

THE QUALITATIVE RESEARCH FOR THE ARCHITECTURAL DESIGN AND EVALUATION OF COMPLETED BUILDINGS – PART 2 – EXAMPLES OF ACCOMPLISHED RESEARCH

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Abstract

The subject consist of two parts. The first one discusses the theoretical basis and methodology of using qualitative research in programming and design. This second part presents some examples of buildings' assessment, with an indication of the methods and techniques of research, and discusses the main results. The approach to design using research fits into the current trend associated with quality assessment in architecture known as *research by design* and *design by research*. Theoretical grounds are based on literature studies and evaluations of dozens of objects with different functions conducted by the authors. Presented research was carried out: qualitative (in terms of technical, functional, organizational, behavioral and economic quality), observations, surveys, interviews (with users, managers, experts, investors), way-finding and participatory. Based on the simplified POE method and personal experiences own methods of objects' evaluation adapted to Polish conditions were developed. Author K. Fross mapped out a simple, quick and effective ways of pre-designing research (in 8 steps) and for building in use (in 7 Steps) for verification of design decisions. The effectiveness of the methods was examined on many examples of evaluated objects. Selected examples of research carried out on facilities with claim of applied methods and techniques were presented and the main results of the evaluations were described. Research examples were chosen to show the versatility and effectiveness of assessments for a variety of functions.

Streszczenie

Artykuł składa się z dwóch części. Część pierwsza omawia podstawy teoretyczne i metodologię w zakresie badań jakościowych z zastosowaniem w programowaniu i projektowaniu. Natomiast niniejsza część druga prezentuje wybrane przykłady wykonanych ocen budynków ze wskazaniem zastosowanych metod i technik badawczych oraz omówieniem najważniejszych wyników. Podejście do projektowania z wykorzystaniem badań wpisuje się w aktualny nurt tematyczny związany z ocenami jakości w architekturze zwany jako *research by design* oraz *design by research*. Podstawy teoretyczne oparto na badaniach literaturowych oraz przeprowadzonych przez autorów ocenach jakościowych kilkudziesięciu obiektów o różnych funkcjach. Wykonano badania: jakościowe (w zakresie jakości technicznej, funkcjonalnej, organizacyjnej, behawioralnej, ekonomicznej), obserwacyjne, ankietowe, wywiady (z użytkownikami, zarządcami, ekspertami, inwestorami), way-finding, partycypacyjne. Bazując na uproszczonej metodzie POE oraz własnych doświadczeniach stworzono własne metody oceny obiektów dopasowane do polskich warunków. Autor K. Fross opracował łatwe, szybkie i skuteczne metody badań przedprojektowych (w 8 krokach) oraz w trakcie użytkowania (w 7 krokach) dla weryfikacji podjętych decyzji projektowych. Skuteczność metod sprawdzono na wielu przykładach ocenianych obiektów. Zaprezentowano wybrane przykłady badań wykonanych na obiektach z podaniem zastosowanych metod i technik badawczych oraz opisano najważniejsze wyniki ocen. Przykłady badawcze dobrano tak aby pokazać uniwersalność i skuteczność ocen dla różnorodnych funkcji.

Keywords: Programming in architecture; Quality evaluation; Design methodology; Architectural design; Quality in architectural design; Facility management.

1. INTRODUCTION

The first part described the theory and methodology of qualitative research. It was assumed that the built environment and its users are a research field and important source of information. Facilities with similar functions to the one that is planned are a record of mistakes and successes of the project. It was found that qualitative and observational studies can provide information for programming and design. Research field are both: objects and their users. The research results included in a list of errors and good solutions, allow to formulate guidelines for the design of the new facility. For qualitative design there is a proposed model of architect-researcher, who is designing with the use of studies (pre-designing). On their basis, he formulates guidelines for the design. After the completion of the object he continues evaluations and observations to verify the design decisions and to draw conclusions for the new projects. In this way such model extends the designer's interest to the stage of designed building use. This complements the traditional approach to the design with the use of research [2].

This second part presents selected examples of own research carried out on objects by authors, provides applied research methods and techniques and presents the main results of the evaluations. Other examples are described in the Fross' K. publications listed in the bibliography [4] [5] [6] [7]. Interesting examples of qualitative research also shows Winnicka-Jasłowska D. in publications [10] [11]. Also worth analyzing are examples of assistance centers research, carried out by Bielak M. [1].

Examples presented in the following part, were chosen to show the versatility and effectiveness of the evaluation for a variety of functions. Qualitative research is suited to the initial phases of planning, object programming and designing, that is, at every stage of the design process (investment and during use). Certainly the most appropriate stage of the design process where the use of pre-designing is absolutely necessary is programming. Qualitative research can help in the correct diagnosis of future groups of users (customers) and their needs. It helps to understand good design practices while avoiding errors (in terms of technical, functional, organizational, behavioral and economic quality) committed earlier (on other facilities). It is important to formulate clear aims of research, criteria for evaluation and selection of appropriate research methods. From own experiences and case studies of building evaluations conducted by students of architecture, advantage of the use of several methods (techniques) at the

same time as a supplement was stated. The authors indicate research that is comfortable in use in everyday design practice, such as observational studies with building round, supplemented with unstructured interviews (in the form of a loose, spontaneous conversation) and an interview with the manager of the object. The last is considered to be the largest base of information about the building use and users. Rounds and observations can be made easily, even spontaneous conversations with users are not time-consuming, arranging surveys or structured interview with the manager require the consent, which is not always possible to achieve [3].

2. EXAMPLES OF AUTHORS' OWN RESEARCH

Example 1 – Modern office buildings – (2002).

Aim of research. Understanding the overall health of the modern, intelligent office buildings for rent.

Research methods. Building rounds, observational studies, qualitative research in the field of technical quality (including indoor climate research with use of devices, infrared studies of elevation, internal devices), as well as functional and behavioral, surveys, interview with the manager and way-finding.

Research results. With the use of research a comprehensive knowledge of the buildings was obtained. Way-finding research, conducted by two independent teams, gave interesting results. Evaluations confirmed the high class of office buildings for rent and on closer examination the user-friendliness (details are described in reference [2]). Below, there are two selectively presented functional mistakes repeated in a few selected high-rise buildings:

- the outside cleaning service company, which leaves a large amount of equipment used every day for cleaning tens of thousands of m², was forgotten (equipment currently crammed into the basement)
- lack of social rooms for tens-person crew that supports object and for the monitoring and management of the facility (currently crammed, for example: under the stairs or in the basement).

Conclusions. The information above was obtained during the facility rounds and interview with the manager (facility manager). Interview with the manager is one of the most important sources of information about the building. If the programming process were preceded by a pre-designing research of objects with a similar function probably those design errors would have not been committed.

Example 2 – Pre-designing research of waterpark – (2004, 2005).

Aim of research. Building a functional-planning program, setting project priorities for investment, identification of user groups and their needs.

Research methods. Observational studies, qualitative research in the field of technical, functional, behavioral and economic quality, interviews.

Research results. Sufficient information for the functional program to build an attractive and matched to the needs of future users was acquired. On the basis of information obtained with the use of research, three main priorities for investment were identified: low operating costs (economic value), attractive exterior and the maximum number of attractions. It was decided to design energetically self-sufficient object based on available, green renewable sources used to produce electricity and hot water. As a result of research and design decisions, a project has arisen: self-contained waterpark powered by natural gas - methane (obtained 1.6 MW of electric power, thermal power 2.1 MW), solar panels (230kW) and heat pumps (130kW). Building with an area of 14,000 m², consisting of: a sports pool, recreation, outdoor pools, observation tower, shopping mall, hotel, gastronomy was designed. Future clients-users were offered “more than 100 attractions” (permit for building – 2005, unrealized) [2].

Conclusions. Research was the principal source of professional expertise helpful in making decisions during the planning, programming and designing. It shew a general scheme of pre-designing research and the flow of knowledge from evaluations and observations of the built environment and its users, as well as literature research of objects with similar features.

Example 3 – Getting to know the opinion of blind people about difficulties encountered in the built environment – (2014).

Aim of research. Getting to know the opinion of blind people about difficulties encountered in the built environment, outside and inside buildings. The aim of the first study was to obtain direct feedback from people with impaired vision and blindness, their school counselors and parents about obstructing free and safe movement of existing spatial obstacles in the building (at home, at school, in other interiors) and in open areas (especially in the city).

Research methods. Surveys-interviews of the blind, their counselors and teachers were performed at the Educational Centre for Impaired and Blind Kids in

Dąbrowa Górnicza. In a survey students were asked to comment on four issues of content: list obstacles that cause you the greatest difficulty in movement in building, obstacles that cause the greatest difficulty in movement in the field, specify one obstacle, which cause a major difficulty to navigate in the building or in the field and which, in their opinion: exercises, facilities, equipment, components in the building or in the field, could raise students’ performance to overcome the difficulties in moving in the building or on the ground. Other respondents (counselors and teachers) were asked similar questions.

Research results. A number of valuable comments were obtained suitable for modernization or designing a space adapted for the blind. In the interior space of the school, students most frequently cited problems with heavy doors (under the conditions of fire protection); opening the door to the outside (the possibility of injury during emergency opening by another person and missing a door already opened); lack of a clear mark of the door location, diversity of shapes and written information. Correct solutions are, for example, suitably marked handrails or stairs. In open areas most cumbersome for visually impaired people are curbs or no distinct boundary or warning between the sidewalk and the street.

Conclusions. It should be noted that the survey was a subsidiary list of questions for counselors of blind children and was filled with their help. Getting from respondents (children with impaired vision and blind and their counselors) specifically identified obstacles and proposals for facilities that can improve their daily movement is for authors (architects) an extremely valuable source of information. The acquired database has not only identified the real difficulties faced every day by children partially sighted and blind, but also contributed significantly to increasing the designers’ awareness, getting to know the scale of the problems of this group of society.

Analysis of surveys also highlighted a significant contradiction between the needs of conveniences for disabled people moving on wheelchairs and the safety of the blind, ie the principle of reducing the curbs at pedestrian crossings. This facility generates a difficulty among the visually impaired and blind in identifying the correct edge of the roadway. The survey gave the authors (designers) new insights in the field of research subject. The authors fully verified their previous knowledge. This confirms once again the enormous value of users’ opinion (through a survey or interview). More results are discussed in the publication *Ujma-Wąsowicz K., Fross K.*: “Greenhouse of

Senses” – A New Quality of Educational Space for the Blind, in: *Advances in Human Factors and Sustainable Infrastructure* [9].

Example 4 – The new library building – (2014).

Aim of research. Obtainment of general knowledge, initial reviews of the new realization of widely available public facility.

Research methods. For preliminary and “fast” (15 minutes) assessment of the object, observation methods of usage and behavior of the users with building round and a brief conversations with the staff were applied. Evaluation was overall and was carried out from the customer’s position.

Research results. List of observed errors, shortcomings, notes treated as first insights from observational studies:

- lack of users, empty object, only staff is visible,
- expensive building for a modest resource of books,
- essential function is marginalized and located on a narrow entresol, which makes it necessary to install lift (additional cost of investment and operation),
- lack of privacy in the use of the main space – mutual obstruction,
- lack of privacy while using computers (ability to glancing by service and passers-by),
- lack of space to “willing stay” in the building – the object is not friendly, does not invite to stay in,
- no additional functions supporting maintenance costs: xero service, gastronomy, book store, ATM, offices for rent, etc.
- lack of multifunctionality – lapse of investment and programming assumptions – object should be the answer to the real needs of today’s users – for example, municipal recreational and cultural center within a library.

Conclusions. This example shows how much information can be obtained by expert (architect) during the 15-minute round of the building and performance of the general observational studies from the client position. Studies were supplemented by a brief conversation with the service. Preliminary research should be complemented by further, wider studies to confirm the observations and explanations of design decisions and program. As a result of this short study, a serious deficiencies of object were elicited, so significant that both the object itself and the idea of the program were rated negatively, emphasizing completely wrongly

prepared investment program and lack of understanding of the future users-customers’ needs. Understanding the shortcomings allows to draw important conclusions for similar new investments. Investment success depends not only on the building itself, even as most of today’s investments with use of EU subsidies. Success is such a plan, program and facility design that meets the modern requirements, needs and expectations. The point is to understand the future user groups, their needs, the calculation of operating costs, giving the possibility of functional changes depending on future organizational or market changes, etc. Following question can be asked: is it better to form inefficient, wasteful, not functional, customer-unfriendly object or is it better to not even build such facility? It seems that in the investors’ minds there is no place to understand that badly prepared investment with erroneous assumptions and poor program, that fails to meet established goals and above all, which generate the cost of maintenance and operation can also be implemented. It is high time to understand that in times of market competition and the still-increasing expectations of users only well prepared investment programs offer the opportunity for success in stage of using and exploitation. Such a large number of deficiencies recognized in just 15 minutes, during the simplified research disqualifies sense of such investments. The general conclusion points the poor functional, economic and behavioral quality of the object. This is an example of “aesthetic” architecture, but not “functional” or usable, because the outer body of the building makes a good impression, draws attention to its fashionable shape.

Example 5 – Remodeled school building (2014).

Aim of research. The aim of the study was to gain knowledge about a group of objects, in this case, the building used for educational purposes, addressed to a specific group of users – students and teachers. The administrative and the technical staff were also taken into account.

Research methods. The study was conducted with the use of a simplified POE (Post Occupancy Evaluation) method in terms of technical, functional, organizational, behavioral and economic quality. Observational research of usage and users’ behavior, object round, interviews with users and surveys were used. They were supplemented by method of graphical analysis based on the plans of the building. Four groups of users were highlighted: students, teachers, administrative and technical staff and those who were a few times in the building. For the first group a set of

questionnaires was prepared (received around 100 filled surveys), with the other three structured (arranging) and unstructured interviews (loose talk) were conducted.

The following questions were asked:

1. Make a list of 5 factors of the building that make you feel comfortable in it.
2. Which of mentioned advantages have the greatest importance?
3. Make a list of 5 factors of the building that make you feel uncomfortable in it.
4. Which of mentioned defects make the greatest discomfort?
5. How, in your opinion, the ease of the use of the building could be improved?

Research results. Based on surveys good sides of the object, according to the user are: attractive outer appearance, design, interesting colors, modern interior space, large lecture hall, availability of lifts, openness related to the glazing, spaciousness, uniform design, modern and industrial character of the building, a large number of sockets.

The factors that caused the greatest discomfort by respondents are: illegible communication, lack of seats and benches in the corridors, lack of gastronomy, bad acoustics in the lecture and meetings halls, poor ventilation, climate conditions, health problems, uncomfortable seats in the auditorium, incomprehensible arrangement of WC, glazed rooms and a glazed door to the toilets – lack of privacy, advantage of concrete in the interior – depressing.

Interviews, lasting 10-30 min, were conducted with a few users. During identification of the shortcomings, the participants of conversations often added the proposals to solve the problem. Valuable and factual information was obtained from technical staff. Interviews were carried out after collecting and formulation of survey results, as a complement and extension of this part of the study. An interesting list of notable shortcomings and solutions also provides a qualitative study carried out by an expert group.

Conclusions. Research was not troublesome. All users were eager to speak about the subject. Most of indicated shortcomings were proper and confirmed by the majority of users. It seems that the basic mistakes could have been avoided by paying more attention to the programming phase to identify the needs of future users. After performed studies, it can be stated that the object is not a model solution for this type of function.

Example 6 – Public space (2014).

Aim of research. The study was performed during the first month of use. The aim was primarily to gain knowledge on the functioning of the new space and proposals for future design solutions.

Research methods. The first step to gather information was an observation of users' behavior (how they use specific zones of space). It was filled with loose conversations with passers-by and surveys.

Research results. After a few conversations with users and own observations factors affecting the comfortable use of space were identified.

The first major problem is the trampling of lawns in strictly specific areas. This is due to landscape architecture elements set in the spaces of highest pedestrian traffic, lawns at points where there were paths before the modernization and sharp corners of lawns, which are disturbing the natural movement (selection of the shortest path). It can be concluded that the designed walking routes are not functioning correctly, indicating that the axis of pedestrian movement in this area were carelessly studied.

Furthermore, the area gives the impression of emptiness (never-ending space) and it even overwhelms by its excessive spaciousness (no privacy). There is no high greenery, or other dominants closing urban interiors. Aside from green lawns, space is dominated by gray color.

Users also paid attention to the lack of recreational function of space. The only area where there is a greater concentration of people is a fountain. It generates a place of social activity. Unfortunately, it is also an obstacle for the free movement because it is located on the main pedestrian axis. The overall space is mainly used for communication purposes, there is no place where it would be worthwhile to meet and stay.

Conclusions. The new technical quality is indisputable. Space does not stand out with innovative and modern architecture, and above all, does not meet the expectations of the users. Initial acquisition of knowledge about the areas with similar functions and taking into account the needs of users as the “future customers” of space creates a higher probability of correct design decisions and helps to avoid past mistakes.

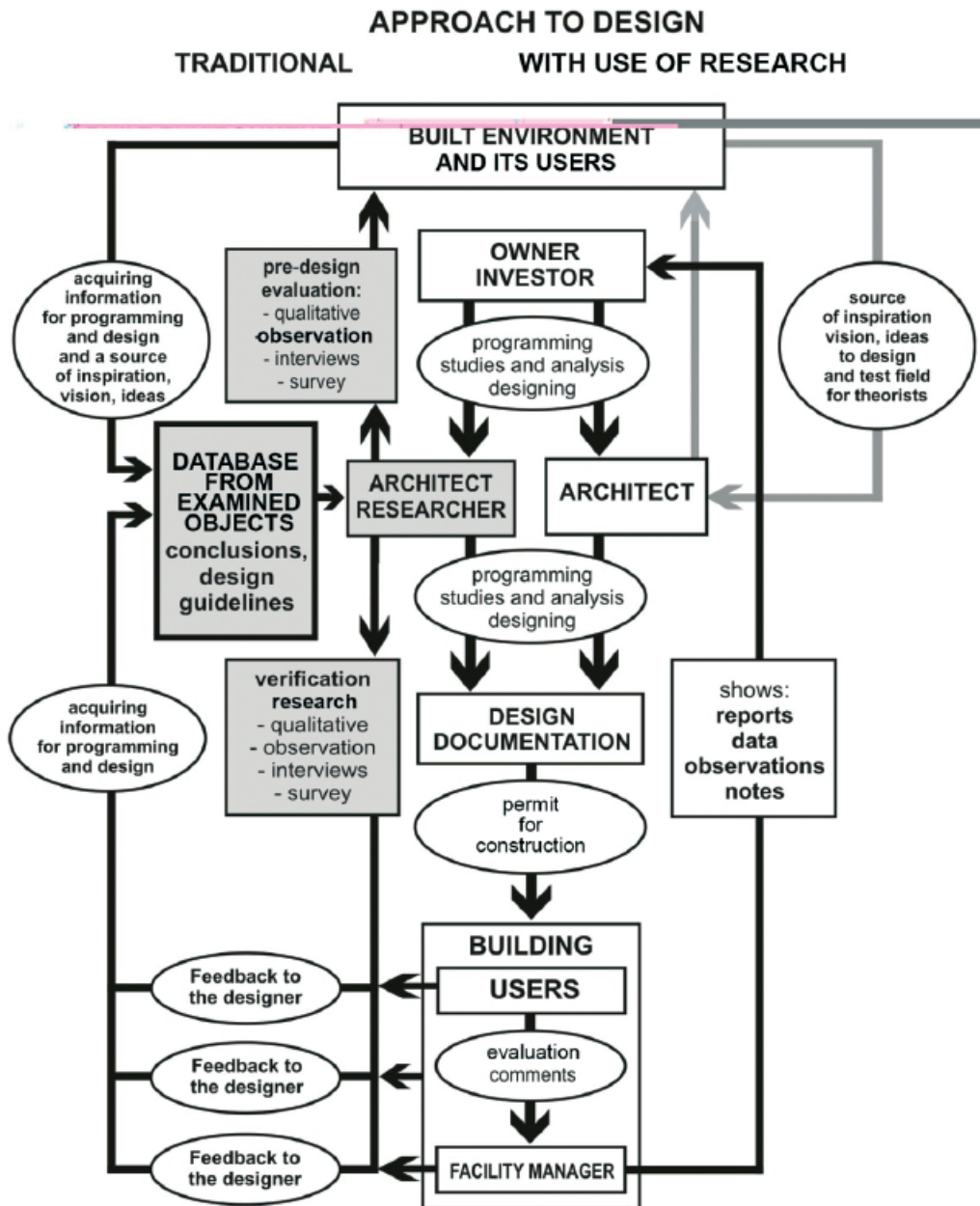


Figure 1.
Scheme - research and traditional approach to design. Flow of knowledge in design with using research [K. Fross, 2012]

3. SUMMARY AND CONCLUSIONS FROM ANALYSED EXAMPLES

All examples demonstrate the remarkable effectiveness of acquiring information through research techniques and methods of qualitative evaluation. The information is obtained directly from the source (from the users or the observations of the building). Simplified methods of procedure give quick results. It

is perfect to use several methods at once, for example: observation round of the building with unstructured interviews (loose, spontaneous conversation), supplemented with survey or interview with the manager. The choice of research methods and techniques depends on the purpose, range or research directed to the selected problem or issue.

Observational, pre-designing and during use research can be an important source of information for design-

ers. Pre-designing research of existing objects with similar functions supports the process of programming and design. Qualitative research was carried out based on the principles of the POE method by selected categories of quality, among technical, functional, behavioral, economic or organizational. Observational refers to the way of using and users' behavior. On the basis of the conclusions, design guidelines can be formulated. Research performed after the inhabitation of the accomplished object are used to verify the design decisions, which is helpful in the process of designers' self-improvement. Pre-designing and during use studies can significantly affect the quality of the design process and thereby directly on the quality of realized investments. It is worth noting that the evaluation of objects are not for criticizing the author of the project, but its a main goal is to draw conclusions from made assessments for new projects in order to be able to design them better and better each time.

The main benefits of qualitative research for the designer: fast and reliable source of information, getting better and avoid past mistakes design, real justification of design decisions, verification of designed decisions and professional self-improvement.

The main benefits of qualitative research for building: less trouble and costs of exploitation, efficient use of space, a better fit to the needs of space, improved building efficiency, easier management and keeping order.

The main benefits of qualitative research for users: better matching of the object, its lot and interior to the needs of users, improvement of users' satisfaction.

In summary, it can be said that the entire built environment is the source of information. It is a database and record of design success and errors. Qualitative research is a valuable complement to the traditional approach to design. It have also a direct impact on improving the quality of the design and the objects themselves. This is consistent with the latest global trends in the design – the design with using studies *Research by Design* and *Design by Research* [2].

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