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Identifying Vertical Product Differentiation in Three Polish Manufacturing Industries: an Enterprise Survey

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Keywords: **product differentiation, quality, competitiveness, manufacturing**.

Contents

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Abstract

The paper attempts to identify indirectly vertical product differentiation in three industries of Polish manufacturing (manufacture of glass and glass products, manufacture of other general purpose machinery and manufacture of other special purpose machinery) by examining how focus on a given group of customers (segment) is related to company characteristics. Changes in companies' segment orientation between 2002 and 2005 are examined and the factors of these changes are discussed. The analysis is based on a survey of 77 companies.

The data support the hypothesis that there exist segments in the consumer goods market, defined by the income level of customers. In the capital goods market, it is shown that domestic-owned customers are the low-end segment of the market, whereas foreign-owned customers constitute a higher segment. It seems that industries producing capital goods have shifted towards higher market segments between 2002 and 2005 and their principal motive was the pressure exerted by competitors, both domestic and foreign.

Introduction

The problem of heterogeneity of products offered on the markets has been of interest to both, the mainstream economics, which analyzed it with its Industrial Organization product differentiation models, and for those non-mainstream economists, who prefer the Schumpeterian approach and are reluctant to equilibrium analysis.

Regarding empirical research, apart from the literature devoted exclusively to product heterogeneity or variety[1], there have been studies, which sought to apply this knowledge in the analyses of other problems. In particular, a recent paper on the competitiveness of Polish manufacturing industry by Wziątek-Kubiak and Magda (2005) analysed, among other things, changes in the *relative unit export value*[2] of Polish products, which is interpreted as changes in the quality of the Polish exports to EU-15. The authors observed an increase in the RUEV of Polish aggregate exports between 1996 and 2003, which suggests an increase in their quality. They also identified manufacturing branches (as defined by the 3-digit level of the NACE-Rev-1 classification), that increased or decreased the quality of their products.

The first goal of this paper is to supplement these findings by a micro level analysis based on the results of a survey conducted among 77 firms from three branches of Polish manufacturing. We will seek to identify vertical product differentiation (differences in quality) by considering the segments of markets where firms operate, and to analyse the changes in their segment orientation between 2002 and 2005 . Our second goal is to propose explanations to the observed changes. The small numbers of companies analysed within each industry obviously limit the generality of the conclusions, yet we believe that this paper can at least make a small methodological contribution to the research into quality and competitiveness problems of Polish manufacturing.

The structure of paper is as follows. In the first part, we shortly present theoretical approaches to differentiation and product quality. In the second part, the theoretical framework of this paper and the methodology of research is presented. In the third section we discuss the results of the analysis. Conclusions wrap up the paper.

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[1] See e.g. the book of Anderson, Thisse and de Palma (1992).

[2] *Unit export value* (UEV) is defined as the ratio of the value of (a bundle of) exported goods over their quantity measured in metric tones. *Relative unit export value* was defined by Wziątek-Kubiak and Magda as the proportion of the UEV of Polish exports to the EU-15 and the UEV of the EU-15 internal exports.

1. Product differentiation and non-price competition in the economic theory – a short review

1.1. Mainstream economics

Mainstream economics defines *product differentiation* as a situation when producer introduces to the product some characteristics that might increase the utility from this product for all the consumers on the market (*vertical product differentiation*) or for some of the consumers (*horizontal product differentiation*). Historically, the theory of horizontal product differentiation is older, as it has been launched by Harold Hotelling in 1926 (Hotelling 1926). However, in this paper we are going to focus on vertical differentiation models, as they can be easily interpreted in terms of quality: higher utility of all consumers is identified with higher quality. That is why these models can be directly applied in the empirical analysis.

An important terminology reservation should be made at this point. Quality, in the sense of vertical differentiation is *performance quality,* i.e. the way consumer perceives the product. Otherwise, one can frequently encounter a different approach, where high quality means low percentage of defectives in firm's output, in other words a high level of the technical conformance of product and project (*conformance quality*, see Reeves and Bednar 1994). This definition is often used in the management science[3]. However, in this part we will focus on performance quality while conformance quality will be briefly addressed in the empirical part only.

In the classical models of vertical differentiation (Shaked and Sutton 1983 and 1987, Gabszewicz et al. 1981) one assumes (as does Hotelling) a continuum of consumers, out of which each one has different parameters of choice. Contrary to the Hotelling model, all consumers have the same valuation of the products, in the sense of the quality classification, but they differ in income. More precisely, a certain continuous distribution of income over the population of consumers is assumed. One assumes as well, that the utility function is a product of the utility from quality of the purchased product and the utility from the money that is left after the purchase.

These assumptions have several implications. First of all, in equilibrium, the price of a higher quality product is higher than the price of a lower quality product. Secondly, if the number of products is finite, the consumers may be classified into "segments", i.e. one may determine ranges of income such, that all the consumers from a given range choose the same product. Thirdly, there exists a minimum quality which will be purchased and under certain assumptions concerning the distribution of income this quality is higher than zero. As a result, there may exist a product, which will not be chosen even if offered at a zero price. It can be shown that the minimum acceptable level of quality is the higher, the higher the income of the poorest consumer is. The fourth characteristic of the model is linked to the third one: under certain assumptions on the distribution of income or on the cost function, the number of products which can be sold in equilibrium is limited. And finally the fifth characteristics: the number of products which may be maintained on the market does not necessarily grow with the increase in incomes. The reason behind is that the competition among higher quality products lowers their prices to such an extent that the product of lower quality loses all of its attractiveness. If the income spread is limited, the products of the lowest quality will be pushed out of the market.

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[3] The topic extensively worked on in this literature is the problem of organizing the production process in a way to obtain the optimum level of conformance quality, as well as the issue of profitability of investing in such improvement of production process (e.g. Karmarkar i Pitbaldo 1997).

The second model we would like to invoke is the work of Banker et al. (1998) in which the demand side is modelled with a representative consumer function, the number of firms is predetermined, but the quality of the products is still endogen to the model. Each firm faces a negatively sloped demand curve, and the demand for its products is the higher, the higher is their quality and the lower is their price, and, respectively, the lower the quality and the higher the price set by competitors. Moreover, each firm has its own level of intrinsic demand. The choice of the quality level influences both fixed costs and variable costs. The authors have considered the case of a duopoly, in which one firm dominates (i.e. has a higher intrinsic demand) and the case of a symmetric oligopoly. The model is a two-stage game: firstly the competitors choose the level of quality and then the level of prices.

The authors analysed how the quality choices of the firms change, when the demand domination of one firm over the second increases or decreases in the duopoly, or when the number of firms grows in oligopoly. They find that the more perfect competition may increase or decrease the average quality in the branch, depending on the fixed cost of quality improvement.

1.2. Post-Schumpeterian approach

Industrial Organization models are subject to criticism from the Austrian school economists, in particular the ones following the legacy of Joseph Schumpeter. The main charge is that mainstream economics is unable of characterising accurately the process of competition, since it ignores "entrepreneurial rivalry" which is the essence of competition (see the review article by Stigler 1998). One of the factors allegedly not accounted for by mainstream is "entrepreneurial discovery" which in view of the Austrians is not properly analysed by uncertainty models (Kirzner 1997). It is also claimed that Industrial Organisation models are "static" (Wziątek-Kubiak 2003, p.21). The quotation marks are justified here, as some of those models certainly are not static in the mainstream economics sense of the word, e.g. multi-stage games. It is more about the fact that the equilibrium – a state in which no one is able to improve her position – even if exists, is by its very nature of no interest for the researcher of competition processes. For competition implies a continuous search for improvements, resulting in contradictory objectives and thus in a struggle, that makes it impossible to maintain any kind of equilibrium.

Lack of formalization is undoubtedly a weakness of this approach[4] and it also makes it difficult to formulate the definition of quality precisely. It seems that the technical characteristics of the product are of a lower importance here: what matters is the price realised on the market (Wziątek-Kubiak, Magda 2005). This is because an increase in price related to higher quality may allow the company to gain market shares, which is the principle goal of companies according to the Post-Schumpeterian paradigm.

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[4] "Such realistic reversion to the competitive concept of the classical economists hale not been systematically formalized into theoretical models" (Stigler 1998, p. 535).

2. Methodology of this paper

2.1. Theoretical framework

Instead of a formal model, we will present now some theoretical assumptions, our empirical analysis rests on[5]. They are based on the mainstream models discussed above but do not seem to contradict the Post-Schumpeterian approach either (at least some of them).

1. Quality is identified with the vertical product differentiation in the sense of higher utility to every consumer as in the model of Shaked and Sutton.

2. Consumers can be divided in segments, differing in their budget constraint, as in the model of Shaked and Sutton. Higher segments buy higher quality.

3. On the supply side, higher quality invokes higher costs due to more expensive and better quality inputs, as in the model of Banker. If company is a multiproduct one, then higher <u>average</u> quality implies higher costs. We draw two consequences from this assumption:

   a) Main competitors in the higher segments are companies from more developed countries

   b) Bigger companies produce higher quality goods (this however applies only to sectors with high fixed costs of quality)

4. There are three reasons for which a company could be improving the quality of its products:

   a) a change in the production function (e.g if company's technology improves due to capital accumulation or takeover by new investors)

   b) a change in the competition structure (e.g. if new low-cost competitors enter the segment company currently operates in)

   c) a change on the demand side[6];

2.2. Methodology

The paper is based on a survey of 77 manufacturing firms from three industries: manufacture of glass and glass products (NACE code 261), manufacture of other general purpose machinery (NACE code 292) and manufacture of other special purpose machinery (NACE code 295). The survey was conducted in spring 2005 and the questions referred to the situation at that time, as well as to the situation in 2002. Some accounting data for the end of 2002 and 2004 were also asked after.

The analysis will consist of three steps:

   a) Identification of market segmentations relevant for the firms;

   b) Observing changes in companies' segment orientation

   c) Looking for determinants of these changes

Research methodology will be presented according to these three steps.

a) Identification of market segmentations relevant for the firms

We hypothesise that the following kinds of segmentations of the market matter for the surveyed companies:

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[5] We do not rule out a formalization in the next version of this paper.

[6] This however might distort the old relationship between product characteristics and market segments and therefore it has some consequences for the empirical research.

- For consumer goods: customers with an income over average, those with an average income and those with an income under average. The data does not allow us to distinguish domestic and foreign customers.

- For capital goods: customers-firms with a predominant share of domestic capital; customers-companies with a predominant share of foreign capital (yet based in Poland); customers-firms based in the EU.

The second segmentation may raise some doubts, because, strictly speaking, EU customers are not a market segment but a different geographical market. One can identify them with a market segment – the highest market segment – only if two conditions are fulfilled: first, all the products we analyse are tradable goods (so that the consumption set of the EU customers is not smaller than that of domestic ones), and second, that they have the same valuation of quality as domestic customers. We believe that these assumptions are not too strong.

The verification of the hypotheses will consist of demand-side and supply-side analyses (in case of the first segmentation where only the supply-side will be examined). Consequently, we will first check if the hypothesized segments indeed differ in terms of requirements of the customers. Companies were asked this question directly but we will supplement their answers by examining the price elasticity of demand in individual segments. On the supply-side we will attempt to answer the question if the choice of market segment was related to a certain level or quality of inputs. In case of the EU-customers in the second segmentation we will bear in mind that exporting requires additional inputs such as freight costs, insurance costs, more bureaucratic work etc.

We have to make two additional remarks at this stage. First, the theoretical assumptions we outlined above make it necessary that **we analyze each NACE industry separately**: we cannot merge to one "market" products that are not substitutes or have different production functions. Unfortunately if we break down the sample into NACE industries and we consider consumer goods and capital goods separately, then we end up with rather small samples of companies. This obviously limits our analysis.

Secondly, we are unable to use the one-dimensional measure of average quality of company's products which would seem optimal in the light of the theoretical assumptions. This optimal measure would be the average income of the firm's customer. We cannot calculate that indicator, because the segments are defined too roughly, especially in the case of capital goods. Consequently, we have no weights to calculate average quality.

What we are going to do, instead, is to look at the correlations between the share of sales realised in each of the segments and a given characteristic of demand or supply. Since we distinguished three hypothetic segments in each of the markets, this method cannot always provide an unambiguous classification of segments: if the correlation with the focus on segment A is significantly positive and the correlation for B and C close to zero – then it says nothing about B and C. We believe, however, that we run a sufficiently large number of "test" so as to draw conclusions on segmentation.

b) Observing changes in companies' segment orientation

We will observe how companies move across segments while examining the statistical significance of the changes. Our inability to calculate the average quality of companies' products will make this part of the analysis particularly difficult.

c) Looking for the determinants of these changes

We will attempt to verify, among other things, two of the three hypotheses suggested by the model of Banker (see 2.1). According to that paper improvements in quality could be (i) a result of the (autonomous) company development, (ii) response to competitors, (iii) consequence of changes in customer requirements. We will be able to check the two latter hypothesis by analysing the question after the motives for quality improvement asked in the questionnaire.

3. Results of the analysis

3.1. Identifying segments of the market

As explained above we will analyse separately firms manufacturing consumer goods and firms manufacturing capital goods and we will test separately their hypothetic market segmentations.

3.1.1. Consumer goods: segmentation by the income level of customers

Companies producing consumer goods all belong to the NACE category 261 (manufacture of glass and glass products)[7]. We will distinguish three groups of customers: those with an income over average, those with an average income and those with an income under average. We do not distinguish between domestic and foreign customers. Since the group of companies is small (23 firms) and the empirical material proved to be rather limited, we will perform only a supply-side analysis for this segmentation[8].

Supply-side analysis

We start our research into the inputs of companies from investigating the labour factor: wages and the level of human capital[9]. As evidenced by the results of the Spearman rank correlation, the higher the share of high-income customers in company's portfolio, the higher the average wage and the relationship is significant at the 1% level (Table 1). A reverse relationship (with high p-values) can be observed for the middle- and low-income customers, which proves that higher wages was associated with the upper segment only.

Table 1. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. average wage paid by the company - Spearman's correlation

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
average wage	Correlation Coefficient	,554(**)	-,361	-,382
	Sig. (2-tailed)	,006	,090	,072
	N	23	23	23

** Correlation is significant at the 0.01 level (2-tailed)

The analysis of human capital shows that a higher share of high-income customers is correlated with a high share of marketing staff and especially – R&D staff. As expected, the correlation with the share of low-income customers is negative (and quite strong). Interestingly, there seem to be a negative relationship between orientation on more wealthy customers and the share of workers with university education (Table 2).

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[7] Three companies from the NACE group 295 (manufacture of other special purpose machinery) that declared producing consumer goods were excluded from the analysis

[8] Although in the section 3.1.2 we do perform a supply-side analysis for an even smaller groups of capital goods producers from the NACE industry 292, in that case we use questions about the requirements of different groups of consumers, which were not asked consumer goods producers.

[9] We have to acknowledge that several companies discussed in this section produce also capital goods, so the analysis of inputs might be to some extent distorted by this fact.

Table 2. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. shares in employment of different kinds of staff

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
Share of white-collar staff	Pearson Correlation	-,040	-,012	,048
	Sig. (2-tailed)	,856	,957	,828
	N	23	23	23
Share of workers with university education	Pearson Correlation	-,353	,031	,331
	Sig. (2-tailed)	,107	,893	,133
	N	22	22	22
Share of R&D staff	Pearson Correlation	,472(*)	-,089	-,408
	Sig. (2-tailed)	,027	,692	,060
	N	22	22	22
Share of marketing staff	Pearson Correlation	,357	-,010	-,345
	Sig. (2-tailed)	,095	,962	,107
	N	23	23	23

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Regarding other inputs, companies were asked to rate the competitiveness of their own technology in a three-point-scale. Again, the firms which were concentrated more on the wealthy customers thought more of its production technology, while the ones focused on the low-end segment of the market considered their technology not competitive.

Table 3. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. companies' opinions on the competitiveness of their technology

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
Company's own rating of its technology as compared to domestic competitors	Pearson Correlation	,408	,082	-,460(*)
	Sig. (2-tailed)	,054	,711	,027
	N	23	23	23
Company's own rating of its technology as compared to industry's world leaders	Pearson Correlation	,371	,040	-,395
	Sig. (2-tailed)	,081	,856	,062
	N	23	23	23

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

We should mention at this place, that the question if the company had an ISO certificate (or other kinds of quality-management schemes) had no relationship whatsoever with company's orientation in terms of market segments.

To obtain further insights into the costs and quality of production processes we checked how companies answered the questions about the biggest cost-side obstacles to a growth in their sales. Companies were presented a list of possible obstacles and they were asked to assess each of them in a five-point-scale. The results are reported in Table 4. Little surprisingly, firms that sold primarily to richer customers were satisfied with their technology, while the firms focused on less wealthy clients were not (the answers are strongly correlated with the answers to the previous question). The positive relationship between the income level of the customers and the human capital in the company is also confirmed.

Table 4. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. main cost-side obstacles to the increase in company's sales

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
Excessive labour costs	Pearson Correlation	-,174	,127	,083
	Sig. (2-tailed)	,427	,563	,707
	N	23	23	23
Insufficient labour skills	Pearson Correlation	-,544(**)	,124	,450(*)
	Sig. (2-tailed)	,009	,584	,036
	N	22	22	22
Terms of financing the investments	Pearson Correlation	,049	-,095	,018
	Sig. (2-tailed)	,829	,673	,935
	N	22	22	22
Outdated production technology	Pearson Correlation	-,540(**)	,157	,424(*)
	Sig. (2-tailed)	,009	,487	,049
	N	22	22	22
Insufficient scale of production	Pearson Correlation	-,207	-,122	,290
	Sig. (2-tailed)	,355	,589	,190
	N	22	22	22
Insufficient level or insufficient use of IT	Pearson Correlation	,155	-,281	,044
	Sig. (2-tailed)	,492	,205	,844
	N	22	22	22

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

When comparing companies from the same industry, labour productivity, defined by revenue from sales per employee is a relevant measure of firm's technological and organisational efficiency. The results of correlation analysis show again that firms focused on higher market segments were superior in those respects (Table 5). Interestingly, the negative correlation is significant for the middle segment of the market.

Table 5. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. main cost-side obstacles to the increase in company's sales

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
labour productivity (revenue from sales per employee)	Correlation Coefficient	,253	-,425(*)	-,037
	Sig. (2-tailed)	,245	,043	,867
	N	23	23	23

* Correlation is significant at the 0.05 level (2-tailed).

We checked main competitors of the firms focused on different groups of customers. The results confirm the difference between the high and the middle segment of the market with respect to the role of the competitors from less developed countries (Table 6).

On the other hand we found little evidence of a relationship between the size of the company and segment orientation, apart from a notable correlation between revenue from sales and focus on the high segment (Table 7).

Finally, we looked at one "Schumpeterian" measure of quality competition. Companies were asked to assess in a three-point-scale the role of quality dimension and price dimension in their current "method of competition". Intuitively, one would expect that firms focused on higher segments would attach more weight to the former method, while the ones concentrated on lower

segment would choose the latter. The signs of the correlation analysis generally support this hypothesis, yet the correlations are weak and statistically insignificant (Table 8).

Table 6. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. the role of different types of competitors on the domestic market

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
Domestic competitors	Pearson Correlation	,042	,368	-,298
	Sig. (2-tailed)	,853	,092	,178
	N	22	22	22
Competitors from the developed countries outside EU	Pearson Correlation	-,166	-,086	,225
	Sig. (2-tailed)	,459	,703	,315
	N	22	22	22
Competitors from EU-15	Pearson Correlation	-,140	-,045	,169
	Sig. (2-tailed)	,534	,842	,452
	N	22	22	22
Competitors from less developed countries	Pearson Correlation	-,317	,412	,028
	Sig. (2-tailed)	,150	,057	,902
	N	22	22	22

Table 7. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. size of the company – Spearman's correlation

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
Employment	Correlation Coefficient	,078	,116	-,066
	Sig. (2-tailed)	,724	,598	,765
	N	23	23	23
Revenue from sales as of 31.12 2004	Correlation Coefficient	,349	-,240	-,204
	Sig. (2-tailed)	,103	,270	,349
	N	23	23	23

Table 8. Percentage of sales realised in the segments defined by the income level of customer in 2005 vs. the declared kind of competition

		High segment (customers with over-average income)	Middle segment (customers with average income)	Low segment (customers with under-average income)
price competition	Pearson Correlation	-,298	,162	,181
	Sig. (2-tailed)	,167	,460	,409
	N	23	23	23
quality competition	Pearson Correlation	,107	-,098	-,037
	Sig. (2-tailed)	,627	,656	,867
	N	23	23	23

3.1.2. Capital goods: segmentation by the customer company

In this section we will examine two markets for capital goods, defined by the NACE industries no. 292 (manufacture of other general purpose machinery) and no. 295 (manufacture of other special purpose machinery). We will examine if the following groups of customer firms: domestic-owned firms, foreign-owned firms and EU-based firms indeed constitute different segments of the market. Our main analytical tool will be, again, the correlation analysis. To maintain the transparency of the paper, most of the tables in this section were moved to the Annex.

Demand-side analysis

Companies were asked directly if the customers with the dominant role of foreign ownership had higher requirements with respect to the quality of the products. In the industry no. 292 a vast majority of surveyed firms did not see any difference between the two groups of customers (Table A 1, see Annex). In the branch 295, however this fraction constituted only 44% of firms, while 41% considered the foreign-owned customers to be more demanding (Table A 2).

If our segmentation of the market meets the criteria of vertical product differentiation, then higher segments of the market should have a lower price elasticity of demand. We tried to see if this indeed was the case by analysing changes in prices and changes in the volume of sales of products **that were not changed in terms of quality (technical nor non-technical)** between 2002 and 2005. We calculated Spearman's correlation coefficients between shares of sales realised in each segment and the quasi-elasticity of demand, defined by the ratio of change in sales over change in price[10].

Again, in the industry 292 there seems to be no relationship between the hypothetic segments and quasi-price elasticity of demand (Table A 3). On the other hand, in the industry 295 the more were the surveyed companies oriented at the segment of foreign-owned companies, the lower quasi-elasticity of demand, and the opposite is the case for the orientation on domestic-owned customers (Table A 4).

Supply-side analysis

Companies oriented more on foreign-owned companies were paying lower wages, and in case of the industry 295 this relationship is significant (Table A 5). In the same industry the orientation on the EU-based customer-firms was correlated positively with average wage.

In the industry 292 the level of human capital is positively and quite strongly correlated with the focus on foreign-owned customers (even if only the correlation with the share of marketing staff is significant at 5% level). There is also a considerable negative correlation with the orientation on domestic-owned customers (Table A 6). In case of this measure we found no significant correlations for the industry 295 (Table A 7). The analysis of human capital yielded no results with respect to the focus on the EU-based customers.

Regarding opinion of firms on their technology, in both industries the companies that were selling a larger share of their output to the EU-customers thought more on their technology and these correlations are significant at the 5% level (Table A 8). It is difficult to say anything about the domestic market: only in case of the industry 295 we found a substantial (yet insignificant at the 5% level) negative correlation between orientation at domestic-owned customers and company's own rating of its technology as compared to industry's world leaders (Table A 9).

In an attempt to assess indirectly the technological level of companies operating in the two segments we looked again at the biggest cost-side obstacles to the increase in company's sales. The analysis yielded few interesting results, however for the industry 295 the signs of the correlation coefficients suggest that focus on foreign-owned customers was related with a higher level of technology while focus on domestic-owned customers – with a lower level of technology (Table A 11). Note that all but one correlations with the share of foreign-owned customers are positive, which indicates that firms focused on that group of customers saw generally less cost obstacles to a growth in their sales.

We investigated the labour productivity of companies defined by the sales-employment ration. We found a significant negative correlation between focus on domestic-owned customers and labour

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[10] It is not the textbook price elasticity of demand, because it also reflects shifts in the demand curve. In fact for several firms the quasi-elasticity of demand we calculated was higher than unity.

productivity in the industry 295 (Table A 12). Correlation coefficients for the two remaining segments were positive and the one for the EU customers quite strong.

The analysis of main competitors on the domestic market suggests that in the industry 292 firms focused on domestic-owned customers were competing mainly with domestic companies while the ones selling a larger share of their output to the foreign-owned firms customers rather with companies from EU-15 (Table A 13). Correlations between the role of different kinds of competitors on the domestic market and firm's focus on the EU market are rather problematic and we will not discuss them. As regards the industry 295, we found no significant results.

Regarding the size of the companies, we find, again, significant correlations in the industry 292, where firms focused on foreign-owned, and especially on the EU-based customers tend to be bigger in terms of employment and revenue from sales, while the opposite is the case for the companies concentrated on domestic-owned customers (this holds however only for the revenue from sales, see Table A 15). Again, we found no significant correlations in the industry 295.

Finally we looked at the "Schumpeterian" measure of the role of the price and quality dimension of competition. We found that in the industry 292 price competition was significantly and positively correlated with the focus on foreign-owned customers while quality competition was significantly and negatively correlated with the share of domestic-owned customers (Table A 17). In the industry 295 we did not find any significant results apart from a quite strong negative correlation between price competition and orientation on domestic-owned customers (Table A 18).

3.1.3. Conclusions from the analysis of hypothetic segmentations

Generally speaking we find that the segmentation by the income level of customers in the NACE industry 261 (manufacture of glass and glass products), was a correct one, i.e. the groups of customers we distinguished indeed constituted different segments of the market in the sense of the theory of vertical product differentiation. Especially the difference between the high and the middle segment seems substantial.

The results for producers of capital goods are more difficult to interpret, since different analyses yielded different results. Table 9 contains the summary of results of all "tests" we performed. Blank fields mean no conclusions or insignificant results. Question marks indicate ambiguous results.

For the industry 292 we have gained substantial evidence in support of the hypothesis that domestic-owned customers were the lowest segment of the market. On the other hand we cannot

Table 9. Summary of analyses of hypothetic segments in the capital goods markets

	No. 292 (manufacture of other general purpose machinery)				No. 295 (manufacture of other special purpose machinery)		
	Rank of EU-based customers	Rank of foreign owned customers	Rank of domestic-owned customers		Rank of EU-based customers	Rank of foreign owned customers	Rank of domestic-owned customers
Requirements							
Demand					2	1	3
Wage					1	3	2
Human Resources	2	1	3		2	1	3
Technology	2	1	3		1	2,5	2,5
Cost obstacles							
Labour productivity							
Competitors	?	?	?				
Firm size	1	2	3		1,5	1,5	3
Schumpeter	1	2,5	2,5		1	2	3
Average	1,50	1,63	2,88		1,42	1,83*	2,75

* plus we know that foreign-owned customers had higher requirements with respect to quality than domestic ones in the industry 295

really tell which group of the customers constituted the highest segment: the difference between EU-based and foreign-owned customers is tiny and it might be the result not of a higher quality but of the fact that exporting products requires additional resources (correlation of EU-export intensity with the size of the firm supports that supposition).

The situation is similar in the industry 295. Domestic-owned customers stand out as the low-end segment. It seems that the EU-based customers are the high-end segment, yet we cannot be sure about that.

3.2. Changes in segment orientation in 2002-2005

In this section we check if companies moved across the segment and draw conclusions about changes in the quality of their products. Here we will be able to relate to the taxonomy of NACE 3-digit industries proposed in the paper of Wziątek-Kubiak and Magda (2005). According to that taxonomy the manufacture of glass and glass products (261) were included in the cluster of "winner" industries i.e. the most competitive ones and ones that had a high and **growing** quality of their products in 1995-2003. On the other hand, both, manufacture of other general purpose machinery (292) and manufacture of other special purpose machinery (295), belonged to the export-oriented group, characterised by poor performance indicators and a low – but growing – quality.

3.2.1. Consumer goods

Analysis of changes in the segment orientation of the producers of consumer goods in the glass industry (261) yields ambiguous results. On the one hand, when we look at the mean changes in the shares of sales realised in different segments, we see that both extreme segments diminished to the advantage of the middle segment (Table 10). The point is, the decline in the upper segment is bigger, which could imply an overall decline in average quality of the output of surveyed companies (these changes, however, are not significantly different from zero, according to the T-test).

Table 10. Change in the share of sales realised in the market segments defined by the income level of the customers (in percentage points)

	N	Mean	Std. Deviation
High segment (customers with over-average income)	22	-1,1364	9,50336
Middle segment (customers with average income)	22	1,5909	7,77456
Low segment (customers with under-average income)	22	-,4545	5,32494

On the other hand, if we take a look at the number of companies that moved to higher and lower segments we find that the former were more numerous than the latter (again, we considered that a company moved to a higher segment if the upper segment increased more than the lower one). This result is reported in Table 11. Apparently the upward shifts were on average smaller than the downward ones.

Table 11. The number of companies that moved to higher/lower segments of the market

	Frequency	Percent
Move to a lower segment	4	18,2
No change	11	50,0
Move to a higher segment	7	31,8
Total	22	100,0

3.2.2. Capital goods

In the companies from the industry 292 we observe a decline in the share of domestic-owned customers and in the share of foreign-owned customers, and an increase in the share of EU-based clients (Table A 19). If we were absolutely sure that clients from the EU are the high-end segment of the market, then these developments would have to be interpreted as an increase in the average quality in the surveyed companies. Since we are not, we can only say that there are some arguments in favour of this statement (especially given that changes are not significantly different from zero see Table A 20)

In case of the firms from the industry 295 we can see a substantial – statistically significant – decline in the proportion of the domestic owned customers (Table A 21 and Table A 22). Yet we cannot be absolutely sure if that implies an increase in the average quality, because of the concurrent decline in the share of EU-based customers.

3.3. Attempt to explain changes

Firms were asked directly if they improved quality and if they did, then for what reasons. The problem is that virtually all the companies said they improved quality (Table 12), which would obviously contradict our findings – if it was not for the difference in the perception of the very notion of "quality". In the above analyses we were referring to the *performance quality*. On the other hand, the firms most likely declared an improvement in the *conformance quality* (see discussion in 1.1).

Table 12. Opinion of the firms on the improvements in the quality of their products

		industry			Total
		261	292	295	
Did the company improve the	Yes	24	17	28	69
quality of its products	No	1	1	6	8
Total		25	18	34	77

Firms were offered several explanations why they improved the quality of their products and these explanations refer to both *performance quality* and *conformance quality* (Table A 23).

"Strong domestic competition on the market of the products manufactured to date" stands out as the motive that played a substantial role in all three industries (note that a positive answer to this question suggests a change in the product characteristics so it indicates an increase in performance quality). Similarly, the import competition was important for the surveyed companies from all the industries.

Regarding the role of demand, producers of capital goods from both analysed industries (292 and 295) indicated quite frequently "Growth of demand for products of higher quality in the domestic market", which indicates performance quality. Note that for the producers of consumer goods in the glass industry (262) it was not among the principal reasons. Companies in all the industries attached an importance to the "adjustment to the requirements of the customer firm" which could be an indicator of improving conformance quality (because it implies no change in firm's target groups).

4. Conclusions

In this paper we sought to identify vertical product differentiation in three industries of Polish manufacturing. Based on an enterprise survey we analysed producers of consumer goods in the NACE industry 261 (manufacture of glass and glass products) and producers of capital goods in the NACE industries 292 (manufacture of other general purpose machinery) and 295 (manufacture of other special purpose machinery).

In the consumer goods market we hypothesised a market segmentation defined by the income level of customers. As shown by our analysis of survey data, including both supply-side and demand-side indicators, that segmentation meets very well the criteria of vertical product differentiation we discussed in the theoretical part.

In the capital goods market we assumed a segmentation into domestic-owned customer firms, foreign-owned (but domestic-based) customer firms, and EU-based firms. The results of the "tests" we ran were less straightforward than in the case of consumer goods, but we concluded that in both industries, 292 and 295, domestic-owned customers were the low-end segment. We were not sure which of the remaining two groups of customers was the highest segment and which was the middle one.

Having confirmed the differences among segments we analysed changes in segment orientation of the surveyed companies over time, which could indicate changes in the products' quality. We found ambiguous results in the glass industries: more companies moved up the quality ladder than down, yet the average quality could decline at the same time. For the industry 292 we found some evidence suggesting an improvement in quality. Although we observed significant changes in the segment orientation of the surveyed companies belonging to the industry 295, we were unable to determine without ambiguity that it indicated improving quality.

As for the motives behind quality improvements, companies in all the industries indicated competition, both domestic and foreign as the main reason. Interestingly, changes in demand played an important role for the producers of capital goods but less so for the producers of consumer goods.

Although the small number of surveyed companies limited both, the generality of our conclusions, and our analytical techniques, we believe that the general idea of the methodology proposed in this paper can be used in similar studies in future.

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Annex

Table A 1 Requirements of foreign-owned and domestic owned customers with respect to quality – industry 292

no. 292 (manufacture of other general purpose machinery)			Domestic-owned customers had higher requirements with respect to quality			
			Yes	No	Same	Total
Foreign-owned customers had higher requirements with respect to quality	Yes	Amount	1	1	0	2
		% of Total	5,6%	5,6%	,0%	11,1%
	Same	Amount	0	0	16	16
		% of Total	,0%	,0%	88,9%	88,9%
	Total	Amount	1	1	16	18
		% of Total	5,6%	5,6%	88,9%	100,0%

Table A 2 Requirements of foreign-owned and domestic owned customers with respect to quality – industry 295

no. 295 (manufacture of other special purpose machinery)			Domestic-owned customers had higher requirements with respect to quality				
			Yes	No	Same	No data	Total
Foreign-owned customers had higher requirements with respect to quality	Yes	Amount	2	11	0	1	14
		% of Total	5,9%	32,4%	,0%	2,9%	41,2%
	No	Amount	1	0	0	0	1
		% of Total	2,9%	,0%	,0%	,0%	2,9%
	Same	Amount	0	0	15	0	15
		% of Total	,0%	,0%	44,1%	,0%	44,1%
	No data	Amount	1	0	0	3	4
		% of Total	2,9%	,0%	,0%	8,8%	11,8%
	Total	Amount	4	11	15	4	34
		% of Total	11,8%	32,4%	44,1%	11,8%	100,0%

Table A 3 Percentage of sales realised in the segments defined by the kind of customer company vs. quasi price elasticity of demand – Spearman's correlation analysis in industry 292

no. 292 (manufacture of other general purpose machinery)		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
quasi price elasticity of demand	Correlation Coefficient	,402	-,316	,114
	Sig. (2-tailed)	,195	,317	,724
	N	12	12	12

Table A 4 Percentage of sales realised in the segments defined by the kind of customer company vs. quasi price elasticity of demand – Spearman's correlation analysis in industry 295

no. 295 (manufacture of other special purpose machinery)		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
quasi price elasticity of demand	Correlation Coefficient	,413	-,371	,264
	Sig. (2-tailed)	,079	,118	,275
	N	19	19	19

Table A 5 Percentage of sales realised in the segments defined by the kind of customer company vs. average wage – Spearman's correlation

			Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
292	average wage	Correlation Coefficient	,140	-,323	-,108
		Sig. (2-tailed)	,591	,205	,671
		N	17	17	18
295	average wage	Correlation Coefficient	,187	-,370(*)	,486(**)
		Sig. (2-tailed)	,290	,031	,005
		N	34	34	32

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table A 6 Percentage of sales realised in the segments defined by the kind of customer company vs. shares in employment of different kinds of staff – industry 292

no. 292 (manufacture of other general purpose machinery)		Share of white-collar staff	Share of workers with university education	Share of R&D staff	Share of marketing staff
Domestic-owned customers	Pearson Correlation	-,138	-,480	-,505	-,438
	Sig. (2-tailed)	,598	,060	,094	,079
	N	17	16	12	17
Foreign-owned customers (based in Poland)	Pearson Correlation	,186	,401	,528	,685(**)
	Sig. (2-tailed)	,474	,124	,077	,002
	N	17	16	12	17
EU-based customers	Pearson Correlation	-,103	,192	-,006	-,179
	Sig. (2-tailed)	,685	,460	,984	,477
	N	18	17	13	18

** *Correlation is significant at the 0.01 level (2-tailed).*
* *Correlation is significant at the 0.05 level (2-tailed).*

Table A 7 Percentage of sales realised in the segments defined by the kind of customer company vs. shares in employment of different kinds of staff – industry 295

no. 295 (manufacture of other special purpose machinery)		Share of white-collar staff	Share of workers with university education	Share of R&D staff	Share of marketing staff
Domestic-owned customers	Pearson Correlation	-,082	-,211	,069	-,087
	Sig. (2-tailed)	,646	,231	,712	,635
	N	34	34	31	32
Foreign-owned customers based in Poland)	Pearson Correlation	,183	,102	-,010	,054
	Sig. (2-tailed)	,301	,567	,959	,771
	N	34	34	31	32
EU-based customers	Pearson Correlation	-,172	,171	-,024	,182
	Sig. (2-tailed)	,347	,348	,903	,335
	N	32	32	29	30

Table A 8 Percentage of sales realised in the segments defined by the kind of customer company vs. companies' opinions on the competitiveness of their technology – industry 292

no. 292 (manufacture of other general purpose machinery)		Company's own rating of its technology as compared to domestic competitors	Company's own rating of its technology as compared to industry's world leaders
Domestic-owned customers	Pearson Correlation	-,316	-,240
	Sig. (2-tailed)	,217	,353
	N	17	17
Foreign-owned customers (based in Poland)	Pearson Correlation	,111	-,135
	Sig. (2-tailed)	,672	,606
	N	17	17
EU-based customers	Pearson Correlation	,428	,542(*)
	Sig. (2-tailed)	,077	,020
	N	18	18

** *Correlation is significant at the 0.01 level (2-tailed).*
* *Correlation is significant at the 0.05 level (2-tailed).*

Table A 9 Percentage of sales realised in the segments defined by the kind of customer company vs. companies' opinions on the competitiveness of their technology – industry 295

no. 295 (manufacture of other special purpose machinery)		Company's own rating of its technology as compared to domestic competitors	Company's own rating of its technology as compared to industry's world leaders
Domestic-owned customers	Pearson Correlation	-,158	-,295
	Sig. (2-tailed)	,381	,096
	N	33	33
Foreign-owned customers (based in Poland)	Pearson Correlation	-,159	,066
	Sig. (2-tailed)	,376	,717
	N	33	33
EU-based customers	Pearson Correlation	,378(*)	,228
	Sig. (2-tailed)	,036	,218
	N	31	31

Table A 10 Percentage of sales realised in the segments defined by the kind of customer company vs. main cost-side obstacles to an increase in companies' sales – industry 292

no. 292 (manufacture of other general purpose machinery)		Excessive labour costs	Insufficient labour skills	Terms of financing the investments	Outdated production technology	Insufficient scale of production	Insufficient level or insufficient use of IT
Domestic-owned customers	Pearson Correlation	,001	-,101	,083	,016	-,301	,157
	Sig. (2-tailed)	,996	,700	,752	,953	,241	,548
	N	17	17	17	17	17	17
Foreign-owned customers (based in Poland)	Pearson Correlation	-,278	-,244	-,404	,029	-,007	-,215
	Sig. (2-tailed)	,280	,346	,108	,911	,980	,408
	N	17	17	17	17	17	17
EU-based customers	Pearson Correlation	,359	,359	,283	-,173	,430	-,019
	Sig. (2-tailed)	,143	,143	,254	,492	,075	,940
	N	18	18	18	18	18	18

Table A 11 Percentage of sales realised in the segments defined by the kind of customer company vs. main

no. 295 (manufacture of other special purpose machinery)		Excessive labour costs	Insufficient labour skills	Terms of financing the investments	Outdated production technology	Insufficient scale of production	Insufficient level or insufficient use of IT
Domestic-owned customers	Pearson Correlation	,106	-,230	,280	,254	,277	,289
	Sig. (2-tailed)	,551	,190	,114	,146	,113	,098
	N	34	34	33	34	34	34
Foreign-owned customers (based in Poland)	Pearson Correlation	-,104	-,075	-,079	-,242	-,270	-,224
	Sig. (2-tailed)	,557	,673	,663	,169	,122	,203
	N	34	34	33	34	34	34
EU-based customers	Pearson Correlation	-,026	,595(**)	-,085	,071	,157	-,057
	Sig. (2-tailed)	,889	,000	,648	,700	,392	,755
	N	32	32	31	32	32	32

** Correlation is significant at the 0.01 level (2-tailed).*

Table A 12 Percentage of sales realised in the segments defined by the kind of customer company vs. labour productivity – Spearman's correlation

			Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
292	labour productivity (revenue from sales per employee)	Correlation Coefficient	-,143	,100	-,037
		Sig. (2-tailed)	,584	,704	,883
		N	17	17	18
295	labour productivity (revenue from sales per employee)	Correlation Coefficient	-,346(*)	,148	,272
		Sig. (2-tailed)	,045	,402	,132
		N	34	34	32

** Correlation is significant at the 0.05 level (2-tailed).*

Table A 13 Percentage of sales realised in the segments defined by the kind of customer companies vs. the role of different types of competitors on the domestic market – industry 292

no. 292 *(manufacture of other general purpose machinery)*		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
Domestic competitors	Pearson Correlation	,648(**)	-,459	-,487(*)
	Sig. (2-tailed)	,005	,064	,040
	N	17	17	18
Competitors from the developed countries outside EU	Pearson Correlation	-,253	,296	,086
	Sig. (2-tailed)	,328	,249	,734
	N	17	17	18
Competitors from EU-15	Pearson Correlation	-,337	,570(*)	-,134
	Sig. (2-tailed)	,186	,017	,595
	N	17	17	18
Competitors from less developed countries	Pearson Correlation	-,637(**)	,075	,709(**)
	Sig. (2-tailed)	,008	,783	,001
	N	16	16	17

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table A 14 Percentage of sales realised in the segments defined by the kind of customer companies vs. the role of different types of competitors on the domestic market – industry 295

no. 295 *(manufacture of other special purpose machinery)*		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
Domestic competitors	Pearson Correlation	,005	,087	,098
	Sig. (2-tailed)	,977	,624	,593
	N	34	34	32
Competitors from the developed countries outside EU	Pearson Correlation	,022	-,031	,104
	Sig. (2-tailed)	,900	,861	,571
	N	34	34	32
Competitors from EU-15	Pearson Correlation	-,203	,209	,057
	Sig. (2-tailed)	,249	,235	,756
	N	34	34	32
Competitors from less developed countries	Pearson Correlation	,110	,007	-,074
	Sig. (2-tailed)	,534	,967	,688
	N	34	34	32

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table A 15 Percentage of sales realised in the segments defined by the kind of customer companies vs. the firm size – industry 292

no. 292 *(manufacture of other general purpose machinery)*		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
Employment	Correlation Coefficient	-,145	,192	,505(*)
	Sig. (2-tailed)	,578	,461	,032
	N	17	17	18
Revenue from sales as of 31.12 2004	Correlation Coefficient	-,635(**)	,627(**)	,663(**)
	Sig. (2-tailed)	,006	,007	,003
	N	17	17	18

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table A 16 Percentage of sales realised in the segments defined by the kind of customer companies vs. the firm size – industry 295

no. 295 (manufacture of other special purpose machinery)		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
Employment	Correlation Coefficient	,146	-,135	,116
	Sig. (2-tailed)	,410	,446	,526
	N	34	34	32
Revenue from sales as of 31.12 2004	Correlation Coefficient	-,169	,000	,269
	Sig. (2-tailed)	,339	,998	,137
	N	34	34	32

Table A 17 Percentage of sales realised in the segments defined by the kind of customer company vs. the declared kind of competition – industry 292

no. 292 (manufacture of other general purpose machinery)		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
price competition	Pearson Correlation	-,246	,482	-,447
	Sig. (2-tailed)	,341	,050	,063
	N	17	17	18
quality competition	Pearson Correlation	-,532(*)	,379	,181
	Sig. (2-tailed)	,028	,134	,473
	N	17	17	18

* Correlation is significant at the 0.05 level (2-tailed).

Table A 18 Percentage of sales realised in the segments defined by the kind of customer company vs. the declared kind of competition – industry 295

no. 295 (manufacture of other special purpose machinery)		Domestic-owned customers	Foreign-owned customers (based in Poland)	EU-based customers
price competition	Pearson Correlation	-,307	,257	,151
	Sig. (2-tailed)	,092	,163	,433
	N	31	31	29
quality competition	Pearson Correlation	-,105	,161	,076
	Sig. (2-tailed)	,554	,364	,678
	N	34	34	32

** Correlation is significant at the 0.01 level (2-tailed).

Table A 19 Change in the share of sales realised in the segments defined by the kind of customer company – industry 292

no. 292 (manufacture of other general purpose machinery)	N	Mean	Std. Deviation	Std. Error Mean
Change in the share of domestic-owned customers (in p.p.)	17	-1,1176	9,91137	2,40386
Change in the share of foreign-owned customers (in p.p.)	17	-,5882	8,45620	2,05093
Change in the share of EU-based customers (in p.p.)	17	2,3903	8,49189	2,05959

Note: the sum of mean changes is not exactly zero, because data on shares of sales are taken from different sources: for the shares of domestic-owned and foreign-owned customers they are based on companies' estimates. For the shares of EU-exports they are based on sales data.

Table A 20 T-test of the hypothesis that the change in the share of sales is zero – industry 292

no. 292 (manufacture of other general purpose machinery)	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Change in the share of domestic-owned customers (in p.p.)	-,465	16	,648	-1,11765	-6,2136	3,9783
Change in the share of foreign-owned customers (in p.p.)	-,287	16	,778	-,58824	-4,9360	3,7595
Change in the share of EU-based customers (in p.p.)	1,161	16	,263	2,39028	-1,9758	6,7564

Table A 21 Change in the share of sales realised in the segments defined by the kind of customer company – industry 295

no. 295 (manufacture of other special purpose machinery)	N	Mean	Std. Deviation	Std. Error Mean
Change in the share of domestic-owned customers (in p.p.)	34	-4,7941	14,69648	2,52043
Change in the share of foreign-owned customers (in p.p.)	34	2,7353	11,28772	1,93583
Change in the share of EU-based customers (in p.p.)	31	-2,2891	20,13168	3,61576

Note: the sum of mean changes is not exactly zero, because data on shares of sales are taken from different sources: for the shares of domestic-owned and foreign-owned customers they are based on companies' estimates. For the shares of EU-exports they are based on sales data

Table A 22 T-test of the hypothesis that the change in the share of sales is zero – industry 295

no. 295 (manufacture of other special purpose machinery)	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Change in the share of domestic-owned customers (in p.p.)	-1,902	33	,066	-4,79412	-9,9220	,3337
Change in the share of foreign-owned customers (in p.p.)	1,413	33	,167	2,73529	-1,2032	6,6738
Change in the share of EU-based customers (in p.p.)	-,633	30	,531	-2,28909	-9,6734	5,0953

Table A 23 Motives behind quality improvements (firms were asked to rate each motive in a 0 to 7 scale)

	261		292		295		Total	
	N	Mean	N	Mean	N	Mean	N	Mean
Reason 1: Faster growth of demand for products of higher quality in the domestic market	24	4,42	17	5,06	28	3,82	69	4,33
Reason 2: Fall in the demand of the products manufactured to date in the domestic market	23	2,13	17	2,71	28	3,21	68	2,72
Reason 3: Strong import competition on the market of the products manufactured to date	24	4,00	17	4,24	28	4,18	69	4,13
Reason 4: Strong domestic competition on the market of the products manufactured to date	24	4,33	17	3,47	27	3,56	68	3,81
Reason 5 Launching exports	23	3,00	16	1,44	27	2,78	66	2,53
Reason 6 Small import demand for the products manufactured to date	23	1,65	17	1,18	26	1,73	66	1,56
Reason 7 Adjustment to the requirements of the customer firm	24	3,96	16	4,38	26	3,73	66	3,97