

Integrating Building Performance in PPP Management Decisions

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I. Introduction

Up to now, the vast majority of infrastructure services has been provided through conventional procurement processes. However, governments are eager to increase the Public Private Partnership (PPP) proportion of total infrastructure investment.

This means that public bodies have to decide, on a case by case basis, whether to procure their required infrastructure services through PPP or by using conventional procedures. The only constraint is that the public administration has to be cost-efficient.¹

The choice of a procurement method must therefore always be made by taking into account cost-effectiveness as a measure of the relationship between costs and benefits. The assessment of economic efficiency in the PPP procedure can be described in three stages²:

- 1) The investments must fulfil the criterion of cost-effectiveness which is verified by using the PPP-suitability test.

This is to ensure that the application of PPP is only for programmes for which it is appropriate

and which are likely to represent good value for money.

- 2) If cost-effectiveness is assured, a comparison of procurement methods is made. The alternative procurement variants must always be compared with the conventional public procedure. The Public Sector Comparator (PSC) is used as a benchmark for the PPP variants. The other procurement methods must be compared against its results.
- 3) The tendering process follows the comparison of procurement methods. The final step is the process of awarding the contract to the chosen bidder. There may be changes to the specification during the negotiation procedure. If so, the PSC must also be adjusted.

In stages 1 and 3 it is feasible to consider the benefits of alternative investments. However, in stage 2 it is generally assumed that the amount of benefit will be constant and that the decision can therefore be made solely on the basis of costs.

These stages clearly show why economic appraisals are now at the core of the PPP-process and that the choice of procurement method (second stage) will be decided primarily on their results.

Because of the long-term characteristics of real estate investments, the results of the economic appraisals are crucial for subsequent decades. This significance justifies the major effort required to develop such economic appraisals. However, looking at practice, it is evident that there is a lack of confidence in the results. Despite the amount of work required, there is distrust of economic feasibility studies for PPP projects. Results in favour of procurement by PPP are often questioned. To improve its acceptance, the existing decision-making process must be critically examined and the potential to optimise it must be identified. Firstly, the existing shortcomings must be analysed and then solutions for regaining confidence must be developed. Given the consequences for the public finances, the personnel and organisational structure of involved institutions, and the quality of pub-

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1 See the regulations in § 7 BHO (Bundeshaushaltsordnung), Article 114 para. 2 GG (Grundgesetz), § 6 HGrG (Haushaltsgrundsatzgesetz: Gesetz über die Grundsätze des Haushaltsrechts des Bundes und der Länder).

2 See also the three stages "Programme Level Assessment", "Project Level Assessment" and "Procurement Level Assessment" of the HM Treasury UK, *Value for Money – Assessment Guidance*, 2006 and NAO, *A Framework for evaluating the implementation of Private Finance Initiative projects: Volume 2*, Report by the National Audit Office, 2006. A fourth stage "Implementation and Controlling" is additionally considered in the Finanzministerkonferenz NRW, *Wirtschaftlichkeitsuntersuchungen bei PPP-Projekten. Leitfaden des Landes Nordrhein-Westfalen*, Düsseldorf, 2006 and BMVBW, *Gutachten PPP im öffentlichen Hochbau. Band 3: Wirtschaftlichkeitsuntersuchungen*, Teilband 1, Arbeitspapiere Nr. 1–3, Beratergruppe, 2003.

lic services, the critical weaknesses must be identified and an improved basis for decision-making must be found. One way is to include the effects on users when deciding for or against a procurement method – by an extension of the decision-making process. Cost-efficiency approaches for PPPs (such as the Public Sector Comparator) now always assume that the performance perspective is clearly defined. The potential for negotiation has so far only been considered on the cost side. Contrary to this perception, a study³ of the PPP school project in the municipal district of Offenbach shows a significant improvement in the quality of the school after its renovation. The study firstly investigated the interaction between the property as a resource and its performance for education. Mistrust of a decision for procurement by PPP could therefore be reduced by including the performance perspective in the decision-making process. An integrated approach, taking performance aspects as well as cost into account, should be used. Selection processes like this should result in comprehensive public procurement decisions. The terms “performance” and “quality” used here mean “fitness for use”, in accordance with the definition by CROSBY. In his understanding, quality means compliance with requirements rather than “goodness” or “excellence”.⁴ The users’ satisfaction is an integral part of quality: the users define the requirements of quality and provide feedback for quantifying quality aspects.

This paper shows that there are frequently considerable differences in quality in the provision of public infrastructure. To be clarified is the way in which these differences in quality can be measured and how they can be taken into account in the decision-making process.

II. Validity of cost-efficiency assessments

The current practice is focused on the costs that arise from the different methods of procurement.

The great importance of economic appraisals, in deciding for or against procurement by PPP, necessitates exact identification of any shortcomings.

Many academic papers have been written about the pros and cons of economic appraisals in procurement decisions. Taken together they give an excellent overview. They exhaustively analyse all phases of the process up to the award of the contract.

Nevertheless, there are weaknesses, some of which have been selected by the authors and are addressed in this paper. Deficiencies were identified in two main areas:⁵

- 1) Action is needed to optimise the method of analysing cost-efficiency.
- 2) The basic data used for cost comparison of conventional procurement (Public Sector Comparator) and procurement through PPP is not sufficient in many cases. No comprehensive data set, capable of statistical evaluation, is available for forecasting construction costs and operating costs in either conventionally realised infrastructure investment or the PPP procurement option. Furthermore, methods of analytical forecasting of operating costs do not apply.

Both these shortcomings have the effect that the previously significant effort expended in comparing cost efficiency has not provided unequivocal results. The results on which the choice of a procurement method is based are usually very vague

The reasons for this can be found in the areas already mentioned which will now be elaborated in the following.

1. Procedural shortcomings

There are two significant weaknesses in the method of carrying out economic feasibility studies: the way that risks are assessed and the focus on costs only. Both could affect the results in such a way that they become unrealistic – at worst random or incorrect.

3 See Weiland, Sonja/Pfnür, Andreas, Empirische Untersuchung der Nutzenwirkungen von PPP Projekten auf den Schulbetrieb am Beispiel der Schulen im Kreis Offenbach, in Pfnür, Andreas (Hrsg.), *Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis*, Band Nr. 16, Darmstadt, 2009. The survey is a joint research project by the chair of Real Estate Business Administration and the chair of Educational Psychology at the Technische Universität Darmstadt and the administrative district Offenbach. This study was funded by the Bundesamt für Bauwesen und Raumordnung.

4 Crosby, Philip B., *Qualität ist und bleibt frei: Die Ratschläge des Qualitätspapstes für das 21. Jahrhundert*, Wien: Ueberreuter, 1996, p. 291.

5 See Bundesverband Public Private Partnership e.V. – Arbeitskreis PPP im Management öffentlicher Immobilien – Optimierungspotentiale im Wirtschaftlichkeitsvergleich. Ein Thesenpapier, in Pfnür, Andreas (Hrsg.), *Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis*, Band Nr. 9, Darmstadt, 2007.

An essential idea of PPP is the assessment of risks and their effective allocation to the party best able to handle them. Their estimation decides which risks devolve to the responsibility of the private partner or would be assumed as partner risk of the new business connection. The currently used method for determining the risk costs is the cost-element-percentage method. However, substantial problems arise from this method. To be blunt: the risk surcharges, despite their name, do not really take account of risks.⁶ The reasons why the method is not appropriate include the uniqueness of projects and disregard of the interaction between risks.

It also does not consider the individual risk attitude of the investor.⁷ From their historic accounting, it is apparent that risk-sensitivity in the public sector is currently very low. The authors recommend that decision-makers should consider the suitability of applying a simulated risk analysis.⁸

Another factor is that the practice of focusing on costs is not comprehensible, especially from a business-oriented point of view. The effects of PPP-projects on their users often become evident elsewhere.⁹ The first studies in 2005 identified some positive effects of PPP procurement on the users.¹⁰

These effects should be included in the cost-efficiency analysis.

Another deficiency of the method is that there is no uniform definition of the Public Sector Comparator (PSC). Current surveys leave much room for an interpretation, or ignore this aspect completely.¹¹ Hence there is a risk that decisions are made on the basis of small and possibly spurious differences between the PSC and the PPP options. Also, opinions differ as to whether or not the optimisa-

tion potential of public real estate management should be taken into account. There is a danger that users of the Public Sector Comparator might believe that it is more accurate than it is, or could ever be. This provides critics with a major point to attack. The only way to satisfy critics is to compare truly realistic calculations. Hypothetical assumptions should certainly be avoided, especially for conventional procurement (PSC).

A different but equally serious weakness is the lack of information.

2. Information deficits

Clearly, the estimation of costs is essential during the cost-efficiency analysis. Cost estimates are necessary for the planning, construction, financing and operating stages of the project. However, insufficient data on operating costs and associated risks is available within the public administration. There is a serious lack of experience, which means that forecasting is difficult for the parties involved and therefore normally has to be carried out by experts.

As a result, subjective influence by the experts cannot be excluded and that is why, in the public perception, expert estimates are viewed as inadequate.

In the public sector, it is necessary to collect data capable of statistical evaluation, so that forecasting of future values and the identification, measurement and evaluation of risks is no longer difficult. Therefore, ideas for improvement of the basis data – e.g. a statistical evaluation¹² and a model evaluation¹³ – have already been developed and must be

6 See Pfnür, Andreas/Eberhardt, Tim: Allokation und Bewertung von Risiken in immobilienwirtschaftlichen Public Private Partnership, in Budäus, Dietrich (Hrsg.), *Kooperationsformen zwischen Staat und Markt*, Baden-Baden, Schriftenreihe der Gesellschaft für öffentliche Wirtschaft, Bd. 54, 2006, pp. 159–188, p. 168 ff.

7 See Pfnür, Andreas/Schetter, Christoph/Schöbener, Henning, *Risikomanagement bei Public Private Partnerships*, Berlin: Springer, 2009, p. 72 ff.

8 For more information about simulative risk analysis, see Pfnür/Schetter/Schöbener, 2009, and Pfnür/Eberhardt, 2006.

9 See European Commission, *Guidelines for successful Public-Private Partnerships*, Brussels, 2003, p. 59 f.

10 See Pfnür, Andreas/Egres, Patricia/Hirt, Klaus, Ganzheitliche Wirtschaftlichkeitsanalyse bei PPP Projekten dargestellt am Beispiel des Schulprojekts im Kreis Offenbach. Ergebnisbericht zur empirischen Untersuchung, in Pfnür, Andreas (Hrsg.), *Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis*, Band Nr. 8, Darmstadt, 2007.

11 See NRW Finanzministerium, *Public Private Partnerships im öffentlichen Hochbau – Leitfaden Wirtschaftlichkeitsvergleich der PPP Task Force des Landes Nordrhein-Westfalen*, Düsseldorf, 2003, p. 51 ff. and Jacob, Dieter, *Erstellung eines Gerüsts für einen Public Sector Comparator bei 4 Pilotprojekten im Schulbereich*, Forschungsbericht, Technische Universität Bergakademie Freiberg, 2003, p. 26 ff.

12 For more information on the improvement of the data by a statistical evaluation, see Pfründer, Uwe/Bahr, Caroline/Lennerts, Kunibert, Examination of life cycle costs as a basis for future Public-Private Partnership (PPP) projects focusing on school buildings, in Proceedings of the fifth European research symposium in facilities management, Tagungsband, Frankfurt, 2006.

13 For more information on the improvement of the data by a model evaluation, see Riegel, Gert, *Ein softwaregestütztes Berechnungsverfahren zur Prognose und Beurteilung der Nutzenkosten von Bürogebäuden*, Dissertation Technische Universität Darmstadt, 2004.

advanced. A first approach to standardising the risk costs has also been presented by the Bundesverband PPP.¹⁴

3. As-yet unresolved shortcomings

Past experience has shown that the optimisation of risk analyses and cost forecasting is a very difficult and time-consuming process.¹⁵ Participants in the process have been very hesitant in adopting it.

Although further amelioration of this shortcoming should be expedited, this is probably associated with the expenditure of major time and effort, over a very long period. It should therefore be considered whether the comparison of cost-effectiveness might also be improved in another, possibly more straightforward, way.¹⁶ So far in practice, enormous effort has been applied to the comparison of costs, although benefits have always been ignored.

It is very likely that the validity of costs-efficiency assessments can be made considerably more effective by taking into account the sometimes considerable differences in quality that the building is able to provide for its users. It is possible that assessment of the benefits, which would not require considerable additional time and effort, could further improve the potential value added and facilitate the comparison of cost-effectiveness. Further research would be required to investigate this hypothesis.

An initial approach is described in the following.

III. Expansion of the concept by analysis of the benefits to users

Lack of confidence in viability, i.e. the economic efficiency analysis, is understandable for the reasons already listed. To increase the acceptance of PPP projects, an integrated approach should be pursued. Quality, measured by the satisfaction criteria of users, should also be focused on. Consideration of cost is only one side of the coin: it is also necessary to consider the quality that is associated with it. From a social perspective, it may be necessary to pay even more for higher quality that is wanted or required, particularly in cases where the positive effects resulting from higher quality are greater than the additional costs. The choice of higher quality together with higher costs could be beneficial.

Particularly under current education conditions, the focus should not be solely on costs, because educational quality is a very important factor for the economy. Satisfaction of users – in other words fitness for use – may have a positive impact on other economic variables. For a project to be successful in the long term, efficiency and also user satisfaction are determining factors. As already shown, what is required is a comprehensive cost-benefit analysis, which should also consider the satisfaction of the users. This cost-benefit analysis must follow an overall objective.

1. Methods and instruments for assessing benefits

a. Basic approach

The modern approach, the integration of socio-cultural factors, in addition to economic factors in discussing the sustainability of development projects was instigated by PREISER.¹⁷ His work set the tone for the present concept of building performance measurement. The term “building performance” can be understood to mean the quantification of the efficiency and effectiveness of a building. The yardstick of efficiency in this measurement concept is “best practice”. The criterion of effectiveness is the added value that can be achieved from a building. Although a building of itself cannot create any added value, it can promote – or interfere with – the added-value process.¹⁸ In this context, the value of a building is derived from the increased benefit that it provides to its owner and user(s). User satisfaction is an obvious criterion for the measurement of building performance.

14 See Bundesverband Public Private Partnership e.V. – Arbeitskreis PPP im Management öffentlicher Immobilien, Risiken immobilienwirtschaftlicher PPPs aus Sicht der beteiligten Akteure, in Pfnür, Andreas (Hrsg.), *Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis*, Band Nr. 4, Darmstadt, 2006.

15 See European Commission, 2003, p. 58 ff.

16 See for non-monetary comparison European Commission, 2003, p. 59.

17 See Preiser, Wolfgang F.E., Toward Universal Design Evaluation, in Preiser, W.F.E./Ostloff, E. (Hrsg.), *Universal Design Handbook*, New York, 2001, pp. 9.1–9.18.

18 See McDougall, Gavin/Kelly, John R./Hinks, John/Bititci, Umit S., A review of the leading performance measurement tools for assessing buildings, in *Journal of Facilities Management*, Vol. 1, No. 2, 2002, pp. 142–153.

To include users' satisfaction in decision-making, it is necessary to make it quantifiable. One method of achieving this is to conduct an evaluation of the users' degree of satisfaction. The evaluation has to have a clear and well-defined primary objective.

When dealing with real estate, it is essential to specify its function. Which higher-level functions does it have to fulfil? For example, attractive and modern school buildings and their surroundings provide the basis for the quality of the education system. Similarly, a hospital building can help to speed patients' recovery.

Once the function to be provided by the property has been specified, it is necessary to determine the factors that can influence it. In a further step, a method of measuring the effect of the real estate factors must be developed.

For commercial buildings, the measurement of factors such as space productivity, to be used for fulfilment of the overall objective, i.e. the optimal provision of space in order to support operating efficiency, is already well-established. For social infrastructure projects, for example school buildings, this assessment is much more difficult as the buildings must support the quality of the education provided. In such cases it is usual to fall back on "soft factors", e.g. socio-psychological methods, for the measurement of user satisfaction. It must be taken into account, however, that these factors are situational and are subjectively assessed by the users, whose requirements may change over time.

This dynamic process between the users' requirements and regular adjustments to meet their demands means that the contribution to the value-added process provided by the building can be increased.¹⁹ This in turn means that the plasticity and flexibility of buildings in relation to the changing requirements of their users can be considerably improved by the application of long-term and regularly repeated building performance measurement.

Despite their major importance, at the moment it can be taken for granted that the benefits resulting from flexibility and elasticity are neither qualitatively nor quantitatively assessed.²⁰

In the assessment it must be noted that the positive effects of a property factor usually continue in the long term. PREISER foresaw a control system for this, oriented to the life cycle of a property. It firstly fulfilled the requirements, improved these in stages and then, in phases, was regularly adapted to the new requirements of the users (revolving) until redevelopment was necessary.²¹ Excluding this time aspect from the decision-making process could result in wrong solutions being chosen.

Figure 1 demonstrates how users' benefits can be used to measure building performance in the concept described above.

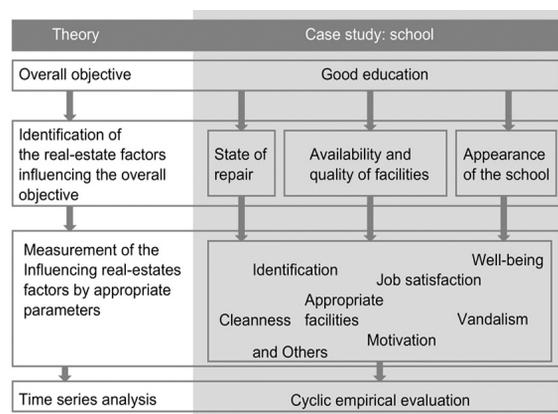


Figure 1

b. Project-specific approach for schools

An extended appraisal of the users' benefits was applied in a survey based on the Offenbach PPP school project in 2009.²² The aim of the study was to clarify the connections between real-estate-related economic activities and their effects on the users. The first step was to define the overall objective and the real-estate function. In this case the function of the school building and its environment was seen as facilitating good education. The next step was to identify and analyse the characteristics of the school buildings that have effects on the users. How can they influence, perhaps improve or support the education carried out in the school? To this end, it was helpful to consider the theory of perception and impact of space. Historically, the specialism of architectural psychology has not been

19 See for the dynamic process of the performance Nes, Sigurd/Hovde, Per Jostein, Condition survey as formal and practical tool in facility management, in Lacasse, M.A./Vanier, D. J., *Durability of Building Materials and Components 8*, Vol. 3, Institute for Research in Construction, Ottawa, Canada, pp. 1645–1654.

20 See Pfnür, Andreas/Schaefer, Christina/Armonat, Stefan, Aligning corporate real estate to real estate investment functions: improved decision making using a real options approach, in *Journal of Corporate Real Estate*, Vol. 6/3, pp. 243–264.

21 See Preiser, 2001.

22 See Weiland/Pfnür, 2009.

taken into consideration for school building projects. Instead, the design of schools has followed the principles of efficiency and pure functionality.²³

The modern educational concepts that have so far been implemented take little account of school construction and design, although increasingly studies that have examined the relationship between a satisfactory building environment and performance have discovered a positive correlation.²⁴ According to a commonly-held view in architectural psychology, satisfaction with the space leads to higher motivation and performance by the users.²⁵ The assessment of these factors by the users must be measured appropriately. Therefore it was necessary to determine the features of a school building that affect satisfaction and to measure this satisfaction by appropriate parameters. To determine these parameters we used variables such as identification, motivation, the perception of vandalism, satisfaction with cleanliness and the facilities etc., which had already been successfully tested in psychological research. The factors that influence education that were identified are shown in Figure 2.

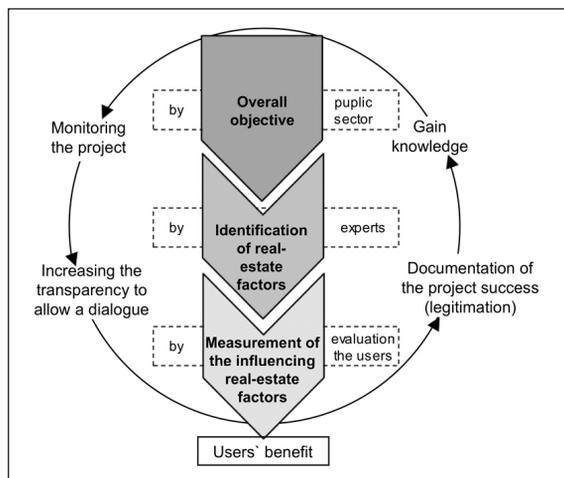


Figure 2

Assessments of these parameters were obtained separately from each group of school users (i.e. pupils, teachers and parents). The assessments took the form of a questionnaire taken at nine selected schools in the municipal district of Offenbach: three primary schools and six secondary schools²⁶.

This selection provided a good mixture of age groups and educational systems. The sample consisted of 1,001 pupils, the same number of parents (only one parent for each pupil) and 501 teachers.

The response rate was quite high: 88.1 % of pupils, 49.2 % of parents and 43.9 % of the teachers answered.

In order to exclude short-term, one-off effects that often occur in connection with new investments, time series analyses were carried out for each group of users. For this, the authors were able to make use of comparison data collected in 2005/2006 for an earlier research project.²⁷ This time series analysis was necessary to investigate satisfaction and thus quality, not just as a one-off effect but based on stability and sustainability. In this way, a follow-up study can be used to expand the information, to monitor the project and to increase transparency, in order to allow a dialogue between the involved parties. Finally it can be used as a justification of the PPP Project for all partners (the documentation of success or improvement that is needed).

The research plan included the following four sub-studies:

- 1) Time series analysis of users' assessments of schools that were in need of renovation in 2005/2006 and that were renovated in 2008/2009, to determine the added value;
- 2) Time series analysis of the users' assessments of schools renovated in 2005/2006 and their assessments three years later, in 2008/2009, to determine the sustainability of added value;
- 3) Comparison of the users' assessments of renovated and non-renovated schools in 2008/2009
- 4) Evaluation of the users' assessments of the schools renovated in 2008/2009.

23 See Budde, Ferdinand/Theil, Hans Wolfram, *Schulen – Handbuch für die Planung und Durchführung von Schulbauten*, München: Verlag Callwey, 1969.

24 See Brill, Michael/Margulis, Stephen T./Konar, Ellen, BOSTI: *Using office design to increase Productivity*, Buffalo, N.Y.: Workplace Design and Productivity, 1984 and Walden, Rotraut, *Zu den Auswirkungen von Architektur auf Leistung, Wohlbefinden und Umweltkontrolle – Drei Studien zu Schule, Hochschule und zum Bürogebäude "der Zukunft"*, Habilitationsschrift Universität Koblenz-Landau, 2006.

25 See Kelter, Jörg, *Office-Excellence-Check – Ergebnisse der Zwischenauswertung zur Orgatec 2006*, Stuttgart, Fraunhofer-Institut für Arbeitswirtschaft und Organisation (IAO), 2006; Clements-Croome, Derek, *Creating the productive workplace*, London: E&FN SPON, 2000 and Gifford, Robert, *Environmental psychology – Principles and practice*, 3rd Ed., Colville: Optimal Books, 2002.

26 All types of secondary schools in the German school system (Gymnasium, Realschule, Hauptschule).

27 See Pfnür/Egres/Hirt, 2007.

Overall, the questionnaires included up to 57 items (the exact number depended on the user group - pupils, parents or teachers). This provided an extensive report with a massive amount of results. The most interesting results are presented below.

c. Selected results

An impressive result identified in the investigation was that vandalism of the school building and its surroundings significantly declined. Vandalism occurred less frequently after the school renovation than before (see Figure 3). This assessment was sup-

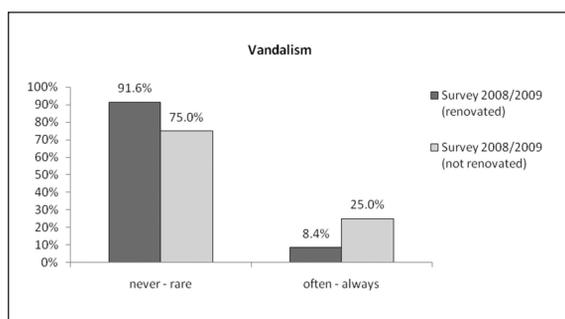


Figure 3

ported by a number of teachers, who also indicated that vandalism had occurred much less frequently since the renovation. The negative effects of vandalism are psychologically indisputable.²⁸ Vandalism leads to a poor school climate, or conversely, a poor school climate implies the occurrence of vandalism.²⁹ Moreover, vandalism appears common when there is a low, or no, identification with the school as an institution, its state of repair and equipment, as well as its image. This was also reflected in the results of the question about pupils' satisfaction with the school building and its equipment (see Figure 4). Both effects appeared stable over time when comparing the two surveys.

28 See Fuchs, Marek/Lammek, Siegfried/Luedtke, Jens/Baur, Nina, *Gewalt an Schulen 1994 – 1999 – 2004*, Wiesbaden: Verlag für Sozialwissenschaften, 2005; Fend, Helmut, *Entwicklungspsychologie des Jugendalters*, 3. Aufl., Wiesbaden: VS Verlag, 2005 and Holtappels, Heinz Günter/Heitmeyer, Wilhelm/Melzer, Wolfgang/Tillmann, Klaus-Jürgen, *Forschung über Gewalt an Schulen*, 5. Aufl., Weinheim: Juventa Verlag, 2008.

29 See Klockhaus, Ruth/Habermann-Morbey, Brigitte, *Psychologie des Schulvandalismus*, Göttingen: Hogrefe, 1986.

30 All evaluated schools have been operated by the same Facility Management since the beginning of the PPP project. The difference is the date of renovation.

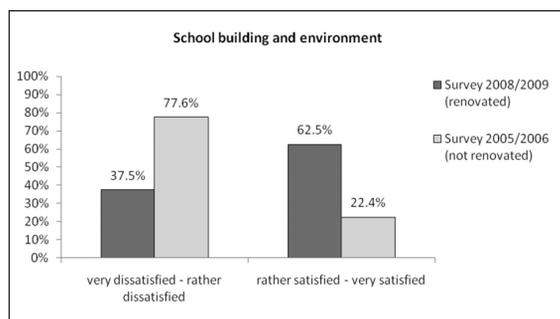


Figure 4

In the same way, satisfaction with the way the building is operated is an influencing parameter on quality – defined as fulfilment of the overall objective to support education. For this purpose, the users were asked about their satisfaction with the visible operations of the facility management. The evaluation reveals that the vast majority of pupils at all PPP schools have high and stable satisfaction with the performance of the facility management, regardless of the state of repair (see Figure 5).³⁰ At the same time minor causes of dissatisfaction –

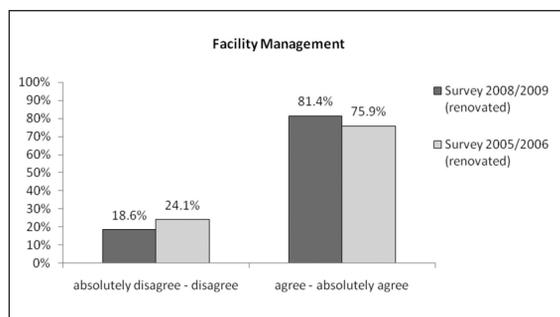


Figure 5

especially with the sanitary facilities in some schools – were identified and will be now more accurately monitored and tracked by the partners.

This was only possible because the partners are subject to independent control and demonstrates an increased willingness for transparency. The performance of conventionally-operated schools has not been discussed in public until now. This was due to a lack of interest, which however is rising with the discussions about procurement as PPP. This means that the quality aspect should be included in the assessment of both types of procurement.

One of the most important results identified by the study is the significant increase in the job satis-

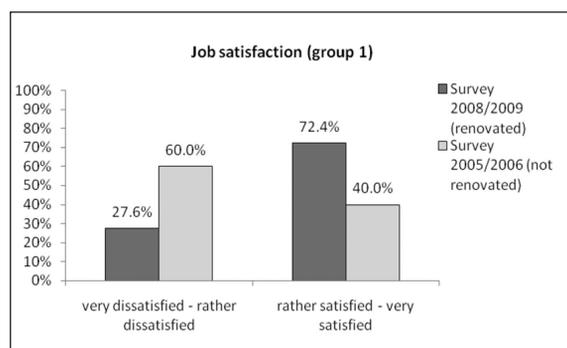


Figure 6

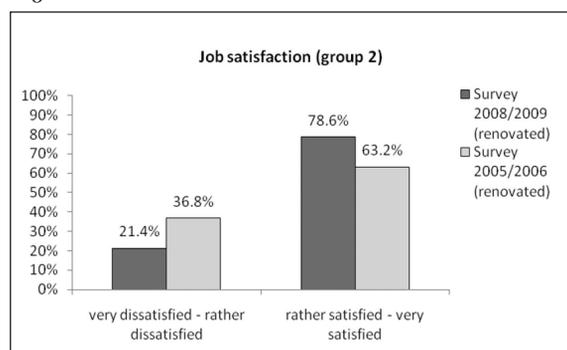


Figure 7

faction of the teachers at the school after school renovation (see Figure 6). Although job satisfaction also increased in the non-renovated schools between the survey dates, renovation resulted in job satisfaction rising by a further 17 %. The effect is stable (see Figure 7). The state of repair therefore significantly contributes to the job satisfaction of the teachers.

Moreover, because job satisfaction has a direct effect on motivation,³¹ it can be assumed that the quality of the teaching improves. The findings suggest that the teaching climate improves and that teachers are more committed to their school. All these effects contributed to improving the school quality, from which the education quality in particular can benefit. It is very important that this positive effect was shown to be lasting in the study of stability.

The results also showed that the teachers identify more strongly with their school after the school building has been renovated (see Figure 8 and Figure 9). Although other factors also influence the teachers' identification with their school, these clear results regarding changes in construction and/or improvement of the school showed that these factors contributed positively to a stronger feeling of identification among teachers.

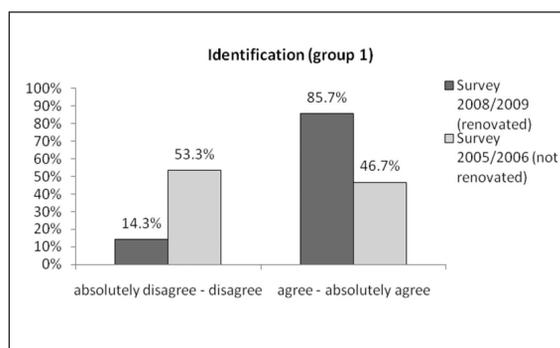


Figure 8

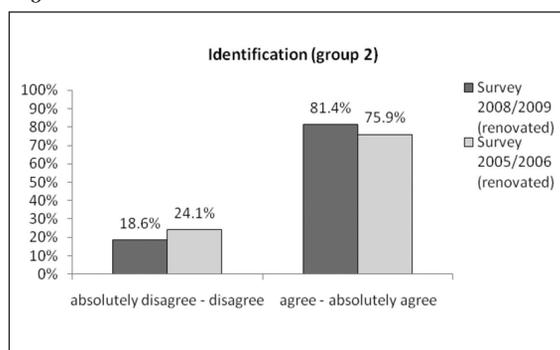


Figure 9

The evaluation of answers provided by the user groups revealed many positive effects of the PPP programme but also a few negative effects, which should be monitored by the involved parties in the future. Some unstable effects that showed declining benefit with time elapsed since renovation could be attributed to familiarity effects and to so-called hygiene factors³² ("taken for granted" factors that can cause dissatisfaction if missing but do not necessarily add to satisfaction if increased) that could also be expected to occur in conventionally-operated schools. Although these decreases were small and justifiable, they should be monitored by the involved parties.

Finally, it can be stated that, according to this study, earlier renovations of school buildings carried out as part of a PPP programme have had a positive and lasting effect on school quality.

Consequently, our analyses showed that the Offenbach District has been able to offer increased school quality relatively quickly due to the PPP program. This effect is continuing in the medium term.

31 See Herzberg, Frederick/Mausner, Bernard/Snyderman, Barbara, *The Motivation to Work*, New York: Wiley, 1959.

32 For a definition of hygiene factors see Herzberg et al., 1959.

2. Analysis of possibilities and limitations by appraising benefits

Up to now, decisions for or against a particular procurement method have systematically and considerably underestimated the effect of good-quality buildings on school quality.

The results of the study presented above show positive effects on the users in the PPP school project. In this case it was demonstrated that renovated, and therefore effectively newer, school buildings and their surroundings, together with better equipment, promote good education. The higher level of satisfaction in the renovated PPP schools is proof of the influence that a school building has on the overall objective of promoting good education. That is the reason why the extent to which the building fulfils its primary function should be considered in deciding on a method of procurement. Presumably, renovation using conventional procurement procedures would produce the same results. In the subject case, renovation was only possible at that time by carrying it out as a PPP. The higher satisfaction is mostly reasoned by the earlier renovation and will remain presumably more stable cause of the contractual agreements during the term of the PPP project.

At the present stage of the investigation there is still a paucity of suitable comparable schools that have been conventionally renovated and are being conventionally operated. At present, the improvements in performance that have been demonstrated can therefore only be attributed to the modernisation of the schools. Nevertheless, the results would seem to suggest that a large part of the increased performance can be attributed to the higher investment costs and modern operating processes associated with the PPP procurement method. This presumption is found in the measured stability of the effects, which indicate that operation by the Private Partners has continued to promote the increased performance due to modernisation in the subsequent period. Complete clarity will require commitment to a quality test of all procurement variants with comparative analyses.

In this case the PPP provides a higher performance level more quickly, with many positive effects that certainly have significant impact on the whole economy. This influence should not be ignored when a deciding between types of procurement (conventional or PPP). By including quality in the

decision-making process the result becomes more sustainable.

In every project, the real-estate function for supporting the primary objective could be clearly defined. However, measurement of the contribution made by buildings or facilities to the primary objective is often complicated. In the case of schools, the building should promote the overall objectives of a school – providing good education.

From a psychological viewpoint, it could be assumed that higher levels of user satisfaction result in improved education. Unfortunately, however, user satisfaction can only be evaluated after a project is completed and it is therefore not possible to base a decision-making process on user satisfaction figures for a particular project. As an alternative, however, the decision could be based on satisfaction assessments from similar projects, although this would require a huge database. The larger the number of records in this database, the better a comparison of experience values of varying projects would be possible.

In addition, the data on user satisfaction with the Project Partners could be used as a controlling instrument. In this way, making available transparent data about the user satisfaction status on a regular basis might reveal possible deficiencies in the project before they could potentially turn into serious problems. Often a timely reaction can save subsequent costs and, in turn, contribute to the overall success of the project. This method also offers the partners the possibility to demonstrate their success by a consistently high level of satisfaction, which could also be of benefit in discussions with sceptics. In a further stage, benchmarking with comparable projects would also be possible, heightening the success of the project to the advantage of all participants.

V. Conclusion

Every building has to fulfil a certain function. This function should support the achievement of the overall objective. The main weakness of existing procurement decisions that was identified was the insufficient consideration of the potential of properties to fulfil a function. In the case examined, school properties can enhance the quality and hence the standard of education of the school to such an extent that it is unreasonable to make a

decision based only on costs. It is often difficult to measure the contribution of buildings to the fulfilment of the function of achieving the overall objective. The method developed here measures the influence of school buildings on the quality of education, based on an evaluation of user satisfaction.

The positive relationship between user satisfaction and education quality has already been assumed from psychological studies. The results of the empirical survey show an increased level of satisfaction of school users after renovation and operation as a PPP project. The positive effects on users that were identified are mainly stable. The results make clear that PPP projects influence more than just the cost of the provision of buildings.

Furthermore, PPP projects have effects on the quality of education and processes. In this context it must be noted that PPP projects often allow projects to be completed earlier, therefore bringing improvements in education quality more quickly.

Expansion of the decision-making process to include the effects described could potentially increase the general acceptance of procurement by PPP.

Another advantage of the method used for measuring the users' satisfaction is the possibility of using the results in a control system. The findings generated in this way could be helpful for further optimisation of both PPP and conventional projects. It is intended to repeat the project evaluation at suitable intervals. The resultant time series analyses will provide important management information. In the future, a comparison between the types of realisation could be made, giving further information about the pros and cons of each rather than simply focusing on costs.

The authors recommend that, in future, user groups should be polled on a regular basis, throughout the lifetime of a building or facility, in order to assess its quality, regardless of whether the facility is part of a PPP procurement alternative or not.

Firstly, the results would serve as a basis for effective project controlling; secondly, such assessments could serve as benchmarks, leading to continual improvements in built facilities and in the award of public sector contracts.