Factors and Impact of Risk Management Practice on Success of Construction Projects of Housing Developers, Kathmandu, Nepal

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Abstract

Risk Management is set of activities concerned with identifying the root causes of risks and to trace their consequences through the comprehensive and systematic way of identifying, analysing and responding to risks to achieve the project objectives. The use of risk management is essential from the early stages of a project, where major decisions such as selection of site, construction methods and procurement methods can be influenced. This research is conducted to identify significant factors of risk and the impact of Risk Management Practice on success of construction projects of Housing Developers in Kathmandu Valley. It was revealed that housing developers of Kathmandu valley are quite aware regarding Risk Management (more than 80%) and are practising it in their project someway (more than 65%) whereas only 45% of the developers are practicing using formal techniques . Risk factors related to time overrun, cost overrun, quality, project scope, design and specification, contract, finance and economy, health safety and environment, organisation and leadership were found to be the ten significant factors. These ten risks are taken as success criteria for hypothesis testing. Out of thirty three hypothesis testing to find impact, only 6 hypotheses were not accepted and impact was not seen. For the remaining twenty seven hypotheses, significant impact was found to exist between the variables. Those 27 hypotheses are Risk Identification, Risk Assessment and Risk Response on Project Success, Scope well defined, Technical Specifications Compliance, Planned budget, Quality, Time, Contractual Risks, Financial and economic Risks, Safety, Health and Environmental Risks, Leadership Risk and Organizational Risk.

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Thus from this study, it can be said that significant impact exists between risk management practice and success of projects for the housing projects in Kathmandu valley. And thus from this study, it can be said that significant impact exists between risk management practise and success of projects for the housing projects in Kathmandu valley.

Keywords: Risk Identification; Risk Assessment; Risk Response; Risk Management; Risk Factors; Statical.

1. Introduction

1.1. Background

In the early days of project management, the projects were generally of short duration- about one to three years and the environment was much more stable. The modern day projects, such as privatized infrastructure projects, have project life that is spread over many years. Projects are becoming larger and more complex. These projects involve the large capital investment, generate unbalanced cash flows, and involve complex contractual agreements. They encounter changing economic and financial situation, face unpredictable political environmental changes. The stability of modern projects is thus, constantly subjected to certain sensitive and volatile, external and internal environments. The resulting instability causes uncertainty. Uncertainties bring with them, elements of risk. The success or failure of a project largely depends upon the effectiveness and the efficiency with which the risks and uncertainties are managed. Risk is actually the uncertainty that matters and it is a subset of uncertainty and it connects the uncertainty with the objectives. Risk is the effect of uncertainty on objective of project. It could be the stochastic, aleoratic, epistemic or its combination. Hence, risk management has emerged, as the main function of project management. Risk management is the art and science of managing risks caused by unforeseen changes (uncertainties) which may require deviations from the planned approach and may therefore affect the achievement of the project objectives. It involves systematically identifying, planning and controlling risks. Construction projects are unique, complex and most demanding in nature. So to maintain its professionalism by managing the risk is must for its stakeholders. Risk is an abstract term. In a given situation, risk is viewed differently by different people. For example, the likelihood of rain on a cloudy day may be perceived as the risk of getting wet by a man walking in the street, a risk of slipping on the road by a motor cyclist and an opportunity to plant the seeds by a farmer. To some it may pose a hazard, danger or threat, while others may see it as an opportunity. Risk in generally signifies an uncertain event, situation, or condition which may occur. It may have either a positive or negative effect on the project objectives. Some risks may pose a threat to the achievement of project objective while some other risks may enhance it. Favourable risk events are called opportunities whereas unfavourable risk events are termed as threats [1]. Risk is considered purely as an art, a talent that is needed over a period of time through experience. It has been considered so because a variety of styles can be observed in the handling of similar projects by different people in construction. Nowadays the environment, projects has to operate, is more complex and fast changing. There is a greater need for supplementing the art of risk management by systematic and scientific methods rather than using rule of thumb, using common sense, sharp judgment, trial and error approaches.

1.2. Statement of the Problem

Nepal has shown considerable increase in the sector of Construction Project in the last few years. Especially construction projects are focused in the capital city Kathmandu. Construction companies are faced with more risk and uncertainty than ever before. In fact, many projects have not been started even after approval from the government authority. One of the reasons behind this can be the associated risks and uncertainties. In addition, clients expect more. Besides, they do not want surprises, and are more likely to engage in litigation when things go wrong. These things make the project managers in Nepal think about the relationship between such new risks and uncertainties and about the success of the project they manage and are forced to ask if Risk Management contributes to project success. In this context, difficulty is assured and also doubt exists as to if it works. Perhaps formal practice of risk management is not followed but almost all the developer companies intuitively practice it for fulfillment of their objective. The main challenge facing management is to estimate extent of risk by the position holder, also to estimate whether the management is aware of the risk and if they apply their knowledge in avoiding risks. Top management should investigate various types of risks in projects, and how they can manage risk, via education or past experience and other sources. It is always a multi-faced problem to know how risky the construction project is as it requires knowledge of economics, engineering, mathematics and many more disciplines. Accordingly, this research sets sights on introducing the impact of risk management on construction projects success from the perspective of employees of the housing developers.

1.3. Research Objectives

The main objective of this research is to assess the risk factors and impact of risk management practices on success of construction projects of housing developers, Kathmandu valley. The study also aims at:

a) To analyse the status of risk management practices of shared-residence construction projects of Kathmandu.

b) To identify the significant factors of risk.

c) To analyse the impact of risk management practice on construction projects' success.

2. Literature Review

2.1. Various events

Any form of event can be classified into Uncertainty or Risk. The major difference between both of these lies in their probability of occurrence. Probability when assigned to an event becomes Risk. An event for which it is difficult to assign a probability can be termed as uncertainty. The only way to deal with uncertainty is to convert it into risk by assigning to it the probability obtained from years of experience. Some methods by which decision under uncertainty can be taken are: Hurwicz criterion; Laplace insufficient reason criterion; Maximax criterion; Maximin criterion; Savage minimax regret criterion. Risk can be categorized into Opportunity and Threat on the basis of their outcomes. Favourable outcomes are known to be opportunities while unfavourable one are known to be Threat. Different approaches should be employed for these risks. Exploitation, Enhancement, Sharing and Acceptance are some strategies for dealing with Opportunities whereas those for dealing with Threat are Avoidance, Transfer, Reduction and Acceptance. 'Maximum Likelihood Principle',

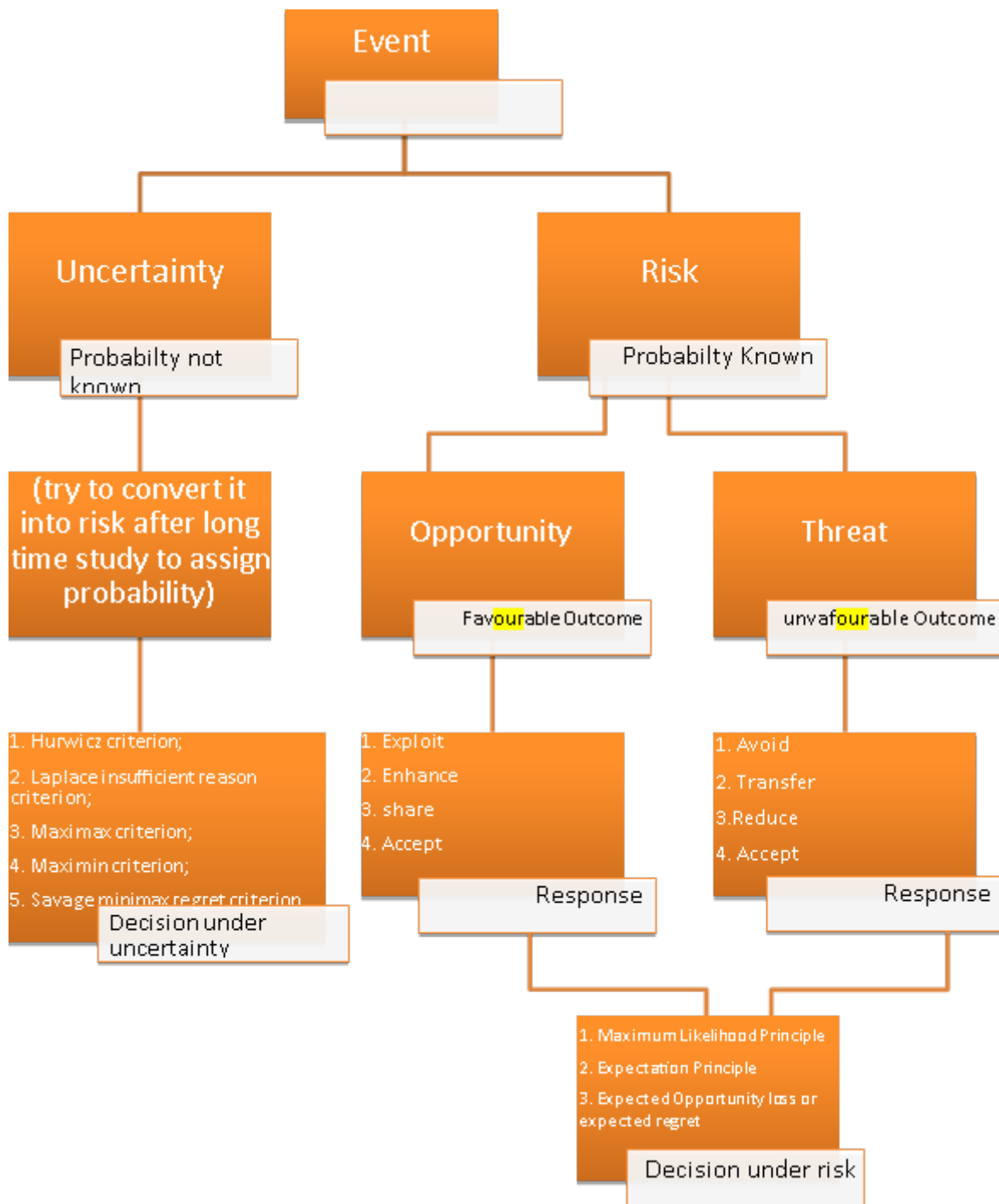'Expectation Principle' and 'Expected Opportunity Loss or Expected Regret'

Figure 2.1: Types of events

2.2. Factors of Risk

Most of risks that the professionals are being in the context of housing and real estate projects are mentioned table 2.1. Those risks are tactfully deal by the developer, consultant and contractor during particularly in implementation phase [2].

Table 2.1: Rank of risks in housing and real estate

First ten risks	Fourth ten risks
1. Cost increases due to donation to political parties	31.Bankrupcy in project partners
2. Cost increase due to change of policies	32.Increase in site overheads
3. Improper project feasibility	33.Error in design drawings
4. Banking policy change about the project	34.Loss due to political instability
5. Cost increases due to rewards to authorities	35.poor quality of construction materials
6. Loss due to bureaucracy for late approval	36.Unknown site physical condition
7. Project delay	37.Breach of contracts by project partner
8. Improper selection of project type	38.Dispute within Stakeholders
9 Design changes	39. Purchased poor quality of accessories
10 Due to conflict in the partner	40. Shortage of water, gas and electricity
Second ten Risks	Others risks
11. Project obstruction in the name of local	41.Breach of contract by other participants
12.Incompetent of project management team	42.Disputes with partners
13.Incomplete contract terms with partners	43.Problems related cultural issues
14.Local form's incompetence & credibility	44..Problems related Social issues
15. poor relation with government authorities	45. construction material price hike
16.low credibility of shareholders & lenders	46.lack of fairness during tendering process
17.conrovery of court judgment	47.Organization relation with local partners
19.Planning and budgeting defects	48.Enviromental regulation in the project
20.More job to be execute in same time	49.lack of skillful workers in the site
Third ten risks	50.Obsuletness of building equipments
21.Sub contractor's low credibility	51.Accedent or death in site
22.Fluction of bank's interest rate	52.Force majeure
23. Insufficient law for joint venture	53. Equipment failure
24.Increase project overhead expenses	54.Industrial dispute
25. Loss due to fluctuation of inflation rate	55.increase of labor cost
26. Lack of project organization structure	56.lack of transportation facilities
27.Problem due to partner's different practices	
28.Fall short of expected income from project use	
29. Shortage of construction materials	
30.Lack of security in the site	

2.3. Risk Management Process

- Identifying the risks affecting project objectives by means of structured interviews or brainstorming

- Classifying the risks by type and degree of impact

- Recording the risks in a risk register

- Assessing qualititatively the risks by frequency and impact scales and ranking them

- Modeling and analyzing quantitatively the important risks (by methods like sensitivity analysis, probabilistic analysis and Monte-Carlo simulation, decision trees, event trees, influence diagrams etc.)

- Formulating a risk response strategy by risk avoidance, reduction, transfer, acceptance

- Preparing a project risk management plan that summarizes the status of the project on risk issues and the response strategy with a risk action schedule

- Implementing the strategy

- Reviewing periodically the status of identified risks, the risk management strategy and identifying new risks [3].

The Risk Management process involves 4 basis ladders towards Risk Resolving viz. Preliminary Activities, Risk Identification and Categorization, Risk Assessment and Analysis and Risk Response Planning. While Preliminary Activities involve defining of objectives and scope of the risk study along with Identification of Stake-holders and Project Requirements, Risk Identification and Categorization involves identifying sources of risk and opportunities.

Risk Assessment and Analysis deals with assessing the frequency and impact of risks in qualitative terms, quantifying risks where necessary using quantitative techniques and structuring risk modelling where necessary and applicable apart from prioritizing risks for mitigation.

Risk Response, on the other hand, deals with identifying risk mitigation actions and estimating costs and resources needed. Risk Management Review has to be done at each step as to whether or not everything being done is correct and as per the plan.

A research was carried out by authors in [4] in Jordon on 'The impact of risk management on construction projects success from the employees perspective' in 2013. The main objective of this research was to study the impact of risk management on construction projects success.

The survey directed to the participants was developed according the research design, approach, and data. This survey included two major sections. The first section asked about the procedure followed in the organization to manage the risk. In section two, the survey attempted to specify if the project they experienced achieved the success criteria. 7 criteria factors were defined for construction project success listed in the questionnaire. The results of the study indicated that an impact existed between both Risk identification and Risk assessment on project success, scheduled time, planned budget, and the ability to comply with technical specifications. There was no impact between Risk assessment and avoiding lawsuits or claims. Also the study indicated that there is an impact of Risk response on project success, meeting the scope of work, scheduled time, and achieving the quality standards.
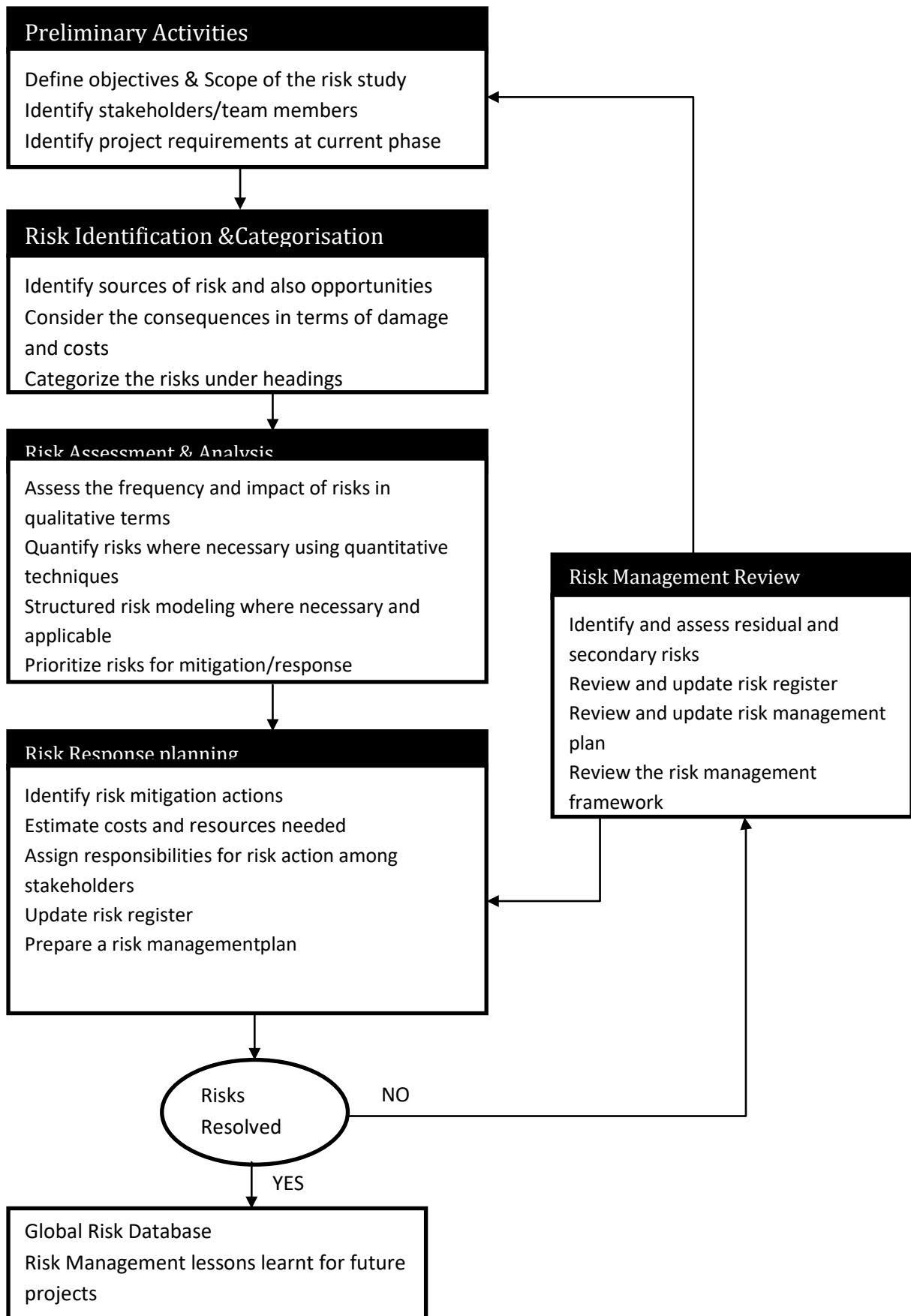
Preliminary Activities

Define objectives & Scope of the risk study
Identify stakeholders/team members
Identify project requirements at current phase

Risk Identification &Categorisation

Identify sources of risk and also opportunities
Consider the consequences in terms of damage
and costs
Categorize the risks under headings

Risk Assessment & Analysis

Assess the frequency and impact of risks in
qualitative terms
Quantify risks where necessary using quantitative
techniques
Structured risk modeling where necessary and
applicable
Prioritize risks for mitigation/response

Risk Management Review

Identify and assess residual and
secondary risks
Review and update risk register
Review and update risk management
plan
Review the risk management
framework

Risk Response planning

Identify risk mitigation actions
Estimate costs and resources needed
Assign responsibilities for risk action among
stakeholders
Update risk register
Prepare a risk managementplan

Risks
Resolved

NO

YES

Global Risk Database
Risk Management lessons learnt for future
projects

Figure 2.2: The Risk Management Process Flowchart [3]

3. Methodology

This study examined the impact of risk management practices on construction project success.

To fulfil the first objective of this research i.e. to analyse the risk management practice of Shared-Residence construction projects of Kathmandu, a questionnaire survey was carried out. Respondents were provided with the list of questionnaires that was intended to know the practise of risk management that their developers follow. Response choices on the questionnaire were coded as 1 (Highly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) and 5. (Highly Agree). Same method was followed to identify the significant factors of risk and their impact.

Similarly to find impact of risk management practice on the success of construction projects in Nepalese context, scheduled questionnaire survey was carried out among the employee of projects. Questionnaire consisted of several statements that were supposed to help to understand the practices that were prevailing in their projects regarding the various steps of risk management i.e. risk identification, risk assessment and risk response. Respondents were asked to rate each statement on Likert Scale (1: Least Agreed to 5:Most Agreed). Similarly respondents were also provided with the list of risk factors on the basis of which success of that project was asked. Out of those factors, top ten risk factors were identified, based on the response, as the success criteria. Three independent variable and ten dependent variable are in this research, the independent variables are: risk identification, risk assessment and risk response for the housing developers, the dependent variable are the top ten risk factors as the success criteria. The participants were the employee in housing developers companies, who experienced previous project.

3.1. Study Area

Study area was limited on Kathmandu valley only. The housing developers companies of Kathmandu valley were the area of this study. Mainly the study focuses on the risk management practice they are approaching in their projects and their impact on the success of project.

3.2. Study Population

The scope of this research includes housing construction projects in Nepal. It was necessary to sample this research because it is impossible to conduct all the construction companies. The population consists of 34 housing developers in Kathmandu.

3.3. Sample Size

For the conduction of research and fulfilling the objectives, purposive sampling among the study population was done and the schedule questionnaire was carried out with the various employees of the sample developers companies. Total of 30 responses were received from the 14 numbers of housing developers.

3.4. Data Collection

A primary and secondary data collection method was adopted for this research to identify the impact of risk management practice on construction projects' success in Nepalese context for housing developers. Primary Data collection: Primary data were collected through scheduled questionnaire to employee as well as interview with senior engineers and managers of housing developers.

The questionnaires were based on research objectives. Secondary Data collection: Secondary data are collected from the literature study of national and international journals and articles. Literatures (Publication, report, magazine, data) of national international context.

3.5. Data Analysis

The survey questions listed a number of statements to evaluate risk management and success of the housing project. For each of these statements, respondents indicate their preference by rating it on a 5 point likert scale, where 1 indicates "strongly disagree" and 5 indicates "strongly agree."

The data which were collected from the questionnaire were analyzed through MS Excel, SPSS software where the outcomes were presented in graphical way for ease of achieving objectives. Since the study is a descriptive type, simple frequency distributors can be used as an analytical tool in the form of different charts and tables.

The multiple choice research variables were analyzed through frequency analysis. The perception level of the respondents to this survey about the research variables was assessed by using the mean score (MS) computed by the following formula [5].

$$MS = \sum(f \times s) / N \quad (1 \leq MS \geq 5)$$

Where 's' is score given to each research variable by the respondents and ranges from 1 to 5 when 1 is "Strongly disagree" and 5 is "Strongly agree"; f is frequency of responses to each rating (l-5) for each research variable; and N is total number of responses.

The risk management practice of housing developers were analyzed by the above mentioned methods to the respondent's response of Likert Scale. Similarly, the significant factors were analyzed by ranking the Mean Score (MS) calculated for each factors provided.

To find impact of risk management practice on the success of construction projects in Nepalese context, hypothesis were tested among the three independent variable and ten dependent variable. Three independent variable is risk identification, risk assessment and risk response.

The ten dependent variable was choosen after analysing the risk factors that are found to be most critical in Nepalese context. Top ten risk factors were choosen as the success criteria and was taken as dependent variable and following hypothesis were tested to analyse the significance of risk management on projects success:
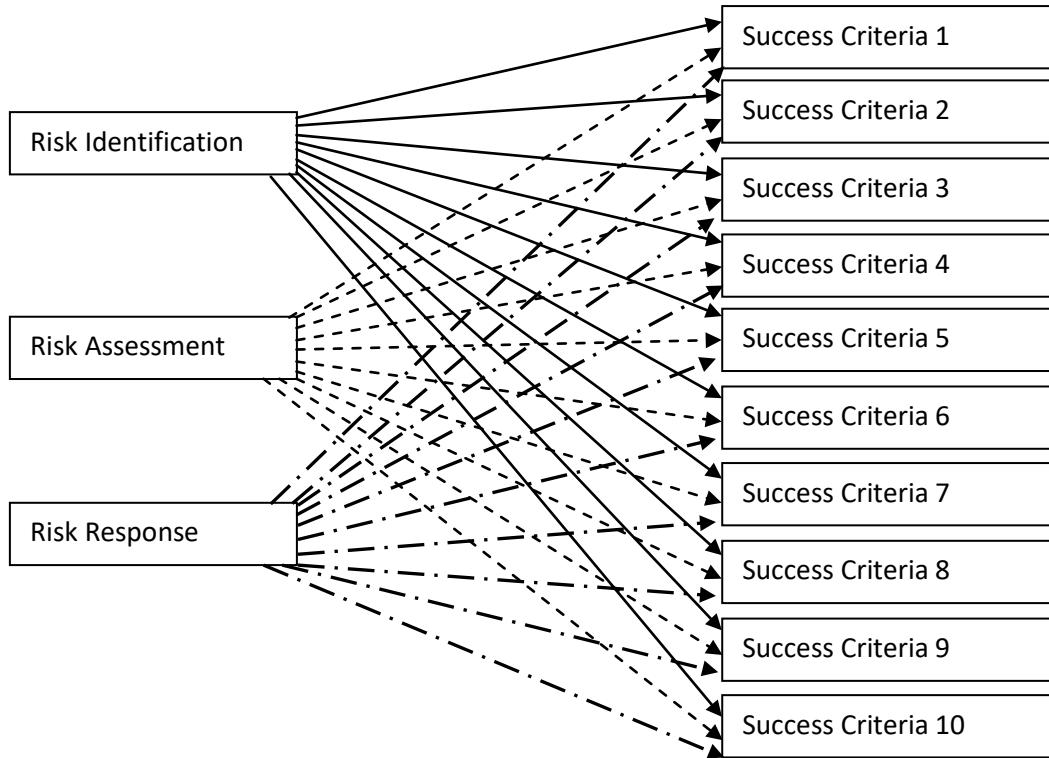
Figure 3.1: Research model for hypothesis testing

Hypothesis

Ha1: There is an Impact of Risk Identification on Project Success

Ha1-1: There is an Impact of Risk Identification on Success Criteria 1

Ha1-2: There is an Impact of Risk Identification on Success Criteria 2

Ha1-3: There is an Impact of Risk Identification on Success Criteria 3

Ha1-4: There is an Impact of Risk Identification on Success Criteria 4

Ha1-5: There is an Impact of Risk Identification on Success Criteria 5

Ha1-6: There is an Impact of Risk Identification on Success Criteria 6

Ha1-7: There is an Impact of Risk Identification on Success Criteria 7

Ha1-8: There is an Impact of Risk Identification on Success Criteria 8

Ha1-9: There is an Impact of Risk Identification on Success Criteria 9

Ha1-10: There is an Impact of Risk Identification on Success Criteria 10

Ha2: There is an Impact of Risk Assessment on Project Success

Ha2-1: There is an Impact of Risk Assessment on Success Criteria 1

Ha2-2: There is an Impact of Risk Assessment on Success Criteria 2

Ha2-3: There is an Impact of Risk Assessment on Success Criteria 3

Ha2-4: There is an Impact of Risk Assessment on Success Criteria 4

Ha2-5: There is an Impact of Risk Assessment on Success Criteria 5

Ha2-6: There is an impact of Risk Assessment on Success Criteria 6

Ha2-7: There is an Impact of Risk Assessment on Success Criteria 7

Ha2-8: There is an Impact of Risk Assessment on Success Criteria 8

Ha2-9: There is an Impact of Risk Assessment on Success Criteria 9

Ha2-10: There is an Impact of Risk Assessment on Success Criteria 10

Ha3: There is an Impact of Risk Response on Project Success

Ha3-1: There is an Impact of Risk Response on Success Criteria 1

Ha3-2: There is an Impact of Risk Response on Success Criteria 2

Ha3-3: There is an Impact of Risk Response on Success Criteria 3

Ha3-4: There is an Impact of Risk Response on Success Criteria 4

Ha3-5: There is an Impact of Risk Response on Success Criteria 5

Ha3-6: There is an Impact of Risk Response on Success Criteria 6

Ha3-7: There is an Impact of Risk Response on Success Criteria 7

Ha3-8: There is an Impact of Risk Response on Success Criteria 8

Ha3-9: There is an Impact of Risk Response on Success Criteria 9

Ha3-10: There is an Impact of Risk Response on Success Criteria 10

Reliability Test

To measure the validity and reliability of collected data, Cronbach's alpha has been used. Cronbach's α is a function of the number of items in a test, the average covariance between item-pairs, and the variance of the total score. The theoretical value of alpha varies from zero to 1, since it is the ratio of two variances. However, depending on the estimation procedure used, estimates of alpha can take on any value less than or equal to 1, including negative values, although only positive values make sense. Higher values of alpha are more desirable. Calculated alpha value is less than 0.6 are not acceptable, value between 0.7 to 0.8 are acceptable, value between 0.8 and 0.9 are good and alpha value above 0.9 are excellent. Cronbach's alpha is calculated by using the following formula:[6].

$$\alpha = \frac{K}{K-1} X [1 - \sum_{j}^{k} = 1 \frac{Var(Xj)}{Var(Xo)}$$

4. Results and Discussions

This research survey was one of the first steps towards exploring the impact the of risk management on the success of project in context of housing developers of Kathmandu. The data obtained from this study suggested that there is an impact exists between the risk management practices followed by the housing developers on theirs success criteria of their projects. This research also explores the various significant factors of risk on the basis of their probability of occurrence and their impact in projects in context of housing developers. The collected data were analyzed using MS Excel and SPSS:[7].

4.1. Risk Management Practise of housing developers of Kathmandu

As per 30 response received during the research, it is found that the top management of housing developers are highly aware regarding the risk management with the mean score of 4.03 on the Likert Scale.

Table 4.1: Statistics of Management Awareness regarding Risk Management

Mean	4.03
Std. Dev.	0.62

Rate	Frequency	Percentage
3	5	16.67
4	19	63.33
5 (Most Aware)	6	20.00
Total	**30**	**100.00**

No respondent was found to rank themselves on scale 1 and 2 meaning each of the respondent questioned, was aware to some extent about risk management. Most of the respondentsi.e 63 % of total were found to rank themselves on scale 4 which means these companies were quite aware about risk management. 5 out of 30 participants also ranked themselves on scale 5 which is to say they held the belief that they were most aware about it.

Further, the respondents perceive that risk management is being highly practiced either formally or informally in housing projects with the mean score of 3.83 on the Likert Scale.

Table 4.2: Statistics of Management practicing Risk Management formally/informally

Mean	3.83
Std. Dev.	0.69

Rate	Frequency	Percentage
3	10	33.33
4	15	50.00
5 (Most Followed)	5	16.67
Total	**30**	**100.00**

33% of total respondents were found to place themselves on scale 3 while 50% were found to place themselves on scale 4. That is to say, these respondents seems to have satisfactorily and sufficiently followed risk management practice respectively. The number of those not following or following very little risk management practice was zero. 17% of respondents claimed that they have been following it on a high scale. The data shows slight decrease in formal risk management practice. On Likert Scale, mean score was found to be 3.36, while investigating further, regarding the formal practice of risk management by housing developers.

Table 4.3: Statistics of Management practicing Risk Management formally

Mean	3.36
Std. Dev.	0.92

Rate	Frequency	Percentage
1 (Least Followed)	1	3.33
2	3	10.00
3	13	43.33
4	10	33.33
5 (Most Followed)	3	10.00
Total	**30**	**100.00**

Very little i.e 13.33% of projects were found to have not followed formal risk management techniques or to have followed on a very minute scale. It can be seen from the data, the percentage of projects following formal risk management techniques has increased from scale 1 to 3 which has then decreased coming upto scale 5. That is to say, majority of projects seem to have followed it on an average scale. It is, at the same time, good to see one-third of projects following it on scale 4.

Further while visualizing the practice being followed by the housing developers regarding the risk management, following results obtained as shown in tables below.

Table 4.4: Mean and Standard Deviation of Risk Identification

S.N.	Statements	Mean	Std. Dev.
1	Systematic identified and applied procedures for identification of opportunities	3.50	0.86
2	Use of management's experience to identify the risk	3.63	0.89
3	Management's intention to identify the risk's source.	3.80	0.85
4	Management's intention to identify how and why risks arise	3.67	0.76
5	Management's intention to identify the losses of risk	3.93	0.83
6	Use of analyzing process to identify the risk	3.53	0.94
7	Scenario analysis to identify the risk.	3.13	1.11
8	Physical inspection to identify the risk.	3.53	0.82
9	Questionnaires to identify the risk.	3.23	1.14
10	Interview to identify the risk.	3.30	1.02
11	Brainstorming to identify the risk.	4.13	0.86
12	SWOT Analysis to identify the risk	3.57	1.01
13	Use of local/overseas experience to identify the risk.	3.77	1.04
14	Identification of the area of risk's impact.	3.80	0.85
	Total	**3.61**	

Majority of organizations seem to have identified and applied procedures for systematic identification of opportunities at a level more than average. They have managed to use the experience of the organization to identify the risk at a degree more than average, i.e with MS of 3.63. The degree at which organizations have identified the risk's source exceeds the degree of identification of the reason and the ways of risks by 0.13. In other words, organizations have been identifying risk's source at a better level than the level they've been identifying the reasons and ways behind the risk. Organizations tend to identify the losses of risk at the greatest degree i.e nearly at the scale 4. Analysis of process by organizations in order to identify risk runs at an average scale i.e at scale 3.53. To identify the risk, organizations seem to prefer the brainstorming techniques and then after its local/overseas experience in order to identify the risk. After that they perform SWOT analysis, physical

inspection, interview and lastly the questionnaire technique for the identification of risks. The Table 4.4 indicates that there is high rate of Risk Identification with mean of 3.61

Table 4.5: Mean and Standard Deviation of Risk Assessment

S.N.	Statement	Mean	Std. Dev.
1	Analyzing and evaluating opportunities to achieve objectives	3.63	0.76
2	Analysis of strengths and weaknesses of the risk management systems with other organizations it works with	3.47	0.73
3	Collation of risks to develop decision making on appropriate actions	3.73	0.87
4	Assessment of risk by quantitative analysis method	3.43	0.82
5	Assessment of risk by qualitative analysis method	4.17	0.95
6	Analysis according to likelihood	3.73	0.64
7	Analysis according to consequences	3.80	0.66
8	Analysis according to reputation impact	4.03	0.61
9	Analysis according to achievement of objectives	3.87	0.86
10	Analysis according to financial impact	4.13	0.86
	Mean	**3.80**	

Organizations seem to have the ability to analyze and evaluate opportunities that helps to achieve its objective at a rate slightly more than average. Also, they try to identify the strengths and weaknesses of the risk management systems of the organizations they work with. They do this at a scale of 3.47 which is again slightly beyond average. They seem to collate risks in order to develop decision making with a MS of 3.73. Mostly the organization tend to use qualitative techniques rather than quantitative techniques in order to assess the risk. From the data it is also clear that mostly risk assessments are done according to the financial impact and reputation impact. Only after that achievement of objectives and consequences of risk is considered while analyzing the risk. The Table 4.5 indicates that there is high rate of risk assessment with mean of 3.80.

One of the major aspects of risk response is identification of risk management plan. Organizations seem to have been able to prioritize Risk Management Plan to a Mean Score (MS) of 3.43 in average, with a standard deviation of 0.6. This depicts their ability to successfully do a little above the average scale. They have, also, taken into consideration their limits to achieve Risk Management Objectives with MS of 3.5 which again means it is being done at a scale slightly above average. Cost and benefits of identifying risks have been evaluated at a scale of 3.67 and Great loss-causing risks have been prioritized at that of 3.77.

It speaks how organizations have been careful of losses and how they have tried to adopt necessary precaution.

Up to date Business Continuity Plan has been identified at a scale of 3.67 which enjoys the same level of prioritization as of identification of cost and benefits and that of effectiveness of available controls and risk management responses. Organizations seem to have prioritized the fact that responsible managers must understand the risks faced by the organization to a scale of 4.03. Organizational belief that senior management are responsible regarding communications about risk appears to be firm to a degree 3.73. Their belief regarding monitoring the effectiveness of risk management to be an integral part of routine management reporting occupies an importance level of 3.5 while that of supporting the effective management of risk between staff and management occupies an importance level of 3.47. As per the responses received regarding the methods of risk response, Risk Transfer method found to have highly practiced as compared to other methods with MS of 4.23.

Second method was found to be Risk Avoidance with MS 3.87. Then after comes the Risk Reduction and Risk Acceptance/Retain with MS of 3.77 and 3.53 respectively. The Table 4.6 indicates that there is high rate of Risk Response with mean of 3.69.

Table 4.6: Mean and Standard Deviation of Risk Response

S.N.	Statement	Mean	Std. Dev.
1	Presence of Identified risk management plan	3.43	0.68
2	Considers the limits to achieve risk management objective	3.50	0.78
3	Evaluation of costs and benefits of identifying risks	3.67	0.71
4	Finding out the effectiveness of available controls and risk management responses	3.67	0.71
5	Prioritization of risks according to losses	3.77	0.68
6	Identified and up-to-date business continuity plan	3.67	0.99
7	The responsible managers must understand the risks faced by the organization	4.03	0.61
8	Senior management are responsible regarding communications about risk	3.73	0.87
9	Monitoring the effectiveness of risk management as an integral part of routine management reporting.	3.50	0.78
10	Effective management of risk between staff and management	3.47	0.82
11	Appropriate level of control regarding risks that it faces	3.47	0.78
12	Transferring the risk, as Risk Responding method	4.23	0.82
13	Reducing the risk, as Risk Responding method	3.77	0.90
14	Avoiding the risk, as Risk Responding method	3.87	0.90
15	accepting/retaining the risk, as Risk Responding method	3.53	0.86
	Mean	**3.69**	

To test the relaibility of data regarding risk management practise of housing developers, Cronbach's alpha was calculated to determine the internal consistency.

Table 4.7: Reliablity Statistics for data of Risk Management Practise and Awareness

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.975	0.975	49

Here, alpha value lies above 0.9 so internal consistency of data is excellent.

4.2. Significant factors of Risk

To identify the significant factors of risk and their respective impacts on project, respondents were asked to give the rating on Likert Scale (1-5) for each of the 16 numbers of risk factors provided. Mean score (MS) of each factors were calculated and hence the signifcant factors were ranked on the basis of it.

Table 4.8: Mean Score of probability of occurrence of various risk factors

S.N.	Risk factors	MS of occurrence
1	Time Overrun Risks	4.067
2	Cost Overrun Risks	3.933
3	Project Scope Risks	3.833
4	Quality Risks	3.700
5	Contractual Risks	3.667
6	Design and Specification Risk	3.533
7	Organizational Risks	3.400
8	Financial and economic risk	3.400
9	Safety, Health and Environmental Risks	3.400
10	Leadership Risks	3.367
11	Physical Resources Mobilization and utilization risks	3.233
12	Technology Risks	3.200
13	Political, WTO, legal and social risk	3.100
14	Communication and network failure risks	3.033
15	Funding Failure Risks	2.900
16	Force Majeure and ecological risks	2.700

In terms of probability of occurrence, as per the respondents, Time Overrun Risk was found to be the most

probable risk factors that may occur. After that Cost Overrun Risk, Project Scope Risks and Quality Risk was found to be most probable to occur. In context of the Nepal, the above result can be said correct as most of the project are delayed and complete in more cost than estimated one. In housing projects, there occurs frequent changing in scope requirement, and the no control for extra work can be seen, even no proper analysis of changes and problems in quality control can be seen as per the case study. Hence Project Scope risk to be also one of the most probable risk is a justifiable result.

Table 4.9: Mean Score of impact of various risk factors

S.N.	Risk factors	MS of Impact
1	Time Overrun Risks	4.400
2	Cost Overrun Risks	4.400
3	Quality Risks	4.200
4	Force Majeure and ecological risks	3.900
5	Design and Specification Risk	3.867
6	Project Scope Risks	3.833
7	Financial and economic risk	3.800
8	Organisational Risks	3.767
9	Safety, Health and Environmental Risks	3.767
10	Leadership Risks	3.667
11	Political, WTO, legal and social risk	3.600
12	Funding Failure Risks	3.600
13	Physical Resources Mobilisation and utilisation risks	3.567
14	Contractual Risks	3.567
15	Communication and network failure risks	3.300
16	Technology Risks	3.200

While analyzing the response received for the impact of each risk factor provided to the respondents, the highest impact was found to be for the Time and Cost Overrun risks, Quality risk. After that Force Majeure and Ecological risk was chose to be of high impact by the respondent. Following that highest impact producing risk factors were Project Scope Risks, Design and Specification Risk, Financial and Economic Risks.

By combining the result of Probability of Occurrence and their respective Impact for each risk factor, significant factors of risk were obtained as shown in Table 4.10. As a result, the most significant factor was found to be Time Overrun Risks followed by Cost Overrun Risk, Quality Risks, Project Scope Risks, Design and Specification Risks, Contractual Risks and so on as shown in Table 4.10.

To test the relaibility of data regarding significant risk factors of housing developers, Cronbach's alpha was calculated to determine the internal consistency.

Table 4.10: Rank of various risk factors according to their Mean Score

S.N.	Risk factors	Rank
1	Time Overrun Risks	1
2	Cost Overrun Risks	2
3	Quality Risks	3
4	Project Scope Risks	4
5	Design and Specification Risk	5
6	Contractual Risks	6
7	Financial and economic risk	7
8	Safety, Health and Environmental Risks	8
9	Organizational Risks	9
10	Leadership Risks	10
11	Physical Resources Mobilization and utilization risks	11
12	Political, WTO, legal and social risk	12
13	Technology Risks	13
14	Funding Failure Risks	13
15	Force Majeure and ecological risks	15
16	Communication and network failure risks	16

Table 4.11: Reliablity Statistics for data of significant risk factors

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.948	0.950	32

Here, alpha value lies above 0.9 so internal consistency of data is excellent.

4.3. Impact of Risk Management Practice on Projects' Success

To find the impact of risk management practice on the success of construction projects in Nepalese context, questionnaire survey was conducted among the employee of projects. Three independent variable is present in the study namely Risk Identification, Risk Assessment and Risk Response. For the dependent variable, top ten Success Criteria were calculated from the response received.

And as per those ten criteria, the success of the project were evaluated from the response. Mean of those ten dependent variable (success criteria) is shown in Table 4.12. Hypothesis were tested to analyze the significance of risk management on projects' success.

Table 4.12: Mean of Success Criteria

S.N.	Statement	Mean
1	Well defined and maintained (no changes) Project Scope	3.93
2	Comply with technical Specifications	3.77
3	Project within the planned Budget	3.67
4	Achieve the quality standards as specified in the specifications	3.70
5	Project Adherence to Schedule (on or ahead of schedule)	3.43
6	No problem in contractual process and implementation	3.50
7	Financial and economic risks not impacted the project	3.60
8	Organizational risks did not impact the project	3.58
9	Safety, health and environmental risks overcome successfully	3.58
10	Leadership risks did not impacted the project	3.52
	Mean	**3.78**

The above table indicates that there is high rate for success criteria with mean of 3.78.

Hypothesis were tested among the independent variables and dependent variables as shown in Figure 3.1. The summary of hypothesis is shown in Table 4.13. Out of thirty three hypotheses testing to find impact, only 6 hypotheses were not accepted and impact was not seen. For remaining twenty seven hypotheses, significant impact was found to exist between the variables as shown in Table 4.13. Those hypotheses are Risk Identification, Risk Assessment and Risk Response on Project Success, Scope Well Defined, Technical Specifications Compliance, Planned budget, Quality, Time, Contractual Risks, Financial and Economic Risk, Safety, Health and Environmental Risks, Leadership Risk and on Organizational Risks. Impact of Identification, Assessment and Response was not found to exist on Overcoming of Organizational Risk and Overcoming on Contractual Risk. Thus, from this study, it can be said that significant impact exists between risk management practise and success of projects for the housing projects in Kathmandu valley. Similar results were obtained in the research paper, 'The impact of risk management on construction projects success from the employees' perspective' in 2013. Risk identification was found to lay an impact on project success, the scheduled time, the planned budget and the ability to comply with technical Specifications. Also, Risk Assessment was found to lay an impact on Project Success and Planned Budget. As per the research, Risk Assessment was not found to lay an impact on avoiding lawsuits or claims and on the ability to keep future work. Also, Risk Response was found to lay an impact, as per the research, on project success, achieving the quality standards, meeting the scope of work and the scheduled time. Despite the fact that the success criteria as dealt in the paper was different from those considered here, results were found to be similar as for the impact of Risk Management on Project Success.

Table 4.13: Summary of hypothesis testing

S.N.	Hypothesis	F	Sig. F	Impact
1	Impact of Risk Identification on Project Success	96.192	0.000	Impact Exists
2	Impact of Risk Identification on Scope well defined	25.759	0.000	Impact Exists
3	Impact of Risk Identification on Technical Specification compliance	38.662	0.000	Impact Exists
4	Impact of Risk Identification on Planned budget	23.923	0.000	Impact Exists
5	Impact of Risk Identification on Achieving Quality standards	45.920	0.000	Impact Exists
6	Impact of Risk Identification on Adherence to schedule	27.312	0.000	Impact Exists
7	Impact of Risk Identification on Overcome Contractual Risks	1.946	0.174	No Impact Exists
8	Impact of Risk Identification on Overcome Financial and economic risk	9.636	0.004	Impact Exists
9	Impact of Risk Identification on Overcome of Safety, Health and Environmental Risks	15.598	0.000	Impact Exists
10	Impact of Risk Identification on Overcome of Leadership Risk	6.397	0.017	Impact Exists
11	Impact of Risk Identification on Overcome of Organisational Risk	3.052	0.092	No Impact Exists
12	Impact of Risk Assessment on Project Success	94.040	0.000	Impact Exists
13	Impact of Risk Assessment on Scope well defined	29.005	0.000	Impact Exists
14	Impact of Risk Assessment on Technical Specification compliance	70.277	0.000	Impact Exists
15	Impact of Risk Assessment on Planned budget	22.544	0.000	Impact Exists
16	Impact of Risk Assessment on Achieving Quality standards	35.064	0.000	Impact Exists
17	Impact of Risk Assessment on Adherence to schedule	23.007	0.000	Impact Exists
18	Impact of Risk Assessment on Overcome Contractual Risks	1.586	0.218	No Impact Exists
19	Impact of Risk Assessment on Overcome Financial and economic risk	9.677	0.004	Impact Exists
20	Impact of Risk Assessment on Overcome of Safety, Health and Environmental Risks	14.918	0.001	Impact Exists
21	Impact of Risk Assessment on Overcome of Leadership Risk	7.326	0.011	Impact Exists
22	Impact of Risk Assessment on Overcome of Organisational Risk	3.697	0.065	No Impact Exists
23	Impact of Risk Response on Project Success	90.393	0.000	Impact Exists
24	Impact of Risk Response on Scope well defined	21.652	0.000	Impact Exists
25	Impact of Risk Response on Technical Specification compliance	32.695	0.000	Impact Exists
26	Impact of Risk Response on Planned budget	22.880	0.000	Impact Exists
27	Impact of Risk Response on Achieving Quality standards	41.824	0.000	Impact Exists
28	Impact of Risk Response on Adherence to schedule	42.488	0.000	Impact Exists
29	Impact of Risk Response on Overcome Contractual Risks	1.499	0.231	No Impact Exists
30	Impact of Risk Response on Overcome Financial and economic risk	8.891	0.006	Impact Exists

31	Impact of Risk Response on Overcome of Safety, Health and Environmental Risks	12.181	0.002	Impact Exists
32	Impact of Risk Response on Overcome of Leadership Risk	5.459	0.027	Impact Exists
33	Impact of Risk Response on Overcome of Organizational Risk	2.186	0.150	No Impact Exists

Discussion on result of hypothesis testing

1. Risk management (from the Risk identification, Assessment and Risk Response) was found to lay an impact on project success. Early identification of risks such as inadequate design information, no quality assurance plan and lack of database can lead to precaution helping the project succeed. Risks such as ineffective control system and poor allocation of resources, when identified, become likely to be resolved leading to project success. Sometimes, poor motivation among participants, poor communications among them, lack of co-ordination among stakeholders become the reason for project to fail. Identification of this risk can help participants, employees and stakeholders motivate each other, communicate and co-ordinate better. High rate of sickness and absenteeism in employees, too, can lead to project failure. Identification of the possibility of such sickness can lead the organization save an alternative to be hired during such circumstance, thus, leading to project success. Often times, Housing Developers fail to identify that the project is too complex to be carried out in a given set of circumstances and that the project plans are unrealistic. Identification of such complexity can play a significant role towards resolving them since no Housing Developer would want itself to suffer a failure. Constantly changing market conditions, bad weather, bad working conditions, natural disasters, accidents and theft and fraud can be some of the sudden risks not taken into consideration. Identification and considerations for such risk can be a good initiation against project failure. Identification of Political and Social Risks such as change in government policies and laws, local regulations, constraints on the availability of labor, requirements for license and permits, unfamiliarity with local laws, crime and insecurity, religious and cultural conflicts, inflation, cash flow problems, absence of safety audit, failure to arrange partners equity in time, partner conflicts, payment problems, loss of data due to network problems are risks a little difficult to handle. Their, identification, however, help initiation of the process of success. Risks are also a matter of changing with time, be it in terms of technology or thought. Realization of a technique being old and identification of new techniques help enhancement of project, thus, leading to success. Identification of a better documentation system too is important. Incorrect documentation of claims, disputes and wastage are risks one should identify. With proper identification and assessment, better response can be planned so that success of project is ensured

2. Risk Identification, Risk Assessment and Risk Response was found to play a significant role in defining the Scope of Project. Identification of the complexity of project helps the Housing Developer act towards making it less complex contributing to the project success. Once the Housing Developer come to recognize the project scope to be ill-defined or to be changing in nature, it immediately acts towards re defining it and comes up with a better and well-defined scope. The extent of work control and the analysis of changes and problems in quality control too are major aspects of Project Scope Risks. These are aspects that need to be assessed at every other stage of the Project. Sometimes, the Housing Developer may be lagging behind in these aspects. Assessment of

this at any moment of Project helps take action the very instant. This forms the basis for achieving the success in scope of project.

3. All three parts of risk management i.e. Risk Identification, Risk Assessment and Risk Response was found to lay an impact on achieving success in compliance of Technical Specification. Many a time, an Housing Developer suffers not because of larger factors, but because of aspects that appear to be very minute in nature. A Housing Developer might be failing to identify a risk more than anything else. Identification itself is an achievement often times. Once the Housing Developer comes to identify risks such as inadequate information given in specification, likelihood of design changes, difficulty in translating the specification into construction because of unrealistic specifications, poor design and non-conformity with national and local specifications, it acts towards their assessment and plan for the response required, for no Housing Developer would want to ultimately suffer losses. Incorporation of new construction technology is not always easy. It can cause the Housing Developer to fall in risk. Identification of such risks was found to be helpful for the Housing Developers to take measures against it so that even if they hired new technologies, they did it with caution so as to comply to the Technical Specification.

4. Following risk management was found to lay an impact on Planned Budget of Project as well. Identification of factors likely to affect Planned Budget of Project like Inflation, helps the Housing Developer yield necessary measures like pre-procurement of materials or procurement of limited materials as per the need of the project. Inaccurate cost estimates, inaccurate cost planning and control, no extra work control, no analysis of change, constantly changing market conditions and incomplete project closure can be some other risks, which when identified, assessed, help the Housing Developer take measures towards risk. Identification at an early stage is best. Identification at any stage, however, help the Housing Developer initiate sorting out in some way or other so that it can adhere to the Planned Budget of Project.

5. Quality Standards were found to be affected because of management of risk. Risks such as no quality assurance plan, no method statements, poor quality materials, untrained manpower, unachievable quality specifications, problems in quality control and re-working defects enjoy a medium degree of probability of occurrence making a medium and high impact on Quality Standards. No soil investigation and absence of approved soil and material testing laboratories are other risks affecting Quality of the Project. While not identifying these gives rise to negative impact, their identification and assessment help prevent the high negative impacts on Quality Standards. This is either because the Housing Developers then, act towards making quality assurance plan, generating method statements, improving the quality of materials, training their manpower, taking measures towards making specifications realistic and achievable and controlling quality. These make the project gain a high level of Quality Standards.

6. Identification, assessment and response of risk was observed to lay an impact on Adherence to Schedule. Not being able to identify risks like inaccurate activity time estimates, incomplete assessment of project time, cost, resources and quality implementation plans, ineffective control system and inflexible and unrealistic project plans is found to lay a high negative impact on the Project Schedule. Once identified, Housing Developers are found to seek measures and go for their assessment. Also, risks such as unrealistic time schedules, incomplete Work

Breakdown Structure, no formal sequencing plan, poor allocation of resources, no database, unsatisfactory conduct of status review meetings and inability to take timely corrective action are found to lay impact on Project Schedule, whose identification too serves towards project success in terms of Adherence to Schedule, by doing the suitable assessment and making response plan for those assessed risks.

7. All three component of risk management i.e. risk identification, risk assessment and risk response was not found to lay an impact on overcoming Contractual Risks. It was found that contractual Risks such as non-standard and inconsistent condition of contracts, insufficient time to prepare bid tenders, delay in possession of site, errors or omissions in bills of quantities, payment problems, extra work variations, unrealistic tendered amount, no-credit worthiness of contractor, high cost of legal decisions, insufficient insurance and surety, incorrect documentation of claims and disputes and unfamiliarity of local laws remained unaffected even after their identification and assessment. Risk management did not have any role to play in overcoming them. No matter how hard Housing Developers tried to overcome these risks having identified them, it didn't prove helpful. One reason for this might be the fact that there is several other parties involved in any contractual administration playing a major role, co-ordination among which is really difficult, due to which the contractual risks might be really uncertain and due to which further plan to overcome the risk becomes unsuccessful.

8. Risk management was found to impact the Financial and Economic risk beared in a project. It was found to overcome them, an early identification and suitable assessment of Investment Risks, Inflation and Escalation of Prices lets Housing Developers make provisions for such an risk event. A prediction of inflation might help Housing Developers procure materials at an early stage while the case with escalation might be different. Fluctuation in availability and that in exchange rate in adequate sources and in availability of funds, cash flow problems, effect of time and cost overrun, if identified can be driven towards assessment, which is the case with many developers in Kathmandu Valley. Local and national taxes, too are perceived to be risks by many. Unless a sudden change in the laws concerning them, it should not be perceived to be risk and should be paid off in time. Fluctuating demand scenario and constantly changing market conditions, too, when identified seemed to help Housing Developers overcome Financial and Economic Risk.

9. Risk management was found to play a significant role in overcoming Health, Safety and Environmental Risks. Certain factors like unsafe working conditions and non-conformance to statutory requirements for workers safety might lead to severe hazards. Most of the developers in Kathmandu Valley seemed to have obtained considerable impact having identified risks of healthcare and environment protections and that of absence of safety audit along with that of inadequate healthcare, security, firefighting and disaster management capabilities. Risk of accidents/strikes/work stoppage and worker perceptions, when identified, helped developers to care for them and their safety overcoming Health, Safety and Environmental Risks which if not identified, would not have led to their overcoming.

10. A significant role was found to be played by Risk management in overcoming Leadership Risks. Leadership risks can be very disastrous to any developers anywhere. It includes risks such as no project vision, no team building, poor motivation among participants, and high turnover of critical team members, indecisiveness, unreasonable stakeholder expectation and lack of senior management support. Identification of these risks helped

Developers of Kathmandu Valley overcome them. Identification also helped them overcome other sort of Leadership Risks like lack of team consensus over project plans, limited authority/control of the project manager, poor communications, poor industrial relations, high rate of sickness and absenteeism, unsafe working conditions resulting in accidents and poor turnover, conflicts among staff and participating organizations, lack of co-ordinations, insufficient liaison with public services and barriers in information communication.

11. Risk Management was not found to play any role in overcoming the Organizational Risk. Housing Developers in Kathmandu Valley could not overcome Organizational Risks even after their identification. Organizational Risks like Inappropriate Organization Network, poor assignment/allocation of tasks and responsibilities, lack of competent persons, no project manual/documented procedures/processes, project being too complex for the resources available along with inadequate communications infrastructure, wrong selection of project management, no database, inflexible and unrealistic project plans, poor quality control, unsatisfactory conduct of status review meetings, inability to take timely corrective actions, incomplete project closure, even after trying to manage those risk, were not found to lay any impact on positive directions. Developers were bound to suffer this risks as uncertainty where proper assessment is very difficult due to which it might not be found to have impacted by the Risk Management process .

4.4. Conclusions

This research indicates that more than 80% of respondents believe that their top management are highly aware regarding the risk management, with the mean score of 4.03. Further, it is also found that Risk management is being highly practiced either formally or informally by housing projects in Kathmandu valley with the mean score of 3.83. The research shows slight decrease in formal risk management practise. Mean score was found to be only 3.36 and around only 43% of respondents reported that risk management is being formally followed in their projects. This research mentions the status of housing developers of Kathmandu valley following the risk management. From this research it is found that mostly the management are aware about the risk management and are practising it with their experience, knowledge to some extent but not in full package. Generally they are found to be focused on risk of scheduled time and cost. Very less responses, among the received, were found confident that their organization is following the risk management in formal way.

This research also sets insights into the significant factors of risk in the context of construction projects in Nepal. The most significant factors of risk in construction projects of housing in Kathmandu are Time overrun risks, cost overrun risks, quality risks, projects scope risks, design and specification risks, contractual risks, financial and economic risks, organizational risks, safety health and environmental risks and leadership risks.

All three independent variable (Risk Identification, Risk Assessment and Risk Response) have significant impact on 8 (out of 10) success criteria viz. Scope well defined, Technical Specification compliance, Planned budget, Achieving Quality standards, Adherence to schedule, Overcome Financial and economic risk, Overcome of Safety, Health and Environmental Risks, Overcome of Leadership Risk. Also all three independent variables does not found to have impact on 2 (out of 10) success criteria viz. Overcome Contractual Risks and Overcome of Organizational Risk. The conclusion can be drawn that there is really high impact of risk

management practice in the success of project. Hence it can be concluded that success of construction project also rely on the methods and way of practising the risk management in the projects.

4.5. Recommendation

- Senior management should be trained for the practice of risk management using the formal techniques.
- The organization should prepare the risk management plan for their projects and should provide appropriate level of control regarding the risks that it faces
- The organization should monitor the effectiveness of risk management as an integral part of management reporting.
- To manage the risk effectively and efficiently, the organizations should made contractor understand the risk responsibilities, risk event conditions, risk preference and risk management capabilities

4.6. Limitations of the Research

This study explore the current practices of risk management that are being followed in housing projects of Kathmandu valley only and their impact on construction projects' success. For this research, developers who perform either apartment type project or individual housing project or both, are considered rather than Individual owners.

Limitation: This research sets sights on introducing the impact of risk management on construction projects success from the owners' and their employees' perspectives only.

Acknowledgements

References

[1] K K Chitkara. Construction Project Management. New Delhi: Tata McGraw Hill, 2011.

[2] M. P. Koirala. "Risks in Housing and Real Estate Construction Project." PhD scholar, Shingania University Rasjasthan, India, 2011.

[3] D. P. Mootanah. "A Strategy for Managing Project Risks in Value Management Studies" in Save International Conference Proceedings, 1998.

[4] H. H. Alshibly. "The impact of risk management on construction projects success." Interdisciplinary Journal of Contemporary Research in Business, vol. 5, pp. 12-43, Aug. 2013.

[5] D. W. Chan and M. M. Kumaraswamy. "A comparative study of causes of time overrun in Hong Kong construction projects." International Journal of Project Management, vol.15, pp. 55-63, 1997.

[6] N. Ritter. "Understanding a widely misunderstood statistic: Cronbach's alpha."paper presented at Southwestern Educational Research Association (SERA) Conference, New Orleans, LA, 2010.

[7] A.K. Mishra and M.Shrestha." Health and Safety Status of Casual Workers in Road Improvement Project Kathmandu Valley, Nepal." International Journal Engineering Technology Science and Research, Vol.4,pp.1187-1199,2017