

## **The Cost-Benefit Factor: A Tool between Management and Marketing**

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**Abstract:** Today, scientific libraries have to serve a whole range of customers including collaborative partners, third-party funding agencies and political authorities. Funded by public investment, libraries have to deal with the question of their added value for the knowledge society. Up to now, the responses have been more concentrated on the qualitative rather than the quantitative aspects. The contingent valuation method will give an answer.

**Keywords:** Cost benefit-factor, contingent valuation, market research, added value

### **1. Introduction**

The TIB, as the German National Library of Science and Technology, plays an important role in Germany's research infrastructure. Within its fields of engineering, architecture, chemistry, computer science, mathematics and physics, the TIB is worldwide the largest specialised library. It has been an important provider of literature and information for over five decades at an internationally competitive level. This is based on unique collections of essential and highly specific technological and scientific specialist literature across all media. Furthermore, the library conducts numerous research and development projects on digital libraries.

The TIB is an institute of the Leibniz Association which is one of the four large science organisations in Germany (apart from Fraunhofer and the Max Planck Society). Every seven years, all the members are evaluated by an independent, external panel of experts who examine strategies, services and management methods. Both the results of the experts and the Leibniz Association Senate's statement are used at the German Joint Science Conference for the assessment of further funding requirements. The worst case scenario can lead to the closure of institutions and facilities.

Annually, around 23 million euros are invested into the TIB by the federal and state governments. In the German library scene, this sum does admittedly amount to a great deal of financial support from the funding agencies, but how long can this level of funding be maintained?

## **2. Motivation and Aims**

To measure a company's return of investment is customary, but what is the ROI of a library? A large sum begs the question of whether this public investment is justified. The TIB wanted to know if there is any evidence of added value for the knowledge-based society. Is the library really that useful to its target groups of researchers and developers in the economy and the sciences as it thinks it is and, furthermore, is this benefit quantifiable and thus verifiable? In short, is the large investment made into the TIB worthwhile and how much is a scientific library worth?

In order to answer these questions, the TIB conducted an online survey which followed three aims:

Firstly: Find out about the structure, industry sectors, typology of and usage by the customers, as well as the products and services used.

Secondly: Formulate an added value of the TIB in financial terms and find out how much the TIB is worth to its customers in financial terms. In 2009, the budget was 24.5 million euros, from which 19.5 million euros were allocated from the Ministries; 2.1 million euros came from our own income from the services the library provides and 2.9 million euros from third-party funding from various EU and German Research Foundation projects, as well as other funding organisations. The aim was to provide politicians and ministerial funding bodies with an important fiscal argument for the high operating costs of the TIB.

Thirdly: Support of the library's strategy and its intended path. The TIB is the world's largest specialised library for technology and science. In this radically changing technological, scientific and political environment, it is not just expected to fulfil its traditional function and to make its collections available in both printed and electronic form; it is also expected to develop new fields of activity. This involves, for example, the provision of appropriate infrastructures no longer just for textual materials, but also for multimedia materials, such as research data, films, images, sounds and 3D animations. The access to all collections, irrespective of shape, place and time, must be guaranteed in the long term. The integration of open access publications should also be promoted. These new strategic fields of expertise have already been the focus of the TIB for some time and, in the future, together with national and international partners, associations and networks, it will continue this focus in a more targeted manner. Do customers also see the aforementioned areas of work as being relevant to their scientific work processes?

The timing of the study was deliberately chosen to be 2009/2010 as, at the beginning of 2011, the evaluation of the TIB by the aforementioned Leibniz Association's panel of experts was imminent. So close to this evaluation, a good result of this study was sought and would indeed be helpful.

### **3. Procedure**

In 2009, the TIB commissioned the market research institute, TNS Infratest Business Intelligence, to carry out a customer online survey which took place between November and December 2009. A total of 663 TIB customers (random sample) completed the online questionnaire which consisted of 45 questions. The average interview duration was 13 minutes, the evaluation, of course, anonymous.

### **4. Results Part 1: Customer Typology**

We want to briefly discuss the customer typology here in order to be able to categorise the TIB.

The 663 customers who took part in the survey are a representative cross-section of all customers. 44% of them work in the private sector. A good third of these are employed in large companies with over a thousand employees. The customers primarily come from mechanical engineering, the chemical/pharmaceutical industry, electrical engineering and automotive industry and suppliers. 29% of all customers are attached to (non-)academic research and teaching, 14% to other state institutions, such as libraries and administrations.

On average, 68% of customers have been using the TIB for four years and longer, 52% already for seven years and longer. 30% became customers in the last three years; and 47% have called upon the TIB at least once in the last month.

The customers believe that the library offers a high level of service. 76% indicate that deliveries are quick and reliable, 74% that the collection is current and comprehensive. These are the two most important reasons why customers continue to use the TIB on a frequent basis. At 81%, the delivery of documents and interlending is by far the most used service within the TIB. The information obtained from the TIB is required within the field of research and development in three out of four cases.

### **5. Results Part 2: What is the added value of the TIB?**

In a new type of project approach, the TIB decided to join up with TNS Infratest Business Intelligence to determine its benefits both for the individual but also for Germany as a centre of scientific activity. For these purposes, we reverted to the "Contingent Valuation".

This is a special technique based on the stated preference theory in which customers are asked to give an assessment of the value of the library in financial terms. This technique reveals preferences for goods for which no real market exist. The contingent approach is based on the assumption that a certain willingness to pay also exists for non-market goods.

The basis of any contingent valuation is a carefully drawn-up questionnaire. In general, all surveys are based on five types of questions. Let's have a look at the results of the survey among the 663 customers of the TIB.

#### **Investment in Access**

At the beginning of the survey, the customers were asked to quantify their monthly expenditures for the TIB in euros. Furthermore, questions were also asked on "Investment in Use" in order to differentiate between "power users" and "occasional users".

- 60% of all TIB users order between one and ten documents per month. The most intensive users come from the private sector.
- For 75% of users, the TIB services can be used quickly. That means that they spend less than one hour per day using the services. Just over a quarter of the public institutions spend more than one hour per day.

These questions were placed at the beginning of the questionnaire because they are easy to answer. This "baseline measurement" lays the ground for all subsequent questions. This allows the respondents to deal realistically within the future scenarios presented to them later on.

#### **Cost of Alternatives**

The respondents were then asked to estimate their additional efforts and costs they would have in the unlikely event that the TIB no longer existed. The respondents gave the following estimates:

- If the TIB no longer existed, 57% of the customers thought that their work would be "somewhat affected". 30% thought that their work would be "severely influenced".
- All customer groups would expect increased efforts in terms of time. Without the TIB, 54% of all respondents would have to use up to 25% more working time and accept additional costs (without personnel costs). 16% would have to spend up to 50% more working time or even more.
- If the TIB's services no longer existed, a third of the respondents would not expect their costs to change. 42% of respondents would expect an increase by up to 25%. 16% would expect their costs to increase by between 26% and 50%. 6% of respondents would expect their costs to at least double. 7% estimate a cost increase of between 51 and 99%.

The questions on the level of impact, the working time and the additional costs prepare the respondents for making realistic financial estimates. They make it

more probable that the respondents will give well thought-out and honest answers when they have to say how much they would be willing to pay if the framework conditions for the provision of the TIB services were to drastically change.

### ***Price Elasticity of Demand***

The first question for which the respondents had to provide a financial estimate was as follows: "Please imagine that the prices for the TIB service packages increase by 50% on average. How do you think this would probably affect the way you (or your organization) use(s) the TIB?"

- 45% explained that their usage pattern would remain unchanged.
- 23% would reduce their usage by 1% to 25%.
- 16% would reduce their usage by 26% and 50%.
- 10% would reduce their usage by more than 50%.
- 7% would stop using the TIB altogether.

Public institutions would demonstrate the strongest response to a drastic price increase, namely by reducing their usage by 62%.

Does this result mean that the TIB could increase its prices by 50% without suffering any financial losses? No! This is strongly supported by the answers regarding their own willingness to pay (see below). It is also argued in specialist literature that true preferences are only revealed when respondents believe that they have to pay the amount they have specified out of their own pocket.

### ***Willingness to Pay***

Various questioning techniques can be used to ascertain the respondents' willingness to pay. If public funds were no longer available for the TIB, would those questioned be prepared to pay a specific amount themselves on top of the current expenditure to ensure that the TIB survives? The key results to this question are as follows:

- 19% of respondents could imagine their own institution directly funding the TIB on a regular basis.
- A quarter of the respondents cannot imagine doing so. The corresponding percentages are 28% for private sector institutions, 27% for public institutions and 22% for academic research and teaching institutions.

For this question, the respondents were proactively informed that it was simply intended to help assess the TIB's value. It was not to be assumed that the library's funding was at risk or that it was considering increasing its prices.

In the previous open-ended direct question no amounts of money were mentioned in order to avoid influencing the respondents. Although the question looks simple at a first glance, the respondents were often unsure. Also in this

survey, 56% of all respondents answered the question on their willingness to pay more with "do not know".

Willingness to pay, as indicated in the open questions, is underestimated and hence too low. A "bidding game" question on an auction basis with specific payment suggestions was therefore part of the survey. The question was: "Does that mean that you or your organization would not be willing to pay for example 10 percent more, to ensure the survival of the TIB and its services?"

- In response to this question a further 23% of respondents, in addition to the 19% of respondents in the previous question, were willing to pay the aforementioned additional sum.
- Customers who answered this question with "No" (23%) or "Do not know" (54%) were asked to indicate reasons. 42% said that they had no responsibility for the budget. 36% thought that the TIB's services should not become more expensive. 32% believed that the TIB should be funded purely by public money. 23% said that the TIB is useful but that they could not afford to pay an additional ten percent each month. 12% felt that a price increase of ten percent would not be justified.

As a consequence, in an open-ended direct question, those questioned were also asked to imagine a world where there are no budget restrictions. If this were the case, how much more would the customers be prepared to pay the TIB?

- The respondents answered that they would be willing to pay on average 24% more. 50% did not answer the question. 24% could imagine increasing expenditure by up to ten percent, whereas nine percent could imagine increasing expenditure by up to 20%. 4% would be willing to increase their expenditure by up to 30%, 0.2% by up to 40%, 3.8% by up to 50%, 0.2% by up to 80% and 2.8% by 81% or more. 7% refuse to pay more.

In a follow-up question, the respondents were asked to justify why they would not be willing to pay more.

- A quarter of the TIB customers surveyed said that they were not authorized to make such decisions. 15% said that their organization had to make spending cuts. A quarter felt that the TIB's current prices were appropriate. 8% pointed out that the competition was cheaper in this case.

For the follow-up question "Having thought about your reasons for your answer, would you like to stick with the figure you gave or correct it?" the key results were as follows:

- 94% of respondents stuck with their answer. 1.7% didn't want to make any further changes. 4% changed their answer. 1% was willing to pay between 11% and 20% and a further 1% was willing to pay 81% or more.

### ***Willingness to Accept***

Finally, the customers were presented with the hypothetical situation that the public authorities stopped funding the TIB but that the German government would be willing to pay current customers a monthly compensation fee (“Willingness to Accept”).

- 2.6% of respondents would not be willing to accept financial compensation. The other respondents would demand 427 euros per month on average if the TIB were to close. The payments that they would demand ranged from 174 euros for the private sector, to 367 euros for non-academic research and education, to 559 euros for academic research and teaching, and to 828 euros for other public institutions.

Also in this survey, the levels of financial compensation that would be demanded exceed the current average expenditure and the respondents' willingness to pay more than they currently pay. The levels of financial compensation that would be demanded are actually almost four times higher than current expenditure and three and a half times higher than the average willingness to pay more. Other studies come to similar conclusions.

### ***Method for calculating the TIB's added value***

The "individual value", which is the maximum sum of money that a respondent would be willing to pay to use the TIB's services, is calculated from the answers of the previous five questions regarding the “Investment in Access”, the “Costs of Alternatives”, the “Price Elasticity of Demand”, the “Willingness to Pay (WTP)” and the “Willingness to Accept” (WTA). In an additional step, individual values and public subsidies are compared. A factor is calculated which is used to ascertain the TIB's economic value in four calculation steps. These are shown below:

#### ***Calculation step 1: Direct calculation***

In a first step, the answers to the questions which ascertain specific sums of money (“Investment in Access”, “Costs of Alternatives”, “Willingness to Pay” and “Willingness to Accept”) are directly calculated by allocating an individual separate euro value to the results of the four questions for each respondent. In addition, the answers on “Investment in Use” are used to weight the answers from the "power users" differently to those from the occasional users.

#### ***Calculation step 2: Verification through regression models***

Regression models are used to check whether the results from calculation step 1 reach the same result or whether it produces differences in individuals' willingness to pay. If necessary, the results are corrected.

The individual value from calculation step 1 is verified for each respondent with the aid of regression analyses. This ensures that plausible results are obtained.

The results for “Price Elasticity of Demand”, the extent of the level of the impact if the TIB were to close (“Costs of Alternatives”) and the follow-up questions on “Willingness to Pay” and how much are also used. This results in a corrected individual value in euros for each respondent.

The first approximate value from calculation step 1 and the individual value corrected by using the regression analyses from calculation step 2 are compared with each other. As shown in the survey, willingness to pay increases as the topic is dealt with further. 237 respondents increased their willingness to pay after the first follow-up question and 137 after the second follow-up question. However, the increases are marginal. By including these corrections from the respondents we now have a more realistic individual value for each respondent.

***Calculation step 3: Cost-benefit factor, value assessment for each respondent***

The ratio of the corrected individual values to the TIB's per-capita budget results in an index factor per respondent. These values are then aggregated into one overall index factor.

***Calculation step 4: Ascertaining the economic value***

The public subsidies are multiplied by the overall index factor. This results in the economic value of the German National Library of Science and Technology in euros.

As an institution funded by the federal government and the federal states, the TIB receives around 23 million euros per annum. The results of the study break down as follows:

- For every euro of public money invested in the TIB, the library generates 3.8 euros in added value.
- The TIB customers confirm that the TIB is worth 3.8 times more value to them than the costs that it generates.
- The TIB converts 23 million euros of annual support into 87 million euros for the German information economy and knowledge society.
- If public funding for the German National Library of Science and Technology were to stop, Germany's scientific activity would accrue losses of at least 64 million euros.

**6. Results Part 3: Support of New Business Areas**

Alongside the measuring of the cost-benefit factor, it was important for the TIB to ask its customers about future strategic areas of work. The result can be construed as acknowledgement and support for the TIB's path:

- The customers have confirmed that the functions of the TIB should, in future, concentrate specifically on the expansion of new services, for example, research data and multimedia products, such as audiovisual media. The TIB should support research with innovative services and integrated



processes. To this end, a digital infrastructure should be built up and expanded.

- It should also not be forgotten that the traditional library services are still a major asset for the TIB: Completeness of its collection, indexing, retrieval and archiving remain at the top of the agenda. The aim of the TIB should still be to network its customers quickly and in a targeted manner with the information that they require. To this end, both print and digital media need to be archived.
- National and international collaborations will also strengthen the TIB's extensive range in the future and increase the acceptance of the library amongst its customers.
- The customers expect the quick and reliable provision of full text. A current and comprehensive collection is important to them. Furthermore, it is also good to appreciate the exclusivity of the collection. The customers appreciate the high quality service and advice given by its employees.

### **7. Helpful Tool – Between Strategy and Marketing**

How have we used the results for our purposes? To begin with, all the results and responses collected during the internal public relations work were published and posted onto the library's internal intranet. Email information, internal information events and reports for committees, departments and teams about the methods and significance of the results were circulated and this always in combination with the director's particular thanks to all his colleagues; after all, without the staff, such a result could, of course, never have been achieved. An interesting psychological effect set in, too; staff now had, alongside the usual figures about the inventory, customers, etc, an additional way of quantifying their own work contribution in the context of the institution's overall societal development. This recognition from outside is a good internal motivator for the meaningfulness of one's own work.

As part of the external public relations work, different paths were taken and strategically differentiated target groups approached. The results were presented in a brochure and a more detailed description of the method was added for interested parties (in both German and English) with a motto from the former British Prime Minister Gordon Brown: "The public have a right to know that they are getting value for money and therefore there are tough choices and hard decisions that have to be made. The something-for-nothing days are over in our public services and there can be no blank cheques". The results were presented at a press conference where the Lower Saxony Minister for Science and Culture said: "The economic benefits of this library are impressive. We now have evidence of this. The TNS Infratest survey results prove that the TIB is an effective generator of knowledge and an efficient information service provider. With its priceless collections, it is an important force for research and science which enriches our scientific society".

A wonderful statement which was circulated with the results of the study via websites, newsletters, social media and press channels, distributed at exhibitions

and conferences and described in specialised articles and presentations (and will continue to be); indeed all the available marketing tools have been used.

There were different types of feedback such as from customers working in a corporate library who want to use the results themselves, not just for internal motivation, but also to counter a feared internal closure by conducting their own survey. In various online fora, there were lively and controversial discussions about the method, discussions which ranged right through from congratulations for the courage shown in exposing a library to this hitherto rather unconventional method in order to obtain a cost-benefit value, via criticism of the basis of the data, to an outright rejection of wanting to assess an institution which is regarded as a custodian of cultural heritage in terms of euros and cents.

From a strategic point of view, the added value result has been gainfully used; its introduction to the TIB's advisory and supervisory committees, which includes representatives from the state and federal government, i.e. the funding agencies, as well as to the collaboration partners and major customers from science, research and industry, has confirmed to the library that this method is a very good concept which has provided a pleasing, strategically significant outcome decisive for the argument to continue the TIB's funding. Other important political decision-makers and disseminators were also kept informed about the well-invested funds.

Another important strategic issue is the possibility of a benchmark with other comparable institutions. We are familiar with the comparison values of the British Library (4.4) and the ETH Zurich (not yet published), but in the case of the British Library, it must be taken into account that it also has museum and cultural functions which means that it caters to a wider audience and is thus able to generate a higher value. The more institutions at an international level which go through the Contingent Valuation Method, the easier it is not just to make comparisons, but for the individual institutions to work better on their own respective weaknesses whilst maintaining or expanding their strengths.

## **8. Conclusions**

This added value indicator alone can certainly not give a reliable picture of an institution, so the TIB complemented this with, for example, regular customer surveys or in-depth interviews with those disseminators and decision-makers who are of importance to the TIB. These interviews were conducted at the end of the added value study. Here, too, the TIB's strategies have been confirmed, such as the increased efforts to enter into international collaborations and also the indexing of non-textual materials – we published this study, too. Quite new are the results of a customer satisfaction survey which we also conducted with TNS Infratest. By using the so-called TRIM Method, it was possible to obtain a differentiated picture of the services offered and the customers' evaluation thereof. From this customer satisfaction index, it was then possible to ascertain

an indicator for our strategic Balanced Score Card. However, this is a subject for another presentation...

To do market research, to take a closer look at your customers, and to look especially for the cost-benefit factor of your library really are tools between management and marketing. Seen strategically, the factor is one indicator which can be significant and a trump card in investment negotiations as it documents the importance of an institution for the national science location.

In the case of the TIB, a repeat of this assessment is certainly conceivable and would make sense due to the possible comparability over the years – a reasonable time, therefore, would be before the TIB's next evaluation in 2018.

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