


## Case study approach in post-occupancy evaluation research

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received August 12, 2023 Received in revised form Nov. 25, 2023 Accepted November 28, 2023 Available online December 01, 2023</p> <p><i>Keywords:</i> Case study, Post-occupancy, Qualitative research, Research approach, Research design</p> <p><b>*Corresponding author:</b> Anisza Ratnasari Architecture Doctoral Program, Universitas Katolik Parahyangan, Indonesia Email: <a href="mailto:anisza.ratnasari@pradita.ac.id">anisza.ratnasari@pradita.ac.id</a></p>	<p><i>A case study is a research approach that focuses on one or multiple real-life cases as the subject, encompassing both concrete entities such as individuals, groups, or organizations, as well as abstract constructs like processes, networks, or projects. This approach is employed to in-deep investigate complex issues and has been applied in various disciplines, such as; the social sciences, humanities, management, psychology, and architecture. The specific characteristics of a case study involve thorough exploration and analysis, data collection from diverse sources, and identification of key themes within the case. The strength of case studies lies in their ability to combine quantitative and qualitative data, enabling researchers to gain a profound understanding of the processes and outcomes of a phenomenon. This study applies a systematic literature review from several credible scholar articles. Two architectural case study researches are selected as precedents to provide a concrete overview of the characteristics, strengths, weaknesses, and procedural framework of implementing the case study approach. Analysis is conducted by comparing various gathered data to discern the potential for case studies to contribute to a comprehensive understanding of the complexity of issues and the quest for their solutions.</i></p>

### Introduction

A case study is a research approach using one or several cases from a real-life context as the object of study (Hollweck 2015) in (Creswell and Poth 2017). Cases can involve concrete entities, such as individuals, groups, or organizations; or an abstract construct, such as a process, network, community or a project (Sudradjat 2020). In a case study, researchers can engage in exploration, investigation, as well as in-depth understanding of complex issues contained within the case, thereby gaining recognition in the academic as a reliable and valid qualitative research approach (Adewuni, Zakari, and Madu 2020).

Case studies have been widely applied in social and humanities research, including issues related to communities (Kwon 2020), sociology (Osorio-García-de-Oteyza, Pérez-Coutado, and Jimenez-Sosa 2020), education (Frelin 2015; Asmussen and Creswell 1995), and criminality (Nath and Pratihari 2018). Case studies have also been extensively utilized in research across the fields of management, governance, psychology, and medicine (Hervira 2022).

The limitations of quantitative methods in providing a comprehensive and profound explanation of social and human behavioral issues have encouraged researchers to consider the potential application of case studies in seeking solutions for complex research problems.

Through the implementation of case studies, researchers can surpass the statistical results of quantitative research and gain an in-depth understanding of human behavioral perspectives. Furthermore, case studies can assist researchers in elucidating the processes and results of phenomenon, through observation, reconstruction, and thorough analysis of the cases under investigation (Tellis 1997) in (Zainal 2007).

The case study approach plays a crucial role in architectural research. This approach has been adopted in a critical assessment of the values, constraints, issues, and practices that may arise in architectural research. One of its contributions is through post-occupancy evaluation (POE). POE is the process of rigorously evaluating building systems after construction and occupancy (Preiser, White, and Rabinowitz 2015). Findings that encompass in-depth descriptions and analyses of buildings as case studies serve as input for designers, users, and managers to enhance building performance. Through a review of two POE studies, this study aims to identify, analyze, and critically and systematically assess relevant previous research.

The case study approach is widely adopted in architectural research, among others, to comprehend the factors influencing the performance of a particular entity. In this article, the author conducts a study on the relevance and benefits of applying the case study approach in the field of post-occupancy evaluation (POE) research (Hong and Kang 2010). POE is understood as a standard procedure conducted to assess the functional and technical performance of a building after the building has been completed and occupied for a certain period of time (Preiser, White, and Rabinowitz 2015). The initial discussion focuses on the characteristics, strengths and weaknesses, as well as the procedures of the case study approach. The next step involves a review of 2 (two) precedents of applying the case study approach in architectural research as practical examples.

#### Case study as research approach

Creswell and Poth (2017) perceive case study research as a methodological approach rather than merely a method. This approach enables researchers to combine various relevant and complementary methods. Additionally, researchers can collect detailed and intricate data by involving numerous informants, to create descriptions and distill them into case themes.

Based on a review of various previous case study research, several specific characteristics can be identified as follows:

1. Identification of specific cases to be studied (Single or multiple cases);
2. Case identification depends on a limited number of parameters;
3. The focus of the study are to explore, describe, analyze, identify themes, and to report in-depth about the cases;
4. Description and analysis are flexible, according to the units of analysis;
5. Conclusions encompass the overall significance of the studied cases (Creswell and Poth 2017).

Case studies can be divided into 3 (three) types, namely; single case, multiple case, and intrinsic cases. Case studies can be divided into 3 (three) types, namely; single case, multiple case, and intrinsic cases. In a single case, the researcher focuses solely on one case in-depth, aiming to comprehend its characteristics, dynamics, and influencing factors. In a multiple case, the researcher concentrates on several cases simultaneously, with the goal of comparing and analyzing the similarities, differences, patterns, and trends among these cases. Meanwhile, in an intrinsic case, the researcher focuses on gaining an in-depth understanding of the case, identifying patterns, issues, and opportunities, and generating insights that can be applied in decision-making or problem solving for the case. In general, the common characteristics of the case study research approach can be summarized in table 1.

**Table 1.** General characteristic of case study research

Components	Description
Research focus of approach	Developing an in-depth description and analysis of a case or multiple case
Unit of analysis	Studying an event, a program, an activity, or more than one individual
Type of research problem best suited for approach	Providing an in-depth understanding of a case or cases
Forms of data collection	Using multiple sources, such as interviews, observations, documents, and artifacts
Strategies of data analysis	Analyzing data through description of the case and themes of the case as well as cross-case themes
Description of research procedures	Stating the rationale, type, and data procedure
Organization of research outcomes	Providing first extensive description of the case

Components	Description
	followed by key issues (themes or issues) in the case
Concluding format	Making case study assertions and advancing a closing vignette
Nature of disciplinary origins	Drawing from psychology, law, political science, and medicine

Source: [Creswell and Poth 2018](#)

Several stages must be passed by researchers to conduct case study research. First, researchers must ensure that case studies are the most appropriate research approach for solving research problems. Second, researchers need to clearly formulate the research objectives, in order to select relevant cases that align with the research goals. Third, researchers must establish well-structured data collection procedures to optimize the available resources. Fourth, data analysis should be conducted, integrating it with contextual themes and information. Finally, researchers report the findings of their case study in written form ([Hollweck 2015](#); [Creswell and Poth 2017](#)).

[Groat and Wang \(2013\)](#) explained that although case studies can reveal causal relationships, understanding of causality tends to be diverse and complex when compared to experimental approaches. On the other hand, the diversity of data sources is a challenge for researchers to integrate, combine, and merge it with other data. Furthermore, the ability of this approach to generalize data to theory also requires further confirmation through the replication of other case studies. Overall, the complexity, depth, and diversity of quality in case studies contribute to its capacity as a research design.

However, it should be understood that perfect research, there are always gaps behind it, and case studies are no exception. [Groat and Wang \(2013\)](#) explain that although case studies can reveal and explain causal relationships, the understanding of causality tends to be diverse and complex when compared to experimental approaches. Integrating case studies with its context can expand the scope, making them challenging to

control. The diverse data sources pose a challenge for researchers to combine, integrate and merge with other data. The ability of the case study to generalize data to theory also requires further confirmation, in the form of replications from other case studies. The varied depth, complexity, and quality of case studies contribute specifically to its capacity as an alternative research approach. Generally, the advantages and disadvantages of the case study approach can be summarized in [table 2](#).

**Table 2.** Strength and weakness of case study

Strength	Weakness
Capacity to explain causal links;	“Causality” likely to be multi-faceted and complex;
Focus on the embeddedness of the case in its context;	Potential for overcomplication;
Ability to generalize to theory;	Replication required in other cases;
Richness of multiple data sources;	Challenge of integrating many data sources in coherent way;
Compelling and convincing when done well;	Difficult to do well; fewer established rules and procedures than other research designs;

Source: [Groat and Wang 2013](#)

## Method

This study applies a systematic literature review, which aims to identify, analyze, and critically assess previous relevant research ([Snyder 2019](#)). The scope of data and information gathered from the literature includes; characteristics, strengths and weaknesses, procedural and frameworks as precedents in architectural research. The literature review phase is conducted critically and systematically, involving in-depth reading and memoing to comprehend the issues, objectives, methods, outcomes, and conclusions of the research precedents in a critical and comprehensive manner. To ensure the reliability of data and information, selected literature sources consist of highly credible literatures, books and scholar articles.

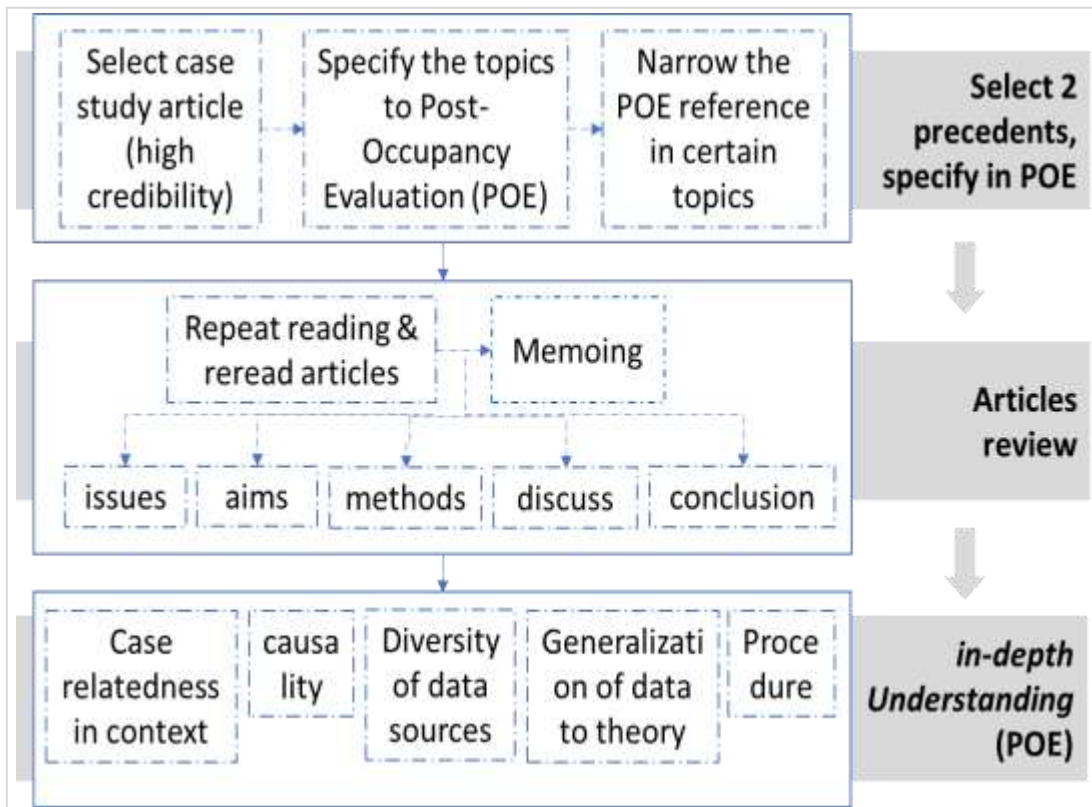


Figure 1. Systematic literature review procedure

#### Case study research precedents review

Research precedent 1:

Lei et al. (2022). Post-Occupancy Evaluation of the Biophilic Design in the Workplace for Health and Wellbeing. *Building*, 12(417), 1–20.

This research focuses on the impact of implementing a biophilic design on users. The intriguing issue is how biophilic design based on users' perceptions affect their health and well-being. Further elucidated, the causality reveals that the personal state of mind also influences the user's subjective attitude and feelings toward their workplace.

Researchers set 2 (two) biophilic design offices building in Singapore and Shenzhen as cases. The selection of it is determined based on predetermined criteria. These criteria include; the function of an office building, high-rise building category, the gross floor area (GFA) above 4,000 m<sup>2</sup>, has more than 200 workers, and applies biophilic design attributes.

The research procedure is divided into 2 (two) stages: the observation stage and the validation stage. The observation begins by cross-case

describing the biophilic theory according to several experts, namely the framework of 24 biophilic design attributes by Stephen Kellert (Kanamori and Brodsky 2001) and the 14 biophilic design patterns by Teraphin Bright Green (Browning, Ryan, and Clancy 2014). The theoretical framework is tailored appropriately to the observed context. Subsequently, the data is analyzed using a 5-points likert scoring and ranking system, which strengthens the role of post-occupancy evaluation (POE) as an investigative research method. The validation stage is conducted to explore the influence of design implementation on users.

Data collection was conducted through several complementary methods, such as; observation, investigation, and survey (using questionnaire techniques). A digital questionnaire was developed and adapted from the findings of the initial phase, focusing on biophilic design attributes in the workplace. It was subsequently expanded to evaluate the specific issues. Through field observations and questionnaire analysis, the researcher was able to analyze and obtain results

regarding user preferences for biophilic design in the workplace.

The implementation of the case study method in this research provides an in-depth insight into how biophilic design can influence the well-being of workers in the workplace. Through direct observation and subjective assessment by users, this study offers valuable design recommendations for practitioners and designers to enhance biophilic design practices in the workplace. However, it should be noted that this study has limitations, including aspects related to the focus of observation, study location, and sample selection techniques. Further research on a larger scale can be conducted to confirm these findings and generalize the results to a broader population.

Overall, this study provides a thorough understanding of the application of the case study method to post-occupancy evaluation of biophilic design implementation in the workplace. The findings of this study can provide a valuable guide for practitioners and designers in enhancing biophilic design practices focused on health and wellbeing in the workplace (Lei et al. 2022).

#### Research precedent 2:

Occupant Satisfaction with the Indoor Environment in Seven Commercial Buildings in Singapore. *Building and Environment*, 188 (November) (Cheung et al. 2021).

The main issue discussed in this article is occupant satisfaction in indoor environmental quality (IEQ). The purpose is to describe the level of occupant satisfaction with various IEQ factors, as well as to verify certain IEQ factors that can achieve the level (target 80%) of occupant satisfaction. It also intends to explore the reasons for occupant dissatisfaction in the environment and identify IEQ factors that have a high impact on occupant satisfaction.

Seven commercial buildings in Singapore, with a total of 666 workers as respondents were selected as case studies. Selection of cases based on several criteria. First, buildings are Green Mark certified (a building rating system for evaluating building performance and

environmental impact). Second, the building uses an air conditioning system. There are other more specific criteria, namely; the number of respondents from each building is at least 10% of total building occupancy, office workers and occupying their own work space. Observation is limited to office space, excluding non-office space, management room or service room. Data was obtained through a digital survey using a survey instrument adapted from CBE (Centre for the Built Environment) IEQ Occupant developed by CBE University of California, Berkeley. The survey includes 18 parameters measuring the level of occupant satisfaction, where each question is based on a 7-point Likert scale. Each respondent's "dissatisfied" answer will be followed by questions to identify the source. It was found that sources of dissatisfaction were categorized into 4 (four) aspects, including: thermal environment, air quality, lighting, and sound.

There are quantitative and qualitative data generated from digital cross-sectional surveys. Quantitative data consists of workers' satisfaction responses with IEQ factors using a 7-point satisfaction scale, while qualitative data pertains to the reasons for workers' dissatisfaction in the workplace. Statistical analysis is performed using a linear regression model. The aim is to identify IEQ parameters from 17 parameters that significantly contribute to overall work environment satisfaction.

According to this study, the overall IEQ satisfaction was 78% and the level of dissatisfaction was more than 20%. Respondents are satisfied with the flexibility of dressing (86%), artificial lighting (84%) and cleanliness (82%). Meanwhile, the dissatisfaction parameters are sound privacy (42%), personal control (32%), temperature (30%), air movement (27%), privacy (26%), and noise level (21%). Researchers suggest that it is difficult to achieve a single occupant satisfaction level (ie 80% satisfaction criterion) for all IEQ parameters. Development of satisfaction levels for each IEQ factor is a solution to achieve the target of indoor environment satisfaction.

## Result and discussion

The application of the case study approach to POE research has been exemplified in two previous research precedents. These two precedents can contribute to in-depth understanding of the complexity of problems, problem solving, and the potential of case studies. Table 3 provides a comparison between the two precedents, encompassing aspects such as focus, cases, units of analysis, respondents, data collection techniques and instruments, data analysis, research findings and reporting.

**Table 3.** Comparison of two POE precedents of case study research

	<b>Precedent 1</b>	<b>Precedent 2</b>
Research focus	Post-occupancy evaluation of biophilic design in workplace	Occupant satisfaction of indoor environmental quality (IEQ)
	Effect of design on worker health	Causes of occupant dissatisfaction with IEQ
Case study	2 offices in Cina & in Singapura	7 commercial building in Singapura
Respondent	200 respondents	666 respondents
Unit of analysis	Design biophilic attributes;	Workplace/office
Data collection & instruments	Observation dan survey (digital questionnaire - 4 scale Likert)	Survey, melalui CBE IEQ Occupant ( <i>Likert skala 7</i> )
Means of data	Quantitative: survey (numeral)	Quatitatif: survey (numeral)
	Qualitative: photographs and videos	Kualitatif: dissatisfaction statement
Data analysis strategy	Cross-case description	linear regression models
Research Result	9 attributes of biophilic design in workplace	Satisfaction IEQ 78% and dissatisfaction IEQ 20%
	7 out of 9 attributes contribute to the health and well-being of workers	Parameters of dissatisfaction are temperature, noise, personal control, privacy, air movement.

Prominent characteristics in both of these precedents are the determination of multiple case to describe in-depth of the selected issues. Specific cases with predetermined criteria are reviewed and studied. The similarity between

these two precedents lies in the selection of buildings as case studies and the specification of the issue that has been limited. In linewith the research objectives of case study, both aim to obtain an in-depth understanding of the issues/themes raised, namely; worker workers' health and well-being for the first precedent, and indoor environmental satisfaction for the second precedent. Furthermore, both precedents can elucidate causal relationships, although there are complex and multi-faceted causal relationship, especially for the first study as it necessitates the generalization of theories from 2 (two) previous theories presented. Nonetheless, it may not be fully applicable to all cases. This new theory must be validated through the replication of other case studies, for example; whether the implementation of biophilic design in workplace is similar when applied in other regions of China or Singapore.

The diversity of data sources serves as a positive aspect of case study research. One set of data can corroborate another, and it must also be able to validate the findings of previous studies. Observations and investigations as primary data are validated with qualitative data obtained through questionnaires. Moreover, the data generated from various sources can surpass the statistical results of quantitative data because it is able to produce behavioral observations from the perspective of workers as users.

Finally, a case study as a research approach will be highly engaging and yield convincing results when conducted effectively. Researchers must meticulously structure the research methodology, as one weakness of this case study lies in the lack of rules and procedures.

## Conclusions

The case study research approach is highly beneficial for gaining a profound understanding of a compelling issue, event, or phenomenon within a real-life context. Prominent characteristics of case study research are focusing on one or multiple issues within a particular context, being able to explain causality, presenting of theory development, converging of data sources in triangulation patterns, and generalizing theory. Case study research in architecture combines quantitative and qualitative data, as well as observes behavior through the perspectives of users. The core of the case study approach involves elaborating strategies,

methods, techniques, or theories to conduct an in-depth identification of the researched case.

## References

- Adewuni, M. B., K Zakari, and D. A. Madu. 2020. 'Case Study as a Research Method'. *JECM: African Scholar Journal of Environment Design & Construction Management* 18 (4): 393–403.
- Asmussen, Kelly J., and John W. Creswell. 1995. 'Campus Response to a Student Gunman'. *The Journal of Higher Education* 66 (5): 575–91. <https://doi.org/10.1080/00221546.1995.11774799>.
- Browning, William, Catherine Ryan, and Joseph Clancy. 2014. '14 Patterns of Biophilic Design: Improving Health & Well-Being in the Built Environment'. In *Terrapin Bright Green* 1.
- Cheung, Toby, Stefano Schiavon, Lindsay T. Graham, and Kwok Wai Tham. 2021. 'Occupant Satisfaction with the Indoor Environment in Seven Commercial Buildings in Singapore'. *Building and Environment* 188 (January): 107443. <https://doi.org/10.1016/j.buildenv.2020.107443>.
- Creswell, John W., and Cheryl N. Poth. 2017. *Qualitative Inquiry and Research Design Choosing Among Five Approaches*. United Kingdom: SAGE Publications, Inc.
- Frelin, Anneli. 2015. 'Relational Underpinnings and Professionalism – a Case Study of a Teacher's Practices Involving Students with Experiences of School Failure'. *School Psychology International* 36 (6): 589–604. <https://doi.org/10.1177/0143034315607412>.
- Groat, Linda N., and David Wang. 2013. *Architectural Research Methods*. 2nd ed. New York: John Wiley & Sons, Inc.
- Hervira, Frans Zizka. 2022. 'Nursing Acute Pain in Patients With Bladder Cancer: A Case Study'. *Journal of Applied Nursing and Health* 4 (2): 158–63. <https://doi.org/10.55018/janh.v4i2.42>.
- Hollweck, Trista. 2015. 'Robert K. Yin. (2014). Case Study Research Design and Methods (5th Ed.).' *Canadian Journal of Program Evaluation* 30 (1): 108–10. <https://doi.org/10.3138/cjpe.30.1.108>.
- Hong, Hyun-Jin, and Mi-Hee Kang. 2010. 'Spatial Conditions of a Children's Library Supporting Children's Development: With Priority Given to User Benefit Criteria'. *Journal of the Korean Society for Information Management* 27 (2): 173–99. <https://doi.org/10.3743/KOSIM.2010.27.2.173>.
- Kanamori, Hiroo, and Emily E. Brodsky. 2001. 'The Physics of Earthquakes'. *Physics Today* 54 (6): 34–40. <https://doi.org/10.1063/1.1387590>.
- Kwon, Young Suk. 2020. 'A Case Study on Local Cultural Sensibility and Healing Tourism in Korea'. In *Proceedings of the International Conference on Culture Heritage, Education, Sustainable Tourism, and Innovation Technologies*, 651–55. SCITEPRESS - Science and Technology Publications. <https://doi.org/10.5220/0010398506510655>.
- Lei, Qinghua, Stephen Siu Yu Lau, Chao Yuan, and Yi Qi. 2022. 'Post-Occupancy Evaluation of the Biophilic Design in the Workplace for Health and Wellbeing'. *Buildings* 12 (4): 417. <https://doi.org/10.3390/buildings12040417>.
- Nath, S., and H. K. Pratihari. 2018. 'Gang Rape and Murder - A Case Report.' *Journal of Forensic Sciences and Criminal Investigation* 10 (1): 1–4. <https://doi.org/https://doi.org/10.19080/JFSCI.2018.10.555776>.
- Osorio-García-de-Oteyza, Miguel, Ariana Pérez-Coutado, and Mirian Jimenez-Sosa. 2020. 'Entrepreneurship among Female Immigrants. A Case Study in Madrid'. *Revista Iberoamericana de Estudios de Desarrollo = Iberoamerican Journal of Development Studies* 9 (2): 30–53. [https://doi.org/10.26754/ojs\\_ried/ijds.375](https://doi.org/10.26754/ojs_ried/ijds.375).
- Preiser, Wolfgang F. E., Edward White, and Harvey Rabinowitz. 2015. *Post-Occupancy Evaluation (Routledge Revivals)*. Routledge. <https://doi.org/10.4324/9781315713519>.
- Snyder, Hannah. 2019. 'Literature Review as a Research Methodology: An Overview and Guidelines'. *Journal of Business Research*

- 104 (November): 333–39.  
<https://doi.org/10.1016/j.jbusres.2019.07.039>.
- Sudradjat, Iwan. 2020. 'Teori Dalam Penelitian Arsitektur'. *ARTEKS: Jurnal Teknik Arsitektur* 5 (1): i–vi.  
<https://doi.org/10.30822/arteks.v5i1.378>.
- Tellis, Winston. 1997. 'Introduction to Case Study'. *The Qualitative Report*, July.  
<https://doi.org/10.46743/2160-3715/1997.2024>.
- Zainal, Zaidah. 2007. 'Case Study as A Research Method.' *Jurnal Kemanusiaan* 9.

**Author(s) contribution**

**Anisza Ratnasari** contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

**Iwan Sudradjat** contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.