Perceptions of stakeholders about technical capacity and performance of local builders in residential building construction sites at Gaindakot Municipality, Nepal.

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ABSTRACT

This research is focused to study the technical capacity and performance of local builders in residential buildings construction sites at Gaindakot Municipality and evaluation of local builders from stakeholders. Questionnaire survey, Checklists, field survey, inspection, and evaluation of residential buildings constructed by local builders was the primary sources of data. Similarly, previous research, reports, documents, relevant websites and municipal data were secondary sources of data to draw conclusions regarding research objectives. From Questionnaire survey and field evaluation, it was found that the technical capacity and performance of local builders in constructing residential buildings was found to be very weak. From the perceptions of stakeholders, it was found that technical capacity positively affects performance of local builders in residential buildings construction. Technology and availability of equipment to local builders are of major concern for the respondents. Similarly, local builders were found lacking in technical knowledge and skilled human resources. It was also investigated that local builders are lacking in proper knowledge and awareness related to building bylaws. Young local builders in Gaindakot Municipality are actively involved the in residential building construction sector but they are lacking in own owned machinery, tools and equipment needed for building construction. The relationship between technical capacity and performance of local builders was established through regression analysis. A strong correlation coefficient R2= 0.714. was found and the scatter plot shows relationship between the performance and technical capacity was Y(Performance) = 0.901X (Technical Capacity) + 0.0401. Local Builders technical capability is an important criterion for evaluating potential performance of construction activity. Local Builder's technical capability has significant impact on time, cost and quality performance.

Keyword : - *Technical capacity, Performance, Local Builders, Stakeholders*

1. Background

The technical capacity of local builders is the ability of them to employ relevant skills and expertise in terms of technical know-how and equipment capacity for the residential building construction with the objective of ensuring project delivery to the desired quality specification within the budgeted cost and time schedule [Aje & Famakin, 2012]. Local builders' performance is the foremost way to the success of any building construction project as it is builders who convert designs into reality. The better and improved Local builders' performance leads to increased client satisfaction, improved reputation of builders and hence their competitiveness in the market. While Local builders' performance has been a subject of much research, evidence suggests that there remains much need for further improvement [Egan, 1998].

For the last 40 to 50 years there has been a rapid increment of reinforced concrete (RC) framed buildings constructed in the urban and semi-urban areas of Nepal. Most of these buildings have been built on the advice of

mid-level technicians and masons without any professional structural design input. These buildings have been found to be significantly vulnerable to a level of earthquake shaking that has a reasonable chance of happening in Nepal. The 1934 and 1988 earthquakes in Nepal, and the resulting deaths and damage to both housing and schools, again drew attention to the need for changes and improvement in current building construction and design methods [NBC:201,1994]. Similarly; The past earthquake of 25th April 2015 which was a strong earthquake of Magnitude 7.8 hit central and Western Nepal badly with the epicenter near the Barpak village of Gorkha district was the lesson to build the earthquake resilience buildings to reduce the loss of property and lives of individuals. Many public and residential buildings were damaged due to the strong earthquake which also cause the casualties and injuries [Adhikari & Ayala, 2019].

However, the locally available builders are least trained and are not financially strong enough to bear the good quality construction equipment and materials in the residential building construction projects. The trend of migrating labors and builders from India seems to be unhealthy competition among the builders which directly affects in the quality of the construction work. There is the effect of the technical capacity on the performance of local builders in constructing residential buildings [MoLE, Nepal, 2016]

2. Statement of problem

The use of local builders is preferred most in terms of the choice in constructing residential buildings because clients often had better known to local builders. It is easier to assess their qualifications and skills concerning to the envisaged works. The type and quality of their previous work is easy to assess because it is carried out in nearby location and which can easily be inspected. Local builders are also well known in the neighborhood. They are also the subject of local pressure to perform their best, thereby retaining their good reputation and continuing to do business locally. The special effort to boost the Local builders will have a positive effect on local trade and contribute positivity to the local business environment [ILO, 2009].

Output and appearance are the important consideration in any design of residential building. Similarly, the performance aspects are also the important criterion for local builders in residential building construction, which is influenced by technical aspects. whereas, this study was focused on the status of technical competence of Local builders and the assessment of technical capacity which make impact on the project performance. The key elements of this study are represented by the builder's knowledge, skills of employees, equipment holdings and the compliance parameters of the project which helps to access the status and identification of requirement of skilled and unskillful workforce, basic equipment, and tools needed for the proper completion of project on time with satisfied work condition. The study will also fulfill the gap of needed proper study on the need of better technical capacity required for local builders to do residential building construction work at local level.

3. Research design

The research design is the conceptual structure within which research is conducted. Moreover, it comprises the outline for the collection, measurement and analysis of data. Hence, the design carries a blueprint of what the researcher does. Research design has a significant impact on the reliability of the results obtained. It thus acts as a firm foundation for the entire research. It is needed because it facilitates the smooth functioning of the various research operations. It makes the research as efficient as possible by giving maximum information with minimal expenditure of effort, time and money [Kothari & Garg, 2015].

4. Design method of purposed research study

Descriptive and Diagnostic research study was the major research design model for this study. Descriptive research studies are those studies that are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occur or its association with something else. From the point of view of the research design, the descriptive as well as diagnostic studies share common requirements and as such, the study has group together these two types of research studies [Kothari & Garg, 2015].

In most of descriptive/diagnostic studies the researcher takes out sample(s) and then wishes to make statements about the population on the basis of sample analysis. Here the study mentioned that the problem of designing samples tackled in such a fashion that the samples yield accurate information with a minimum amount of research effort. Usually, one or more forms of probability, sampling or what is often described as random sampling, are used. Several methods (viz., observation, questionnaires, interviewing, examination of records, etc.), with their merits and limitations, are available for the purpose. While designing data-collection procedure, adequate safeguards against bias and unreliability was ensured [Kothari & Garg, 2015].

5. Study Area

This assessment research was aimed to evaluate the technical capacity and performance of local builders who are working in residential building construction projects at Gaindakot Municipality of Nepal. It was aimed at examining effect of capacity on performance of local builders in residential building construction. Figure 1 shows the study area.
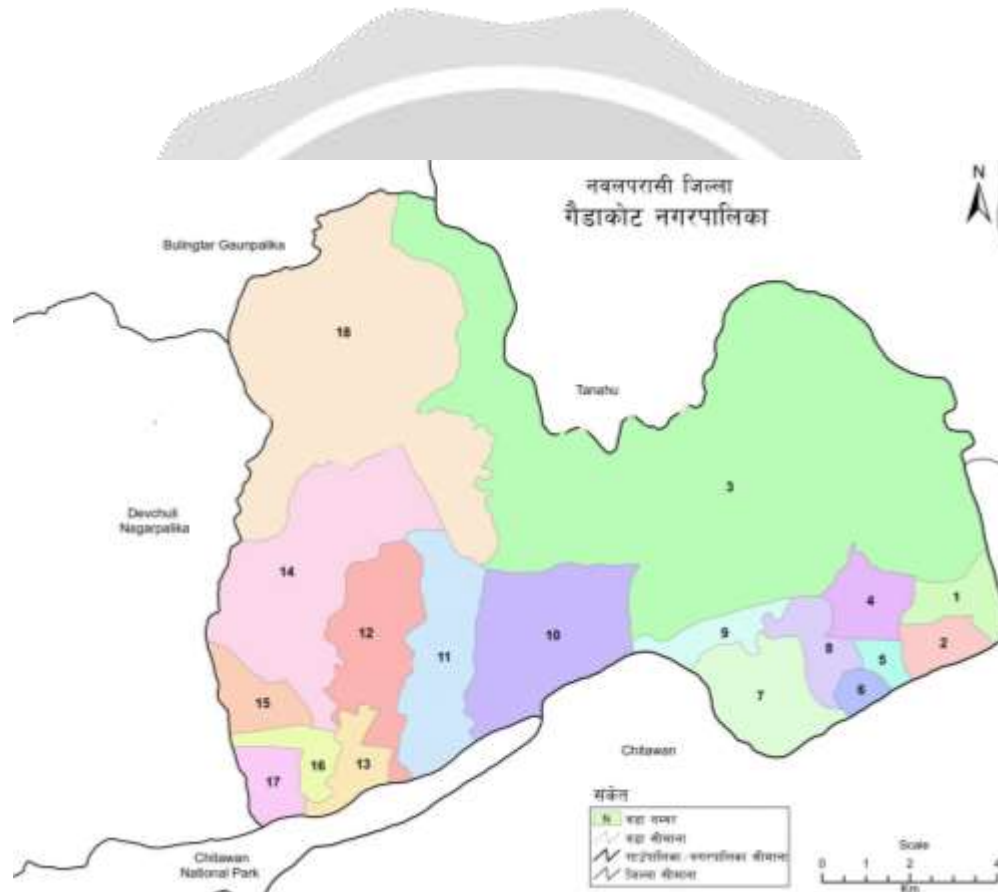

Figure 1: Study Area, Gaindakot municipality, Nawalparasi East [Source: MOFALD]

6. Method of sampling

Here in this study, we have studied only a subpart of whole population, which require less money and less time. Most of the time, non-sampling errors are so much large that the results of sample surveys are much more accurate than those of census survey. Non sampling error arise due to a number of factors such as inefficiency of field workers, non-responsible, bias due to interviewers, etc. these errors are likely to grow when the number of units inspected increases [Kothari & Garg, 2015].

The research is based on the status of technical capacity and the performance of local builders in constructing residential building projects at Gaindakot Municipality. The study has gathered information from the local builders, clients, and consultants.

7. Study population

The research study was limited within the different wards of Gaindakot municipality. The verified official data of registered number of populations was taken for the research study.

The total population size (N) of the study was:

Table 1 : Various parties involved in residential building construction

S. N	Related Components	Actual Registered Numbers
1	Consultants	18
2	Clients (House owners)	362

Source: Gaindakot Municipality office (2022-1-10)

8. Sample size

For the optimized and time frame-based study the responses from the each and every individual is not possible. For the intended output of the study, stratified random sampling method within the study population was done.

Sample size is chosen as per the Slovin's formula

$$n = \frac{N}{(1+Ne^2)} \quad \dots\dots\dots\dots\dots\dots\dots\dots \text{(I)}$$

Were;

n = Number of samples,

N = Total population

and e = Error tolerance (5%)

N = 380; e = 0.05

Then, n = 194.87, Here; Total population is 380 (Clients, Consultants).

The sample size for different strata as shown in Table 2 was calculated from the proportionate sampling distribution formula as per equation (II) as referenced from [Poudel, Kunwar & Gaire, 2015].

$$\text{Stratified random sampling} = \frac{Total\ sample\ size}{Entire\ Population} * \text{Population of subgroup} \dots\dots\dots \text{(II)}$$

From the above equation; Actual sample size are calculated as per the subgroups of population

Table 2 : Actual sample size for the study (Calculated data)

S. N	Description of strata	Population Size	Sample size	Actual sample size
1	Client	362	177.51	178
2	Consultant	18	8.82	9
	Total	380	186.33	187

Source: [Author, 2022]

9. Data Collection

This section mainly covers the data collection methods of the study. It mainly covers the design, targeted population, methods of collecting the data with their reliable and valid analysis tools.

Here in this study, we study only a subpart of the whole population, require less money and less time. Most of the time, non-sampling errors are so much large that the results of sample survey are much more accurate than those of census survey. Non sampling error arise due to a number of factors such as inefficiency of field workers, non-responsible, bias due to interviewers, etc. these errors are likely to grow when the number of units inspected increases [Kothari & Garg, 2015]. Hence, we have used stratified random sampling for our study.

10. Primary Data and Secondary Data

Primary data was collected through interview, field evaluation, checklists, questionnaires method of data collection from the client, consultants and builders. The structured questionnaire method of data collection follows the similar pattern of the interview schedule. It is the most used method of data gathering tool. The study intend that question are factual and designed for securing the right information based on the objectives about the certain conditions or practices of which respondent is presumed to have knowledge. The interview method of data collection involves the oral verbal responses through the personal interviews and, if possible, through telephone interviews. The observation method like evaluation forms and checklists were used for obtaining information which involves gathering of data necessary for measuring the variable under investigation [Singh, 2006].

Secondary data was collected from the various publications, books, magazines and newspaper, public records and statistics, municipal annual reports, municipal publications, historical documents, and other sources of published information. The only verified and trusted data was used in this study [Kothari & Garg, 2015].

11. Framework of Study

The framework shows the variable relation to each other. The variables are dependent and independent variables. The independent variable is assumed to influence the changes in the dependent variables. The independent variable is the technical capacity of local builders. The performance of local builder is the dependent variable.

The following figure shows the relation between the purposed research variables.

Independent Variables   **Dependent Variables**

Local builders' technical capacity	→	Local builders' performance
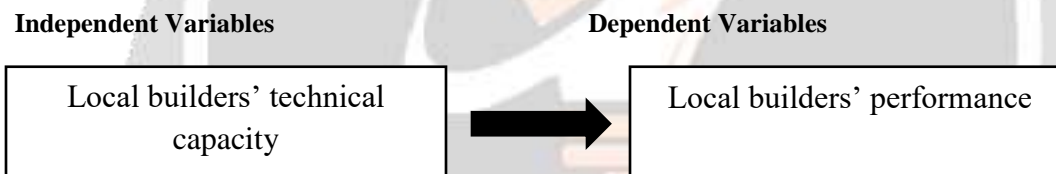
As was similar demonstrated in research [Simiyu, 2015].

12. FINDINGS OF STUDY

12.1 Technical capacity results from the Likert scale-based questionnaire survey

To analyze the technical capacity of local builders, a questionnaire survey was conducted among the 187 respondents i.e., 178 house owners and 9 consultants. The Likert scale-based questionnaire was asked among the respondents. The results from the data are tabulated in Table 3:

Table 3: Frequencies of technical capacity of local builders based on Likert scale

Technical Capacity	Very poor	Poor	Average	Good	Very good	Weightage Mean
Adequacy of technical supervision	20	79	61	11	16	32.3
Experience of Key personnel	15	68	74	25	5	33.2
Availability of equipment and tools	18	79	59	24	7	32.2
The personal ability of the builder	15	61	68	36	7	34.6
Builders Experience	29	62	59	25	12	32.6
Proper planning	20	60	73	23	11	33.7

Permanent workforce	24	61	66	27	9	33.1
Quality assurance	24	56	72	28	7	33.2
Safety management	42	70	44	27	4	29.4
Use of new technology	42	51	58	32	4	31.0

Source: [Field survey results, 2022]

From Table 3, the majority of respondents have rated the performance of local builders on the "Poor" and "Very Poor" scale category.The weightage mean indicates that safety management was the concern of respondents. Similarly, Technology and availibility of equipment to local builders are of concern for the respondents. The highest weightage mean score for the parameter of performance of local builders is the Personal ability of builders whereas safety management is the least mean score. Quality assurance, permanent workforce, and Proper planning parameters have the almost same mean scores.

12.2 Performance results from the likert scale-based questionnaire survey

To analyze the technical capacity of local builders, a questionnaire survey was conducted among the 187 respondents i.e., 178 house owners and 9 consultants. The Likert scale-based questionnaire was asked among the respondents. The results from the data are tabulated below in Table 4:

Table Error! No text of specified style in document.**: Rankings of performance indicators based on Likert scale questionnaires.**

Performance	Very poor	Poor	Average	Good	Very good	RII	Rank
Works within scope of work	13	55	69	37	13	0.581	1
Co-operation of work in site of the contractor	19	52	62	37	17	0.580	2
Availability of skilled workforce	10	51	81	39	6	0.579	3
Public relation of Local builders	14	58	62	42	11	0.576	4
Compliance to bylaws	16	54	70	31	16	0.575	5
Responses to directive immediately	16	51	72	41	7	0.570	6
Technical skills and knowledge of Local builders	26	44	67	32	18	0.570	6
Timely completion of work	15	66	56	33	17	0.569	8
Equipment holding status	16	58	67	34	12	0.566	9
Use of safety tools at site	13	60	73	32	9	0.561	10
Working capital status of Local builders	22	57	55	42	11	0.560	11
Cleanliness and working site condition	15	62	68	30	12	0.559	12
Personal behavior of Local builders	25	52	59	39	12	0.558	13
Regular attendance of employees	27	47	73	24	16	0.552	14
Provision of supervisor personnel in site	25	65	69	17	11	0.519	15

Source: (Field survey results, 2022)

From Table 4, the majority of respondents have rated the performance of local builders on the "Poor" and "Very Poor" category of scale. The highest ranked parameter of performance of local builders was Works within scope of work, whereas provision of supervisor personnel at the site is the least ranked indicator of performance of local builders. Responses to directives immediately, Compliance with bylaws, public relations of Local builders, the working capital status of Local builders, technical skills, and knowledge of Local builders' parameters have the almost same RII scores.

From the above Table 4, the rating of performance is higher than that of technical capacity as the performance rating is higher on the "good" and "very good" scales. It can be interpreted that from the perceptions of stakeholders, technical capacity is lower than that of the performance of local builders on doing residential building construction work. None of the contractors had followed the requirement of supervisor at site, so the performance may have hindered.

Regular attendance of the contractor's employee is one of the important factors for the quality performance, once the skilled employee is absent his/ her work is entrusted to junior one which he/she may not be able to perform up to the desired level. Attendance is ranked 14 by the respondents.

13. REGRESSION ANALYSIS RESULTS

For determining the relationship between technical capacity and performance of local builders' inferential statistics have been used. The research tries to establish the relationship between the dependent and independent variables. This type of method involves the computation of simple linear regression analysis and coefficient determination.

13.1 Coefficient of determination

The coefficient of determination is the indicator that ascertains how well a model can forecast outcomes in the future. The R^2 is the square of the sample correlation coefficient of the outcomes and the predicted values. It defines the degree of variation independent variable about the variation in the independent variables or rather the variation independent variable. In this case, the performance of local builders is explained by only one dependent variable i.e., technical capacity. The coefficient of determination is presented in following Table 5:

Table 5: Summary of model output

Model	R	R^2	Adjusted R^2	Std. The error in the estimate
1	0.845	0.714	0.712	0.0500

Source: (Author, 2022)

Here, R^2 adjusted is the coefficient of determination which illustrates the variation in the dependent variable as a result of changes in the independent variable. The value of the adjusted R^2 for this research is 0.714 which is equivalent to 71.4 percent. The implication of this is that 71.40 percent of changes in the performance of local builders could be accounted to technical capacity. This implies that technical capacity is very critical to local builders.

13.2 Simple linear regression analysis

The research study tries to achieve the effect of technical capacity on performance. Simple linear regression analysis was used to test the influence among the predictor variables. The research study used SPSS V 26.00 to compute the measurements of simple regression analysis. The result of a simple regression analysis is tabulated below in Table 6:

Table 6 : Regression analysis results

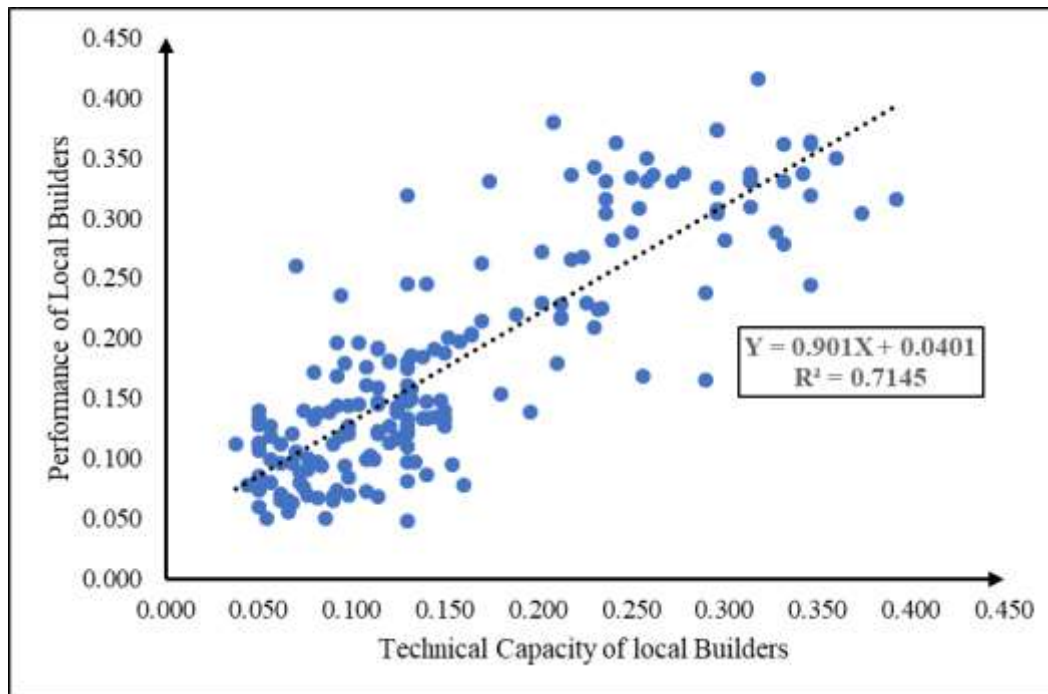| Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std. Error			
Constant	0.0401	0.0075		5.319	0.000
Technical capacity	0.901	0.0419			

Source: (Author, 2022)

From the computed data; the established regression equation was

Y = 0.901X + 0.0401

Where Y = Performance of local builders in residential building construction

X = Technical capacity

Figure 2: Regression line of the outcomes

Source: [Field survey results, 2022]

The regression coefficient for technical capacity ($\beta = 0.901, p = 0.000$), shows that technical capacity is statistically significant on the performance of local builders. An increase in technical capacity by one unit would lead to an increase in performance by a factor of 0.901, at a 0.000 level of significance. This implies that from the perceptions of stakeholders, technical capacity positively affects the performance of local builders in residential building construction.

As was similar findings in research [Simiyu, 2015] in Kenya, the research has found that 71.45 percent of changes in the performance of road projects could be accounted to financial capacity, technical capacity, organizational capacity, and regulatory capacity. However, in this study ,71.4 percent change in performance could be accounted for technical capacity only in the case of residential building projects.

Mishra & Chiluwal, 2018 have identified that Quality control of material, Adequacy of design and specification, Overall management action, Skillful workers, and an insufficient supply of materials were the most significant factor affecting the performance of the Small Hydropower Construction Project of Nepal. Whereas, in this study, the indicators of a similar research study were used to analyze the technical capacity of local builders in residential building construction which affect the performance of local builders. As a similar outcome to the previous research, this research has also found the positive effect of technical capacity on the performance of local builders in constructing residential buildings.

15. CONCLUSIONS

The conclusion to this study was technical capacity has a positive effect on the performance of local builders in constructing residential buildings as per the perceptions of stakeholders. Technology and availibility of equipment to local builders are of concern for the respondents. The highest weightage mean score for the parameter of performance of local builders is the Personal ability of builders whereas safety management is the least mean score. Local builders are lagging in technical capabilities including managerial and supervisory capabilities, which need to

boost up for enhancing performance efficiency of local builders. In case of technical capacity and performance, local builders should be capable of holding the self-owned machinery and equipment related to building construction, which will help to reduce the time and labor force required for particular work. Local builders should provide the employees with proper training. Pursuing further training will help the local builders to be able to easily adopt the latest technology in construction, will also enhance managerial competence as well as help in accident avoidance as the trainees may be subjected to safety training in the course of their pursuant of further training.

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