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INTRODUCTION

Construction team communication is a crucial factor for successful project implementation. By improving construction team communication, high productivity can be achieved. Therefore, as a project manager it is essential to effectively manage the construction team communication process; identify stakeholders, plan communication, distribute information, manage stakeholder expectations and report performance in order to boost project performance. Most researchers have revealed that, due to the use of various communication tools, team communication between internal and external stakeholders become ineffective without clear guidance from management and involvement and commitment from all construction team members. Therefore, this research is aimed at investigating how construction team communication could be effectively managed by Project Managers in Sri Lankan Construction Projects.

Broader Research Problem

When considering construction team communication management phenomena, majority of researches have been carried out for virtual construction teams and in widely geographically-dispersed teams. However, less research is done on less geographically-dispersed construction project teams such as a team operation in one region. Hence, more researches addressed information communication technology (ICT) based communication and not focused for close communication settings. Further, when considering construction team communication management domain, there is lack of research on holistic view of each steps of construction team communication management process. Therefore, this research anticipates filling the research gap by introducing an effective construction team communication management process for Project Managers in Sri Lankan construction projects. In order to accomplish the aim of this research, four objectives have been identified.

Aim and Objectives

Based on the background study, the aim of this research was "to investigate how construction team communication could be effectively managed by Project Managers in Sri Lankan construction projects". The four objectives are; to identify the terms "construction team communication" and "communication management process" in project context, to identify current construction team communication in Sri Lankan construction projects, to explore tools and techniques used in construction team communication management process in Sri Lankan construction projects and to suggest an effective construction team communication management process for Project Managers in Sri Lankan construction projects.

HIGHLIGHTS

- Established construction team communication management process with feedback loops for distribution of information, managing stakeholder expectations and performance reporting
- Discovered six reasons for not practising specific tools and techniques of the construction team communication management process
- Explored types of documents and data exchanged and tools and techniques used in each step of the process
- Identified prevailing used tools and techniques in each steps in the process with industry perspective
- Rendered pattern-matching to reveal how far literature synthesis is validated by research findings.

METHODOLOGY / PROCESS

In order to achieve the above mentioned aim and objectives, a comprehensive literature survey was carried out to achieve first two objectives and following research method was adopted to achieve remaining two objectives.

Further, Shaw (1999) has explained that qualitative research allows the subject being studied to give much 'richer' answers to questions put to them by the researcher and may give valuable insights which might have been missed by any other methods. Therefore, a clear boundary of study cannot be predefined in a phenomenon and if a holistic and in-depth investigation is required, qualitative research method can be used as a scientific method as a way to build more complete understanding of reality.

Case study Research

Yin (2003) has defined the case study research method "as an empirical inquiry that investigates a contemporary phenomenon within its real life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." Therefore, case studies emphasize detailed comprehensive contextual analysis of a limited number of events or conditions and their relationships, which cannot be separated from their context. Since the aim of this research required an in-depth explanatory study, case study research strategy was selected.

To compare different results on construction team communication management process in construction projects, two cases from public sector (A) and private sector (B) projects were selected due to time constraint and convenience. Further, multiple-case design was applied to this study, which derives directly through literal replication, where choosing cases that have similar settings and are expected to achieve similar results. Data collection within the case study was based on semi-structured interviews with case study participants, using an adopted interview guideline to ensure that all issues are explored. Eventually, accumulated views and comments concerning the case study research findings were analyzed using appropriate tools and techniques in qualitative data analysis; cross-case analysis, content analysis, cognitive mapping and write-up to report the outcome of third and fourth objectives respectively.

RESULTS / OUTCOMES

When critically analyzing both case A and case B, construction team communication management process can be suggested in following manner as depicted in Figure 1.

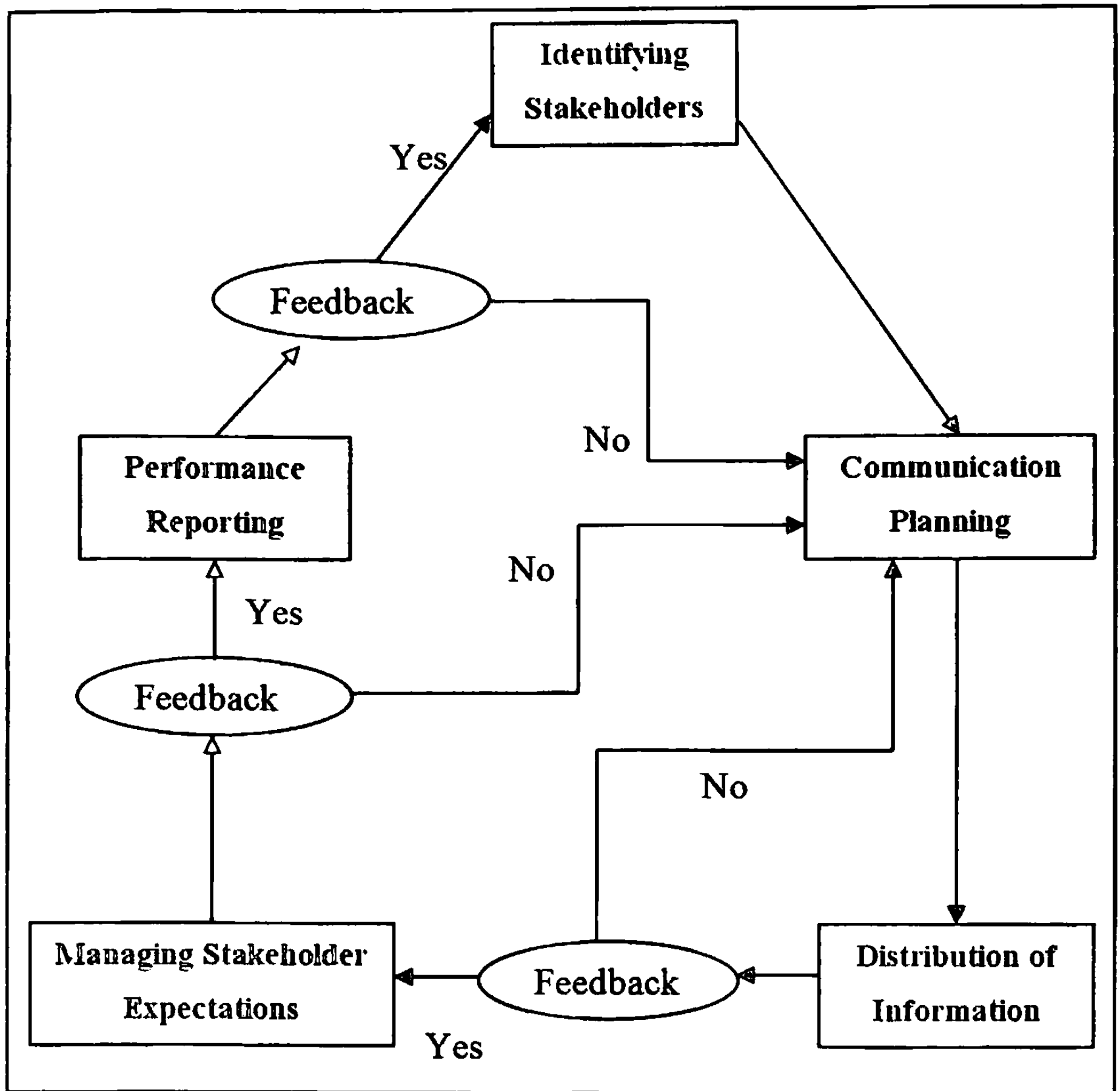


Figure 1 - Proposed Communication Management Process for Construction Team

According to accumulated views and ideas of most of case study participants regarding types of documents used and tool and techniques used in each step, following Table I was prepared.

Table 1: Type of Documents and Data Exchanged and Tools and Techniques used in each step of Construction Team Communication Management Process

Construction Team Communication Management Process	Type of Documents and Data Exchanged in Each Step	Tools and Techniques used in Project Teams
1. Identify stakeholders	Contract document, letters, memos, drawings, specifications, faxes, BOQs, programme, finance documents, profit and loss accounts, safety plan, quality plan, resource plan	Organize social meetings (get-together and parties), cultural social responsibility works to enhance livelihood facilities of inhabitants
2. Communication plan	letters, memos, faxes, telephone calls, meeting minutes, drawings, specifications, BOQs, programme, log notes	past experience, previous projects evaluation reports, communication modes and communication channels
3. Distribution of information	Method statement, meeting minutes, letters, BOQs, emails, memos, circulars	communication methods, hard copy and soft copy distribution of information
4. Manage stakeholder expectation	Enterprise Resource Plan (ERP), customer evaluation chart, supplier evaluation form	Communication types, communication channels, management skills, leadership qualities and negotiation skills
5. Performance report	Performance reports, progress reports, meeting minutes, request for information, weather reports, labour histogram, cash flow forecasts	communication methods, reporting tools, progress review meetings and face-to-face discussions at site

Similarly, the tools and techniques currently practised by the industry on construction team communication management process have to be identified in a detailed manner with justifications made by interviewees. Therefore, those prevailing used tools and techniques with industry perspective are shown in Table 2.

Table 2: Industry Perspective for using Proposed Tools and Techniques in Construction Team Communication Management Process

Step	Tools and Techniques	Case Description
1. Identify stakeholders	❖ Stakeholder analysis	In case B, almost all case study participants suggested, " both stakeholder analysis and expert judgement play a vital role in identification of stakeholders, since their behaviour cannot be predicted. "
	❖ Expert judgement	In both case A and case B all case study participants expressed, " expert judgement can be used to identify stakeholders ".
	❖ Organize social meetings ❖ Organize corporate social responsibility work	Consultant of case B expressed " we have organized social meetings such as get-together and parties, corporate social responsibility work to enhance livelihood facilities of inhabitants to build-up relationships and identify their potential threats and interests. "
2. Communication planning	❖ Past Experience ❖ Previous project evaluation reports	The consultant of case B expressed that " we refer past experience, previous project evaluation reports and communication methods to prepare communication plan in more realistic manner. "
	❖ Communication modes ❖ Communication channels	The consultant of case A stated, " communication types and communication channels are used to communicate with people. "
3. Distribution of information	❖ Verbal and non-verbal communication methods ❖ Hard copy distribution ❖ Soft copy distribution	Almost all case study participants in both case A and case B expressed " we use communication methods such as letters, progress review meetings etc., hard copy distribution tools to keep as evidence and soft copy information distribution for speedy distribution. "
4. Manage stakeholder expectation	❖ Communication methods ❖ Communication channels ❖ Management skills (Leadership qualities, negotiation skills and writing skill) ❖ Interpersonal skills	<ul style="list-style-type: none"> ❖ The consultant of case A stated "we use communication methods such as letters, CVI, progress review meetings, management skills such as leadership qualities, negotiation skills and writing skills are used as tools and techniques in this step." ❖ The contractor of case B's vision was "since this step is used to identify customer satisfaction, interpersonal skills and management skills are necessary." ❖ All case study participants of case B expressed, "we use communication channels to manage stakeholder expectation, since various types of stakeholders involve in the project."
5. Performance report	❖ Variance analysis ❖ Judgemental method to forecast ❖ Communication methods ❖ Reporting tools	<ul style="list-style-type: none"> ❖ The contractor of case B explained, "By using variance analysis, we identify how we maximize the profit." ❖ The consultant of case A expressed, "by using judgemental method we can foresee the performance of the contractor." ❖ Both case study participants stated, "We use both hard copy and soft copy communication methods to report performance." ❖ All of them have mentioned, "We use progress reporting as reporting tools."

THEME 8

Table 3 below is focussed for comparison with the literature findings against the case study findings of construction team communication management process in relation to the construction industry which further reveals how far the literature synthesis was validated by research findings.

Table 3: Pattern Matching between Theorized Data and Observed Data

Theorized Data	Observed Data
Identifying Stakeholders	
❖ The identification of stakeholders is more concerned with their instrumentality, organization's capacity and this is needed to prepare communication protocol and to obtain approvals from relevant regulatory bodies.	❖ At the initial stage of the project, it is necessary to obtain approvals from various regulatory bodies, such as; Urban Development Authority, Municipal Council, Fire Department, Central Environment Authority etc.
❖ Stakeholder analysis and expert judgement can be used as tools and techniques	❖ Stakeholder identification is done through judgements made by their competence
Communication Planning	
❖ This is the process of determining the information needs at project stakeholders and define a communication approach	❖ Communication plan is crucial to determine project stakeholder information needs and define communication approach.
❖ In actual practice public sector project managers do not use communication plan and the most of the time they communicate with parties when some party asking information	❖ Since they are in government sector organization, they often use traditional types of communication methods to communicate information.
❖ Communication requirement analysis, communication technology, communication models and communication methods are tools and techniques in planning of communication.	❖ Past experience, previous project evaluation reports, communication modes and communication channels are used as tools and techniques in planning of communication.
Information Distribution	
❖ Distribution of information is the process of making relevant information available of project stakeholders.	❖ Distribution of information is essential to identify whether their message is properly communicated without any disturbances or not.
❖ The information should be clear and direct as possible, limiting areas in which misinterpretation could arise.	❖ The purpose of this step is to correct and right information should be delivered to right person at right time with feedback at right quality.
❖ Construction team context, the most of information distribution is done through hard copy documentation such as; letters, memos, faxes and meeting minutes.	❖ Case study participants use verbal and non-verbal communication methods, hard copy distribution (letters by post or by hand) and soft copy distribution (through emails) as information distribution tools and techniques.

Managing Stakeholder Expectation	
❖ Project's success or failure is strongly influence by both the expectations and perceptions of its stakeholders.	❖ The consultant of case A expressed that managing stakeholder expectation is to identify stakeholder perception regarding the project which is positively or negatively affected.
❖ Managing stakeholder expectations is the process of communicating and working collaboratively with stakeholders to meet their needs, concerns and addresses their issues.	❖ The client of the case B emphasized that they have to maintain good relationship with both contractor and consultant through treat them impartially, due to they may work loyalty.
❖ Communication methods, interpersonal skills and management skills as tools and techniques for managing stakeholder expectation	❖ The most of industry professionals used communication types, communication channels, management skills, leadership qualities and negotiation skills as tools and techniques in this step
Performance Reporting	
❖ Performance reporting is the process of collecting and distribution of performance information.	❖ This is important to examine and review the actual progress of the project. Further, they have pointed out feedback of performance reporting also should have to be included under the process for its continuous flow.

When analysing reasons for not practising specific tools and techniques of each step of construction team communication management process, they can be illustrated in the following cognitive map given in Figure 2. As per Figure 2, there are six reasons identified as research findings for not practising specific tools and techniques with quotations made by interviewees.

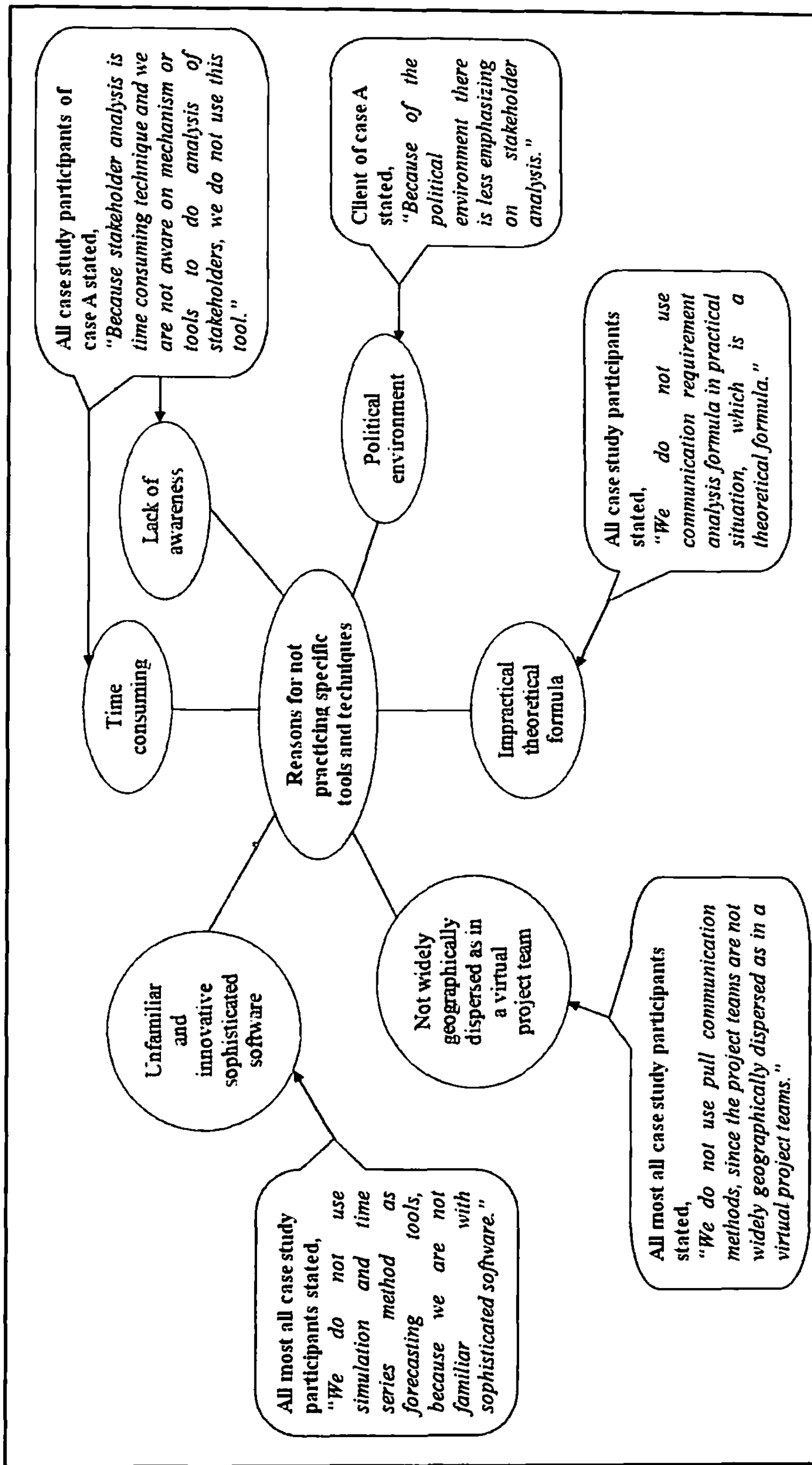


Figure 2 - A Cognitive Map for Reasons for not Practicing Specific Tools and Techniques of Construction Team Communication Management Process

CONCLUSION

The aim of the research was to investigate how construction team communication could be effectively managed by Project Managers in Sri Lankan construction projects. Having focused on this aim, four objectives were formulated. The first two objectives were successfully achieved through literature survey and last two objectives were achieved through an empirical study.

By analyzing of multiple case study research findings following outcomes were discovered;

- Purpose of each step, stakeholders involved in each step, type of documents and data exchanged and tools and techniques used by construction teams in Sri Lankan context
- Suggestions to improve each step by using identified tools and techniques
- A cognitive map (refer Figure 2) on reasons for not practicing specific tools and techniques
- Pattern-matching to reveal how far literature synthesis was validated by research findings
- Construction team communication management process was established with feedback loops for distribution of information, managing stakeholder expectations and performance reporting.

Considering the findings of this research, it is worth recommending that the every Project Manager should understand the entire construction team communication management process and how its' tools and techniques are used to achieve project goals.

The measures such as construct validity and internal validity were applied to validate the research. However, still there are number of limitations in generalizing the findings of this research; mainly, the cases for this study were selected on building projects in both public sector and private sector on traditional procurement method with project period of more than two years. Therefore, the generalization of the research findings is limited to the same population and which can be accumulated to existing literature synthesis. The research data is based on opinions of people, which were confirmed by observations as well as opinions of opposition parties of case study participants.

Eventually, followings could be given as suggestions for further research, which emerged out of this study;

- A study on how communication barriers affect the effective construction team communication
- A study on how to manage stakeholder expectations in a construction project to achieve project objectives
- Develop an effective construction team communication management process for integrated procurement method