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TARGET COSTING FOR THE DEVELOPMENT OF OFFICE BUILDINGS

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ABSTRACT

In the project development of office buildings, the project budget is set at a very early stage based on both the obtainable market rent as well as the profitability evaluation. The current approach in project development is wasteful and not value-oriented, as the calculation and allocation of the target costs does not follow a standardized process. The estimation of costs for realisation and follow-up costs is corporate-oriented and not carried out detailed enough in the early stages of the project development process.

Although the approach of target costing has prevailed in product development for a long time, so far no implementation in the German construction and real estate sector can be observed. Target costing is necessary to integrate proper cost-planning, cost-management, and cost-controlling in the project development process to create valuable and user-oriented properties.

The objective of this conference paper is to analyse the adoption and potentials for increasing values with target costing pertaining to an optimised cost-benefit-ratio for project development of office buildings. The lessons learned are transferred to an optimised method approach. The focus of this approach for practical application is on the determination and allocation of the component-level target costs in terms of specific requirements of users or project developers. In particular, due to the strict market orientation and focus on customer requirements, target costing provides support for project developers in developing properties of increasing value.

KEYWORDS

Process, product development, target value design, target costing, cost planning

INTRODUCTION

Target costing is a management method originated in Japan which is applied in product development for many years. Target costing should be understood as a strategic approach for cost planning, rather than a simple cost reduction method. The objective of the methodology is generating profit by a market-driven product development meeting the market requirements at market prices. (Ansari et al., 2007)

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This cost management tool is aimed to influence a products cost structure within its development process through an early integration of cost information. The objective is to optimise the cost structure by identifying appropriate cost reduction potential with the focus on meeting customer requirements. (Niemand, 1993) The peculiarity of this methodology is a different perspective of the cost aspect. Instead of considering costs as the outcome of a design, costs are rather deemed as a significant influencing criterion and steering instrument in the development process. (Zimina et al., 2012) Target Value Design was developed as one approach for the adoption of the manufacturing target costing method to the characteristics of the construction and real estate sector. Its processes were applied and improved on projects by an US general contractor and a healthcare service provider. (Zimina et al., 2012)

In Germany the research of target costing for the development of real estate is taking place primarily in scientific studies. Hitherto target costing is not applied in business practices of the construction industry. The documentation of target costing projects occurs mainly in the US. Analysing the project results and the success of the target costing methodology, the focus is mainly on achieved cost savings, whereas related value generation is hardly considered. (Miron et al., 2015) The documented projects in the US are solely developed with the purpose of own use, in contrast to German research on target costing in real estate development, which implies that the development process is operated by a developer.

The application of target costing is significantly influenced by the individual perspective of the project developer. In Germany development projects are mainly carried out by trader-developers with the objective of selling the property after completion to investors. Therefore the development of an optimized approach for the application and adaptation of target costing to real estate development is taken out in the perspective of a trader developer. The focus is set on the development of office buildings, in particular on target cost planning. This paper presents an approach for the adaptation of target costing on real estate development considering potential improvement of existing target costing approaches. The main research efforts were undertaken on the following two aspects:

- determination of a function structure for office buildings
- development of a methodology for estimating drifting costs integrating market and client requirements at an early stage of the development process

RESEARCH METHOD

The initial research contained the concepts and different approaches of manufacturing target costing. In a further step different approaches for the adoption of the target costing method in the construction sector have been analysed. The outcome of this research and actual practices in the real estate sector led to the development of an optimized approach considering the determination of a function structure of an office building and a methodology for the estimation of the drifting costs based on the users requirements. This approach allows an integration of user requirements at an early stage of the development process to obtain value generations through an optimized cost-benefit-ratio.

DEFINING TARGET COSTS AND TARGET COSTING PROCESS

As a first step ahead of the definition of the target costs strategic decisions in terms of product positioning on the market have to be made. The objective is the development of a client-oriented product concept with the specification and the derivation of the target price as the obtainable price on the market. (Seidenschwarz et al., 2002) Thereby the target price represents the client's willingness to pay. The income approach to valuation, a standardised valuation method in Germany, provides a procedure for identifying the market value in terms of the determination of the target price.

The allowable costs are derived from the target price by subtracting the required target profit. (Arnaout, 2001) The allowable costs are defined as maximum costs based on client requirements and competitive conditions (without consideration of existing technology and process standards). (Horváth & Seidenschwarz, 1992)

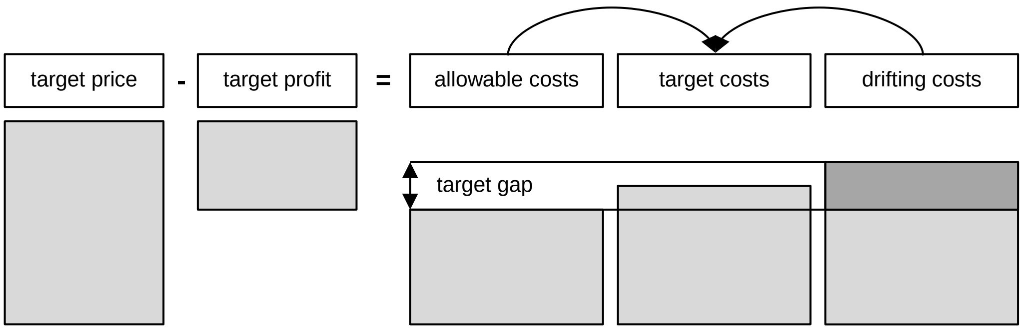

Figure 1: Process of the definition of project-level target costs (Figure 12 in Krupper, 2006)

The allowable costs as a maximum cost limit are set against the drifting costs. The drifting costs are the prognosed standard costs which the company would incure at the current technology and process standard for providing the project. In general drifting costs exceed the allowable costs. The difference represents the target gap and shows the necessary cost reduction target in the development process as the objective of the target costing process. (Horváth et al., 1993)

There is no explicit consistent procedure for the final determination of the target costs for the total project costs. The exceeding difference is deemed to be overcome by means of value analysation and rationalisation efforts. In general the allowable costs do not represent a companies competence and are therefore mostly not obtainable, or at least not in short term. Hence the target costs are established as an amount between standard costs and allowable costs. (Horváth et al., 1993)

DECOMPOSITION OF THE PROJECT-LEVEL TARGET COSTS

The proceedings and presentation of the decomposition of the target costs on a component level are oriented to the approach of the so-called house of quality, a common and essential tool within the quality function deployment (QFD). Quality function deployment is a comprehensive approach translating client requirements in equivalent technical features in every product development and production phase. (Liebchen, 2002)

Figure 2 shows the individual steps of the proceeding of decomposing target costs which are explained in the following in terms of the application in real estate development.

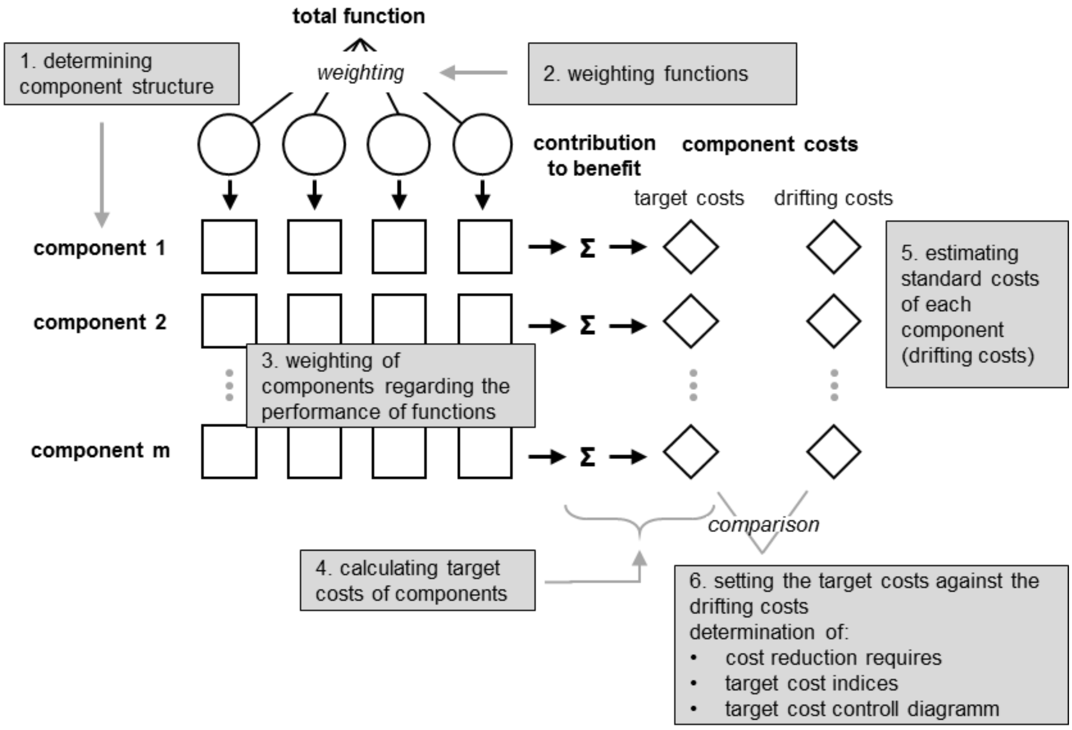

Figure 2: Decomposition of the project-level target costs to component-level target costs using the approach of the quality function deployment (Figure 2-3 in Götze & Fischer, 2008)

Step 1: Developing the component structure

Developing a component-function-matrix requires as a first step the definition of product components. The German Institute for Standardisation provides with the standard DIN 276 a structure for buildings costs which is applicable as a component structure in the target costing process. The component structure can be carried out consistently in the same way by the assumption of building cost groups. The standard DIN 276 forms a framework for building costs, which defines a structure to divide total costs into cost groups. This structured order is maintaining a transparent presentation with the possibility to extend into greater details for a differentiated analysis and constant updates throughout the whole project process. (Greiner et al., 2005) The standard therefore serves as a cost structure and cost planning instrument. (Blecken et al., 2000) The structuring is set by a three level ordinate number. The first level contains following seven cost groups (CG):

- CG 100 – Site
- CG 200 – Clearance and Development
- CG 300 – Structure – Construction works
- CG 400 – Structure – Services
- CG 500 – External works

- CG 600 – Equipment and Work of Arts
- CG 700 – Consultant Fees

This structural system allows the transformation of a planning oriented to an execution oriented cost calculation and leads to the conclusion that the application of the structure seems useful for the target costing method.

Step 2: Definition of the function structure and weighting according to client requirements

The functions of a building are defined and weighted reflecting the client requirements. First, the functions of an office building which describe the client desires and requirements must be determined and weighted according those requirements to be accounted in the further course of the target costing process. There is no common definition of the functions of an office building. There are numerous approaches for valuation methods on the market, but the valuation is based on different criteria. Therefore different valuation approaches for the quality of office buildings are analysed to identify the key function structure. The valuation of these systems is based on criteria catalogues. The relevant criteria for a systematic analysis have been identified and grouped by functions. In addition the function structure of two target costing approaches for real estate development of the German authors Krupper and Liebchen have been analysed. The function structure in Kruppers approach is based on the building quality assessment, a methodology for building valuation. The latter approach is designed to develop residential real estate. The comparison of the valuation systems and methodology approaches results in the following function structure for office properties.

Table 1: structure of functions of office buildings

category	functions
design / appearance	design building envelope
	design office spaces
	design circulation areas
spatial layout	functional structure
	flexibility
access and infrastructure / transportation	access for persons
	safety / security
amenities	sanitary facilities
	social facilities
technical service	information and communication
comfort	acoustic comfort
	visual comfort
	thermal comfort - heating
	cooling / ventilation
	user control

operation	maintenance
	operating costs

Step 3: Identifying the contribution of components for realising the functions

In a first step the percentage contribution of each cost group or component to provide the respective functions must be determined. (Horváth et al., 1993)

Table 2: Determining the proportionate contribution to cost groups for providing the functions

	functions				total
	F1	F2	F …	Fn	
percentage weighting of functions					**Σ = 100 %**
components					
CG 330					
CG 340					
CG …					
CG m					
total	100	100	100	100	

contribution to each component for performing the functions

Subsequently the weighting of the component contribution to the realisation of functions is carried out by multiplying the respective function weighting factor (the weighting factor according to the importance of a function to the client from step 2). The total contribution to benefit (on the entire building) of the individual components or cost groups across all functions can be determined by summarising the line total. (Horváth et al., 1993)

Table 3: Identifying the contribution to benefit of each component

	functions				total contribution to benefit of component
	F1	F2	F …	Fn	
percentage weighting of functions					**Σ = 100 %**
components					
CG 330					
CG 340					
CG …					
CG m					**Σ**
total					**100**

contribution to benefit of components

Step 4: Determining component-level target costs

In the following step the determined total project target costs are distributed respectively decomposed to the individual components or cost groups to obtain the component-level target costs. The allocation is based on the determined, weighted proportion of benefits of a cost group according to step 3. (Krupper, 2006)

MODIFICATION OF THE ALLOWABLE COSTS – CONSIDERATION OF CONTROLLABLE COSTS

The previous derivation of the target costs is a full-cost approach, taking all cost elements into account. These include all costs for the building construction, including site costs. (Krupper, 2006) In the following step the target costs are divided and broken down into product components. The decomposition of target costs to component-level can basically be proceeded on full-cost basis. However for an effective application of the target costing method an exclusion from target costs of cost elements, which cannot be influenced and controlled by planners is recommended. (Götze & Linke, 2008) For non-controllable cost groups on a planning level, fixed budgets should be set estimated from experience data or contractual arrangements. For this purpose the building cost information center (BKI) offers a database with construction costs information providing cost indexes in Germany (BKI, 2015). The BKI publicises a statistical cost database which is derived from actual costs of numerous completed projects and constantly updated. The subtraction of these estimated budgets for cost elements excluded from the market-oriented design process of the allowable costs results in the modified allowable costs respectively the allowable costs in a narrower sense (allowable costs i.n.s.)

Table 4: modification of allowable costs

target price		Building earning value (without site value CG 100)
- target profit		
= allowable costs	**CG 100 - 700**	
- fixed cost elements	**CG 100**	Site
	CG 200	Clearance and Development
	CG 600	Equipment and Work of Arts
	CG 700	Consultant Fees
= allowable costs i.n.s.	**CG 300** **CG 400** **CG 500**	Structure – Construction works Structure – Services External works

Due to the controllability of costs target costing approach is limited to the investment cost of the building and outdoor facilities.

Step 5: Estimating drifting costs of components

This step involves the estimation of the drifting costs of each component or cost group to be set against the component-level target costs. The respective drifting cost value can be determined based on cost indexes provided by BKI.

Step 6: Comparison of target costs and drifting costs

The final step is considered as the phase of cost controlling within the target costing process. Comparing drifting costs with target costs reveals the cost reduction target and determines the cost reduction target. This step constitutes with the comparison of cost and benefit relation the basis for cost optimisation and fulfillment of client value.

INTEGRATING MARKET AND USER REQUIREMENTS IN THE CALCULATION OF DRIFTING COSTS

Forming the basis for the determination of target costs, drifting costs play an important role within the target value design process. Especially if considering the lessons learned from an example of the application of target costing at a development of a medical office building in the UK which shows the necessity of a more realistic and accurate determination of drifting costs. In this case several unsuccessful attempts of the project had to be reported, as the target costs were first determined too imprecisely, only with a casual square foot estimate. (Ballard, 2006)

An inaccurate and undifferentiated derivation of target costs endangers the successful completion of a project. Since the drifting costs form the basis for decisions about the cost targets, the estimation of drifting costs has to be undertaken with great concern to ensure the accuracy and to develop realistic targets.

A new approach for an accurate and more realistic determination of drifting costs may be the integration of client requirements and needs by means of a weighting of functions. Given that in Germany the construction cost database of BKI is in common use and an essential basis for cost estimations it seems appropriate that an optimised target costing approach refers to their cost indexes. The BKI-database provides cost indexes for categories of simple, average and high standard, whereas for each category a range from lowest to highest and medium value is available additionally. Therefore resulting in a conclusive weighting scale from 1 to 9.

The contribution of a cost group to perform a function whose importance is attached to 1-3 points, the costs are allocated based on the medium value of the simple standard category. For the significance level with 4 to 6 points, the medium values of the average standard category and with 7 to 9 points of the high standard category are measured. The lowest weighting with one point also gives consideration to functions, which are necessary for a building but are from the client's perspective of low value.

Table 5: Using the cost indexes depending on the clients weighting of functions

	weighting points								
weighting points	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
cost indexes according to standard	simple standard	simple standard	simple standard	average standard	average standard	average standard	high standard	high standard	high standard

The calculation of the weighted drifting costs occurs by using the component functions matrix. The contribution of each cost group for performing the respective function ($a_{m,n}$) is determined with the same methodology for the decomposition of target costs according to the QFD.

Table 6: Determining the contribution of cost groups for performing the respective functions by means of calculating the weighted drifting costs.

cost groups (CG)	**functions**				**drifting costs**
	F 1	**F 2**	**…**	**F n**	
CG 330	$a_{CG\ 330,F1}$	$a_{CG\ 330,F2}$	…	$a_{CG\ 330,Fn}$	
CG 340	$a_{CG\ 340,F1}$				
CG …	…				
CG m	$a_{m,F1}$			$a_{m,n}$	
total	**100**	**100**	**100**	**100**	
weighting points (1 to 9)					
standard (simple/average/high)					

The weighted drifting costs are calculated according to the weighting of functions using the respective cost indexes (CI) of each cost group. The costs are determined considering the ratio of contribution for performing the functions and the respective standard.

Thus the weighted drifting costs of a cost group *m* results by their respective contribution to performing the functions in simple standard ($\Sigma a_{m,F\ simple\ s.}$), average standard ($\Sigma a_{m,F\ average.\ s.}$) and high standard ($\Sigma a_{m,F\ high\ s.}$) and the multiplication with the respective cost index ($CI_{simple\ s./average\ s./high\ s.)}$ and the corresponding reference area.

$$\textit{Weighted drifting costs } CG_m = \left(\frac{\Sigma a_{m,\ F\ simple\ s.}}{\Sigma a_{m,n}} \times CI_{simple\ s.} + \frac{\Sigma a_{m,F\ average\ s.}}{\Sigma a_{m,n}} \times CI_{average\ s.} + \frac{\Sigma a_{m,F\ high\ s.}}{\Sigma a_{m,n}} \times CI_{high\ s.}\right) \times \textit{reference area}$$

The integration of customer requirements in the calculation of weighted drifting costs enables realistic and accurate cost estimation for the desired profile of a building, even in the early stages of a development process.

LIMITAIONS

The distribution of the target costs based solely on the benefits components and the adoption of a proportional relationship between costs and benefits should be considered with appropriate approaches. A possible limitation lies in determining the shares of the cost groups to perform the functions. For this reason future research for target costing in real estate development may involve the following aspects:

- Evaluation of each cost groups contribution for performing the functions
- Integration of ecological factors and follow-up costs, e. g. with the implementation of additional cost groups or operating costs.

CONCLUSIONS

A main weakness and yet essential fundamental basis is constituted in realistic, accurate and reliable planning and determination of the target costs. This part of target costing method is subject of great impact potentials. Therefore this paper contemplates within the framework of determining target costs for office building optimization approaches for the target costing process. The obtained conclusions of this research are stated as follows:

- Target costing is an applicable methodology as a supportive tool for the development of market compliant buildings due to the strict client-orientation.
- To ensure a successful target costing application, realistic and reliable planning and determination of target costs are a core prerequisite.
- Continuous cost information is required in the early stages of the process hence suitable instruments and tools for cost estimation have to be provided.

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