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Comprehensive customer solutions in selected chemical product lines in the Czech Republic

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This paper aims to summarize the results of quantitative research striving to determine the importance of providing a comprehensive solution to the needs and requirements of buyers of the selected chemical products. It also aims to investigate the role of different components of products, services, and other aspects of offerings play as parts of a comprehensive solution designed for customers processing chemical products. The respondents were managers of enterprises purchasing the examined categories of chemical products in the Czech Republic and our research took place in 2021. Its outcomes show that a comprehensive solution of the needs and requirements of customers in the case of chemical products is perceived far more broadly than those hitherto presented in the literature. In general, it differs especially in the phase of research and development of delivered products, in the phase of consulting and cooperation with customers in harmonizing the technology of processing the products, as well as in the aspects of providing additional services and waste disposal.

Keywords: Market; Superior customer value; Comprehensive solution and usefulness; Components of comprehensive solution; Chemical products

Introduction

Commoditization pressures and the increased competition have both prompted manufacturers to transition to the solution-based business [1,2]. The history of customer solution marketing and selling can be traced back to the early 1960s, with emergence of systems selling a concept that combines products and services to fulfil the extended customer needs [3].

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Implementation of a strategy for devising comprehensive solutions to the problems of customers has related to the fact that business markets have been shifting from a goods-dominant to service-dominant logic [4–8]. It is connected with value co-creation on the basis of cooperation and interaction of business network entities, too [9–12]. Value creation shifts from being a supplier-driven process toward a customer-driven process, though it is primarily a joint and interactive process between the supplier and the customer, as both parties operate within each other's processes [13].

Implementation of a strategy for devising comprehensive solutions to the problems of customers requires to find out what customers think and is being a comprehensive solution to their needs. It also needs to be clarified what its internal content means in terms of products, services, and other value elements for the customer.

The contemporary concept of creating customer value by providing comprehensive customer solutions

Industrial marketing studies of the customer-perceived value have traditionally focused on the characteristics of the value proposition of which a supplier provides, e.g. price, product quality, delivery timing etc. [14–16]. Maleki et al. [17] researched six dimensions of customer value, namely quality, cost, time, customization, know-how, and respect for the environment. Some studies have also considered the relative impacts of supplier characteristics, e.g. expertise, reputation [18–19], as well as relationship elements (trust, commitment, customer understanding, communication) [20], thus integrating the concept of customer value as a comprehensive solution for the customer [21–22]. In this context, the authors emphasize, in particular, the intangible aspects of the hedonic value – social, emotional, and epistemic [23]. They also pay attention to the integration of Company Social Responsibility (CSR) into the value creation chain [24–25].

The provision of comprehensive solutions entails the unique combinations of products and services that address customer's specific business problems [26]. Customer solutions constitute goods and service components integrated together into customized combinations which, in turn, are embedded in longitudinal relational processes between the business customer and supplier [27–29]. Comprehensive solutions have been defined as "individualized offers for comprehensive customer problems that are interactively designed and whose components offer an integrative added value by combining products and/or services so that the value is more than the sum of the components" [30]. In the literature on industrial marketing, valuations focus on the characteristics of the value proposition that are offered by the supplier [20,31]. These include product and service attributes, pricing, and elements of the delivery process. In addition,

the elements of the business relationship, such as trust, commitment, and goal mutuality, comprise also the elements of customer valuations [20,32] and collaborative value proposing process [32].

Recent conceptualizations of customer solutions recognize the need to consider a broader business network and other parties that potentially influence (or are influenced by) the customer solution [33,34]. The antecedents of customer solutions also vary across the industry and market actors.

The current literature sees solution delivery as a service-dominant process in which customer needs form the core rationale for solution implementation [27,35]. The recognition of which solutions are service-dominant has led to a greater acknowledgment of individuals as the primary vehicles through which implementation processes contribute to the value creation and to customer solutions [27,36]. Interpersonal interactions are major elements of sales and key-account management practices [37]. They also provide the basis for important intra- and inter-firm relationships, which aids the solution execution, while also creating, appropriating, and utilizing resources to achieve valuable outcomes [27,36,38, 39]. Interpersonal relationships are the basis for the joint production of valuable outcomes, where the actors are co-creators of a value [40–43].

Although the role of sales representatives in providing the comprehensive solutions to customers in the B2B market is irreplaceable, the importance of inter-functional collaboration with customers in value co-creation has been increasing. At the same, it is necessary to involve customers in all the phases of creating and providing comprehensive solutions and to work closely with them [44–46].

When providing comprehensive solutions to customer problems, we need to keep in mind that there are differences between the individual customers due to variances in their preferences and their access to stimuli of which they use to assess the supplier performance [22,47]. This is particularly the case in comprehensive industrial solutions [48,49]. In such a context, suppliers provide a combination of goods and services to address problems the buyer firm faces [35,50]. This involves collaborative efforts of the individual actors from both supplier and buyer firms through a series of relational processes [22,49].

The essence of comprehensive solutions and activities undertaken by entities of the value network in the process of preparation and implementation is only generally described in the literature [51–53]. Different authors coincide in the opinion that a comprehensive customer solution is:

- a customer-driven process,
- an offer of a unique customized combination of products and services and unique ways of their processing, completely solving customer needs and problems,
- a service-dominant process,
- simultaneous provision of tangible and intangible components of customer value within its provision,

- an interactive process between the supplier and the customer as well as other members of value network on the basis of partnerships.

Unfortunately, definitions of a comprehensive customer solution needs are too general. The literature sources lack information about the importance of the concept of creating customer value in the form of a comprehensive solution to their needs for purchasers of certain products. They also miss any specification of the meaning and concept for proper solutions of customer problems in specific conditions of the individual industrial areas, product lines, and target markets.

Materials and methods

This paper shows the outcomes of a research project aimed to find out answers to these questions and hypotheses:

- How important is a comprehensive solution to the customers buying and processing the researched chemical products? There was a hypothesis that the comprehensive solution to the customers buying and processing the researched chemical products is both important and useful.
- What does a comprehensive solution mean to processors of the chemical products examined; i.e., what components of the supplier's offering, range of services, service provision methods, and which ways of mutual contact and cooperation between the supplier and the customer plus the aspects of their reputation are, in particular, parts of comprehensive customer solutions? The respective hypothesis was that comprehensive solutions to customer needs and requirements vary according to different researched chemical product lines.
- What parts of a comprehensive customer solution are common to the customers buying the researched chemical products that parts are, in contrast, specific for the individual product categories?

The research was conducted within the companies in the Czech Republic that purchase organic dyes and pigments, industrial explosives, or inorganic acids and salts for industrial consumption and/or processing. These categories of chemical products were selected deliberately since it was hypothesized that the ideas of industrial purchasers of such typical chemical products about the concept of a comprehensive solution to their needs are significantly diverse.

The research took place at all the enterprises in the Czech Republic that are buying one of the three above chemical products for industrial processing or use. These companies were selected in cooperation with the Association of the Chemical Industry of the Czech Republic and with companies manufacturing the given products in the Czech Republic. The research had involved 47 companies.

We had chosen those managers and other employees of the customer enterprises who cooperated with the suppliers in innovation of products and technologies for their businesses, in the delivery and processing thereof, and in the sale of their products to their customers. At each company purchasing any of the above products for industrial consumption, the research had involved SBU directors, product directors, workers dealing with product development and modernization of technologies (strategic development managers or research and development managers), workers in marketing and logistics (purchase managers, production managers and technologists, quality managers, marketing or sales managers, and managers and workers in the section of counselling and application services). The quantitative research has shown that a number of enterprises accumulate these functions and entrust them to one or two workers. In this case, the research had involved 106 managers and only 8 of the addressed managers refused to fill in the questionnaire.

The interviewers had been the authors of this paper and undergraduate students of the Faculty of Chemical Technology, the University of Pardubice, and they visited each of the researched companies personally. Each company nominated a research coordinator from the company employees to synchronize the way of conducting interviews and their scheduling. The coordinator had distributed printed questionnaires to the managers to fill them in or gave them a link to the electronic version of the questionnaire. The respondents filled the questionnaires in, handed them over to the coordinator, and he/she sent them back to the researchers.

With the exception of open-ended questions, the research was evaluated using the statistical program of IBM SPSS Statistics, version 24 (IBM, Armonk, NY, USA). All the tables and figures given below were made by the authors of this article.

Results and discussion

Usefulness of comprehensive solution in terms of processors of chemical products

First, the quantitative research was focussed on the general perception of comprehensive solution usefulness by the processors of selected chemical products. The managers of the customers evaluated the usefulness of this customer value concept using a seven-point scale from 1 – absolutely useless to 7 – extremely beneficial. The vast majority of the surveyed managers and workers evaluated the provision of a comprehensive solution to customer needs as very positive (see Table 1).

Table 1 Usefulness of provision of a comprehensive solution to customer needs

Purchased chemical products	Provision of a comprehensive solution to customer needs									
	Relative frequencies of beneficial effect levels [%]							Quartiles*		
	1	2	3	4	5	6	7	25	50	75
Pigments and dyes	0	0	0	6	24	41	29	5	6	7
Industrial explosives	0	12	0	0	36	24	28	5	6	7
Inorganic acids and salts	0	0	12.5	35.5	25	12.5	12.5	4	5	6
Total	0	3	3	12	27	30	25	5	6	7

* Used scale from 1 – absolutely useless to 7 – extremely beneficial.

Based on the results of quantitative research, the hypothesis that a comprehensive solution to customer needs and requirements is very useful to processors of chemical products is confirmed. Table 1 shows that managers of customer enterprises purchasing the researched chemical products consider a comprehensive solution to their needs to be very beneficial to extremely beneficial. This view predominates especially among buyers of pigments and dyes and buyers of industrial explosives. Managers of customer enterprises purchasing inorganic acids and salts evaluated provision of comprehensive solutions to customer needs somewhat less favourably (slightly beneficial to very beneficial). Nonparametric goodness-of-fit tests of medians did not confirm statistically significant differences in the medians of perceptions of the usefulness of comprehensive solutions to customer needs ($\chi2 = 2.649$, $df = 2$, asymp. sig. (2-sided) = 0.266). However, an exact Pearson $\chi2$ test by the Monte Carlo method showed statistically significant differences in the empirical distribution of the relative frequencies of beneficial effect levels ($\chi2 = 43{,}966$, $df = 10$, Monte Carlo sig. (2-sided) <0.0005; see Figure 1.

As for buyers of pigments and dyes, what predominates is the significantly positive evaluation of the benefits of comprehensive solutions to customer needs. However, with respect to purchasers of industrial explosives and inorganic salts, there were – in addition to positive reviews – also strongly negative assessments of the customer value concept.

Positive attitudes to the complex solutions to customers result from the fact that some producers of pigments and dyes are making customize products. They need to be in close contact with the purchasers and cooperate with them in research and development of such products, testing them at the user's premises and during the actual product processing at the users' premises. The negative assessments of the complex solution concept have mainly managers of large enterprises processing pigments and dyes. They are adequately equipped for processing or using these products and do not require application services from suppliers to such an extent.

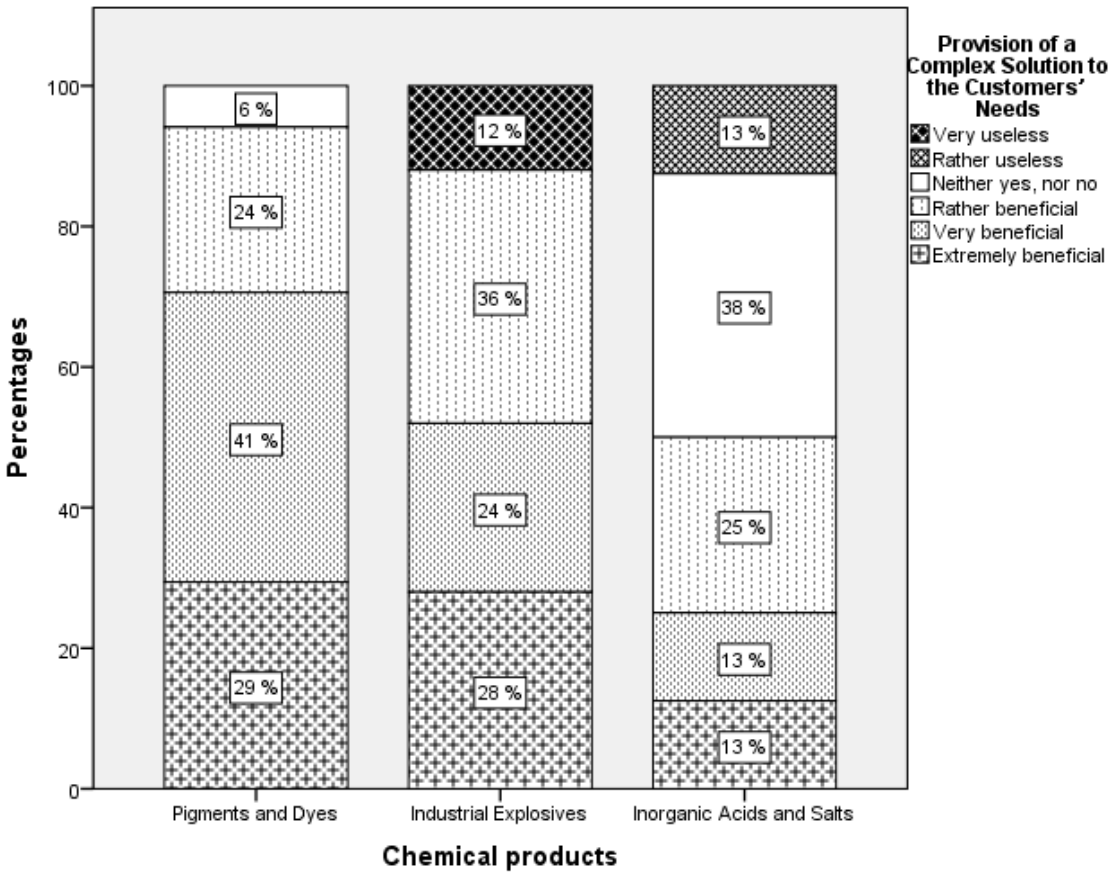

Fig. 1 Usefulness of comprehensive solutions to customer needs from the point of view of customers by chemical product lines

An analogous situation is with processors of industrial explosives. Large quarries and mines have their own blasting specialists, and so they do not want to provide their suppliers with an extensive user service related to preparation and execution of rock blasting. Smaller quarries, mines, and construction companies do not usually employ these specialists, and so the industrial explosive suppliers are required to offer the complete user service within rock blasting.

Also, unless purchasers of inorganic acids and salts have sufficient knowledge of, and experience with their use in the manufacture of their products, they require participation of suppliers in distribution, storage, and use of these delivered chemical products.

Components of a comprehensive solution to customer needs

Second, the quantitative research conducted among managers of customer businesses led to determination of the level of perceived benefits of the individual components of a comprehensive solution to the needs of buyers of chemical products, too. This made possible to define the general components of a comprehensive solution to the needs of buyers of chemical products through correlation analysis and the factor analysis.

Nonparametric correlation analysis of perception of the benefits of various aspects of a comprehensive solution to customer needs using Spearman's Rho has revealed a very strong correlation between the most studied aspects of complex solution to customers. Therefore, factor analysis was chosen to identify a smaller number of the general components. To find out latent variables or components, principal factor analysis was performed with Varimax orthogonal rotation, which allows better interpretation of the components. Suitability of application of factor analysis was assessed by the Kaiser–Meyer–Olkin measure (KMO) and the Bartlett's sphericity test. The assumptions of the factor analysis were met, as KMO is 0.677, and the null hypothesis of the Bartlett's sphericity test, which assumes that the correlation matrix of the variables is an identity matrix, can be rejected. To find a suitable set of components, we used a Cattell scree plot. Four components (factors) were identified in the overall explained variance of 78.983 percent (see Table 2).

The results of factor analysis show that for buyers of chemical products, a comprehensive solution to customer needs consists of four frame components:

- a wide range of customized products and services,
- high and consistent quality of products and services at a reasonable price,
- relationships based on interconnection between the customer and the supplier, public relation (PR), events, sales support, and
- a good supplier's reputation, customer-oriented corporate culture, partnership, and flexibility of the supplier.

In addition to the traditional tangible components of a comprehensive solution to customer needs, the outcomes of the quantitative research have also shown that a wide range of products and services with high and consistent quality at a reasonable price should also be based on intangible benefits for customers.

These are, in particular, strong partner relationships with the suppliers of chemical products who have a very good reputation in the market environment, who are serious, trustworthy, and flexible in serving their customers. The intangible aspects of complex solution to customer’s needs ask existence of a customer-oriented corporate culture at the supplier’s company, information, technology, and business interconnection between the supplier and other stakeholders with the customer and relationships among suppliers and their customers based on mutual partnership.

Table 2 Rotated matrix of factors of the benefits of individual aspects of a comprehensive solution to customer needs for purchasers of chemical products

Aspects of a comprehensive solution to customer needs for purchasers of chemical products	Components (factors)			
	A sufficient range of products and services	High quality products and services at a reasonable price	Relationships based on interconnections, PR, events, sales support	Supplier's reputation, corporate culture, partnership and flexibility
Sufficient range of products offered by the supplier	0.917			
Sufficient range of technical services provided by the supplier	0.595			
High and consistent quality of the supplier's products in accordance with customer requirements		0.850		
Affordability of the supplier's products		0.808		
Sufficient quality of services provided by the supplier		0.693		
Supplier's reliability in meeting the agreed terms of delivery		0.673		
Various forms of PR and sales provided as support by the supplier to the customer			0.854	
Supplier's special events for customer's staff (training, specialized events, etc.)			0.819	
Information, technology, and business interconnection between the supplier and other stakeholders with the customer			0.744	
Good corporate reputation on the part of the supplier's company				0.749
Existence of a customer-oriented corporate culture at the supplier's company				0.798
Partnership and flexible style of customer services offered by the suppliers				0.781

Extraction method: Principal Component Analysis; Rotation method: Varimax with Kaiser normalization; Rotation converged in 7 iterations

Usefulness of aspects of a comprehensive solution for purchasers

The quantitative research was designed to thoroughly map the usefulness of various aspects of a comprehensive solution to customer needs. The results of quantitative research have shown that a usefulness of partial tangible and

intangible aspects of a comprehensive solution for purchasers of chemical products differs in general and for each purchased chemical product.

Data in Table 3 summarize the overall outcomes related to perception of the benefits of the individual aspects of a comprehensive solution to customer needs from the perspective of managers of enterprises purchasing and processing chemical products for industrial consumption.

The results of quantitative research among all chemical processors of researched chemical products in the Czech Republic have confirmed the findings from previous qualitative research conducted in only six customer businesses. The quantitative research has shown that most aspects of a comprehensive solution to customer needs are important and beneficial to processors of chemical products. The assessment of the usefulness of all aspects of the complex solution to customer needs at the median level ranges from extremely beneficial level to slightly beneficial. Only two aspects, "supplier's special events for the customers' staff (training, specialized events, etc.)" and "various forms of PR and sales support provided by the supplier to the customer" are considered by managers of customer businesses to be neither beneficial nor useless (median is equal 4). Customers had a neutral attitude to them but did not reject them.

The subsequent crosstabs analysis revealed that in terms of perception of usefulness of certain aspects of a comprehensive solution to customer needs, the views of managers of customer businesses vary according to the categories of chemical products. We can demonstrate these differences by the results of both nonparametric goodness-of-fit tests of medians and exact Pearson $\chi 2$ goodness-of-fit tests of empirical distribution by the Monte Carlo method (see Table 4).

Results from quantitative research on the different concepts of delivering a comprehensive solution to customer's needs confirm the hypothesis that comprehensive solutions to customer's needs and requirements vary according to different researched chemical product lines.

Both nonparametric goodness-of-fit tests of medians and exact Pearson $\chi 2$ goodness-of-fit tests of empirical distribution by the Monte Carlo method proved statistically significant differences in views of processors of different chemical products in the perception of five aspects of comprehensive solution to customer needs. They are the benefits of a sufficient range of products, a sufficient range of technical services provided by the supplier, sufficient quality of services provided by the supplier, partnership, and a flexible style of customer services offered by suppliers, and on the supplier's customer-oriented corporate culture.

The exact Pearson $\chi 2$ goodness-of-fit tests of empirical distribution by the Monte Carlo method has confirmed that the empiric distribution of relative frequencies of beneficial effect levels statistically significantly differs in the researched chemical products in all the other aspects of comprehensive solution of customer needs, with the exception of affordability of the supplier's products.

Table 3 Perception of usefulness of aspects of a comprehensive solution to customer needs from the perspective of purchasers of chemical products

Components of a comprehensive solution to the customer needs	Aspects of a comprehensive solution to customer needs	Usefulness for purchasers*									
		Relative frequencies [%]							Quartiles*		
		1	2	3	4	5	6	7	25	50	75
Wide range of customized products and services	Sufficient range of products offered by the supplier	3	14	8	14	28	21	0	3	5	6
	Sufficient range of technical services provided by the supplier	3	3	3	17	28	26	0	4	5	6
High quality products and services at a reasonable price	High and consistent quality of the supplier's products in accordance with customer requirements	0	0	0	3	8	34	55	6	7	7
	Supplier's reliability in meeting the agreed terms of delivery	0	0	5	3	12	12	68	6	7	7
	Affordability of the supplier's products	0	0	0	0	23	32	45	6	6	7
	Sufficient quality of services provided by the supplier	0	0	8	9	34	26	23	5	5	6
Relationships based on interconnection between the customer and the supplier, PR, events, sales support	Information, technology and business interconnection between the supplier and other stakeholders and the customer	0	3	6	17	31	23	20	4	5	6
	Supplier's special events for customer's staff (training, specialized events, etc.)	9	15	6	29	20	12	9	3	4	5
	Various forms of PR and sales support provided by the supplier to the customer	6	20	9	35	15	12	3	2	4	5
Supplier's reputation, culture, partnership and flexibility	Partnership and a flexible style of customer services offered by the supplier	0	0	5	20	20	37	18	4	6	6
	Overall level and reputation of the supplier's company	3	0	3	17	44	27	6	5	5	6
	Customer-oriented corporate culture at the supplier's company	0	3	14	14	26	32	11	4	5	6

Note: *Used scale from 1 – absolutely useless to 7 – extremely beneficial.

Table 4 Perception of usefulness of comprehensive solution aspects from the perspective of managers of customer businesses according to chemical product

Components of a comprehensive solution to customer needs	Aspects of a comprehensive solution to customer needs	Usefulness according to purchased products (median*)			Median test			Pearson χ^2 test		
		Pigments and dyes	Industrial explosives	Inorganic acids and salts	χ^2	*df*	Asymp. sig. (2-sided)	χ^2	*df*	Monte Carlo sig. (2-sided)
Sufficient range of products and services	Sufficient range of products offered by the supplier	5	6	4.5	12.755	2	0.002	41.181	12	0.000
	Sufficient range of technical services provided by the supplier	6	4	5	18.502	2	0.000	64.140	12	0.000
High quality products and services at a reasonable price	High and consistent quality of the supplier's products in accordance with the customer requirements	7	7	6	**	**	**	20.843	6	0.002
	Supplier's reliability in meeting the agreed terms of delivery	7	7	6	**	**	**	35.664	8	0.000
	Affordability of the supplier's products	6	6	7	3.829	2	0.147	5.941	4	0.206
	Sufficient quality of services provided by the supplier	5.5	6	6	9.537	2	0.008	42.063	12	0.000
Relationships based on interconnection between the customer and supplier, PR, events, sales support	Information, technology and business interconnection between the supplier and other stakeholders and the customer	5.5	5	5	4.370	2	0.112	29.186	10	0.001
	Supplier's special events for the customer's staff (training, specialized events, etc.)	4	4	3.5	0.506	2	0.776	47.890	12	0.000
	Various forms of PR and sales support provided by the supplier to the customer	4	4	4	0.617	2	0.734	21.188	12	0.042
Supplier's reputation, culture, partnership and flexibility	Partnership and a flexible style of customer services offered by suppliers	6	5	4.5	6.872	2	0.032	24.903	8	0.001
	Overall level and a corporate reputation of the supplier's company	5	5	5	5.962	2	0.051	20.136	10	0.021
	Customer-oriented corporate culture at the supplier's company	6	5	4	25.404	2	0.000	41.608	10	0.000

* Scale from 1 – absolutely useless to 7 – extremely beneficial; ** All values are lower than or equal to the median, the test cannot be performed

Although the empiric distribution of relative frequencies of the beneficial effect levels statistically differs significantly in the researched chemical products, all aspects of comprehensive solution of customer needs – with the exception of the affordability of the supplier's products – vary, when the median to the benefits of six aspects is the same for attitudes of processors of all researched chemical products. The nonparametric median goodness-of-fit tests did not confirm a statistically significant difference in the medians of the perception of their benefits for managers of the customer enterprises in these aspects. The same medians of comprehensive solution aspects perception for the different researched chemical products have these aspects: high and consistent quality of the supplier's products in accordance with the customer requirements, supplier's reliability in meeting the agreed terms of delivery, information, technology and business interconnection between the supplier and other stakeholders and the customer, supplier's special events for the customer's staff, various forms of PR and sales support provided by the supplier to the customer, and the overall level, as well as a corporate reputation of the supplier's company. Although the median perception of these aspects of a complex solution to customer's needs is the same for processors of all researched chemical products, the variability of opinions differs.

The reasons for diverse perception of the beneficial effect of the respective aspects of a comprehensive solution to customer needs as per the individual researched chemical products were examined within the quantitative research.

Most managers of businesses purchasing pigments and dyes and industrial explosives find a sufficient range of products and services considerably more beneficial than managers of businesses interested in inorganic acids and salts do. This is due to a wide range of follow-up products that customer companies manufacture from pigments and dyes and because of the different geological conditions of use of industrial explosives. Moreover, companies processing pigments and dyes often need to adapt their products for their own customers, and therefore they require suppliers to perform extensive testing, quality control checks, and application services. Purchasers of these products have thus higher demands concerning the range of technical services offered by suppliers.

Managers of customer businesses purchasing pigments and dyes are somewhat more demanding with respect to high and consistent quality of products, which corresponds to their requirements in all deliveries and with respect to the supplier's reliability in meeting the agreed terms of delivery, than the buyers of industrial explosives and inorganic acids and/or salts. This is because of applicability of pigments and dyes in different production batches requiring the same shades of colour and the same intensity of coloration during the whole production. For these reasons, it is absolutely essential that the suppliers of pigments and dyes collaborate with their customers throughout the entire production cycle, from the product development and testing, via the quality testing of manufactured products and certification of their quality, up to reliable contact with the customers in the form of application services.

The high usefulness of adequate quality of services provided by the supplier to purchasers of industrial explosives stems from the fact that distribution, storage, and, in particular, the use of industrial explosives as flammable and generally dangerous substances requires both special technical equipment for transport and warehouses, a high level of expertise of the staff and compliance with strict legal regulations at all stages of production and application. Therefore, the customers' demands regarding the quality of services pertaining to industrial explosives are considerably higher than those in the other two categories of chemical products.

What was surprising, though in a negative sense, was the discovery that not all purchasers of chemical products consider information, technology and business interconnection between the supplier and other stakeholders on the one hand, and the customers, on the other, to be very beneficial as a part of complex solution. Surprisingly, the respondents evaluate the beneficial effect of this aspect across all the scale of the beneficial effect, although positive attitudes still prevail. The thing is that they are aware of the fact that it is often sensitive data, which could be misused by their business partners.

Purchasers of chemical products have diverse opinions on the benefits of cooperation of the suppliers in product research and development, adaptation of the customers' technologies to the suppliers' products and in-product testing at the customer's premises. While large customer enterprises do not usually require these services from the suppliers, medium-sized and smaller customer businesses highly appreciate such forms of cooperation as they do not have their own scientific and research base.

Smaller customer businesses also welcome the fact that their suppliers provide them with the know-how for product use or processing, and even are willing to lend equipment or apparatus facilitating the product use or processing at their premises, or the fact that the suppliers participate in modernization of their operations. And again, large customer enterprises do not have these requirements.

A partner and flexible style of customer service offered by suppliers is perceived to be very beneficial especially by purchasers of pigments and dyes and industrial explosives, especially with regard to the need to customize products and services according to the specific requirements and wishes of the individual customers. In order to do this, manufacturers of both product categories have to execute small-scale production of many types of items, because of specific requirements of different customers that make impossible to manufacture such products in mass quantities. This requires much closer contact with the customers and quick responses to their changing requirements. Producers of inorganic acids and salts do not need to be so flexible as their products are basic chemicals produced in large quantity, i.e., all customers anticipate the products with similar characteristics.

The research also revealed that purchasers of different chemical products assess the benefits of special events and various forms of PR and sales support on the part of their suppliers as neutral on average. However, even in this case the

assessments of the beneficial effect of this aspect of a comprehensive customer solution were diverse. They were mostly appreciated by the purchasers of industrial explosives, particularly with respect to the need for training of the customer's staff and common solution to the problems connected with application of industrial explosives within surface and underground blasting of rocks. These problems mostly result from stricter legislative restrictions, increasing pressure of the state authorities, and last but not least from the public pressure. The beneficial effect of special events and various forms of PR and sales support on the part of their suppliers is, by contrast, perceived by the purchasers of dyes and pigments and inorganic acids and salts as significantly lower, as they do not expect them from their suppliers into such an extent.

Comparison of the perceptions of usefulness of the individual aspects of the comprehensive satisfaction of customer needs by categories of chemical products has shown that for purchasers of various chemical products the comprehensive satisfaction of customer needs is a different combination of partial aspects of supplies and services.

Conclusions

The current literature review has indicated that the modern concept of customer value creation requires an ability of offering comprehensive solutions to customer needs and requirements. Unfortunately, the literature sources lack information about into what extent the concept of creating the customer value in the form of a comprehensive solution to their needs is important for industry as a whole, or only to some parts of industries, or, eventually, only to some product categories made by a certain industry. It also lacks specification of the meaning and concept of comprehensive solutions to customer problems in specific conditions of the individual parts of industry, product lines, and target markets.

The outcomes of the qualitative and, subsequently, quantitative research have proved the hypothesis that comprehensive solutions to the industrial customer needs and requirements significantly differ during the sale and processing of different products of a certain industry, but not in all their aspects.

Comprehensive solutions to customer needs and requirements have a number of common features in the case of purchase and processing of chemical products. We have verified for all buyers of the researched chemical products that a comprehensive solution to customer needs incorporates a wide range of products and services. Namely, being supplied in a high and consistent quality at a reasonable price, the supplier's reliability in meeting the agreed terms of delivery, information and technological connection between the supplier and the customer, along with effective sales support and PR. And all that has come from a supplier having a perfect reputation and a customer-oriented corporate culture, thus serving them in a partnership and with flexible style of service.

The outcomes of the research showed that, in addition to the traditional components of customer value – products and services at reasonable prices – creation of customer value as comprehensive solution to customers should be based on intangible benefits in the form of strong relations between producers and processors of chemical products, the supplier's reputation, partnerships, and flexibility in these relations.

The beneficial effect of these aspects of a comprehensive solution to customer needs and requirements is of a different meaning for purchasers of chemical products. All customers find two aspects extremely beneficial, namely "high and consistent quality of the supplier's products in accordance with customer requirements" and "supplier's reliability in meeting the agreed terms of delivery". The aspects "a partner and flexible style of customer services offered by suppliers" and "affordability of the supplier's products" are considered as very beneficial. The aspects "a sufficient range of products offered by the supplier", "a sufficient range of technical services provided by the supplier", "sufficient quality of services provided by the supplier", "information, technology and business interconnection between the supplier and other stakeholders and the customer", "a customer-oriented corporate culture in the supplier's company" and "an overall level and corporate reputation of the supplier's company" are perceived by purchasers as slightly beneficial. The aspects "supplier's special events for customer staff (training, specialized events, etc.)" and "various forms of sales support and PR provided by the supplier to the customer", can then be regarded by the managers of customer businesses to be least beneficial for strengthening the relations between suppliers and buyers – more specifically, they consider them as neither beneficial nor useless.

However, the corporate managers' idea of providing a number of aspects of a comprehensive solution to customer needs and requirements differs in individual categories of researched chemical products. What the processors of organic dyes and pigments consider (within a comprehensive solution to their needs), as crucial is a cooperation with the suppliers in research and development of new products, cooperation in adjustment of the technology for their processing. They also require application service within the use of organic dyes and pigments. This means that, in the case of organic dyes and pigments, a comprehensive solution to customer needs refers mainly to pre-production phases. As for users of industrial explosives, comprehensiveness of the solution to their needs mainly refers to the utilization of these products. They require the industrial explosives manufacturers to cooperate with them in geological surveys, insertion of explosives into rocks, during blasting and removal of blasted rocks. In this area, this means that a comprehensive solution to customer needs and requirements differs from that of the other chemical products within the scope of application service. The idea of comprehensive satisfaction of customer needs and requirements within purchase and processing of inorganic acids and salts is far narrower than that of the users of dyes and pigments, as well as that of the users

of industrial explosives. They feel fully satisfied mainly thanks to an excellently functioning of order-and-delivery systems, i.e., mainly due to high-quality and flexible logistics services. What they slightly less appreciate, compared to the processors of organic dyes and pigments and industrial explosives, is a customer-oriented corporate culture and management style of their suppliers and a very good reputation of the supplier's company on the market.

The extensive quantitative research into a comprehensive solution to customer needs and requirements has confirmed the significant importance of this concept of creating customer value also in chemical industry. Our paper largely contributes to the definition of those aspects of a comprehensive solution to customer needs and requirements in the chemical product markets that are common to all the chemical products. Yet another contribution is the finding that the way of providing a comprehensive solution to customer needs and requirements is different within the sale and processing of different chemical products. A comprehensive solution to customer needs and requirements should respect not only the specifics of the industry, but also some nuances of the individual product categories. It has to be customized to each of target markets and each of customers. A limitation of our research is that if there is a larger number of the researched product categories and of their buyers, we cannot generalize the research outcomes across the entire chemical industry.

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