Appendix C

Qualitative analysis (thematic matrix)
The need for variation orders management system

Impact of variation orders

- Significant negative impact: 1,8,11,14,15,18,20,23
- Detrimental variations have greater impact: 1,8,14,18
- Beneficial variations need to be managed: 1,14
- Delay in the design stage: 2,5,9,10,18
- Cost overruns: 2,9,18
- Design errors: 8,14
- Disputes and conflicts: 4,17,21
- Quality defects: 6,14,21
- Design productivity: 14
- Effective design: 9,18
- Design Performance and progress: 13,18

How do manage variation orders

- No formalised approach: 1,4,9,14,22
- Simple process: 1,14
- Reviewing the design: 8,16,18
- Providing information about variation orders: 7,19
- Negotiation: 4,8,21
- Estimating the cost and time of the variation orders: 3,14,19
- No problems with variation orders management: 5
- Variation orders are normal to occur: 1,5
- Variation orders are easy to manage: 4,5
- Having good relation with the consultant: 2,5
- Well identification of the change: 14,18
- Good evaluation of the change: 14
- Getting the approval and implementing the change orders: 18

Documenting and recording the change: 11,14,18

- Reporting to the client for need of variation order: 20,23
- Having good project management practices: 16,17,21
- Looking how variation orders are done from previous projects: 13,18
- Time of applying any change is different depends on the variation: 1,13
- No need for client approval for some minor changes: 9,13,18,21,22
- Lack on written down contracts: 14,18
- Change in one discipline affects others: 14,19,21
- Lack of training courses and workshops: 22
- Poor definition of change management: 18
- Late design changes: 8,14,21
- Insufficient change details: 10,19,20
- Lack of professional engineers: 2,5,12,13,19

Problems associated with the current variation orders management

- Poor change management: 2,8,11
- Lack of trust: 9,10,12,20,23
- Lack of awareness: 8,14
- Poor relation between client and consultant: 1,16
- Initiating variation orders after the finalised design: 4,17
- Lack of competitive process: 9
- Bureaucracy of public sectors: 18
- No attention to negative impact of variation orders: 7,17
- Variation orders affect our other projects: 14
- Absence of change management system practices: 1,19
- Clients should provide more details about the variation orders: 9,11,21
- No enough attention to the design stage: 4,5,9,22
- Consultants making design changes without consulting the client: 1,3
- Need for strong structure for variation orders management: 1

Using models/ frameworks to manage variation orders

- Currently no existing model or framework to manage variations: 1,2,3,7,9,11,14
- Just with joint-venture with international consultants: 14
- Having no ideas about models or frameworks to manage variation orders: 1,2,4,7,9,10,13,17,20,22,23
- Having ideas about models or frameworks to manage variation orders: 1,2,4,7,9,10,13,17,20,22,23

Causes of not using models/ frameworks

- Lack of awareness about the importance: 14,18,20
- Lack of knowledge: 1,9,14,17
- Lack of experiences with change management: 18,21
- Lack of sufficient contracts: 8,10,14,15
- No effective communications: 2,10,16,18
- Assuming that it is complex: 1,13
- Scope of the project is not clear enough: 19,22
- Causes of variation orders are not identified: 8,11
- Initiating high amount of variations orders by the client: 8,13,18
- Requesting the variations to be implemented immediately: 12,19
- Clients are not educated about using models and frameworks: 14
- No enough meetings with the clients: 11,19,21
- Choosing consultants without competitive process: 8,11

The existing model/ framework to manage variation orders

- Straightforward process to manage variation orders: 11,14,18,20
- Identifying the variation order: 9,17,18,19
- Cost and time estimations: 2,7,18,14
- Approval of the variation orders: 8,9,13,14,18
- Implementation of the variation order: 2,14,18
- Documentation of the variation order: 14,18

Problems with using model/ framework to manage variation orders

- Assuming it is hard to be applied: 1,5,9,17
- Lack of awareness of change management systems: 1,18,23
- Need for training courses and workshops: 4,5,18
- Need for professional and qualified engineers: 1,5,18

The need for variation orders management system

- Significant need: 1,3,5,14,18,20,23
- Would assist us to better manage variation orders: 11,14
- Would help us to identify the variation orders: 1,5,13
- Analysing the variation order comprehensively: 1,12,18
- Leading to have effective design and review process: 9,14
- Better understanding for variation orders: 18
- Avoiding unforeseen design errors: 19,22
- Need for strong structure for variation orders management: 1

Training courses, variation process and contract’ terms must be reviewed before applying a change management system: 11,18,21