tendency generate loss. Unprofitable customer profile.

Surely, the enterprise should not get rid of unprofitable customers from *Group II* because created connections are extremely valuable and difficult to retrieve, if broken. It is important to understand the source of unprofitable key customers. Various researches conducted to analyse the customer profitability have proven that gross margin on customers from *Group I* and *Group II* is approximate, which indicates that pricing and discount schemes have an insignificant impact on customer profitability. It turns out that customers from those groups report different demand for sales and logistics activities. Mainly, costs called the ABC/M of the customer are the problem in such system because they depend on many various factors, for example localisation or purchasing behaviour of customers.

Efficient actions, which may be undertaken to improve customer profitability (Kaplan & Anderson, 2007):

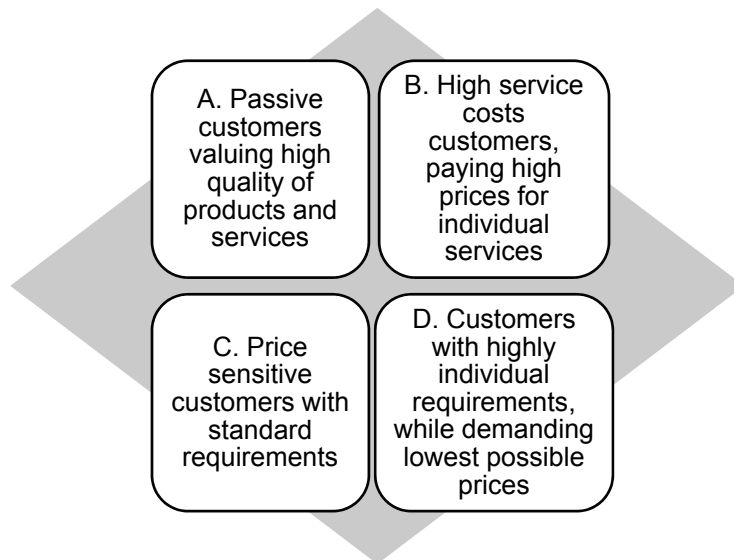
- raise products prices to compensate extraordinary production efforts,
- implementation of optimal production series,
- modernise machinery to lower machines working process costs, which leads to lowering production costs,
- implementation of motivational pricing and discount schemes, encouraging the customer to place bigger and less frequent orders (discount system for standard orders, higher pricing for non-standard orders),
- implementation of modern IT technologies to simplify and lower ordering cost,
- negotiate new transport contracts to lower their costs,
- implementation of discounts on transport minima or customer self-acceptance.

It should be remembered, while implementing pricing and discount schemes, that it influences on losing a part of the revenue. Moreover, costs are mostly accounted on various formalised accounts, while they are not assigned to specific customers. It is also an often case that the pricing and discount policy is quite random, based on negotiation possibilities with particular customers, not on economics

of customer service. Precision findings concerning customer orders and price calculation have an impact on lowering overheads. Thus, it is possible to make unprofitable customers profitable using price negotiations, assortment structure, order conditions, variability of products, communication, distribution, and payment methods.

Figure 3 presents customers segmentation into four groups by the cost of service

Figure 3: Customer profiles by the cost of service



Source: Own elaboration based on Shapiro, et al., 2007, p. 104.

Customers from the *Group A* need special protection in the enterprise customer portfolio due to high gross margins they provide, while not generating high costs. This group of customers is vulnerable to marketing activities of enterprises' competitors. Thus, the company has to be ready to grant customers from the *Group A* special discounts and individual services.

Group D is a specific challenge managers have to face. This group generates low margins and high SMDA (Sales, Marketing, Distribution, Administration) costs. Managers have to identify ineffective activities leading to increase in costs and increase not only in effectiveness of such activities but encourage customers to change their irrational purchasing behaviour as well. Figure 3 presents an alternative to Porter's theory, which encourages to choose a specific competitive advantage strategy.

There is a possibility to move customers from right to left part of the whale curve, making them profitable through correcting activities described above. However, if some customers still belong to the *Group D*, the situation should be reanalysed before deciding about non-cooperation with them. If customers are not new in the company's portfolio or do not provide non-financial benefits (such as prestige, advertising, reliability or know-how), then ending the cooperation with customer is an option that should be considered. The safest solution may be making the customer to resign himself, if needed, by reduction of discounts or increasing prices of ordering process.

3. CASE STUDY OF POLISH LABORATORY DIAGNOSTICS MARKET'S ENTERPRISE

3.1. Enterprise characteristics

The analysed enterprise is a polish company operating on a widely understood sphere of biotechnology on laboratory diagnostics market. The company delivers its products to almost 1800 laboratories in Poland and it is also exporting them to Lithuanian, Latvian, Romanian, and France markets. The enterprise has implemented current ISO standards, which are complementary to modern cost accounting methods.

At the moment, when the research was conducted, the company employed 82 employees, so it belonged to the SME sector, being a medium enterprise. The analysed company is listed on the Warsaw Stock Exchange on the NewConnect¹.

3.2. Research hypotheses

Regarding the purpose of the study and research two hypotheses may be made:

H1: There is a significant difference between cost of different customer groups in Time-Driven Activity-Based Costing system and that of traditional accounting system in the analysed enterprise.

H2: There is a significant difference between profitability of different customer groups in Time-Driven Activity-Based Costing and that of traditional accounting system in the analysed enterprise.

Hypotheses will be tested descriptively due to a broad and multi-level research, which is not suitable for only statistical and mathematical testing. Conclusions drawn from the research will serve as a basis to either accept or reject the hypothesis.

3.3. Research methodology

The research lasted six months. During this period, essential data have been gathered and results have been accordingly elaborated. The study covered the cost analysis and customer profitability analysis using Time-Driven Activity-Based Costing.

The research consisted of following steps:

1. Analysis and segmentation of customers of the enterprise – four specific groups of customers have been distinguished taking the company customer portfolio into consideration.
2. Drafting the whale curve of customers for the enterprise.
3. Customer Profitability Analysis in the analysed company based on Time-Driven Activity-Based Costing
4. Selection of one random customer from each previously distinguished group and the analysis of their cost structure.
5. Project activities, which could provide improved profitability and lower costs for every previous randomly selected customer that is also a representative of the group, from which he has been selected.

3.4. Case study

The company have not performed any analyses of neither recipients nor suppliers. The enterprise used an electronic accounting system to support its operations. Costs registry has been carried out according to their types and cost centers. Indirect costs have been allocated based on appropriate settlement keys. In the researched company it is assumed that indirect costs (mainly sales costs) are proportional to the amount of sold and delivered products and goods.

Table 1: Customer segmentation in the researched company

No.	Customer group	Percentage of the total number of customers	Percentage of sales
1	National distributors	6.21%	16.08%
2	Tender customers	30.11%	43.03%
3	Individual customers	62.17%	35.64%
4	Export distributors	1.51%	5.25%

Source: Own elaboration based on data collected from the enterprise.

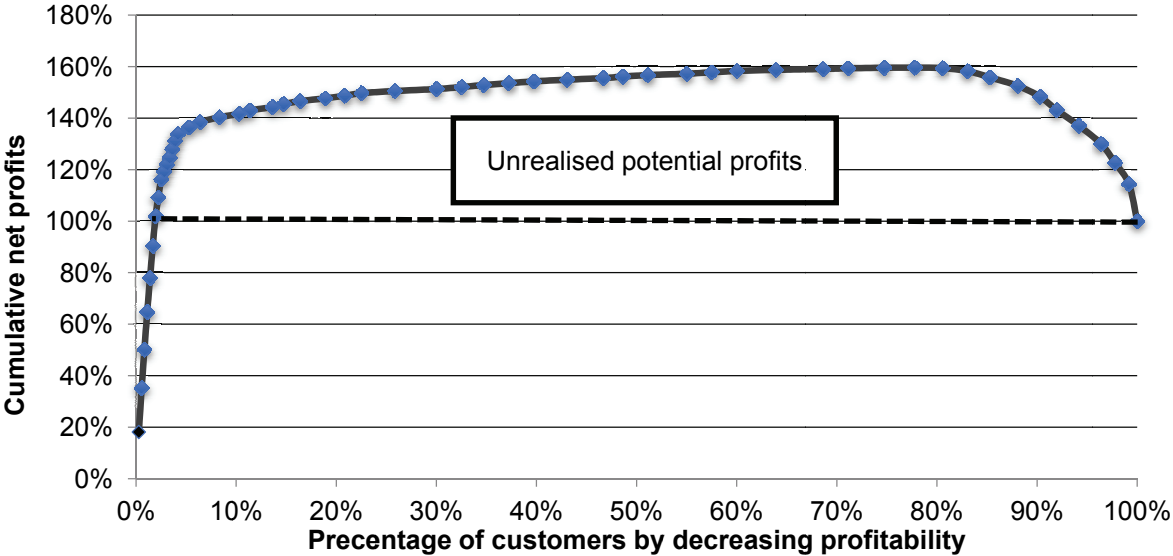
Table 1 presents four customer groups distinguished from the company's customer portfolio. These four groups are: national distributors, tender customers, individual customers, and export distributors.

¹ NewConnect is an alternative stock exchange allowing smaller companies to float shares run by the Warsaw Stock Exchange. The exchange is conducted outside the regulated market as an multilateral trading facility. Compared to the main market of Warsaw Stock Exchange, NewConnect offers lower costs for floated companies, simplified entrance criteria and limited reporting requirements

The table also includes the share of each group of customers in the total number of customers, and total sales.

Figure 4 presents the whale curve of customers in the company. It is clearly seen that the shape of the curve is similar to the theoretical model presented in the previous section – about 20% of customers generates almost 150% of the total profits. Between 20% and 80% of customers there is a little profit – about 10%. They are customers generating a little profit or being on break-even point. Moreover, among them there is a group, which may generate a little loss. Next 20% of customers belonging to the right part of the curve are decreasing potential profits of the company almost by 60%, which leads to the final level of the profits – 100%. The maximum of the whale curve of customers is 160% of the total profits generated by almost 80% of customers. However, the biggest profit growth is on the range of 1% to approximately 20% of customers, reaching 160% of the profits.

Figure 4: The whale curve of customers in the researched company

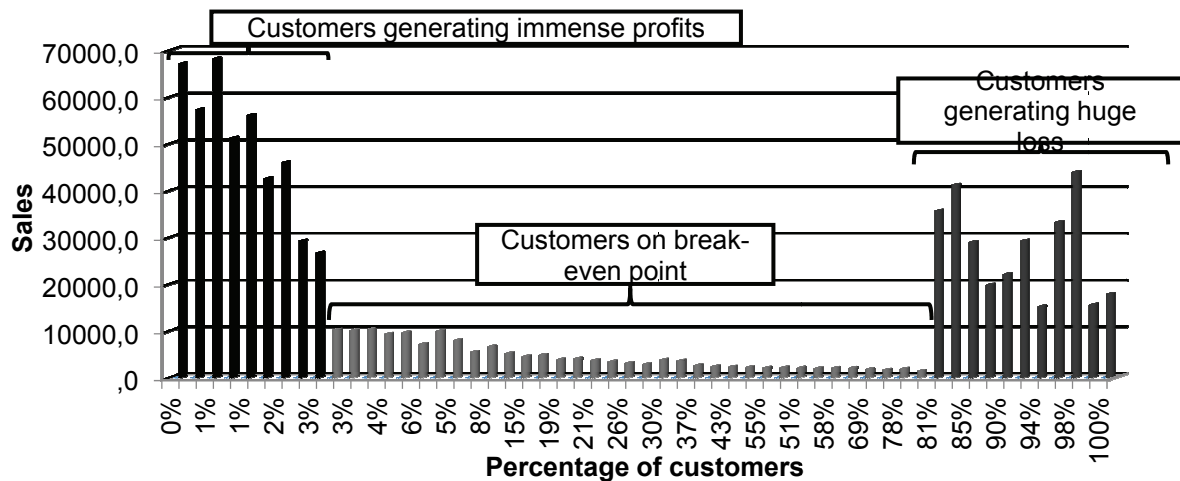


Source: Own elaboration based on data collected from the enterprise.

The purpose of the customer analysis is to identify profitable and unprofitable customers and project a set of improving activities being aimed to move unprofitable customers to the left part of the whale curve presented in figure 4.

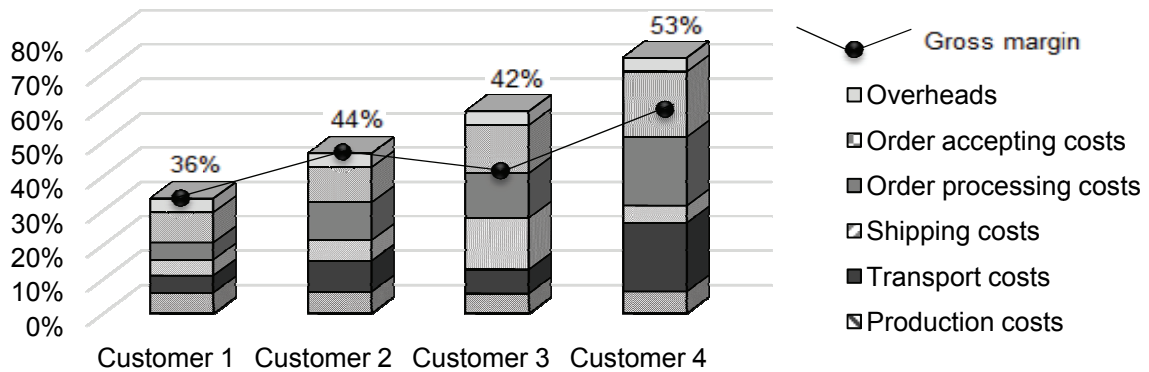
Figure 5 presents sales profits of specific customers. Horizontal axis represents customers according to decreasing profitability and the vertical axis represents sales profits generated by particular customers. Both in theoretical model, as well as in the case study, the biggest customers prove to be most and least profitable. This is due to high turnovers, which have an impact on either immense profits or huge loss for the researched company.

Figure 5: Customers profitability in the researched company



Source: Own elaboration based on data collected from the enterprise.

Figure 6: Costs of core business processes for chosen customers



Source: Own elaboration based on data collected from the enterprise.

Figure 6 presents costs of core business processes for four randomly chosen customers – one from each group from table 1. Analysing the structure of costs for *Customer 1*, it can be seen that order accepting costs are dominating. This customer places his orders mostly via telephone. Production costs are also relatively high. *Customer 1* may be classified as profitable because the share of costs in profits (30%) is lower than gross margin for this customer (36%).

Customer 2 shows high order accepting and order processing costs. This is due to a specific purchase behaviour of the customer. This customer purchases highly individualised products relatively often but in small quantities. The company treats every order separately using standard administrative procedures to each one. The high level of order accepting costs results from the ongoing price negotiation process with this customer. Transport costs have a significant share in overall costs because products, which are bought by *Customer 2* require specialised transport conditions. *Customer 2* may be classified as the one on the break-even level. The share of costs in profits is equal to the gross margin for this customer. There are possible solutions allowing to correct the profitability of this customer: encouraging the customer to place larger and less frequent orders, encouraging the customer to place orders via e-mail, fax, negotiating fixed prices of purchased products, attempting to fix prices of products to higher levels to compensate special efforts connected to the customer, attempting to negotiate the split of transport costs between the customer and the company.

Costs structure of *Customer 3* proves to be stable but costs of order accepting, order processing, and shipping remain relatively high – such level results from placing orders on various products in small quantities. Receiving every order from *Customer 3* has been lasting about 20 minutes, generating high costs. High costs of order processing is a disturbing phenomenon, which is due to frequent changes in orders made by the customer. If these costs will not become settled in the coming months, managers

should solve the problem. The possible solution seems to be the dialogue with the customer and the emphasis on the fact that costs of frequent changes in orders not only burdens the company but the customer as well. Such costs may be the effect of yet unidentified ineffectiveness sphere on the line customer-company. Moreover, *Customer 3* proves to be costly in terms of shipping. It results from the fact that the company has to use external services for the shipping, which is due to the decision of taking the burden of shipping costs on itself for the first few months of cooperation to make the offer more attractive. *Customer 3* is unprofitable at the moment. It should be mentioned, however, that the customer is new in the company's customer portfolio, so with the passage of time, the situation may stabilise.

Customer 4 proves to be costly in spheres of order accepting, order processing and transport. High transport costs results from the geographical reasons – the headquarters are located far from the location of the researched enterprise. Moreover, *Customer 4* places orders via telephone, purchasing small quantities of products, which reflect in lowering the sales profitability. *Customer 4* is definitely unprofitable. The profitability improvement may be obtained by: proposing new structure of prices calculations with a 10% discount for large orders placed on standard products, while pricing small orders higher – up to 30% more, implementing discounts for transport minima, negotiating new set of rules concerning transport to lower its costs, encouraging the customer to place orders via e-mail, fax.

4. CONCLUSIONS AND FURTHER RESEARCH PERSPECTIVE

There are both profitable and unprofitable customers in the customer portfolio of every enterprise. Case study confirms both hypotheses. Therefore, it is true, that using Time-Driven Activity-Based Costing in customer profitability analysis, not only there is a significant difference in cost of different customer groups but there is also a significant difference in profitability of different customer groups.

Every company has a possibility to influence the profitability of customers making unprofitable customers profitable. However, such actions require time and a good planning. There are several solutions, which are supposed to improve customers profitability in the researched company presented in the article. Implementing modern cost accounting methods is helpful in profitability improvement process.

Authors have chosen Time-Driven Activity-Based Costing to analyse customer profitability but there are other more precise methods for customer profitability analysis, primarily Cost-to-Serve.

The paper is a comparative basis for the further research. Research results from it will be compared to results derived from the study using Cost-to-Serve. The same enterprise, which is researched in this article will be analysed again with the usage of different cost accounting method, which is known to be able to allocate costs in a way that makes all customers in the company's portfolio profitable.

After the research implementing Cost-to-Serve in the enterprise, there will be a basis to determine, which of cost accounting method is more efficient in the customer profitability analysis. Comparison of the current and the future case study will be appropriate because the next research will take place in the small interval from the current one.

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