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**Evaluation of Designers' Experience with the Use of Electronic Building Permit
System (EBPS): A Case Study of Chandragiri Municipality, Kathmandu.**

by

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SUBMITTED TO DEPARTMENT OF CIVIL ENGINEERING IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT**

**DEPARTMENT OF CIVIL ENGINEERING
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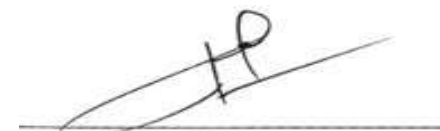
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ABSTRACT

The building permit process plays an important role in urban governance by making sure that it complies with safety standards and planning regulations. In Nepal, the traditional paper-based system has been related to delays and administrative inefficiencies. To make transparency and efficiency finer, the Government has introduced the Electronic Building Permit System (EBPS). Chandragiri Municipality, a swiftly growing urban area in Kathmandu Valley, has implemented EBPS to simplify approvals and support planned development.

This study emphasizes on designers' perceptions of EBPS in Chandragiri, focusing on usability, efficiency, and operational challenges. A mixed-method approach was adopted, using a Likert-scale questionnaire to collect data from registered designers. Descriptive statistics and Relative Importance Index (RII) were used to study responses. The findings indicate that user experiences are generally positive, with strong ratings for real-time application tracking (RII = 0.899), user-friendly interface (0.893), and reduced office visits (0.860). The scores were lower in the areas of timely issue resolution (0.687), municipal responsiveness (0.740), and regulatory update accuracy (0.672).

Overall, EBPS has improved transparency, accessibility, and processing efficiency, though there is need for improvements in administrative support, system updates, and response mechanisms. Practicing quarterly regulatory updates, establishing dedicated support units, enhancing technical capacity, and incorporating user feedback are among the recommendations. The study provides guidance for expanding the Electronic Building Permit System across other municipalities and strengthening e-governance in Nepal.

Keywords: *Electronic Building Permit System (EBPS), Usability, Efficiency, Designers' perception, Urban governance*

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LIST OF ABBREVIATIONS

EBPS	Electronic Building Permit System
UA	Usability and Accessibility
SFF	System Features and Functionality
ICR	Information Clarity and Relevance
SR	Support and Responsiveness
ETM	Efficiency and Time Management
OE	Overall Experience

CHAPTER ONE: INTRODUCTION

The purpose of this chapter is to give an overview of the research and highlight its importance. It contains the problem statement section, research questions, and objectives, which are framed based on existing gaps in the existing body of knowledge. The research boundaries are established by defining the scope and limitations of this study.

1.1 Background

The building permit process is a crucial component of urban governance, serving as a regulatory tool to ensure that construction activities comply with safety standards, zoning regulations, and municipal planning guidelines (World Bank, 2018). Traditionally, in Nepal, the process of obtaining building permits has been largely manual and paper-based, which means applicants must submit physical documents, make repeated office visits, and rely on in-person communication with municipal authorities. Although this traditional approach has been effective, it has often been criticized for inefficiency, long processing times, procedural ambiguities, and a tendency to encounter bureaucratic obstacles (UN-Habitat Nepal, 2017).

In recent years, the advancement of information and communication technology has enabled municipalities across the globe to adopt digital platforms to enhance service delivery in urban governance (Heeks, 2002; OECD, 2020). In Nepal, the Government and several local municipalities have introduced the EBPS as part of their e-governance initiatives to promote transparency and efficiency (MoFAGA, 2021; ADB, 2020). The EBPS enables designers, engineers, and architects to submit building plans digitally, monitor application progress, and get approvals online. The expectation is that this system will lower human error, reduce delays, improve transparency, and improve efficiency in service delivery.

Chandragiri Municipality, one of the swiftly urbanizing local governments in the Kathmandu Valley, has implemented EBPS to manage the increasing demand for building approvals while promising systematic urban planning and sustainable development (CBS, 2021). Given the municipality's increasing number of residential and commercial construction projects, the EBPS is expected to be an important tool for balancing urban growth with regulatory compliance.

1.2 Rationale of the Study

While the theoretical benefits of EBPS are well recognized (United Nations, 2018; UNDESA, 2020), the practical effectiveness of it is largely dependent on the perceptions and experiences of the users. Designers, who are primarily responsible for preparing and submitting building permit applications, directly communicate with the system and are, therefore, in a unique position to assess its usability, efficiency, and responsiveness. The feedback they provide is critical for understanding whether the system meets professional requirements and fulfills its intended objectives (Al-Khouri, 2012).

Despite the increasing adoption of EBPS in Nepal, limited scholarly research has systematically assessed the experiences of designers in relation to its effectiveness. Evidence-based improvements require an understanding of whether the system reduces procedural delays, enhances accessibility, and addresses common challenges faced in the traditional system (Paudel, 2021).

1.3 Problem Statement

The introduction of the EBPS in Chandragiri Municipality represents an important milestone in the digitalization of municipal services. However, there are critical issues that are still unclear and need further examination. Designers are concerned with how user-friendly and efficient the EBPS is compared to traditional procedures. The system's success in reducing procedural delays and enhancing transparency is another key question, as highlighted by the Asian Development Bank (ADB, 2020). Furthermore, it is necessary to explore the technical, procedural, and institutional challenges that designers face while using the EBPS (Pokharel, 2021). Equally significant is the consideration of whether the EBPS sufficiently addresses the expectations and professional needs of its users, as focused by the Ministry of Federal Affairs and General Administration (MoFAGA, 2022).

1.4 Research Questions

The following are the main research questions for this study:

- RQ1: What are the designers' perceptions regarding the use of the EBPS in Chandragiri Municipality?

- RQ2: What are the most important factors identified by designers that enhance the designers' experience of the EBPS in Chandragiri Municipality?
- RQ3: What suggestions can be given for enhancing the designers' experience and optimizing the functioning of the EBPS System?

1.5 Research Objective

The main objective of this study is to evaluate designers' experiences with the use of the Electronic Building Permit System in Chandragiri Municipality, Kathmandu.

The specific objectives are to:

1. To determine the designer's perceptions regarding the use of the EBPS System.
2. To find out the most important factors for enhancing the designer's experience with the EBPS.
3. To suggest improvements for enhancing the designers' experience and optimizing the functioning of the EBPS System.

1.6 Significance of Research

There are multiple reasons why this study is significant. Firstly, designers and professionals can express their experiences, challenges, and expectations on a platform provided by it, thereby contributing to user-centered improvements in the EBPS. Secondly, evidence-based insights are provided to Chandragiri Municipality that can help with policy refinement, enhance service delivery, and promote accountability. (MoFAGA, 2022). Thirdly, at the national policy level, the findings support the current e-governance initiatives in Nepal by pointing out lessons and best practices that can be replicated in other municipalities (ADB, 2020; UNDESA, 2020). Lastly, for the academic community, the study fills the gap in research on electronic building permit systems in Nepal and provides a case study for comparative analysis in the wider field of urban governance and digital service delivery. (Paudel, 2021).

1.7 Scope and Limitations of Research

The study focuses on designers registered and actively using the EBPS in Chandragiri Municipality. It looks at their direct experiences with the system, which include usability, efficiency, responsiveness, and challenges. The research is limited to the context of Chandragiri Municipality and does not cover other municipalities or stakeholders such as municipal staff, contractors, or house owners, though their opinion may also be relevant.

1.8 Organization of Thesis

This research is divided into following five chapters:

- a) Chapter 1 (Introduction): This chapter provides introduction to the research. It contains the arrangement of the thesis, background information, problem statement, research questions, objectives, significance, scope, and limitations of the study.
- b) Chapter 2 (Literature Review): A comprehensive review of the existing literature is presented in this chapter. It includes previous research, government guidelines, quality standards, methodologies, and findings related to the electronic building permit system in Nepal as well as abroad.
- c) Chapter 3 (Research Methodology): This chapter consists of the research methodology used in the research. It focuses on the data collection methods and data analysis techniques to be used in this research study.
- d) Chapter 4 (Results and Discussion): This chapter contains the analysis of the data collected, using statistical tools and mathematical modeling techniques. It contains the interpretation of results, followed by a detailed discussion of the findings.
- e) Chapter 5 (Conclusion and Recommendation): This chapter contains conclusions and recommendations drawn from the study, based on the study's objectives.

CHAPTER TWO: LITERATURE REVIEW

This chapter explores relevant literature to provide a base for the study. It examines existing research, theories and frameworks related to Electronic Building Permit System. It identifies main points and focuses on gaps in the current body of knowledge and establishes a strong foundation for the purpose of this research. It also supports the development of the research framework and guides the study's direction.

2.1 Introduction

The building permit process is a crucial regulatory mechanism to make sure that it complies with structural safety, zoning regulations, and urban development policies. In Nepal, the process has been traditionally paper-based, exposed to bureaucratic delays, and susceptible to inefficiencies (Kathmandu Post, 2015). The Electronic Building Permit System (EBPS) has been implemented by several municipalities, including Chandragiri, to tackle these challenges. This platform is a web-based platform that automates permit application, review, and approval.

This chapter reviews the relevant literature on EBPS, focusing on its development, global and regional comparisons, technological adoption in design practices, and the specific context of Chandragiri Municipality. It also pinpoints the research gap that supports the current study.

2.2 Overview of the Electronic Building Permit System in Nepal

2.2.1 Historical Development

In Nepal, the EBPS was first introduced in 2012 under the Comprehensive Disaster Risk Management Program (CDRMP) of the United Nations Development Program (UNDP) in collaboration with Innovative Solution Pvt. Ltd. (Innovative Solution, 2020). Its main aim was to enhance efficiency, enhance transparency, and make sure the compliance with the National Building Code (NBC) and Building Byelaws (BBL).

In 2015, Kathmandu Metropolitan City (KMC) started a pilot phase of EBPS, which was later expanded to other municipalities like Lalitpur and Kirtipur (My Republica, 2015).

The system is reachable through a dedicated portal, allowing architects, engineers, and municipal staff to interact digitally throughout the permit cycle.

2.2.2 Key Features and Workflow

The Electronic Building Permit System provides a range of functions designed to organize the building permit process. These contain online application submission with the potential to upload computer aided drawings and required documentation, automated compliance checks against the provisions of the Nepal Building Code (NBC) and Building Bylaws (BBL), monitoring application progress in real-time and archiving approved permits and design files digitally. In addition to this, Geographic Information System (GIS) tools are incorporated into the system to support spatial verification (Innovative Solution, 2020). The typical workflow of the EBPS begins with the submission of applications by designers, followed by initial screening at the municipal registration desk. This is followed by a technical check and field verification process, after which the application is sent for approval by authorized municipal officers. Finally, the process ends with the issuance of the building permit, and the records are digitally stored for future reference.

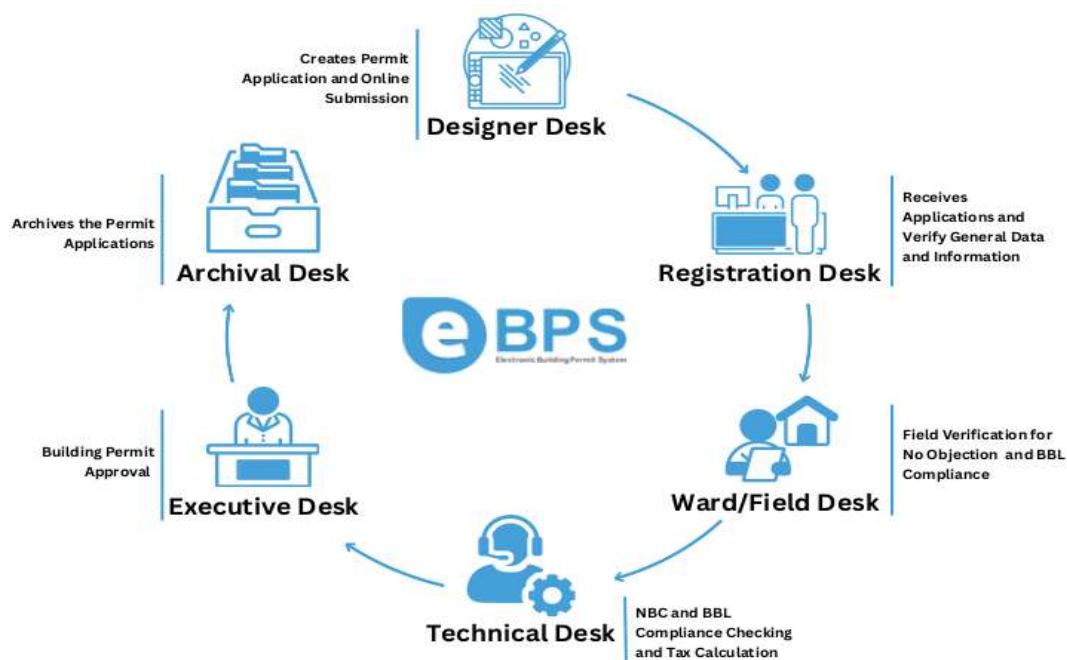


Figure 1: EBPS Workflow

2.2.3 Reported Benefits

The average permit processing time has been significantly reduced by EBPS, as indicated by studies and municipal reports, from more than 21 days to shorter durations. (Kathmandu Post, 2015). Transparency has been improved, and manual errors have been reduced by adoption of EBPS, and it also has contributed to Nepal's improved World Bank Doing Business "Dealing with Construction Permits" ranking (World Bank Group, 2020).

2.3 Global and Regional Perspectives on Electronic Permit Systems

The adoption of electronic permitting systems is largely influenced by motivations like enhancing administrative efficiency, improving regulatory compliance, and ensuring stakeholder satisfaction, as highlighted by international research (Zhao et al., 2019). For instance, in Greece, the national electronic building permission system encountered challenges related to fragmented governance, limited technical infrastructure, and the need for capacity building (Dimopoulos et al., 2016). In Singapore, the CORENET system has been notable for its integration of Building Information Modeling (BIM) to enable automated compliance checks, thereby minimizing human review time and enhancing design accuracy (Building and Construction Authority, 2018). Similarly, in South Korea, the introduction of BIM-based e-permitting significantly lowered approval times by approximately 30% through the adoption of automated rule-checking (Lee et al., 2018). These international cases illustrate that the overall experience of designers is shaped not only by the usability of the software but also by the extent to which the system is effectively integrated into existing professional workflows.

2.4 Role of Designers in the EBPS Workflow

In the digital building permit process, design professionals such as architects, structural engineers, and other practitioners hold an important role. Designers are the primary initiators of applications in most municipalities, including those using EBPS, and they must ensure that submitted documents comply with regulatory, technical, and procedural standards. The overall efficiency and effectiveness of e-permitting platforms is largely influenced by their workflow and professional responsibilities, as they are the main point of interaction with the system.

The preparation and submission of detailed architectural, structural, electrical, and plumbing drawings is an important task for designers in the EBPS environment. To be approved for review, these documents must meet established municipal requirements, which include zoning standards, setback rules, building codes, and safety guidelines. The quality, accuracy, and completeness of submitted documents have a direct impact on processing time and reduce the likelihood of repeated revisions, as evidenced by literature on e-governance and digital permitting (Al-Khoury, 2012; ADB, 2020). In order to lower submission errors, system interfaces must support high-resolution uploads, standard templates, and automated checks.

Responding to comments or compliance queries that are raised during the review process is another significant task for designers. Reviewers in many e-permitting systems use the platform to provide digital annotations or request clarification. It is the designer's responsibility to assess these comments, update the technical drawings accordingly, and resubmit revised documents. According to research, efficient communication and feedback mechanisms, such as real-time notifications, version tracking, and structured comment threads, are necessary to lower friction between applicants and municipal reviewers (Bernadas et al., 2025). A system that is well-designed can help streamline revisions and reduce delays caused by miscommunication.

During the EBPS submission process, design professionals frequently work together with other specialists. Geotechnical engineers, mechanical system designers, environmental consultants, and certified surveyors are often required to give input on complex building projects. Multi-user collaboration features must be included in the EBPS, which will enable different experts to contribute files, verify data, or digitally certify documents. The use of collaborative digital platforms has shown that compliance in modern urban development projects requires interprofessional coordination, and a lack of integrated workflows can lead to bottlenecks in approval processes, as highlighted by studies on collaborative digital platforms (UN-Habitat, 2017).

Designers are in charge of managing repeated submissions, which are a regular part of the permit cycle. Revisions are possible due to both regulatory comments and client-initiated design changes, site constraints, or updated building standards. According to the literature, e-permitting systems must provide strong document management functions, like version histories, automated comparison tools, and revision metadata, to help users

in effectively tracking changes and maintaining regulatory transparency (World Bank, 2018). The digital system is at risk of replicating the inefficiencies of traditional paper-based workflows if it doesn't have these features.

Overall, designers' responsibilities in the EBPS workflow are diverse and highly technical in nature. To achieve the intended benefits of efficiency, transparency, accuracy, and accountability, the system must be designed with professional design practice in mind. In order to enhance the building permit process without complicating it, it is crucial to understand the needs, challenges, and expectations of architects and engineers.

2.5 Local Context: Chandragiri Municipality

Chandragiri Municipality adopted the Electronic Building Permit System as part of its modernization drive, aiming to simplify service delivery and enforce NBC compliance (Innovative Solution, 2020). However, there is no published study specifically examining designers' experiences including usability, efficiency, and support systems within Chandragiri's EBPS environment. This absence directly addresses the research gap shown in this study.

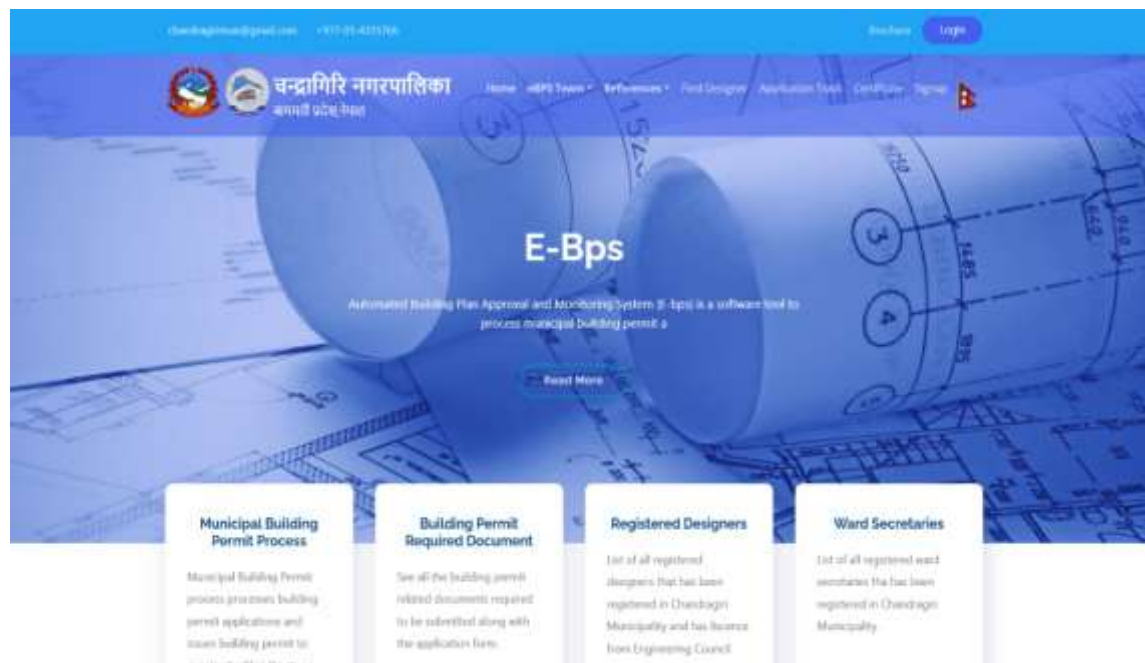


Figure 2: User Interface of EBPS of Chandragiri Municipality

2.6 Review on Questionnaire Dimensions

The subjective feelings of users towards the products they use are referred to as user experience. The same product may have varying opinions from different users or groups of users. Thus, gathering feedback from a diverse range of users is often necessary for evaluating user experience. The use of questionnaires is common for this purpose, especially online, as they facilitate efficient data collection from many users. The User Experience Questionnaire's primary objective is to enable quick and immediate evaluation of the user experience of interactive products (Laugwitz et al., 2008). The user experience questionnaire used for pretesting for this study contains six scales with 26 factors (Schrepp, 2015). This questionnaire is pre-tested and refinement is done in the questionnaire according to the feedback provided by the designers.

The development of the questionnaire for this study is based on established models and validated instruments used in previous studies on website quality, usability, and e-government service evaluation. Three key studies, Barnes and Vidgen (2000), Abd Ellatif (2006), and Bernadas et al. (2025), have been looked into for this research which provides the base for the questionnaire dimensions adopted in this research. Their work collectively provides the knowledge of using the questionnaire regarding the categories of system Usability & Accessibility (UA), System Features & Functionality (SFF), Information Clarity & Relevance (ICR), Support & Responsiveness (SR), Efficiency & Time Management (ETM), and Overall Experience (OE).

2.7 Research Gap and Justification

While EBPS implementation in Nepal has been documented, existing literature focuses on technical descriptions or municipal performance indicators rather than the firsthand view of professional users. The designers' role is crucial, they prepare submissions, interact with the system, and respond to compliance feedback yet their experiences in Chandragiri remain unrecorded. This research aims to fill this gap by systematically evaluating designers' experience with EBPS in Chandragiri Municipality, thereby informing system enhancement and policy refinements.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the methods used to carry out the research. It covers the research design, the research population, how the sample was chosen, the tools used to collect data, and how the data were analyzed. Research methodology means the overall approach used to achieve the target and objectives of the study. It is a step-by-step way to solve the research problem in a logical way. For this study, a questionnaire survey was the main method, supported by a review of existing literature. The literature review (secondary data) helped to identify the important factors, which were then included in the questionnaire. Primary data were collected through the survey responses.

3.2 Research Design

A research design is the plan for conducting research. It explains how the research will be organized and carried out to meet the objectives set at the beginning. It assists the researcher in organizing the process and choosing methods to make sure the study successfully reaches its objectives.

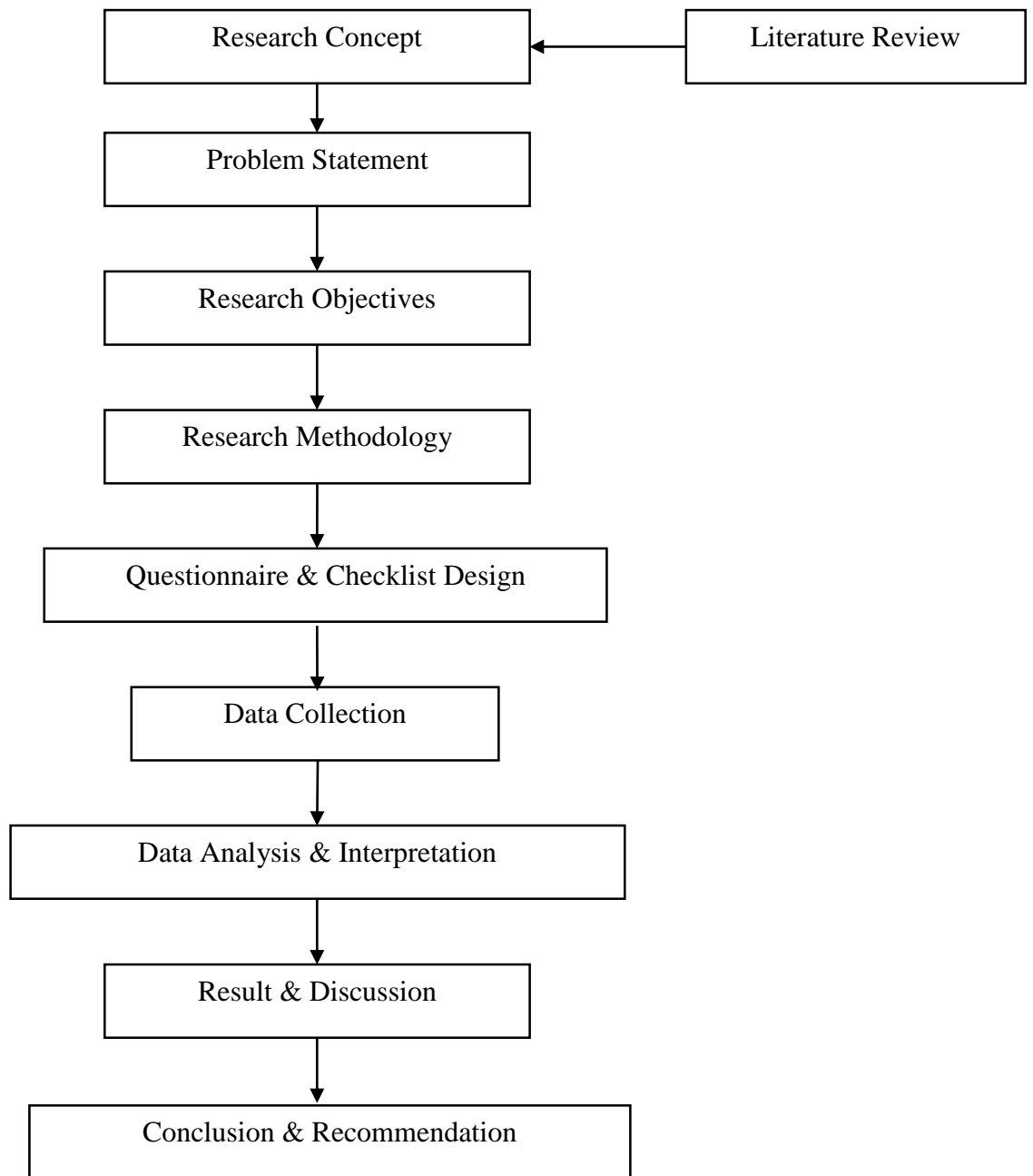


Figure 3: Flow Chart of Research Methodology

3.3 Research Methodology

A mixed-method approach is used to provide a comprehensive assessment of designers' experiences with EBPS. The quantitative component includes structured questionnaires with Likert-scale items to measure perceptions of system usability, efficiency, functionality and support. The qualitative component includes focused group discussions with the designers to capture insights into suggestions for system enhancement. This combination allows for both statistical analysis and in depth understanding of designer experiences.

The following table shows the research matrix for this research.

Component	Details
Research Aim	To evaluate designers' experiences with the Electronic Building Permit System (EBPS) in Chandragiri Municipality, focusing on usability, efficiency and functionality of the system.
Research Approach	Mixed-method approach combining quantitative and qualitative methods.
Research Design	Population: Registered designers in Chandragiri Municipality (architects, engineers, urban planners). Sample Size: All of the registered designers. Study Area: Chandragiri Municipality, Kathmandu Valley.
Data Collection Methods & Tools	- Structured Likert-scale questionnaire (5-point scale) to measure system usability, functionality, efficiency, responsiveness and support. - Focused group discussion for qualitative insights. - Secondary data review (municipal reports, EBPS records).
Questionnaire Design	- Pre-testing questionnaire: Conducted with 5 designers to test clarity and relevance; feedback used to refine items. - Reliability Analysis: Cronbach's Alpha calculated; values above 0.70 considered acceptable to ensure internal consistency.
Data Analysis Techniques	- Descriptive statistics to analyze demographic data and overall trends. - Mean score analysis to categorize levels of agreement. - Relative Importance Index (RII) to rank system features. - Thematic analysis for qualitative responses to identify challenges and suggestions.
Expected Outcome	Identification of designers' perceptions, important factors and features and recommendations to optimize EBPS usability, efficiency, and functionality.

Table 1: Research Methodology Matrix

3.4 Study Population, Sample Selection and Sample Size

The target population for this study consists of registered designers in Chandragiri Municipality who actively use the EBPS for building permit applications, including architects, engineers and urban planners. A census survey was conducted using the municipal registry of licensed designers as a sampling frame, all the 74 registered designers were determined as representatives, ensuring enough coverage of perspectives while maintaining manageability for survey administration.

3.5 Study Area

The study is conducted in Chandragiri Municipality, a rapidly growing region in the Kathmandu Valley. This area is picked due to its active adoption of the EBPS and the growing volume of building permit applications, making it a relevant context to examine system performance.

3.6 Data Collection Methods

Structured Questionnaire: A five-point Likert-scale questionnaire is developed to measure designers' perceptions regarding the Electronic Building Permit System (EBPS). The instrument examines key dimensions such as usability, system functionality, technical support, administrative responsiveness, and overall system efficiency.

Open-Ended Questions: Open-ended questions are included to collect qualitative responses, enabling selected participants to express their views on challenges faced, improvement suggestions, and overall experience with the system.

Secondary Data Review: Additional information is gathered from municipal reports, EBPS usage records, and relevant policy and regulatory documents. These sources support validation and contextual understanding of the primary data.

Questionnaire Design

A pre-testing of the user experience questionnaire is to be carried out with five designers to evaluate the clarity, relevance, and completeness of the questionnaire items. Based on their feedback, modifications are made to improve the questionnaire, improve response

scales, and ensure the instrument effectively measures the intended information. From the feedback of the pre-testing, the questionnaire was designed in a five-point Likert scale model grouped into 6 categories: Usability & Accessibility (UA), System Features & Functionality (SFF), Information Clarity & Relevance (ICR), Support & Responsiveness (SR), Efficiency & Time Management (ETM) & Overall Experience (OE).

3.7 Data Analysis

The collected data are analyzed using both quantitative and qualitative techniques to ensure a comprehensive understanding of designers' experiences with the Electronic Building Permit System (EBPS).

3.7.1 Descriptive Statistics

Descriptive statistics are employed to summarize and present the demographic characteristics of the respondents, as well as general trends related to system perception. Measures such as frequency, percentage, mean, and standard deviation are used to provide a clear overview of respondents' profiles and their overall views on the EBPS.

3.7.2 Mean Score Analysis

Mean score analysis is conducted to analyze respondents' levels of agreement on different system attributes. The five-point Likert-scale responses are converted into mean values, which allows categorization into interpretation ranges such as very high, high, moderate/neutral, low, and very low levels of agreement. This helps in knowing users' overall satisfaction and perceptions regarding usability, functionality, technical support, administrative efficiency, and system performance.

Mean Range	Interpretation
4.21 – 5.00	Very High Agreement
3.41 – 4.20	High Agreement
2.61 – 3.40	Moderate/Neutral
1.81 – 2.60	Low Agreement
1.00 – 1.80	Very Low Agreement

Table 2: Mean Range Table

3.7.3 Reliability Statistics

Reliability analysis is an important way to ensure the internal consistency of survey data. Cronbach’s alpha (α) is one of the most used statistical measures to calculate the consistency in questionnaires survey (Tavakol & Dennick, 2011). It evaluates how closely related a set of items are as a group and provides an indication of reliability.

Cronbach’s Alpha (α) is calculated using the formula:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2}\right)$$

where,

k : the number of items;

σ_i^2 : the variance of each individual item;

σ_T^2 : the total variance of the sum of the items.

The value of Cronbach’s Alpha ranges between 0 and 1, where a higher value indicates greater internal consistency and reliability. The following thresholds are used to interpret the reliability of the scale:

Cronbach's Alpha (α)	Reliability
> 0.90	Excellent reliability
0.80 – 0.90	Good reliability
0.70 – 0.80	Acceptable reliability
0.60 – 0.70	Questionable reliability
0.50 – 0.60	Poor reliability
< 0.5	Unacceptable reliability

Table 3: Cronbach's Alpha (α)

In this research, Cronbach's alpha (α) is calculated and used to measure the reliability of the data collected through questionnaire survey. The test is conducted using Microsoft Excel.

3.7.4 Relative Importance Index (RII)

The Relative Importance Index (RII) is a statistical tool used to determine the relative significance of different factors based on respondents' ratings. It is usually applied in perception-based studies to rank variables according to their importance.

The formula for calculating RII is given as:

$$RII = \frac{\sum W}{A \times N}$$

Where:

- $\sum W$ = Sum of weights given to each factor by respondents

$$\sum W = (1 \times n_1) + (2 \times n_2) + (3 \times n_3) + (4 \times n_4) + (5 \times n_5)$$

- A = Highest possible weight (for a 5-point Likert scale, $A = 5$)
- N = Total number of respondents

- n_1, n_2, n_3, n_4, n_5 = Frequency of responses for weights 1 through 5

The resulting RII value ranges between 0 and 1, where values closer to 1 indicate higher importance of the given factor.

The RII is used to rank system features based on respondents' ratings. This approach helps determine the degree of significance assigned by designers to various EBPS components, enabling the identification of the system's strengths as well as areas requiring improvement. The RII technique is widely applied in perception and prioritization studies, making it suitable for evaluating electronic permit system features.

3.7.5 Correlation Analysis

The correlation analysis is conducted to examine the relationships between the six categories of the Likert scale questionnaire: Usability & Accessibility (UA), System Features & Functionality (SFF), Information Clarity & Relevance (ICR), Support & Responsiveness (SR), Efficiency & Time Management (ETM), and Overall Experience (OE). The formula used for calculating the correlation is as follows:

Formula



$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

r = correlation coefficient

x_i = values of the x-variable in a sample

\bar{x} = mean of the values of the x-variable

y_i = values of the y-variable in a sample

\bar{y} = mean of the values of the y-variable

To supplement quantitative findings and gain deeper knowledge, qualitative analysis is to be conducted for open-ended responses. A Focused Group Discussion is to be carried out with the registered designers and municipal officials where their perceptions are carefully reviewed, categorized and interpreted to identify concerns, suggestions, and experiences shared by the designers. This qualitative component provides rich context to

the statistical results, providing a deep understanding of user experience and highlighting practical issues and suggestions not fully captured through structured questions.

3.7.6 Validation of Designers

The information regarding the designers enlisted in the Municipality record will be validated from the official response letter regarding their information from the department concerned of the Municipality.

CHAPTER FOUR: RESULT AND DISCUSSION

In this chapter, the analysis, presentation, and interpretation of the information collected using the methods described earlier are discussed. It shows the output from the questionnaire and the views of respondents about their perceptions about the EBPS system. The data collected was analyzed using simple statistical tools. The data and findings are explained with the help of graphs, charts, tables and figures.

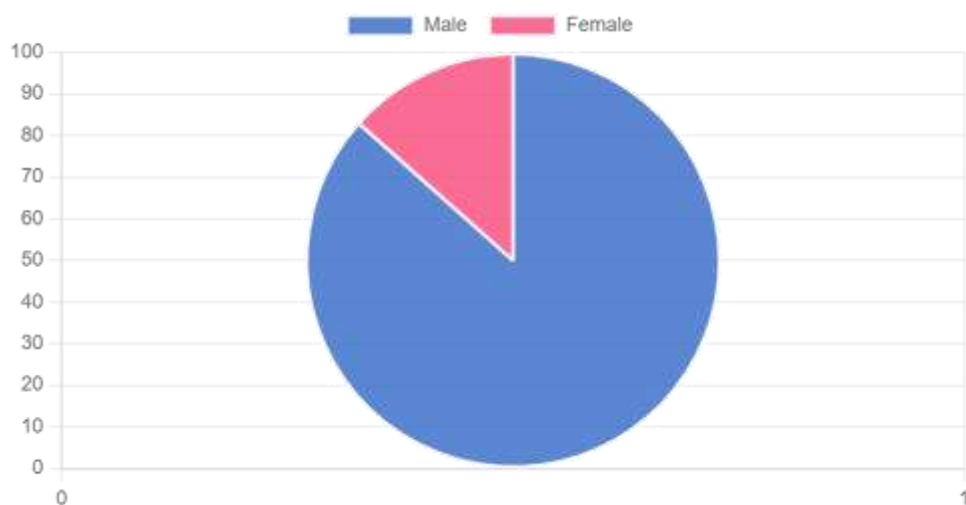
The analysis and discussion are directly associated with the objectives of the study. Therefore, the chapter is divided into different sections according to these objectives.

4.1 Demographic Characteristics of Respondents

a) Gender

Gender	Frequency	Percentage
Female	9	13.43
Male	58	86.57
Total	67	100

Table 4: Gender of Respondents

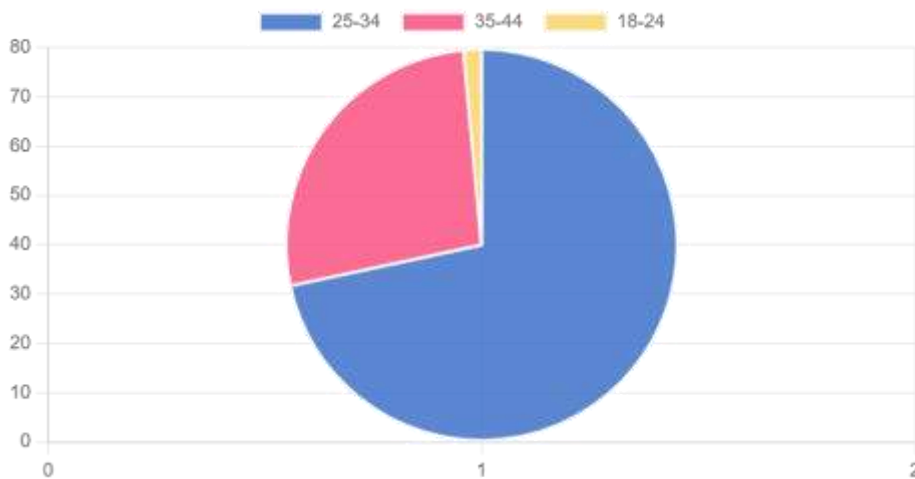


Majority of the respondents in this survey were male (86.57%) while few were female (13.43%), since male working in engineering sector are more and there are very few female representatives. Hence number of male participants was more than that of female.

b) Age Group

Age Group	Frequency	Percentage
18-24 years	1	1.49
25-34 years	48	71.64
35-44 years	18	26.87
Total	67	100

Table 5: Age Group of Respondents

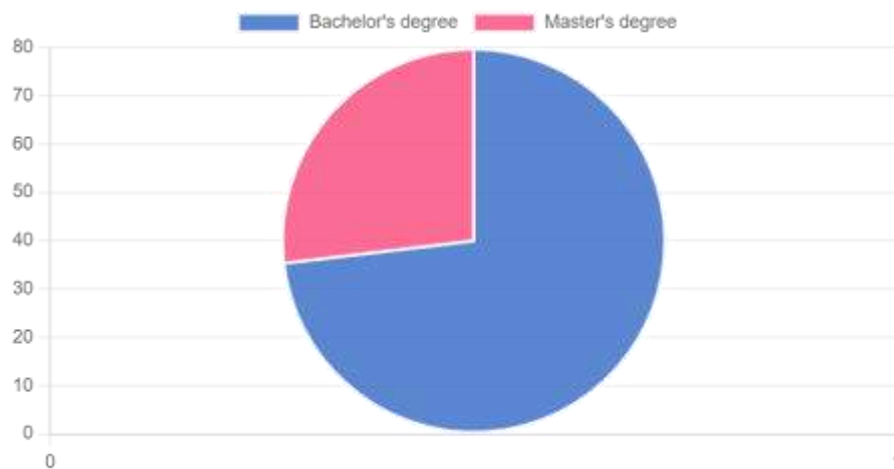


Most of the respondents were of age group of 25-34 years (71.64%). 26.87% were 35-44 years age group. Among three age groups, least were 18-24 years age group, i.e., 1.49%.

c) Level of Education

Level of Education	Frequency	Percentage
Master's Degree	18	26.87
Bachelor's Degree	49	73.13

Table 6: Education of Respondents

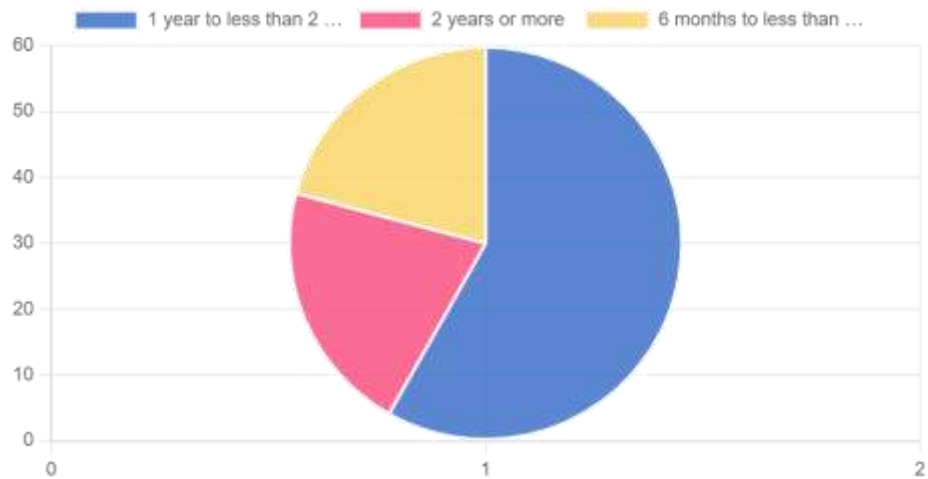


Many of the respondents had completed their bachelor's degree (73.13%). Whereas 26.87% of respondents had completed their master's degree. Zero respondents were with minimum education of diploma level.

d) Timewise Distribution of Use of EBPS System

System Experience	Frequency	Percentage
6 months to less than 1 year	14	20.90
1 year to less than 2 years	39	58.21
2 years or more	14	20.90
Total	67	100

Table 7: Timewise Distribution of Use of EBPS System

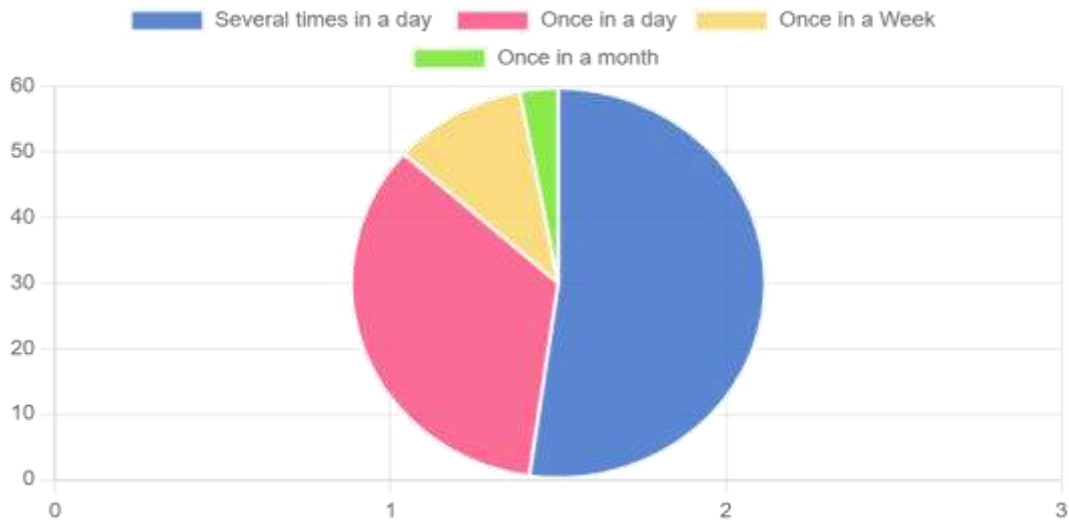


The timewise distribution of use of the EBPS system of respondents is shown in Table 7. Among 67 respondents, 39 of them have used the system for 1 year to less than 2 years, 14 of them have used it for 2 years or more and 14 of them have used it for 6 months to less than a year.

e) Frequencies of EBPS System Usage

Frequency of usage	Frequency	Percentage
Several times a day	35	52.24
Once in a day	23	34.33
Once in a Week	7	10.45
Once a month	2	2.99
Total	67	100

Table 8: Frequencies of EBPS System Usage



The Frequencies of EBPS system usage of respondents are shown in Table 1.6. Among 67 respondents, 35 of them use the EBPS system several times a day, 23 of them use it once a day, 7 of them use for once in a week and 2 of them use it once a month.

4.2 Validation of Designers

The information regarding the designers enlisted in the Municipality record was validated from the official response letter from the technical department of the Municipality. Based on the information provided, there were 74 registered designers enlisted in the Municipality and questionnaire were distributed to all the enlisted designers, in which 67 of them responded to the questionnaire.

4.3 Cronbach's Alpha (α) Test for Reliability

The reliability testing of each category of the questionnaire was done using cronbach's alpha for internal consistency using MS Excel and the results are tabulated as below:

$$\text{Cronbach's Alpha } (\alpha) = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2}\right)$$

Category	Cronbach's Alpha	Interpretation
Usability & Accessibility (UA)	0.63	Questionable
System Features & Functionality (SFF)	0.64	Questionable
Information Clarity & Relevance (ICR)	0.70	Acceptable
Support & Responsiveness (SR)	0.73	Acceptable
Efficiency & Time Management (ETM)	0.74	Acceptable
Overall Experience (OE)	0.82	Acceptable

Table 9: Cronbach's Alpha Test Result

The reliability analysis of the Likert scale questionnaire done using Cronbach's Alpha showed varying levels of internal consistency across the six categories. Usability & Accessibility ($\alpha = 0.63$) and System Features & Functionality ($\alpha = 0.64$) showed questionable reliability, suggesting that although the items moderately measure the same concept, some refinement of questions may be needed to improve consistency. Meanwhile, Information Clarity & Relevance ($\alpha = 0.70$), Support & Responsiveness ($\alpha = 0.73$), and Efficiency & Time Management ($\alpha = 0.74$) showed acceptable reliability, showing that the items in these categories are consistent and dependable in measuring the intended aspects of the Electronic Building Permit System. The Overall Experience category got the highest reliability score ($\alpha = 0.82$), falling within the good range which revealed strong internal consistency in measuring the experience of designers. Overall, the scale can be considered reliable enough with stronger consistency in categories such as overall experience, while certain technical aspects like usability and system features may benefit from improvement in future research.

4.4 Mean Score Analysis for Designers' Perceptions Regarding EBPS System

The analysis of designers' responses to the Electronic Building Permit System (EBPS) in Chandragiri Municipality shows an overall positive perception of the system, with different levels of agreement across different dimensions. The categorization of mean scores into levels of agreement gives a clear view of how the system is being experienced by its primary users.

Very High Agreement (Mean: 4.21–5.00):

The usability and accessibility aspects of the EBPS were highly appreciated by designers. The system was found to be easy to navigate, efficient for task completion, and user-friendly in terms of its interface. The high agreement also extended to the system's functional advantages, such as ease of uploading documents, tracking applications, reducing the need for physical office visits, and preferring digital processes over traditional paper-based procedures. Designers acknowledged the positive impact of the system on their professional work, and many suggested that they would encourage others to adopt the EBPS. This shows a strong endorsement of the system's role in simplifying workflows and enhancing professional practice.

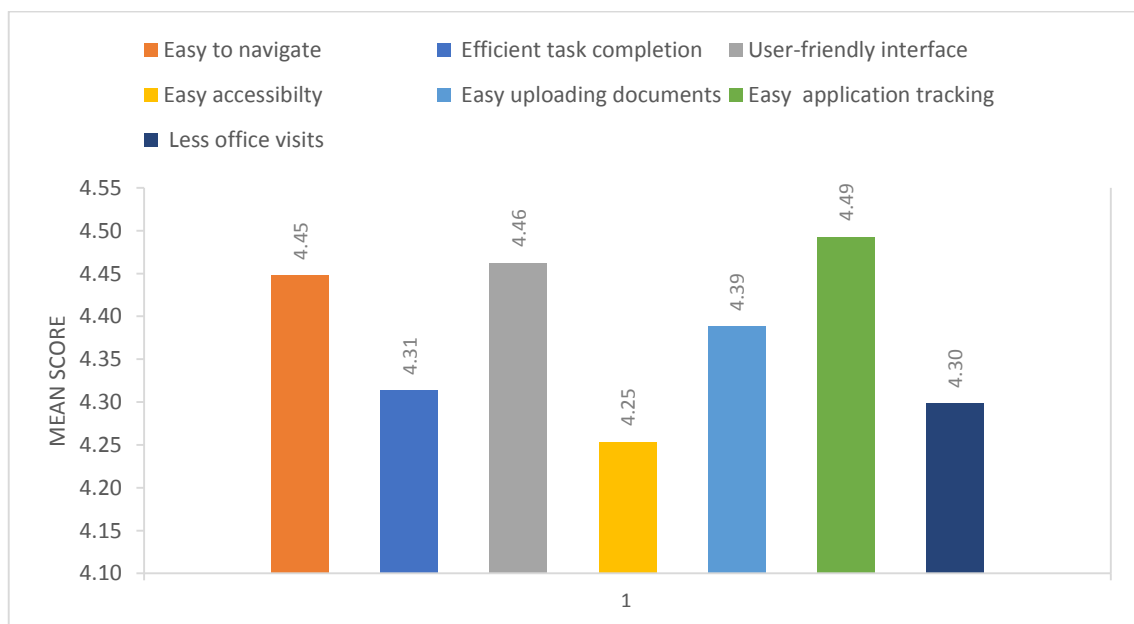


Figure 4: Attributes of EBPS System with Very High Agreement

High Agreement (Mean: 3.41–4.20):

The responses to this range indicate that although the system is highly effective overall, there are still some areas that need to be addressed. Designers generally agreed that the EBPS faces few technical problems and provides valuable support features such as feedback, notifications, and easy to fill digital forms. Furthermore, they confirmed that the system is capable of accommodating municipality-specific requirements, provides clear guidelines, and communicates acceptance or rejection decisions in an understandable manner. Timely issue resolution, availability of technical support, and prompt municipal responses were also identified as strengths. Moreover, designers perceived the EBPS as contributing to faster permit processing, eliminating delays associated with manual systems, improving project management, and enhancing trust in system reliability. This indicates that the EBPS is not only operationally effective but also has enhanced the professional efficiency and confidence of its users.

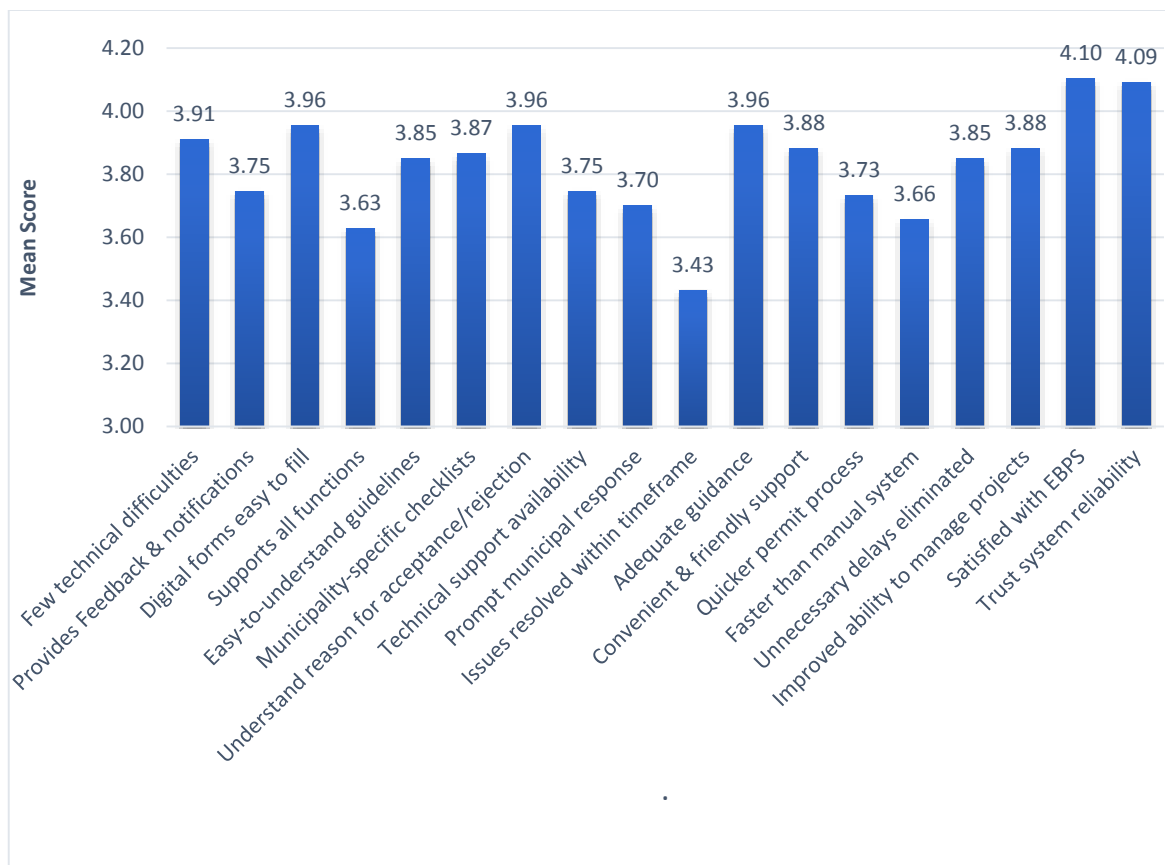


Figure 5: Attributes of EBPS System with High Agreement

Moderate/Neutral Agreement (Mean: 2.61–3.40):

Neutral responses were noted in relation to one key aspect: updates to building regulations. These findings focus on existing gaps in the system’s ability to ensure up-to-date building regulatory information. This suggests that while designers acknowledge the overall effectiveness of EBPS, their experiences show a need for continuous improvements in building regulatory updates.

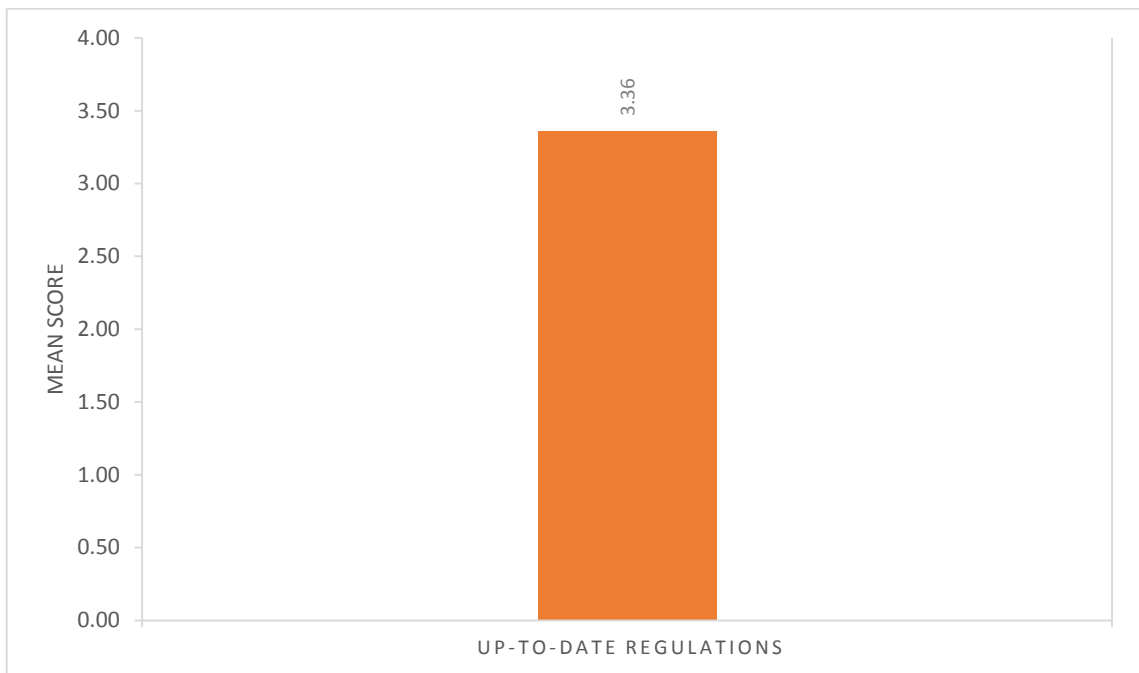


Figure 6: Attributes of EBPS System with Neutral Agreement

The results show that EBPS in Chandragiri Municipality is perceived positively by designers, particularly when it comes to usability, accessibility, and efficiency, which are crucial factors in user satisfaction. High levels of agreement across functional and service-oriented attributes reinforce the system’s contribution to enhancing transparency, lowering bureaucratic delays, and improving overall project management. However, the average responses regarding building regulation updates point toward regions where system upgrades and administrative improvements are required. Strengthening these aspects could further improve user confidence, ensure sustained adoption, and maximize the effect of the EBPS in the municipal building permit process.

4.5 RII Calculation for Categorizing Important Factors for System Enhancement

The analysis of designers' responses to the Electronic Building Permit System (EBPS) in Chandragiri Municipality, based on Relative Importance Index (RII), indicates notable variations in perceived strengths and weaknesses across various attributes of the system. The items are grouped as below depending on their RII values:

Highest-Ranked Attributes:

- The most highly rated attribute was the ability to track the progress of applications through the system (RII = 0.899, Rank 1), followed closely by the user-friendly interface (RII = 0.893, Rank 2) and ease of navigation (RII = 0.890, Rank 3).
- Uploading architectural and structural drawings without difficulty (RII = 0.878, Rank 4) and efficient task completion (RII = 0.863, Rank 5) also got very high agreement.
- Reduced need for frequent municipal visits (RII = 0.860, Rank 6) and Accessibility of the system (RII = 0.851, Rank 7) further highlight the system's effectiveness in improving convenience and efficiency.

Moderately High-Rated Attributes:

- Ease of understanding document acceptance/rejection (RII = 0.791, Rank 8) and the availability of guidance before using the system (RII = 0.791, Rank 9) were also positively perceived.
- Other aspects such as digital form usability (RII = 0.788, Rank 10), minimal technical difficulties (RII = 0.779, Rank 11), and user-friendly support channels (RII = 0.776, Rank 12) were rated well, though slightly lower than the top-ranked attributes.

Lower-Rated Items:

- Some functional and service-related attributes got comparatively lower ratings. For example, the platform's ability to support all required functions (RII = 0.725, Rank 22), timeliness in resolving issues (RII = 0.687, Rank 23), and accuracy of building regulation updates (RII = 0.672, Rank 24) were the least preferred attributes.

- Likewise, perceptions regarding the speed of the process compared to manual systems (RII = 0.731, Rank 21) and municipal officials' responsiveness to queries (RII = 0.740, Rank 20) also got relatively low ratings.

The tabular form of the RII values of different attributes of the questionnaire categories with their rankings are shown below:

Category	Feature	RII Value	Overall Rank (by RII)
System Features & Functionality	Application tracking	0.899	1
Usability & Accessibility	User-friendly interface	0.893	2
Usability & Accessibility	Easy to navigate.	0.890	3
System Features & Functionality	Easy uploading documents	0.878	4
Usability & Accessibility	Efficient task completion	0.863	5
Efficiency & Time Management	Less office visits	0.860	6
Usability & Accessibility	Easy accessibility	0.851	7
Information Clarity & Relevance	Understand reason for acceptance/rejection	0.791	8
Support & Responsiveness	Adequate guidance	0.791	9
System Features & Functionality	Digital forms easy to fill	0.788	10
Usability & Accessibility	Few technical difficulties	0.779	11
Efficiency & Time Management	Improved ability to manage projects	0.776	12
Support & Responsiveness	Convenient & friendly support	0.776	13
Information Clarity & Relevance	Municipality-specific checklists	0.773	14
Information Clarity & Relevance	Easy-to-understand guidelines	0.770	15
Efficiency & Time Management	Unnecessary delays eliminated	0.770	16
Support & Responsiveness	Technical support availability	0.749	17
System Features & Functionality	Feedback & notifications	0.749	18
Efficiency & Time Management	Quicker permit process	0.746	19
Support & Responsiveness	Prompt municipal response	0.740	20
Efficiency & Time Management	Faster than manual system	0.731	21
System Features & Functionality	Supports all functions	0.725	22
Support & Responsiveness	Issues resolved within timeframe	0.687	23
Information Clarity & Relevance	Up-to-date regulations	0.672	24

Table 10: Overall Ranking of the Attributes Based on the RII Values

Similarly, the rankings of the attributes of category Usability & Accessibility based on the RII values are tabulated below:

Category	Feature	RII Value	Rank (by RII)
Usability & Accessibility	User-friendly interface	0.893	1
Usability & Accessibility	easy to navigate.	0.890	2
Usability & Accessibility	Efficient task completion	0.863	3
Usability & Accessibility	Easy accessibility	0.851	4
Usability & Accessibility	Few technical difficulties	0.779	5

Table 11: Ranking of the Attributes of Usability & Accessibility Category

Likewise, the rankings of the attributes of category System Features and Functionality based on the RII values are tabulated below:

Category	Feature	RII Value	Rank (by RII)
System Features & Functionality	Application tracking	0.899	1
System Features & Functionality	Easy uploading documents	0.878	2
System Features & Functionality	Digital forms easy to fill	0.788	3
System Features & Functionality	Feedback & notifications	0.749	4
System Features & Functionality	Supports all functions	0.725	5

Table 12: Ranking of the Attributes of System Features and Functionality Category

Similarly, the rankings of the attributes of category Information Clarity and Relevance based on the RII values are tabulated below:

Category	Feature	RII Value	Rank (by RII)
Information Clarity & Relevance	Understand reason for acceptance/rejection	0.791	1
Information Clarity & Relevance	Municipality-specific checklists	0.773	2
Information Clarity & Relevance	Easy-to-understand guidelines	0.770	3
Information Clarity & Relevance	Up-to-date regulations	0.672	4

Table 13: Ranking of the Attributes of Information Clarity and Relevance Category

Likewise, the rankings of the attributes of category Support and Responsiveness based on the RII values are tabulated below:

Category	Feature	RII Value	Rank (by RII)
Support & Responsiveness	Adequate guidance	0.791	1
Support & Responsiveness	Convenient & friendly support	0.776	2
Support & Responsiveness	Technical support availability	0.749	3
Support & Responsiveness	Prompt municipal response	0.740	4
Support & Responsiveness	Issues resolved within timeframe	0.687	5

Table 14: Ranking of the Attributes of Support and Responsiveness Category

Similarly, the rankings of the attributes of category Efficiency and Time Management based on the RII values are tabulated below:

Category	Feature	RII Value	Rank (by RII)
Efficiency & Time Management	Less office visits	0.860	1
Efficiency & Time Management	Improved ability to manage projects	0.776	2
Efficiency & Time Management	Unnecessary delays eliminated	0.770	3
Efficiency & Time Management	Quicker permit process	0.746	4
Efficiency & Time Management	Faster than manual system	0.731	5

Table 15: Ranking of the Attributes of Efficiency and Time Management Category

The outcome suggests that the EBPS is highly valued for its usability, accessibility, and efficiency in simplifying the building permit process and shows that these aspects are the most that contribute to the improvement of their experience with the system. Designers particularly appreciate features that reduce physical visits, enable real-time tracking, and provide a user-friendly interface. Despite this, the lower scores for regulatory updates, comprehensive functionality, issue resolution, and municipal responsiveness point to critical areas for further improvement.

4.6 Correlation Analysis

The correlation analysis was done to examine the relationships between the six categories of the Likert scale questionnaire: Usability & Accessibility (UA), System Features & Functionality (SFF), Information Clarity & Relevance (ICR), Support & Responsiveness (SR), Efficiency & Time Management (ETM), and Overall Experience (OE). The Correlation Matrix obtained from the analysis is as follows:

	(UA) MEAN	(SFF) MEAN	(ICR) MEAN	(SR) MEAN	(ETM) MEAN	(OE) MEAN
(UA) MEAN	1	0.47	0.29	0.19	0.30	0.41
(SFF) MEAN	0.47	1.00	0.75	0.58	0.42	0.60
(ICR) MEAN	0.29	0.75	1.00	0.75	0.49	0.33
(SR) MEAN	0.19	0.58	0.75	1.00	0.26	0.29
(ETM) MEAN	0.30	0.42	0.49	0.26	1.00	0.34
(OE) MEAN	0.41	0.60	0.33	0.29	0.34	1.00

Table 16: Correlation Matrix

The interpretation of the above correlation matrix in detail is as follows:

Usability & Accessibility (UA):

UA shows a moderate positive correlation with SFF ($r = 0.47$) and ETM ($r = 0.30$), showing that a more user-friendly and accessible system contributes to better system functionality and improved time management. Its correlation with OE ($r = 0.41$) suggests that usability directly enhances designers' overall experience. However, correlations with ICR ($r = 0.29$) and SR ($r = 0.19$) are weaker, indicating that usability is less strongly linked to information clarity and support aspects.

System Features & Functionality (SFF):

SFF has a intense positive correlation with ICR ($r = 0.75$) and SR ($r = 0.58$), meaning that effective system features are closely related with clearer information delivery and more responsive support. Its correlation with OE ($r = 0.60$) is also moderately strong, highlighting that better functionality improves overall user satisfaction.

Information Clarity & Relevance (ICR):

ICR shows strong correlations with both SFF ($r = 0.75$) and SR ($r = 0.75$), indicating that clearer and relevant information is closely tied to better functionality and more supportive

responsiveness. However, its relationship with OE ($r = 0.33$) is relatively weak, which shows that while information clarity is important, it does not directly affect designers' overall perception of the system.

Support & Responsiveness (SR):

SR is intensely correlated with ICR ($r = 0.75$) and moderately correlated with SFF ($r = 0.58$), reflecting that responsive support is strongly associated with information clarity and system features. However, its correlation with OE ($r = 0.29$) is weak, indicating that while support is valued, it contributes less directly to overall satisfaction in comparison to other factors.

Efficiency & Time Management (ETM):

ETM is moderately correlated with ICR ($r = 0.49$) and SFF ($r = 0.42$), suggesting that efficiency improves when information is clear and the system's functions are effective. However, its relationship with OE ($r = 0.34$) is comparatively weak, meaning that while efficiency matters, it alone does not strongly contribute to overall satisfaction.

Overall Experience (OE):

OE correlates most strongly with SFF ($r = 0.60$) and moderately with UA ($r = 0.41$), indicating that system features and ease of use are the strongest contributors to designers' overall experience. Its weaker correlations with ICR ($r = 0.33$), SR ($r = 0.29$), and ETM ($r = 0.34$) suggest that while these aspects are supportive, they play a minor role in shaping the overall perception of EBPS.

4.7 Suggestions from Focus Group Discussion

To ensure the enhancement of designers' experience and long-term efficiency and sustainability of the Electronic Building Permit System (EBPS) in Chandragiri Municipality, a focused group discussion was held with registered designers and the municipal technical team. A total of eleven members were present at the meeting that was held inside the premises of Chandragiri Municipality Office. Based on their feedback, several suggestions and recommendations were made to enhance and further strengthen system performance and hence enhance the designers' experience with the system. The outcome of the discussion has been briefly discussed in the points below:

1. In the discussion with the designers and the municipal technical team, designers Mr. Rijan Maharjan and Mr. Manoj Shrestha said that it is necessary to establish a formal mechanism through which the municipal administration and the EBPS technical team collaborate to continuously update the system. Any change in building bylaws, technical standards, checklists, or approval procedures should be automatically integrated into the system. The municipality should provide periodic updates, preferably quarterly, to keep the system consistent and reflect the latest regulations.
2. Likewise, designers Mr. Sanam Thapa and Mr. Bishal Dangol suggested that a specialized EBPS support desk should be established within the municipality, staffed with personnel trained in both technical and administrative procedures. This desk would provide immediate assistance to users, address system-related problems in real time, and guide designers and applicants throughout the permit process, thereby minimizing delays and improving overall user satisfaction.
3. As per the views of designers present in the meeting, to improve municipal responsiveness, key performance indicators should be introduced, such as average issue-resolution time, response rate to queries, and successful application processing time. Periodic monitoring and giving information to the public of these performance indicators will promote transparency, build public confidence, and encourage a practice of accountability and service excellence.
4. According to designer Mr. Mukesh Lal Karna, a certain municipal budget should be allocated annually for continuous capacity-building of the system users. This includes regular digital literacy programs, refresher courses on system use, and orientation sessions for new users. Providing structured and ongoing training will make sure both designers and municipal officials remain competent in navigating system features and adapting to technological improvements.
5. In opinion of the municipal officials Mr. Hemanta Maharjan and Mrs. Cherina Awale, reviews from system users should be systematically collected through periodic surveys, designer consultations, and interactive programs. The municipality should use this feedback to guide system improvement and service delivery enhancement. Encouraging participatory decision-making will raise a sense of ownership among users and contribute to more user-friendly system upgrades.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

Conclusion:

The findings show that the Electronic Building Permit System (EBPS) in Chandragiri Municipality has been somewhat successful in enhancing designers' experiences, particularly by improving usability, accessibility, and efficiency in the permit process. Streamlining workflows and strengthening professional practice has been significantly boosted by features such as real-time application tracking, user-friendly navigation, online submissions, and reduced office visits. These outcomes highlight EBPS as an effective tool for modernizing municipal services and lowering the inefficiencies of paper-based processes.

However, the analysis also indicates gaps in building regulatory updates, timeliness of issue resolution, and responsiveness of municipal officials. These aspects, though not as highly valued as core usability functions, are crucial for building trust, ensuring compliance, and sustaining long-term adoption of the system.

Recommendations:

To enhance the designers' experience with the system and optimize the system functioning in Chandragiri Municipality and maximize its long-term effectiveness, the following policy-oriented measures were recommended:

1. Create a clear process for the municipal planning department and the EBPS technical team to cooperate so that any modification in building codes, regulations, or checklists is added to the system automatically. The municipality can require these updates to happen on a quarterly basis.
2. Set up a specialized EBPS help desk within the municipality with employees trained in both technical and administrative aspects of EBPS. This desk should be responsible for real-time issue resolution, and user guidance for timely responses.

3. Use clear performance targets, like how issues are resolved immediately or questions answered, to track how responsive the municipality is. Regularly checking and sharing these results with the public will enhance transparency and trust.
4. Allocate annual municipal budget for continuous training sessions targeting both system users (designers) and municipal employees. This includes digital literacy programs, refresher training, and orientation programs for new users.
5. Regularly ask designers for their views through surveys and group discussions. Use their suggestions to make updates to the system and improve municipal services.

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APPENDIX A: QUESTIONNAIRE FOR DESIGNERS

Evaluation of Designers' experience with the use of Electronic building permit system in Chandragiri Municipality, Kathmandu.

Dear Respondent, I am Riwaz Shrestha and am currently pursuing my master's degree in Construction Management at Institute of Engineering, Pulchowk Campus. I have prepared this questionnaire for an academic research study titled "Evaluation of Designers' experience with the use of Electronic building permit system in Chandragiri Municipality, Kathmandu". I have prepared this questionnaire as a part of research for finding out the perceptions of the designers regarding the Electronic building permit system. All your personal information will be kept confidential and the information will be used for academic research only. Your participation in this research is voluntary. If you have any queries regarding the research, please contact me at riwazstha266@gmail.com. If you have any questions about your rights as a volunteer in this research, contact the Department of Construction Management, Pulchowk Campus. Your Response will be highly valued.

Part-I: Demographic Questionnaire

Please answer the following questions.

1. Your Gender *

- Male
 Female

2. What is your age group? *

- 18-24
 25-34
 35-44
 45-54
 55+

3. What is your highest level of education? *

- Diploma
 Bachelor's degree
 Master's degree

4. How long have you been using this E-BPS System? *

- Less than 6 months
- 6 months to less than 1 year
- 1 year to less than 2 years
- 2 years or more

5. On average, how frequently do you use E-BPS System *

- Several times in a day
- Once in a day
- Once in a Week
- Once in a month

Part II: Users Experience Questionnaire

Here are Likert scale questions aiming to capture perceptions, usability, and effectiveness of the E-BPS System. Each question can be rated on a 5-point Likert scale: (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

A. Usability & Accessibility

1. The electronic building permit system is easy to navigate. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. I can complete tasks efficiently using the system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. The system interface is user-friendly for designers. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. I experience few technical difficulties while using the system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

5. The system is accessible whenever I need to use it. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

B. System Features & Functionality

1. I can upload architectural and structural drawings without difficulty. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. I am able to track the progress of my application through the system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. The system generates useful feedback or notifications about my submission. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. The digital forms are easy to fill out and submit. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

5. The platform supports all the functions required for the permit process. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

C. Information Clarity & Relevance

1. The system provides accurate and up-to-date building regulations. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. Guidelines provided in the system are easy to understand. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. The checklists and requirements are specific to Chandragiri Municipality. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. The system helps me understand why documents are accepted or rejected. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

D. Support & Responsiveness

1. Technical support is available when I face issues with the system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. Municipal officials respond promptly to queries or concerns. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. Issues or complaints are resolved within a reasonable time frame. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. I received sufficient guidance or orientation before using the system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

5. Support channels (phone, email, in-person) are convenient and user-friendly. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

E. Efficiency & Time Management

1. The system has reduced the time required to obtain a building permit. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. I no longer need to visit the municipal office as frequently as before. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. The process through the system is faster than the previous manual system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. Online submission of documents has eliminated unnecessary delays in the process. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

5. The electronic system has improved my ability to manage multiple projects simultaneously. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

F. Overall Experience.

1. I am satisfied with my experience using the electronic permit system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

2. I trust the system to handle my submissions reliably. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

3. I prefer using the digital system over the traditional paper-based process. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

4. I would encourage other designers to use this system. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

5. The system has positively impacted my professional work in Chandragiri. *

- 1. Strongly disagree
- 2. Disagree
- 3. Neutral
- 4. Agree
- 5. Strongly agree

APPENDIX B: RESPONSES FROM DESIGNERS

Respondent ID	Usability & Accessibility				
	Q1	Q2	Q3	Q4	Q5
1	4	4	4	4	5
2	5	5	4	4	5
3	4	4	4	4	5
4	5	4	5	4	4
5	5	5	4	5	5
6	5	5	4	5	4
7	4	5	4	3	5
8	5	5	5	4	2
9	4	4	4	2	4
10	5	5	5	4	5
11	5	5	5	4	5
12	4	4	4	3	3
13	4	4	4	4	4
14	4	4	5	4	4
15	5	4	5	4	5
16	4	4	4	5	3
17	4	4	3	3	4
18	4	4	4	5	4
19	4	5	4	4	4
20	5	4	4	4	4
21	4	4	4	4	4
22	4	4	4	3	4
23	5	5	5	4	5
24	4	4	4	4	4
25	5	4	5	3	5
26	5	5	5	4	5
27	4	4	5	3	5
28	4	5	4	4	4
29	5	5	5	5	4
30	5	4	5	3	5
31	5	4	5	3	5
32	3	3	4	4	3
33	3	3	4	3	3
34	4	4	3	3	3

35	4	4	4	4	4
36	4	4	4	4	4
37	4	5	4	4	3
38	4	4	4	4	4
39	4	4	5	3	5
40	4	3	5	3	5
41	4	4	5	3	5
42	5	5	4	4	4
43	4	4	4	3	4
44	4	4	4	5	3
45	4	4	4	4	3
46	4	4	4	4	4
47	5	4	4	4	4
48	4	4	4	4	4
49	4	4	5	3	5
50	4	4	5	3	5
51	5	4	5	3	4
52	5	4	5	4	4
53	5	4	5	5	5
54	4	5	5	4	5
55	4	5	5	4	4
56	5	4	5	5	4
57	5	5	5	4	5
58	5	4	4	5	5
59	5	5	5	5	4
60	5	5	5	4	5
61	5	5	5	4	4
62	5	4	5	5	4
63	5	5	5	4	5
64	5	4	4	5	5
65	5	5	5	5	4
66	5	5	5	4	5
67	5	5	5	4	4

	System Features & Functionality				
Respondent ID	Q1	Q2	Q3	Q4	Q5
1	4	4	3	4	4
2	5	5	4	4	5
3	5	5	3	4	4
4	4	4	5	4	4
5	4	5	5	4	3
6	4	5	5	5	3
7	5	5	4	4	4
8	5	4	3	3	3
9	4	4	4	4	4
10	4	5	5	5	5
11	5	5	5	5	5
12	4	4	3	2	3
13	4	4	4	4	2
14	4	4	4	4	4
15	5	5	5	5	5
16	4	5	4	4	4
17	5	5	4	4	2
18	5	5	4	3	4
19	5	5	3	5	4
20	4	5	4	4	4
21	4	4	3	4	4
22	4	4	3	4	3
23	5	4	3	4	3
24	4	4	4	3	2
25	4	4	3	4	4
26	4	4	4	4	3
27	4	5	4	4	3
28	5	4	4	4	3
29	4	5	2	5	4
30	4	5	3	4	3
31	5	4	3	4	4
32	4	4	4	4	4
33	4	4	4	4	4
34	4	4	2	3	3

35	5	4	4	4	4
36	4	4	4	4	4
37	4	3	4	4	4
38	4	4	3	4	4
39	5	5	3	4	3
40	4	5	4	4	3
41	4	5	3	4	3
42	5	5	4	4	3
43	4	4	4	4	4
44	5	5	4	1	2
45	4	4	3	4	4
46	4	4	4	4	3
47	5	4	5	4	4
48	5	4	3	4	4
49	4	5	3	4	3
50	4	4	3	4	3
51	4	5	3	4	3
52	4	5	3	3	3
53	4	4	3	3	3
54	4	4	3	4	4
55	4	4	4	4	3
56	5	4	5	4	4
57	5	5	4	4	4
58	5	5	5	5	5
59	5	5	4	5	5
60	4	5	4	4	4
61	4	5	3	3	3
62	5	4	5	4	4
63	5	5	4	4	4
64	5	5	5	5	5
65	5	5	4	5	5
66	4	5	4	4	3
67	4	5	3	3	3

	Information Clarity & Relevance			
Respondent ID	Q1	Q2	Q3	Q4
1	2	4	4	4
2	4	4	4	5
3	3	4	4	5
4	3	4	4	4
5	4	4	5	5
6	4	4	4	5
7	4	4	4	4
8	2	4	3	2
9	4	4	4	4
10	5	4	5	5
11	5	5	5	5
12	2	3	2	4
13	1	4	2	4
14	2	4	3	4
15	5	5	4	4
16	4	4	4	4
17	1	4	4	3
18	3	4	4	5
19	3	4	3	4
20	4	3	4	4
21	4	4	4	3
22	2	3	4	3
23	2	3	4	4
24	2	2	3	2
25	2	4	4	4
26	2	4	4	4
27	3	4	4	4
28	3	4	3	3
29	5	2	2	1
30	3	4	3	4
31	3	4	3	4
32	3	4	4	4
33	3	4	4	4
34	2	3	4	4

35	4	3	4	5
36	4	4	4	4
37	4	4	4	4
38	4	4	4	4
39	3	4	3	4
40	3	4	4	4
41	3	4	4	4
42	4	4	4	4
43	4	4	4	4
44	3	1	4	4
45	3	4	3	3
46	4	4	4	4
47	4	4	4	4
48	4	4	4	4
49	3	4	4	4
50	3	3	4	4
51	2	4	4	4
52	3	4	4	4
53	4	3	3	4
54	3	4	3	3
55	4	4	4	4
56	4	4	4	4
57	4	4	4	4
58	5	5	5	5
59	4	4	5	4
60	3	4	4	4
61	4	4	4	4
62	4	4	5	4
63	4	4	4	4
64	5	5	5	5
65	4	4	5	4
66	3	4	4	4
67	4	5	4	4

	Support & Responsiveness				
Respondent ID	Q1	Q2	Q3	Q4	Q5
1	3	4	3	4	4
2	5	5	4	4	4
3	5	4	4	3	4
4	3	4	3	4	4
5	4	4	4	4	4
6	5	5	3	5	4
7	3	4	3	4	4
8	2	1	1	5	1
9	4	4	4	4	4
10	5	5	5	5	5
11	5	5	5	5	5
12	3	4	3	4	3
13	4	4	2	5	4
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16	4	4	4	4	4
17	4	4	4	4	4
18	3	4	4	5	4
19	2	1	4	4	4
20	4	4	3	5	4
21	3	3	3	3	4
22	4	3	4	4	4
23	4	3	4	4	4
24	2	2	1	4	2
25	4	3	3	4	4
26	4	4	3	4	4
27	4	4	3	4	4
28	3	3	3	4	4
29	5	1	1	1	5
30	4	3	3	4	4
31	4	4	3	4	4
32	4	4	4	4	4
33	4	4	4	4	4
34	2	4	3	2	4

35	3	5	5	5	4
36	3	5	5	4	4
37	3	4	4	3	3
38	4	3	4	4	4
39	4	3	3	4	4
40	4	3	3	4	4
41	4	4	4	4	4
42	3	4	4	4	4
43	4	4	4	4	4
44	2	4	4	4	2
45	3	3	3	3	3
46	4	4	4	4	4
47	4	4	3	4	4
48	4	4	3	3	4
49	4	4	3	4	4
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52	4	4	3	4	4
53	2	4	4	4	2
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57	4	4	3	3	4
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61	4	4	3	4	4
62	4	4	3	4	4
63	4	4	3	3	4
64	5	5	5	5	5
65	4	3	4	4	4
66	4	3	3	4	4
67	4	4	3	4	4

	Efficiency & Time Management				
Respondent ID	Q1	Q2	Q3	Q4	Q5
1	4	4	4	4	4
2	4	5	4	4	3
3	4	5	5	4	4
4	3	5	4	4	4
5	3	4	4	4	3
6	3	4	4	4	3
7	5	4	4	4	3
8	4	2	4	2	4
9	4	4	4	4	4
10	4	4	4	4	4
11	5	5	5	5	5
12	4	4	3	4	4
13	1	3	1	2	5
14	1	3	2	2	5
15	5	5	5	5	4
16	4	4	5	4	4
17	2	1	3	4	3
18	3	5	3	4	4
19	5	5	5	5	4
20	5	5	4	3	4
21	4	3	3	4	4
22	4	4	3	4	3
23	3	4	4	4	3
24	1	4	1	1	4
25	4	5	4	4	4
26	4	5	4	4	3
27	4	5	4	4	3
28	4	3	4	4	4
29	5	5	5	4	5
30	4	5	3	3	3
31	4	5	3	4	4
32	3	4	3	4	4
33	3	4	4	4	4
34	4	5	4	4	4

35	4	4	4	4	4
36	4	4	4	4	4
37	3	4	4	4	4
38	4	4	4	4	4
39	4	5	4	4	4
40	4	5	3	4	4
41	3	5	3	4	3
42	3	5	3	4	4
43	4	4	4	4	4
44	4	4	4	4	4
45	3	3	3	2	4
46	4	4	4	4	4
47	4	4	4	4	4
48	4	4	2	4	4
49	4	5	3	4	4
50	4	5	4	4	4
51	3	5	3	4	3
52	4	5	4	4	4
53	4	4	4	4	4
54	3	3	3	2	4
55	4	4	4	4	4
56	4	4	4	4	4
57	4	4	2	4	4
58	5	5	5	5	5
59	4	5	4	4	4
60	3	5	3	4	3
61	4	5	4	4	4
62	4	4	4	4	4
63	4	4	2	4	4
64	5	5	5	5	5
65	4	5	4	4	4
66	3	5	3	4	3
67	4	5	4	4	4

Respondent ID	Overall Experience				
	Q1	Q2	Q3	Q4	Q5
1	4	4	5	4	3
2	4	4	5	5	5
3	5	4	5	5	4
4	4	5	5	5	5
5	5	4	4	5	4
6	4	5	5	5	5
7	4	4	4	4	4
8	3	4	4	4	4
9	4	4	4	4	4
10	5	5	5	5	5
11	4	5	5	5	5
12	4	4	4	4	3
13	5	4	5	5	5
14	5	4	4	4	4
15	5	5	5	5	5
16	4	4	5	5	5
17	4	4	4	5	5
18	4	4	5	5	5
19	5	5	5	5	5
20	4	4	5	5	4
21	4	4	4	4	4
22	4	4	4	4	4
23	4	4	4	4	4
24	3	3	4	4	4
25	4	4	4	4	4
26	4	4	5	4	4
27	4	4	5	5	4
28	4	4	4	4	4
29	5	5	5	5	5
30	3	3	4	4	3
31	4	4	5	4	4
32	4	4	4	4	4
33	4	4	4	4	4
34	4	4	4	4	4

35	4	4	4	4	4
36	4	4	4	4	4
37	4	3	5	5	4
38	4	4	4	4	5
39	4	4	5	4	4
40	4	4	5	4	4
41	4	4	4	4	3
42	4	4	5	5	4
43	4	4	4	5	4
44	4	4	4	4	4
45	4	4	5	5	5
46	4	4	4	4	4
47	4	4	4	4	4
48	4	4	4	4	4
49	4	4	5	4	3
50	4	4	5	5	5
51	4	4	5	4	4
52	4	4	5	4	4
53	4	4	4	4	4
54	4	4	5	5	5
55	4	4	4	4	4
56	4	4	4	4	4
57	4	4	4	4	4
58	5	5	5	5	5
59	4	4	5	5	5
60	4	4	5	4	4
61	4	4	5	4	4
62	4	4	4	4	4
63	4	4	4	4	4
64	5	5	5	5	5
65	4	4	5	5	5
66	4	4	5	4	4
67	4	4	5	4	4

ANNEX I: LETTER FOR PERMISSION OF RESEARCH STUDY



Chandragiri Municipality Office of the Municipal Executive Balambu, Kathmandu



Dispatch No.: 081/082
Ref. No.: 2328

Bagmati Province, Nepal



Date: 2082-03-04

The Department of Civil Engineering
Pulchowk Campus
Institute of Engineering
Pulchowk, Lalitpur.

Subject: Permission for Research Study

Dear Sir/Madam,

This is to inform you that Mr. Riwarz Shrestha, a student of your esteemed institution and currently employed at Chandragiri Municipality, has sought permission to conduct a research study titled "Evaluation of Designers' Experience with the Use of Electronic Building Permit System in Chandragiri Municipality."

We are pleased to grant permission for the aforementioned research, recognizing its relevance and potential to contribute to the improvement of our electronic building permit system. The study may involve the collection of data through surveys, interviews, or document review with relevant stakeholders, including designers and municipal staff, under ethical and professional conduct.

We hope this research will provide valuable insights to enhance user experience and system efficiency. We wish the student success in this academic endeavor and look forward to reviewing the outcomes.





Please feel free to contact our office for any further co-ordination or support required.

Sincerely,

.....
Surendra Thapamagar
Chief Administrative Officer

Cc: Mr. Riwarz Shrestha, Chandragiri Municipality.

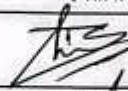
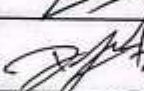

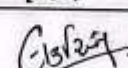
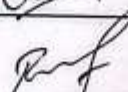
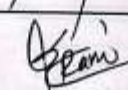


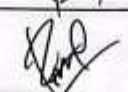
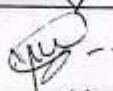
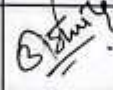
ANNEX II: LETTER FOR VALIDATION OF DESIGNERS

	Chandragiri Municipality Office of the Municipal Executive Baltara, Kathmandu	
Dispatch No.: 082/083 Ref. No.: 290		Bagmati Province, Nepal
Date: 2082/06/02		
 Mr. Riwaz Shrestha Chandragiri-05, Kathmandu.		
Subject: Response to your inquiry regarding the number of registered designers in Chandragiri Municipality.		
Dear Sir,		
Thank you for your letter in which you requested information regarding the number of registered designers in Chandragiri Municipality. We appreciate your interest in this matter and are happy to assist you. As of the most recent records available, there are a total of 74 registered designers in our municipality.		
If you have any further questions or need additional assistance, please do not hesitate to contact us.		
 Er. Lav Kumar Gupta Technical Section Chief		
<hr/> Phone: 01-4315766, Toll Free: 18105000499, Email : chandragirimun@gmail.com, Website: www.chandragirimun.gov.np		

ANNEX III: ATTENDANCE SHEET OF FOCUS GROUP DISCUSSION

चन्द्रागिरि नगरपालिका
नगरकार्यपालिकाको कार्यालय
बलम्बु, काठमाडौं

मिति २०८२-६-२ गते बसेको "Evaluation of Designer's Experience with the use of EBPS in Chandragiri Municipality" सम्बन्धी विस्तृत प्रत्यक्ष छलफलको टाभिले कापी।

सि.नं.	पद	नामावली	हस्ताक्षर
१	इन्जिनियर	मिष्म सण्डारी	
२	इन्जिनियर	पारस थापा	
३	इन्जिनियर	हेमन्त महर्जन	
४	इन्जिनियर	चेरिना खत्री	
५	इन्जिनियर	शिवज प्रष्ट	
६	इन्जिनियर	श्रीराम लामिछाने	
७	डिजाइनर	ई. प्रमथ थापा	
८	डिजाइनर	ई. विशाल डंगोल	
९	डिजाइनर	ई. रविन्द्र महर्जन	
१०	डिजाइनर	ई. सुरेश लाल कर्ण	
११	डिजाइनर	ई. मनोज प्रष्ट	
१२			
१३			
१४			
१५			

ANNEX IV: LETTER FOR OWNERSHIP OF RESEARCH STUDY



Chandragiri Municipality
Office of the Municipal Executive
Balambu, Kathmandu



Dispatch No.- 082/082
Ref. No.: 297

Bagmati Province, Nepal

Date: 2082/06/07

Mr. Riwaz Shrestha
Chandragiri-05, Kathmandu.

Subject: Appreciation and acknowledgement of your thesis on "Evaluation of designers' experience with the use of Electronic Building Permit System in Chandragiri Municipality, Kathmandu"

Dear Mr. Shrestha,

On behalf of the Chandragiri Municipality, I would like to extend our sincere gratitude and appreciation for the valuable contribution you have made through your research titled "Evaluation of designers' Experience with the use of Electronic Building Permit System in Chandragiri Municipality, Kathmandu." The findings and recommendations outlined in your thesis have been carefully reviewed by our team and we are pleased to acknowledge the insightful analysis and the comprehensive approach you have taken in evaluating the experiences of designers using the Electronic Building Permit System. The suggestions you have provided will undoubtedly play a critical role in helping us refine the Electronic Building Permit System and further enhance its efficiency, transparency, and accessibility.

In light of the above, I am pleased to inform you that Chandragiri Municipality has decided to take ownership of the research and its recommendations. We are committed to implementing the strategies you have proposed in order to optimize the building permit process, address the challenges highlighted in your research, and create a more effective and user-friendly system for the benefit of all involved parties.

Once again, I would like to express our sincere appreciation for the effort and expertise you have demonstrated in conducting this research. Your contribution is instrumental in helping us build a more efficient and transparent system, and we look forward to seeing its positive impact on the community.

.....
Surendra Thapamagar

Chief Administrative Officer

ANNEX V: ORIGINALITY REPORT



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ANNEX VI: SUBMISSION ACKNOWLEDGEMENT LETTER FOR 17TH IOE GRADUATE CONFERENCE

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[IOEGC17] Submission Acknowledgement External Inbox x 🖨️ 📄

 **IOEGC-17 Working Committee** <ioegc17@gmail.com> Sat, Nov 29, 10:00 AM (7 days ago) ☆ ↶ ⋮
to me ▾

Riwaz Shrestha:

Thank you for submitting the manuscript, "Evaluation of Designers' Experience with the Use of Electronic Building Permit System (EBPS): A Case Study of Chandragiri Municipality, Kathmandu." to 17th IOE Graduate Conference. With the online conference paper management system that we are using, you will be able to track its progress through the editorial process by logging in to the conference portal:

Submission URL: <https://conference.ioe.edu.np/gc/index.php/17/authorDashboard/submission/663>
Username: riwaz

If you have any questions, please contact me. Thank you for considering this conference as a venue for your work.

IOEGC-17 Working Committee

With Warm Regards,
IOEGC-17 Editorial Team

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