Application of price performance analysis in different supplier – buyer relationships

- work in progress -

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Abstract

The automotive industry is characterized by intense competition between the major OEMs and by limited market growth, which results in a strongly price driven competition in many segments of the market. In conjunction with an average vertical range of manufacture between 20 and 50%, this leads to significant price and cost pressure for purchased materials. These challenges can be addressed by either product or by process optimization measures.

Optimization activities need to be applied to a multitude of individual parts of each vehicle line. Industrial experience shows that the key challenge lies in prioritizing and selecting components of the vehicle for which product or process optimization bears significant cost saving potentials.

Price-performance-analysis serves as a prioritization instrument to address the challenge mentioned above and is suited to the needs of both purchasing and engineering. It contributes to the following objectives:

- Identification of parts with cost saving potentials
- Price plausibility analysis
- Reduction of variants
- Technical parts optimization
- Qualification of purchasing agents
- Facilitation of the collaboration between development and purchasing
- Controlling tool within purchasing organizations

This article describes the basic principles of price performance analysis. The main focus is set on interpreting the results of the analysis and on their practical application in actual negotiations between buyer and supplier. The application of the method is elaborated for different buyer/ supplier relationships, e.g. adversarial/ relational approach (Bartsch, 2005). The article will conclude with current limitations to the application and an outlook on further developments and potentials of price performance analysis.

Introduction

The importance of purchasing as a corporate function has significantly increased in recent years. This is mainly caused by the fragmentation of the value-added process especially in the automotive industry. Thus the proportion of external procurement of German automotive OEMs (Original Equipment Manufacturers) exceeds 75 percent at present according to the VDA (Corsten, Kucza and Hänni, 2004).
A reduced level of vertical integration implies a shift of the proportion of value added to the purchased goods and increases the dependence of OEMs from their suppliers (Wildemann, 2000).
This development is not only caused by the nominal increase of the purchasing volume, but primarily by a shift of technological know-how to the suppliers. Hence, the success of a company is becoming more and more dependent on the competencies of its suppliers (Bartsch, 2005). This development is overlaid by the increasing internationalisation of the purchasing function (Zabota, 2005).
Therefore the tasks of buyers have significantly changed: Besides business and purchasing knowledge, a buyer requires more and more technical know-how in order to understand and assess the increasing complexity and functionality of the products purchased.
In particular the assessment of different quotations with respect to functional and quality aspects has become a central challenge for buyers. The price-performance-analysis has been practically proven and is a suited instrument to analyze and assess purchased parts according to their price-performance-ratio and to derive technical and commercial cost saving potentials.
Besides the fact that this method has not been scientifically analyzed since its introduction in the early 1990’s, price-performance-analysis has in most cases only been used as a tool to enforce price reductions within negotiations. Yet the potentials of price-performance-analysis extend far beyond simple price reductions. The growing strategic importance of purchasing and the increased significance of suppliers has been highlighted by different researchers (Bartsch 2005; Cousins and Spekman, 2000; Chen and Paulraj, 2004). In order to address these issues with price-performance-analysis, it is necessary to develop different levels of interpretation of the results as well as negotiation strategies according to individual buyer / seller relationships.
Hence this article will first of all introduce price-performance-analysis and give an overview of its basic principles. Then different options to interpret the results of the analysis are presented. Afterwards different types of business relations are presented from recent literature and related to different types of buyer / seller relationships. Finally the options to interpret the results of price-performance-analysis are combined with the presented buyer / seller relationships and recommendations are made on how to use the results regarding the buyer / seller relationship.

Price Performance Analysis

The origin of price-performance-analysis goes back to kilo cost calculations. In the 1980's and 90's, statistical methods such as regression analysis were introduced for quotation costing (Cognition Corporation 1995, Price 1989, Gröner 1991). These methods mainly aim to reduce the necessary effort and time for submitting a valid quotation for a new product by using data of previous quotations. In the late 1990's the price-performance-analysis was introduced to purchasing applications by consulting companies. Since then, the method has been further developed and refined, but so far has not been investigated scientifically in detail.
Price-performance-analysis aims at defining a mathematical correlation between the prices of a set of purchased parts (called part family) and one or several properties characterizing the functionality of these parts. Thereby the functionality of the parts is described by one or by a set a technical parameters, so-called drivers. Typically, price-performance-analysis is applied by buyers to identify levers for price reduction. Interpreting this method as a simple means for price reduction impedes to unlock its full price reduction potentials, which are linked to a broader understanding of price-performance-analysis. By comparing different design principles within one part family and by identifying designs which can be realized by the suppliers at favourable costs, cost reduction potentials can be identified in cooperation with the R&D-department (Research and Development). Further, the method can be used to support a target cost setting process and also represents an excellent basis for initiating and focussing product optimization and variant reduction efforts executed jointly between purchasing and engineering.

On this account it seems to be necessary to compare the price-performance-analysis to other cost estimation methods used in purchasing departments. They mainly differ in terms of accuracy, effort for application, scope of analysis, required input data and application potentials (compare figure 1**)**.

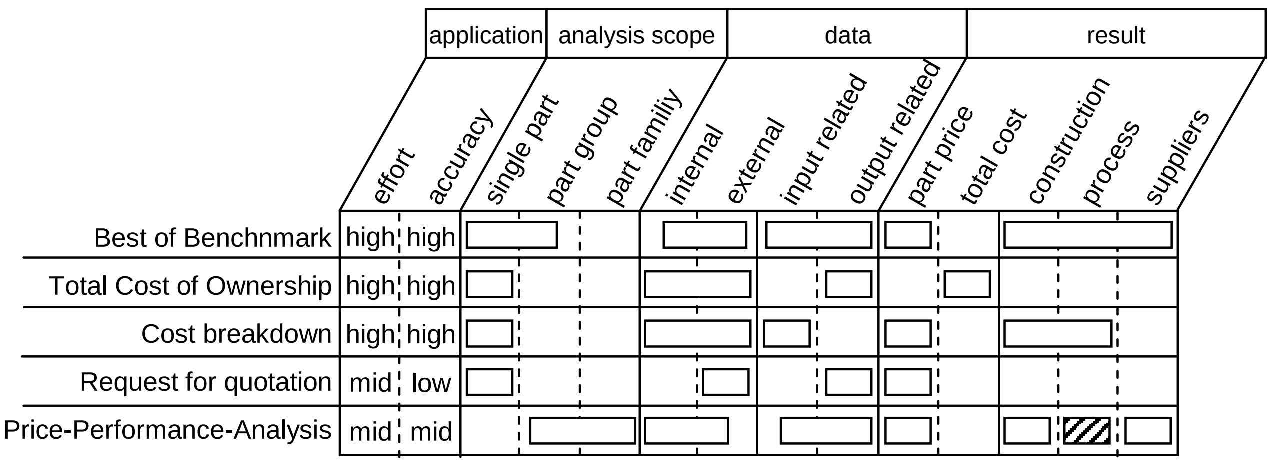

figure 1: price-performance-analysis in relation to other methods

The main idea of the price-performance-analysis is to compare the products of a part family with respect to their functionality. Therefore only technical parameters which describe the functionality or performance of a product can be used within the analysis. This allows for the fact that a buyer needs to purchase a special function which is required in the end product and has to fulfil a defined set of requirements.
Consequently, purchased products with the same functionality should have the same price. Hence it is possible to compare different design principles within one analysis, because the expected price only depends on the product performance. However, this conclusion is only valid if the supplier is free to decide upon the optimal design of the product. It is therefore necessary to differentiate between drawing-specific parts and parts which are not based on drawings. If drawing-specific parts are analyzed using price-performance-analysis, the basic principle to use drivers which describe functional or performance aspects of the parts can be adjusted. Instead parameters should be used which influence the material cost (e.g. weight) or the manufacturing cost (e.g. injection pressure of an injection moulding machine).
A major advantage of price-performance-analysis is that the analysis can be performed to large extend based on internal data. Yet when interpreting the results and deriving cost saving potentials, this can be a disadvantage. To fully understand the reasons for cost gaps in the price-performance-analysis and to identify levers for reducing these gaps a common interpretation of the results with the suppliers is necessary. This is mainly due to the fact that some reasons for cost gaps can only be explained using external supplier data. For example, an out dated finishing technology will increase the manufacturing costs compared to a supplier who is using the latest finishing technology available. The functionality of the part is not influenced by the two different production technologies. The result of the analysis will show the two parts with the same performance but with different price levels.
The realization of cost saving potentials which can be derived by the price-performance-analysis as well as the way the supplier is confronted with the results of the analysis basically depends on the buyer / seller relationship. In a short-term relationship between the companies, the buyer will force the supplier to close the identified gaps or will try to shift the part to another supplier. However in this case the buyer cannot access all necessary data to understand the reasons for the gaps and to identify measures to close the gaps, because the supplier will most likely not reveal the information.
In a long-term relationship, the buyer will typically try to understand the underlying reasons of the gaps and collaboratively discuss options with the supplier to close the identified gaps. Furthermore the buyer will support the supplier to optimize the design or the production process, to reduce the product costs.
After describing the principles of price-performance-analysis and presenting different alternatives of buyer / seller relationships, the influence of the presented buyer / seller relationship to use and interpret the results are described.

Application of the Price Performance Analysis

The individual steps to perform a price-performance-analysis are illustrated in figure 2. As the method attempts to find a correlation between product performance and product price, it is not possible to perform the steps in a sequential manner. In general, several iteration loops will be necessary to find an optimal explanatory model.
If, for instance, no suitable driver set - from a statistical and technical point of view - could be identified during the data analysis, at first the persons performing the analysis should attempt to find additional drivers which explain the price differences between the parts. If this process does not lead to success, the initially defined part families have to be reconsidered.

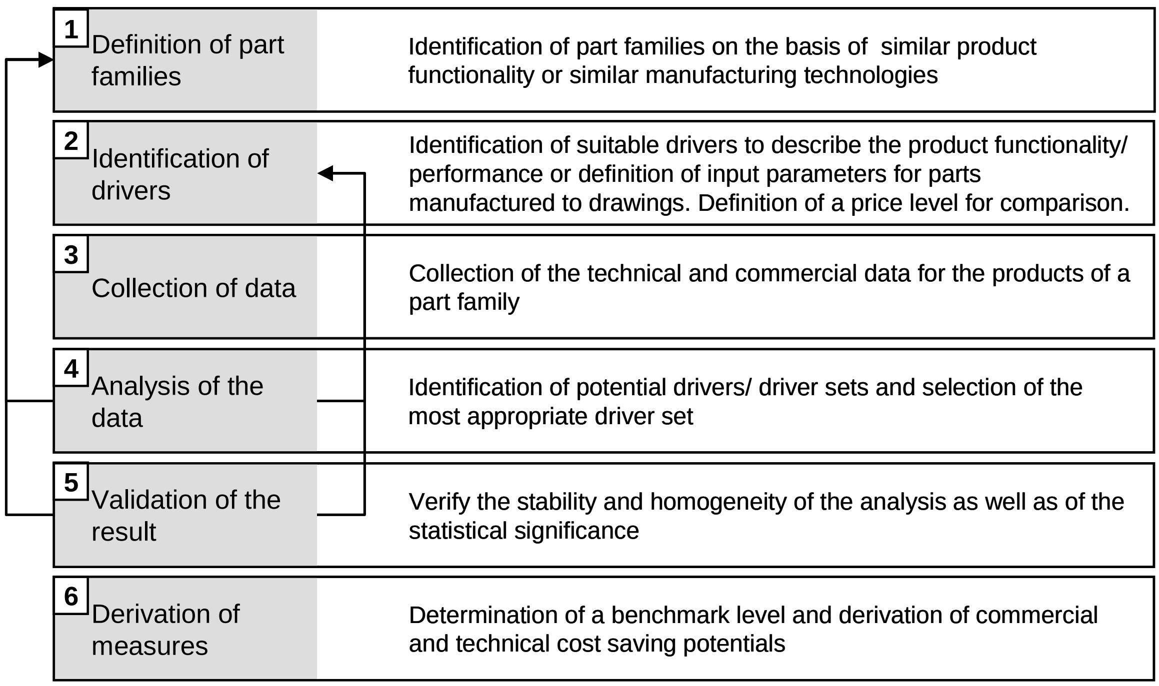

figure 2 :Steps to perform the price-performance-analysis

Definition of part families

In the first phase of a price-performance-analysis, suitable part families are selected. The parts within one part family should either be similar in terms of their functionality or their manufacturing process.
During the definition of part families, drawing-specific parts and parts which are not based on drawings should be differentiated. In the latter case, the supplier is free to define the product design, i.e. the suppliers can choose the technologies and features which will realize the required product functions. This approach constitutes the basic idea of the price-performance-analysis. Consequently, the buyer will not pay for a complex design, but purchases a product with a clearly defined functionality. If the product fulfils this functionality the buyer is willing to pay a adequate price. In other words, the price is assigned to a certain, specified functionality.

The determination of the price-performance-ratio is not a result of internal assessments or customer investigations such as, for instance, within the target costing process (Seidenschwarz 1993), but is based on a statistical analysis of product prices in relation to their functionalities.
It is obvious, that for non-drawing related parts, only drivers that describe the product functionality can be used. For drawing-specific parts, the supplier is in general obliged to use the material and manufacturing technology specified within the drawing. In this case, it is more sensible to use input-driven parameters (e.g. geometrical data, weight or machine size) instead of functionality-related drivers. Therefore part families can be selected by means of a function analysis of all parts, beginning with the primary product function (e.g. generate brake torque). For drawing-specific parts, the main manufacturing technology is a suitable category to classify part families (e.g. castings, die castings).

Identification of drivers

In the second step, appropriate drivers have to be identified in order to describe the product functionality or the manufacturing costs for each part family defined. Experts from purchasing and engineering have to assess whether the primary product function can fully explain existing price differences or if additional parameters are necessary (e.g. special product features). For parts which are not based on drawings a more detailed function analysis (VDI 1996, VDI 1997) will provide additional drivers for the analysis. Because a part family of drawing-specific parts has been defined based on a manufacturing technology, it is impossible to find a distinct description of the product functionality within this part family. Therefore drivers must be used that are capable of describing the manufacturing costs. Drivers should be selected which on the one hand represent the material cost (e.g. weight or volume) and on the other hand the production costs (e.g. processing times, machine characteristics).

Short workshops with participants from engineering, cost planning and purchasing have proved to be a satisfactory approach in identifying technical drivers for the defined part families. Furthermore, these experts should analyze possible driver sets regarding interdependences between the drivers. In addition, experts should determine the functional correlation between drivers and price during the initial phases of the analysis as accurately as possible. For example, to describe the functionality of a pump, it could be more sensible to use the area instead of the diameter, as the area is directly proportional to the flow rate of a pump and the flow rate is a central parameter in describing the function of a pump.

Data collection

Once potential drivers have been identified for all part families defined, all technical and commercial data has to be selected for the parts included. Data based on technical values can for instance be retrieved from engineering data bases, from internal engineering or cost planning experts or from the suppliers. The technical data must be supplemented by commercial/business data, which includes the total purchasing price, certain elements of the price (e.g. logistic costs, annual quantities) as well as a clear description of the parts. Most contracts differ in terms of delivery conditions as well as tooling and developments costs. To compare the parts of a part family on the same basis, it is necessary to define a reference price. The basic idea of the price-performance-analysis is to compare products by their functionality as stated above. In consequence, tooling, logistic or development costs should be deducted from the total purchasing price.

Data analysis

When all data required has been retrieved, linear regression is used to identify the most appropriate driver respectively driver set in order to describe the correlation of the product functionality and the reference price. The identification of drivers for a part family is an optimization problem which aims to achieve a high regression coefficient with a small number of drivers.
Prior the final selection of a driver or a driver set, it is necessary to verify the results both statistically and from a technical perspective. Statistical test methods are not focussed within this paper but have been examined in detail in recent literature (Backhaus 1996, Hammann 2000, Kähler 2004). Besides the statistical validation of the analysis, additional tests have to be performed in order to prove the stability and homogeneity of the analysis as well as the parameters of the regression function from a technical point of view. By visualizing the results of the price-performace-analysis in a chart, these tests can be performed. A universally valid test sequence cannot be indicated, as good results can only be achieved by an individual succession of technical and stability/homogeneity tests and reviews. During the practical application of this method, re-defining the driver sets or identifying new drivers after a failed test is therefore frequently occurs.

Validation of the result

In the following, some of the most relevant tests to verify the results from a technical as well as from a stability and homogeneity perspective are described.
If negative coefficients of the regression function occur, the analysis has to be questioned from technical point of view. Negative coefficients imply that a lower expected price is calculated for a higher functionality. In some exceptional cases, negative coefficients can be reasonable, e.g. the radius of curvature of a mirror: As a smaller radius causes a higher concavity of the glass pane and is more complicated to produce, a smaller radius leads to a higher price. In a univariate case, a negative correlation can be excluded. In general, drivers should only be used in price-performance-analysis if they have been reviewed regarding technical aspects. This also implies that drivers with a high statistical relevance have to be excluded from the analysis if they cannot be justified from the technical perspective.
In the context of stability and homogeneity, two highly relevant exceptions must be mentioned. The first exception refers to a part family containing one or several

products with a very high level of functionality compared to the other parts of the part family. These products have a significant influence on the regression function and have to be excluded from the analysis (figure 3).

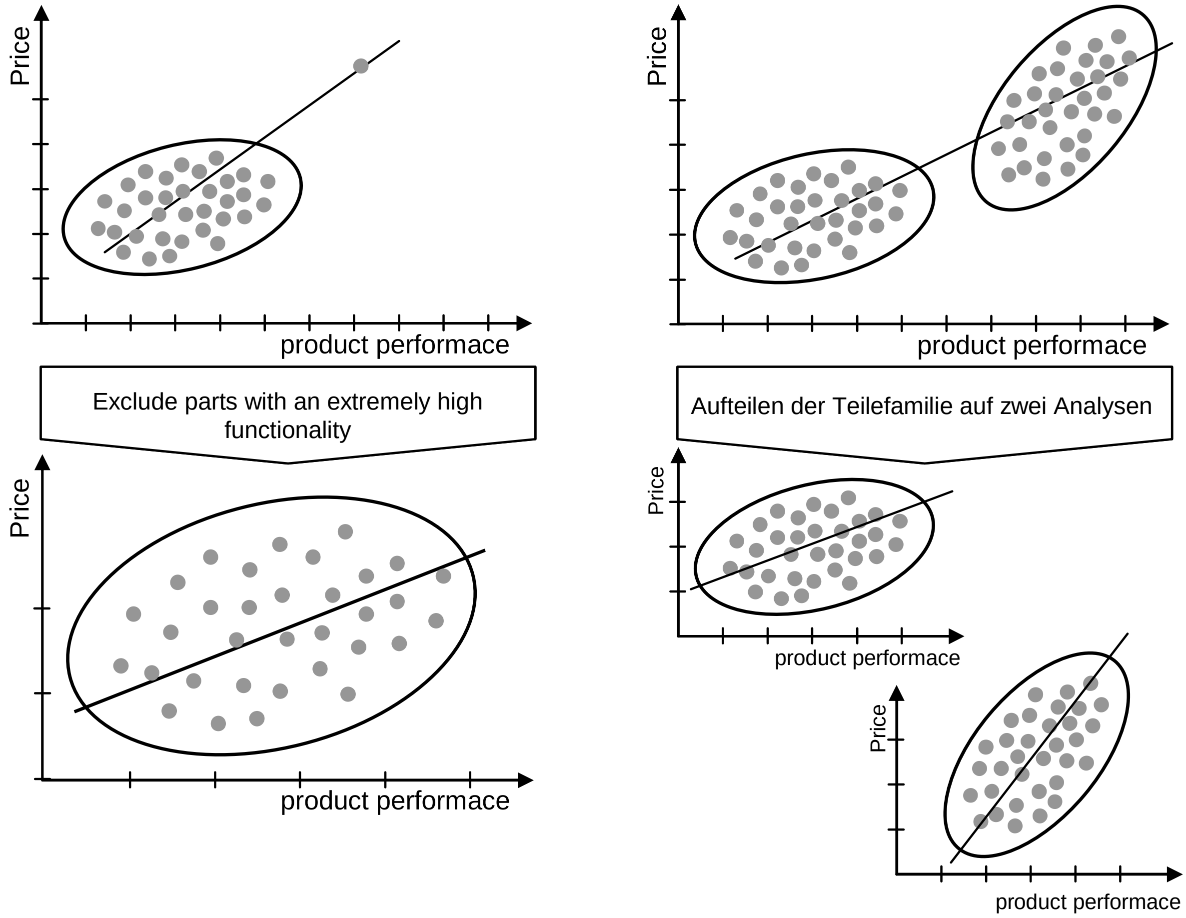

figure 3: Stability and homogeneity test of the price-performance-analysis

In the second case two discrete scatter plots occur in the chart (figure 3). This phenomenon can in general be traced back to a combined analysis of parts from two different applications (e.g. taper roller bearings from axel- and from gearbox applications). In this case, both scatter plots should be analyzed separately.

Derivation of measures

After validating the analysis, cost savings potentials have to be identified and measures derived in order to close the gaps. Firstly, a benchmark level has to be defined. The regression line is not used as a reference for the benchmark level as it simply represents the average of the price-performance-ratio. In order to define a more ambitious benchmark, a second regression is calculated based on 20% of the parts with the best price-performance-ratio. The second regression guarantees an ambitious as well as a statistically valid benchmark level. Based on this benchmark, the cost saving potentials can be calculated by determining the difference between actual price and the benchmark price.

It is highly important to understand that the calculated gaps only indicate potentials for cost saving and cannot not be interpreted as actual cost savings, which can be made effective to the full extent by negotiations with the suppliers. Gaps can be classified into three categories: commercial/business gaps, technical gaps and other types of gaps (figure 4).

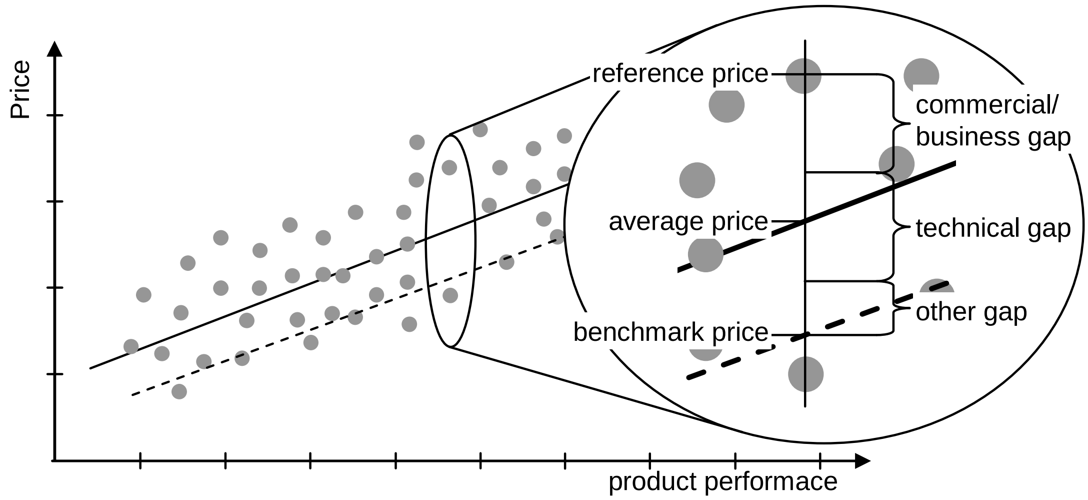

figure 4: Different categories of gaps

Commercial/ business gaps caused by inflated supplier-side prices can be closed by means of negotiation. Either the buyer will grant the supplier sufficient time to close the gap and support him in his effort to reduce the gaps or the buyer will terminate the contract, if the supplier is not willing to reduce the identified gaps and shift the affected parts to another supplier. The way the buyer confronts the suppliers with commercial/ business gaps is mainly depending of the type of buyer/ seller relationship and will be discussed after the different types of buyer/ seller relationships has been presented. Commercial/ business gaps could also result due to a suboptimal allocation of the products of a part family to the suppliers. Often suppliers are specialized in terms of product size or lots size or technologies in order to be able to produce at the optimal cost level. In this case the buyer has to understand the underlying causes for the higher product prices and has to cooperatively discuss the potentials of shifting parts within a part family between the current suppliers. This approach can result in an over-all optimum for the part family in terms of production capabilities, and therefore a win-win situation for all stakeholders can be achieved.

Technical gaps are caused by internal and external factors: Unclear or undefined internal objectives regarding the functionality of the products, unfavourable material specifications or manufacturing technologies can lead to unjustifiably high production costs. In addition, certain product features can raise manufacturing costs disproportionally. In this case, the customer-side relevance of the product feature must be reconsidered and a reduction in product functionality assessed. If such a feature has a low importance from customer view, the buyer together with internal experts from engineering has to asses the potential of downgrading the product.

Furthermore, the issue can be discussed with the supplier, as it is possible that a less expensive design can be implemented that without affecting the product function. External reasons often point to lacking production know-how of the suppliers or to communication and coordination deficits between the OEM and the supplier. The OEM often possesses a broad knowledge concerning different production technologies and a detailed understanding of process optimization. The OEM is therefore in a position to support the suppliers in identifying and levering cost saving potentials by process optimization.
For other gaps two main explanations can be found: On the one hand, it is impossible to generate a system to entirely explain the correlation between price and performance as the number of parameters used within the analysis is limited. Therefore some product features are not considered within the regression function. The price difference for those features has to be determined and subtracted from the absolute value of the gap. On the other hand, significant differences in lot sizes or annual part numbers can lead to price differences. Differences in annual part numbers in contrast should not be deducted from the gap without a detailed analysis by internal engineering experts and suppliers. A very low annual part number often indicates a potential for a reduction in the number of variants and has to be discussed and analysed in detail with experts from engineering before abandoning a variant with a very low production volume. In view of enabling a higher quantity for the main part of the product, a potential shift of the point of variant creation to a downstream production step has to be reviewed and discussed togehter with suppliers.

Different forms of purchasing and transactions

In order to assign appropriate interpretation levels of the price-performance-analysis to different buyer / seller relationships, different forms of transaction are analyzed. Based on individual transaction forms, implications for purchasing in terms of buyer / seller relationships are then derived.

In recent literature on business relation management (Bartsch 2005), different terms are used in order to distinguish between short- and long-term corporate relationships (table 1).

Author	Terms to describe different forms of transaction
MacNeil 1978	Discrete exchange - relational exchange
Hakansson 1982	Exchange episode - relationships
Shapiro 1985	Traditional adversarial approach - new adversarial approach - buyer/ supplier relationship - conduit for innovation
Frazier/ Spekman/ O’Neil 1988	Market - relational - JIT

Author	Terms to describe different forms of transaction
Lamming 1993	Traditional - stress - resolved - partnership/Japanese - lean supply
Burt/ Doyle 1994	Arm’s length - collaborative
Heide 1994	Market governance – non-market governance (unilateral/ hierarchical vs. bilateral)
McIvor/ Humphreys/ McAller 1998	Adversarial - collaborative
Homburg/ Werner (1998)	Spot - relational
Spekman/ Kamauff/ Myhr 1998	Open market negotiations - cooperation - coordination - collaboration
Möller/ Törrönen 2000	Low relational complexity - high relational complexity
Mandják/ Durrieu 2000	Exchange episodes - relationships - networks

table 1: Range of terms to differentiate between forms of transaction (Bartsch 2005)

In contrast to other more detailed classification systems, Burt/ Doyle refer to the initial definition of the IMP-group and only distinguish between two basic forms of transaction: arm’s length and collaborative. The term arm’s length refers to the minimum distance between a supplier and a customer which should not fall below an “arm’s length”. On the contrary, collaborative indicates intense cooperation between the supplier and the customer. The definition of McIvor/ Humpreys/ McAller is closely related to the definitions of Hakansson and of Burt/ Doyle: They use the term adversarial for the description of an interaction which consists of single transactions respectively a short episode of transactions, whereas the term collaborative is assigned to long-term business relationships.

In the context of price-performance-analysis, it is sufficient to differentiate between two supplier / seller relationships: adversarial and collaborative. In order to classify buyer behaviour, Homburg/ Werner (1998) identify four main aspects. Fundamental types of buyer behaviour can be derived from the characteristics of these four aspects:

1. The degree of the specific investments represents the first aspect. A high level of specific investments is considered as an element of a collaborative buyer / seller relationship. However, an adversarial purchasing behaviour is characterized by low or absent specific investments.

2. The willingness to transfer information to another corporation is the second important aspect. To a large extent, collaborative relationships depend on the development and maintenance of communication and on the transfer of information. Hence, a high level of transferred information as well as a high degree of confidentiality are important characteristics of collaborative purchasing behaviour.

3. The third aspect to classify purchasing behaviour is the maturity of contracts. If the degree of the specific investments or the amount and confidentiality of information transferred increases, there is a greater need for legal protection of the relationship. Hence long term contracts are suited to collaborative purchasing behaviour, whereas short term contracts dominate in an adversarial buyer / seller relationships.

4. The total number of suppliers represents the final aspect. In case of adversarial purchasing behaviour, the corporation in general cooperates with a large number of suppliers. In contrast, concentrating on a small number of selected suppliers (ideally a single supplier) is a dominant element of collaborative purchasing behaviour.

Table 2 provides an overview of the oppositional orientations of purchasing behaviour types as defined above (vgl. Homburg/ Werner 1998)

Purchasing behaviour		
Adversarial		**Collaborative**
low ←	specific investments	→ high
low ←	willingness to transfer information	→ high
low ←	degree of confidentiality of the information	→ high
short ←	maturity of contracts	→ long
low ←	number of suppliers	→ high

table 2: Different aspects of purchasing behaviour (vgl. Homburg/ Werner 1998)

Application and interpretation of price-performance-analysis

First of all, different characteristics of price-performance-analysis are summarized and shortly described. Then these characteristics are brought into the context of alternative buyer / seller relationships and different options to use and interpret the results of price-performance-analysis are discussed.

Characteristics of price-performance-analysis

An increased level of transaction transparency is the main objective of price-performance-analysis. Furthermore, price-performance-analysis leads to a reversal of the burden of proof from the buyers to the suppliers. Price-performance-analysis only relies on price information in order to ascertain the price-performance-ratio of the parts. In other words, quality and logistics issues as well as the collaborative behaviour of suppliers in terms of development support, innovations and quick and uncomplicated responses to design or quantities changes are not focussed within a price-performance-analysis. These characteristics have a fundamental impact on the opportunities to lever cost saving potentials identified within the analysis (table 3).

interpretation level	buyer / seller relationship	
	Adversarial	collaborative
Commercial/ business gaps	buyer is short term oriented and demands to close gaps or will terminate the relationship	buyer focuses on underlying causes and grants supplier sufficient time to close gaps, supports in optimization of supplier's product portfolio
technical gaps		
unjustified high production costs	supplier does not communicate unfavourable product specifications	Adjustment of a product specification regarding supplier's production capabilities
superior product feature	information about product costs structure is not available	reduction of the product functionality, identification of less expensive design
lacking production know-how	customer does not support supplier	optimization by support of customer
suboptimal allocation of products	workload, specific production facility information is not shared. Unprofitable products are subsidized by other products	allocation of products within a part family to suppliers with optimal production facilities for these products
other gaps		
shift of the point of variant creation	Information concerning variant-related costs and point of variant creation is not shared	higher quantity for the main part of the product, shift of the point of variant creation to a downstream production step

table 3: Coherence between buyer / seller relationships and alternative possibilities to interpret the price-performance-analysis

table 3 demonstrates that a significant part of the potential cost savings can only be realized within a collaborative buyer / seller relationship. The willingness to share information constitutes a major aspect in closing technical gaps. Often internal supplier information has to be available in order to identify levers for cost reduction. Furthermore, the specific investment into a relationship in terms of developing a supplier or supporting the customer in development challenges provides the basis to exploit further potentials. Supporting and developing suppliers requires high resources of the customer. Therefore only a small number of selected suppliers can be managed in a collaborative relationship. A larger number of suppliers can even impede to set adequate specific investments into the relevant supplier relationships.

Hence, the corporation should focus on a low number of selected suppliers with an high potential.

5. Conclusion

Practical experience in applying price-performance-analysis shows a wide range of applications of this methodology. Not only statistically valid but also technically feasible results can be achieved for a large number of different parts.
However, when interpreting the results of a price-performance-analysis in the case of a long term buyer / seller relationship, certain issues concerning quality, delivery reliability and technology as well as innovation have to be considered. Price-performance-analysis gives a good overview of all optimization potentials related to a part family and provides the basis to derive cost saving potentials as well as measures to close the identified gaps. Yet it will does not disengage the buyer from performing a detailed analysis to interpret the cost gaps.
In most current applications of price-performance-analysis, the method is used exclusively as a tool to close commercial/ business gaps within an adversarial buyer / seller relationship. In fact, this method provides significantly greater potential in identifying and levering cost savings, but potentials related to technical gaps can only be identified within a collaborative relationship.
Further research should emphasis on the potentials of price-performance-analysis to collaborative reduce manufacturing cost by creating a win-win situation for all stakeholders.

6. References

Backhaus, K.; Erichson, B.; Plinke, W.; Weiber, R. (1996),	*Multivariate Analysemethoden: eine anwendungsorientierte Einführung*, Berlin et al.
Bartsch, A. (2005),	*Lieferantenwert - Auswirkungen der Eigenschaften von Lieferanten auf Nutzen und Aufwand bei industriellen Kunden,* Gabler Edition Wissenschaft, Wiesbaden
Burt, D. N.; Doyle, M. (1994),	*Amerikanisches Keiretsu - Die neue Waffe zur Kostensenkung* Econ, Düsseldorf
Cognition Corporation (1995),	*Cost Advantage*. Corporate publication, Cognition Corp., 209 Burlington Road, Bedford, MA 01730
Corsten, D.; Kucza, G.; Hänni, C. (2004),	*Eine Frage der Macht.* In: Logistik heute. No. 6 pp. 32-33
Frazier, G. L.; Spekman, R. E.; O'Neil, C. R. (1988),	*Just-In-Time Exchange Relationships in Industrial Markets* In JM Vol. 52 No. 4 pp. 52-67
Gröner, L. (1991),	Entwicklungsbegleitende Vorkalkulation. Berlin: Springer
Guethenke, G., Moeller, H. (2007),	*Preis-Perfomanz-Analyse - Welcher Preis gehört zu der geforderten Produktfunktionalität?,* in wt Werkstattstechnik online, Vol. 97, No. 5
Hakansson, H. (1982),	*International Marketing and Purchasing of Industrial Goods - An Interaction Approach* John Wiley & Sons, Chichester
Hammann, P.; Erichson B. (2000),	*Marktforschung,* 4th Edition, Stuttgart
Heide, J. B. (1994),	I*nterorganizational Governance in Marketing Channels* In JM Vol. 58 No. 1 pp. 71-85
Homburg, C.; Werner, H. (1998)	*Situative Determinanten relationalen Beschaffungsverhaltens* in Schmalenbahcs Zeitschrift für betriebswirtschaftliche Forschung, Heft 11, Nov. 1998, pp. 979-1009
Kähler, W. (2004),	*Statistische Datenanalyse: Verfahren verstehen und mit SPSS gekonnt einsetzen*, 3rd Edition, Wiesbaden
Lamming, R. C. (1993),	*Beyond Partnership - Strategies for Innovation and Lean Supply* Prentice Hall, New York

MacNeil, I. R. (1978), *Contracts - Adjustment of Long-Term Economic Relations under Classical, Neoclassical, and Relational Contracting*
In NULR, Vol. 72 No. 6 pp. 854-905

Mandják, T.; Durrieu, F. (2000) *Understanding the Non-Economic Value of Business Relationships*
Article of the 16th IMP-Conference, University of Bath

McIvor, R. T.; Humphreys, P. K.; McAller, W.E. (1998) *European Car Makers and Their Suppliers - Change at the Interface*
In: EBR Vol. 98 No. 2 pp. 87-99

Möller, K. K., Törrönen, P. (2000), *Business Suppliers' Value Creation Potential - A Conceptual Analysis*
Article of the 16th IMP-Conference, University of Bath

Price (1989), *The Art of Cost estimating*,
The price way. Corporate publication, Price Systems, Moorestown, New Jersey 08057, USA

Seidenschwarz, W. (1993) *Target Costing – Marktorientiertes Zielkostenmanagement.*
München, Franz Vahlen

Shapiro, R. D. (1985), *Toward Effective Supplier Management - International Comparisons*
Havard Business School, Working-Paper 9-785-062, Boston

Spekman, R. E.; Kamauff, J. W. Jr.; Myhr, N. (1998), *An Empirical Investigation into Supply Chain Management - A Perspective on Partnership*
In IJPDLM Vol. 28 No. 8 pp. 630-650

VDI 1996 VDI 2803 Blatt 1
Funktionenanalyse: Grundlagen und Methoden,
Berlin: Beuth

VDI 1997 VDI 2803 Blatt 2 (Entwurf)
Funktionenstrukturen.
Berlin: Beuth, vorraus. 1997

Wildemann, H. (2000), *Einkaufspotentialanalyse*,
München, TCW

Zabota, D. (2005), *Manager suchen ihr Heil im weltweiten Einkauf*.
In Beschaffung Aktuell No. 02 p. 06. Derived from a panel survey by Droege und Comp. and the Handelsblatt Business-Monitor