

CHAPTER (6)



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***Conclusion and
recommendations***

After researching extensively about the “Problems faced by contractors in speedy construction of pre engineered steel buildings”, I wish to state the conclusions and recommendations arrived at, in the next few paragraphs.

6.1 CONCLUSIONS

The key to business success in this fast moving, highly volatile and demanding age, is to be driven by a strong sense of competitiveness and determination towards fulfillment of the basic market driven needs of the clients. There will be more customers, more purchasing power, more options, and more opportunities, but also more competition. The only way out of this conundrum will be to add more value to the orthodox product or service, in order to keep abreast with the modern concept of aiming for customer delight, instead of mere customer satisfaction of old. Speed is a highly desirable value, which might play a major role in determining the success of the pre-engineered steel construction field, as in any other in this age. The study carried out and detailed in this report identified pressing problems of contractors in speedy construction of pre-engineered steel buildings.



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Financial

It is felt that in this type of speedy construction projects, many problems are created due to irregular, unpredictable cash flow, which in turn is due to various reasons, such as insufficient advance payment, delayed bill payment methods, overloaded extra work etc. Table 5.16 shows the difference between the cash flow of a PEB short duration project and that of an orthodox project. The problems faced by contractors involved in pre-engineered building trade is far different to the problems faced by contractors involved in other major civil works, since the number of projects handled by the former is comparatively larger and the duration of the projects is shorter. Therefore financial commitment at a given time is higher, resulting in a negative cash flow in the early stages of a project. When this situation occurs frequently, that deficit has to be supplemented by resorting to other sources for the existence of the company.

According to the study, factors causing negative cash flow in a pre-engineered builder include:

- ~ Insufficient advance payment for the projects which is not dependent on any deciding factors of the project.
- ~ Unsuitable billing intervals and bill correcting methods which delay payments to contractors by more than a month. (60% of projects – table 5.4).

- ~ Extra work within the previously estimated time without proper notice or timely payments.
- ~ Postponing or failure to pay retention money on time.

Project delay

Among the problems addressed, delays in project duration creates a bottleneck in the success of speedy construction of pre engineered buildings. The duration of a project is not generally influenced by any other deciding factors like, the size of the building, contract sum, project location etc. The completion date of the construction is specified by client's demand which may be influenced by pressure from investors. Therefore, lack of time in arranging resources such as funds, men, machinery, materials and methods, create a stressful situation in these projects.

Factors affecting the speed of work leading to delays in project completion date include:

- ~ Inefficient money supply by the client within the project duration
- ~ Inefficient money control by the contractor affecting supply of material to the site
- ~ Delays in supply of material to the site within the limited short time frame.
- ~ Labour related problems in the site
- ~ Incorrect soil reports and unforeseen ground conditions
- ~ Insufficient time to acquire all BOI facilities such as electricity, water etc.
- ~ Technical and practical difficulties which arise in steel erection work.
- ~ Delays in completing projects may happen due to a combination of factors, like adverse weather conditions, if "free floating duration", is not scheduled.

Labour problems

Pre-engineered buildings are a special category of projects, which have short project duration with a large contract sum. The management of a project plays a vital role in manipulating this speedy work without any sacrifice in cost and quality,

According to the study factors that affect the performance of the project crew:

- ~ Non skilled workers. :
Out of surveyed projects, 94% of projects staff have not receive any training on PEB systems with the introduction of new components of building parts.
- ~Lack of industrial training.
- ~ Heavy workload and ignoring of holidays. 88% of projects (table 5.9) ignored holidays during the construction work and most of the projects were overloaded with work during last two weeks of the project.
- ~ Improper salary payment such as monthly payment frequency, does not assist to solve the financial problems of the workers. (78% of surveyed projects – table 5.9)

Conditions of contract

Rules and regulations for this type of construction work falls under the ICTAD conditions of contract, which has two categories for small civil works and major civil works, based on the contract sum. But unfortunately there is no specialized categorization for the speedy construction of pre engineered buildings with emphasis on project duration as a criteria.

According to the “Conditions on payment” specified by the “ICTAD conditions of contract”, the client or the consulting engineers representing the client, is allowed to retain the contractor’s monthly claim up to 30 or 50 days.

Norm based proportionately on either the contract sum or the contract period is not adhered to in the conditions of contract in the construction industry at present. It is apparent when considering the fact that the advance payment for a project, does not depend on the project value and most of the projects practice design and build concept. Therefore loopholes in this type of contract are:

- ~ Very expensive tendering procedure
- ~ Extended project designing procedure which begins at the tendering stage and finishes with the project completion
- ~ Clearly defined roles of the contractor and the consultant become confused.
- ~ Loss of independent architect /engineer

Pre engineered steel system

Among some of the problems which arise in speedy construction of pre engineered buildings, are structural and technical faults. These include structural incompatibilities such as degree of roof slope, ponding due to lesser thickness of the roofing sheet, non standard size of the roof nails and the grove size of the roof covering, unusable and warped steel sections, weak or unsuitable nuts and bolts for connections etc.

Major delays in pre engineered buildings can generally be traced back to major faults by the steel supplier. Once they receive full payment from the client (at the initial stage by a letter of credit), the client and the contractor are compelled to be obliged to the steel supplier.

Lack of trained personnel in this field creates some labour problems, specially with the introduction of various new products.

In this type of speedy construction work, often, projects start without adequate pre construction planning. Therefore changes may occur while construction is on going. Since the contractor is not given the steel design calculations (structural frames and foundations), he is unable to make any adjustments or additions to the building.



6.2 RECOMMENDATIONS

Financial

1. The authorities should be more committed to ease some of the difficulties faced by contractors involved in speedy construction of pre engineered buildings, by way of low interest loans, subsidized rates for machinery and other tools of the trade.
2. The government should introduce a comprehensive plan to encourage and motivate those involved in the civil construction field, in order to create a healthy environment for sustainable growth in this sector.
3. To ease the contractors' cash flow, it is recommend that the condition of contract be modified to consider the capital investment required to initialize and maintain the requirements of an on-going project, such as supplies and other necessities, rather than focusing on the finished product.
4. It is also recommended that, to ensure the payments to the contractor, the clients should open letters of credit in favor of the contractor.
5. More guarantees and bonds have to be provided by the contractor, such as advance payment, performance bond and liquidated damages for the delay in projects etc. It was expressed by all the interviewees, that these burdens should be more equally shared. The contractors too face difficult situations due to unpaid or delayed bill settlements.
6. As the contractor currently has little opportunity of inducing the client to make timely payments, a guarantee, by way of a bond or other financial tool should be used as insurance against non payment or delayed payment of bills.
7. The payment pattern practiced between client and contractor should be standardized, with a reasonable margin of flexibility allowed, in order to ensure that an acceptable ratio is maintained between the portion of work completed, and the payments made to the contractor.
8. Absence of a responsible controlling body, which could intervene in discrepancies of a financial nature, which arise between the contractor and client is acutely felt.
9. In order to prevent the unethical utilization of the submitted project proposals, drawings, estimates etc., according to the expensive concept of design and build which discussed in section 6.8.1, the client should be forced to pay the contractor for these documents.

Project delay and labour

Pre-engineered building industry is a special category of projects, which have short project duration with a large contract sum. In manipulating this speedy work without any sacrifice in cost and quality, the management of the project plays a vital role.

Contractors undertaking pre-engineered building projects need to be selective when choosing the key personnel of the project. A dedicated and efficient staff, is a valuable and indispensable asset for this type of projects. In order to ensure a smooth functioning of a project, the following guidelines can be adopted;

To avoid delays and stressful situations on site:

1. Adhere to the project's main work schedule
2. Conduct site meetings with the site staff about work progress & labour problems at end of each working day, and inform relevant parties where necessary.
3. Good coordination within and among the project's function groups.
4. Provide incentives and reward schemes for efficiency and hard work, health schemes, safety and insurance etc., to improve the employee-employer relationship.
5. Train people within and from outside the company to enhance their skills.
6. Train people for team work and make several groups with team leaders.
7. Arrange functions and activities in order to improve loyalty to the company and the management, and to break the monotony of their work schedules.
8. Proper salary payment scheme.

Conditions of contract

1. It is necessary therefore, to recognize this type of contracts as a special category of “short duration projects”. Most of the interviewees recommended that the bill correcting and arranging the payment to the contractor should be within a period of 14 days.
2. In addition, it is recommended that the minimum advance payment percentage of 10% which is not influenced by any other deciding factors such as project size, location, complexity etc., should be increased to 30% to avoid the cash deficit at the 2/3 stage of completion of a project.
3. Among the practiced procurement methods, lump sum or turnkey procurement method shows a tendency to be more suitable for short duration projects, (less than 4 months) with contract sums between Rs.15.0 – 18.0 million, while the “design and build” method may be considered more suited to medium scale projects with a project duration of about 5 months, with a contract sum between Rs.20.0 – 40.0 million.
4. ICTAD conditions are based on measure and pay civil engineering contracts. However, during the research it was observed that this document is widely used for pre engineered buildings without essential modifications. Hence it is recommended that the client should use a form of contract based on supply and installation type contracts, for this kind of construction with two stage bidding.

Pre - engineered steel system

1. As the main component of the PEB system is the steel structure, the quality and timely delivery of same is significant. Given this situation, it is considered important for the client, who is the end user of the product, to be more closely associated with the supplier, and preferably have a binding agreement between the two parties, which will pave the way for a comparatively trouble free progress of the project.
2. The pre- engineered structure and associated accessories, should meet the SL Standards. If the said structure and accessories are found to be below acceptable standards, the supplier should be held responsible for compensating same either by replacement of such inferior products, or monetary compensation.
3. To avoid the practical problems faced by the contractor at the site with the introduction of new components over the standard sections, the steel supplier should be pressurised to provide training to the erection staff as this will improve the quality of the final product and maximise the efficiency of the personnel.

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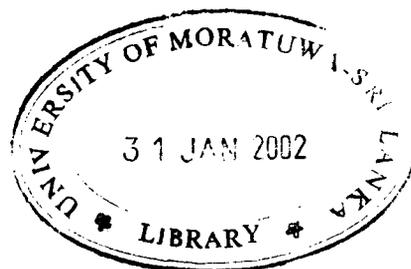
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APPENDICES



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Appendix A - A blank questionnaire

Questionnaire for Identifying & Assessing the Problems Faced by Contractors in Doing Speedy Construction of Pre-Engineered Steel Buildings.

One questionnaire is to be completed for each Pre engineered project

REF: NO :..... /

1. GENERAL ORGANIZATIONAL INFORMATION

1.1 Name of the Organization

1.2 Registered Address :

.....

.....

.....

1.3 Nature of organization : Sole Proprietorship Partnership

Public Ltd., Liability Co. Private Limited Liability Co. Statutory body

1.4 Interviewee - Name :

Designation



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1.5 Contact Telephone Nos. :

1.6 How long have you been doing
Pre-engineered structures? :

2. GENERAL DETAILS ABOUT THE PROJECT

Please write or tick off the answer/answers for the following questions based on your experience.

2.1 Nature of the Project:
.....

2.2 Location of the project
.....

2.3 Approximate size of building
Length Width Eave Ht.
No. of stories No of middle columns

2.4 Approximate project duration :



Mismatch in bolt holes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra works like cutting/ fabrications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damaged sections (warped, cuts, tire)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shortage of bolts, bracings etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5.2 During maintenance periods what were cause of repair works you were requested to carry out in the steel structure in following areas:

- Roof covering - Leaks to improper nailing
- to ponding since thin sheets
- to ponding since much space between purlin
- to lack of lap length of sheets
- Steel members- painting to corrosion
- Any disorientation due to weak fasteners

5.3 Was there any way to compensate the contractor for the errors of the steel supplier ?

Yes No

5.4 Were the instructions given

- Difficult to implement Unnecessarily strict quality control
- Unrealistic standards to Sri Lanka Costly methods
- Precise and adequate

5.5 Did the supplier actually provide all the items in the packing list as it is for the complete building? Yes No

5.6 Did steel supplier provide,

- Drilling machine Screw holding sockets Impact wrenches

6. ABOUT STRUCTURAL VIABILITY

6.1 Did the supplier provide design Calculations and loads considered for the buildings with the building components ?

Yes No

6.2 Did the supplier request from you the soil condition of the site to design the steel structure?

Yes No

6.3 What was the approximate roof slope they provided?

6.4 What were the repairs the contractor was requested to carry out in following areas as defaults:

	Yes	No
Wall cracks Due to lack of wind bracing	<input type="checkbox"/>	<input type="checkbox"/>
Due to inadequate stiffener columns	<input type="checkbox"/>	<input type="checkbox"/>
Since the walls touches with the steel column	<input type="checkbox"/>	<input type="checkbox"/>
Since no tie beam is provided	<input type="checkbox"/>	<input type="checkbox"/>
Due to foundation settlements of failed Foundation designs	<input type="checkbox"/>	<input type="checkbox"/>
Since floor tie beams are not provided	<input type="checkbox"/>	<input type="checkbox"/>

6.5 Cracks appeared after Months

6.7 As you identified, cracks are due to

	Yes	No
Shrinkage	<input type="checkbox"/>	<input type="checkbox"/>
Settlement	<input type="checkbox"/>	<input type="checkbox"/>
Structural movements	<input type="checkbox"/>	<input type="checkbox"/>

7. LABOUR RELATED PROBLEMS

7.1 What degree of satisfaction you have with the skills of the erectors?

Good Fair Not Satisfy

7.2 What are the differences in labour skills needed on pre-engineered structure comparing pre-fabricate building,

	Not much	Fairly High	Very much High
Need more skill workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More risk to erector/builder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High erection cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.3 Was specialized trainer for steel erection provided by the steel supplier?

Yes No

7.4 How many people were employed in (a) civil works?

(b) steel erection work?

What were the working hours? :AM toPM.

What were the holidays :

7.5 How was the salary paid?

Monthly Daily Twice in month

Appendix B1 -Collected data on Organizational Details

NAME OF THE ORGANIZATION	NATURE	EXPERIENCE IN PEB (in years)	REFERENCE NO.
1 Isuru Engineering (Pte) Ltd.	Pvt . Ltd.	6	A/01 - A/16
2 Project Engineering (Pte) Ltd.	Pvt . Ltd.	15	B/17
3 J A T G Engineering (Pte) Ltd.	Pvt . Ltd.	5	C/18
4 Built Mart Lanka Pvt Ltd.	Pvt . Ltd.	10	D/19 - D/22
5 Elemech Engineering Pte Ltd.	Pvt . Ltd.	6	E/23 - E/25
6 Ambanco Construction Pvt Ltd.	Pvt . Ltd.	6	F/26 - F/28
7 K D Lewis & Co.	Pvt . Ltd.	5	G/29 - G/30
8 Sanken Lanka	Pvt . Ltd.	Nill	H/31 - H/32
9 Samuel & Sons	Pvt . Ltd.	Nill	Nill
10 Associated Auto Industries	Pvt . Ltd.	Nill	Nill
11 Conmix (Pvt) Ltd.	Pvt . Ltd.	Nill	Nill
12 Amano Construction	Pvt . Ltd.	Nill	Nill



Appendix B2 - Collected data on projects details

Project	Nature	Location	Size (Sqrs)	Duration(Months)	Procument method	Con.Sum Rs.M
A/01	Garment	Ingiriya	340	6	D & B	26
A/02	Garment	Nittabuwa	200	5	D & B	16
A/03	Garment	Meerigama	201	5	D & B	9
A/04	Garment	Horana	170	3	D & B	8
A/05	Garment	Pannala	460	3	D & B	28
A/06	Garment	Dehiowita	160	4	Turn key	13
A/07	Garment	Pannala	660	6	D & B	19
A/08	W. house	Beruwela	150	4	D & B	4.5
A/09	Garment	Kiridiwela	250	5	D & B	20
A/10	Factory	Biyagama	200	3	D & B	5
A/11	Factory	Biyagama	100	3	D & B	3
A/12	Factory	Biyagama	150	3	D & B	7
A/13	Factory	Katunayake	100	2.5	D & B	3
A/14	Factory	Katunayake	150	2.5	D & B	3
A/15	Factory	Dankotuwa	120	4	D & B	11
A/16	Garment	Mahiyavgana	200	4	D & B	17.5
B/17	Garment	Negambo	200	4	D & B	12
C/18	Factory	Biyagama	60	3.5	Lump sum	3.5
D/19	Garment	Pannala	800	8	D & B	130
D/20	Garment	Katuwellega	440	7	D & B	49
D/21	Garment	Mahiyavgana	270	12	D & B	50
D/22	Garment	Ehaliyagoda	120	6	D & B	14
E/23	Garment	Biyagama	250	6	M.& pay	35
E/24	W. house	Sapugaskan	970	8	D & B	70
E/25	Garment	Nittabuwa	210	6	Turn key	90
F/26	W. house	Horana	200	2.5	Turn key	9.8
F/27	Garment	Panadura	50	3	Turn key	6.5
F/28	W. house	Biyagama	80	2	Turn key	4.4
G/29	Garment	Galagedera	30	5	Lump sum	2.5
G/30	Garment	Minuwangod	30	4	Lump sum	3
H/31	W. house	Muthurajawel	1125	6	M.& pay	70
H/32	Garment	Katunayake	3000	6	M.& pay	40

Appendix B3 - Collected data on Financial Aspects

Project	% Advance	Billing interval	Payment delay (days)	Payment received	Retention received	Extra wk.	Paid for PEB errors
A/01	20	Monthly	30	Installments	Y	F. Paid	N
A/02	20	Monthly	45	Installments	Client has no money	P. Paid	N
A/03	20	Monthly	30	Installments	Client has no money	P. Paid	N
A/04	20	Monthly	21	Installments	Y	F. Paid	N
A/05	20	Monthly	14	Installments	Y	P. Paid	N
A/06	20	Monthly	30	Installments	N-dueto small defects	P. Paid	N
A/07	10	Monthly	14	Installments	Y	P. Paid	N
A/08	20	Monthly	13	Full	Y	F. Paid	N
A/09	20	Monthly	21	Installments	N-dueto unfinished extra wk.	P. Paid	N
A/10	10	Monthly	35	Installments	Y	P. Paid	N
A/11	10	Monthly	35	Installments	Y	P. Paid	N
A/12	20	Monthly	28	Full	Y	F. Paid	N
A/13	20	Monthly	28	Full	Y	F. Paid	N
A/14	20	Monthly	28	Full	Y	F. Paid	N
A/15	20	Monthly	14	Full	Y	P. Paid	N
A/16	20	Monthly	14	Full	Y	F. Paid	N
B/17	20	Monthly	14	Full	Y	F. Paid	N
C/18	20	Monthly	14	Full	Y	P. Paid	N
D/19	20	Monthly	19	Full	Y	P. Paid	N
D/20	20	Monthly	19	Full	Y	F. Paid	N
D/21	20	Monthly	25	Installments	N-dueto small defects	P. Paid	N
D/22	20	Monthly	20	Full	Y	F. Paid	N
E/23	20	Monthly	49	Installments	Client has no money	F. Paid	N
E/24	20	Monthly	35	Full	Y	F. Paid	N
E/25	20	Monthly	14	Full	-	F. Paid	N
F/26	30	Monthly	2	Installments	-		N
F/27	25	Monthly	14	Installments	Y	F. Paid	N
F/28	25	Monthly	7	Installments	Y	F. Paid	N
G/29	20	Monthly	14	Full	Y	F. Paid	N
G/30	20	Monthly	14	Full	Y	F. Paid	N
H/31	20	Monthly	40	Full	-	F. Paid	N
H/32	20	Monthly	40	Full	-	F. Paid	Y

Appendix B4 - Collected data on Assessing Delays

Project	Project delayed (days)	Delay due to	PEB on time	Clients' variations	Technical details on erection
A/01	14	Steel erection	N	Y	Easy
A/02	30	Client has no money	Y	Y	Easy
A/03	60	Client has no money	Y	N	Clear
A/04	7	Labour/Consultant problems	N	Y	Clear
A/05	14	Steel erection	N	Y	Clear
A/06	60	Incorrect soil report	Y	N	Easy
A/07	30	Client has no money	Y	Y	Clear
A/08	14	Steel erection	N	N	Clear
A/09	14	Steel errec./client's material supply	N	Y	Clear
A/10	7	Steel erection	N	N	Clear
A/11	7	Steel erre./Weather	N	Y	Clear
A/12	5	Steel erection	N	Y	Clear
A/13	4	Steel erection	N	N	Clear
A/14	7	Steel erection	N	N	Clear
A/15	7	Steel erection	N	Y	Ambiguous
A/16	14	Steel erre./Weather	N	N	Clear
B/17	30	Civil/Steel drawing/Steel erre.	N	N	Clear
C/18	14	Material supply by contractor	N	N	Clear
D/19	—	—	Y	N	Easy
D/20	—	—	Y	N	Easy
D/21	—	Civil drawing/Weather	Y	Y	Easy
D/22	—	—	Y	N	Easy
E/23	180	Civil drawing/ Weather/Steel erre.	N	Y	Easy
E/24	30	Weather	Y	N	Easy
E/25	14	Weather/Steel erection	N	Y	Easy
F/26	3	Steel erection	N	N	Clear
F/27	6	Labour problem	Y	Y	Clear
F/28	5	BOI problem/Weather	Y	N	Clear
G/29	240	Rocky foundation	Y	N	Easy
G/30	7	Weather	Y	N	Easy
H/31	—	—	Y	N	Clear
H/32	120	Steel erection	N	N	Clear

Appendix B5 - Collected data on Problems of PEB Structure

Project	Problems while erection	Roof leak	Wall cracks (due to)	Provided all items	Provided design calculation	Roof slop
A/01	Incorrect hornches	Improper nailing	Structural movements	Y	Y	5.7deg
A/02	N	Ponding/lack of lap length	lack of wind bracing	Y	N	5.7deg
A/03	N	Ponding/lack of lap length	N	Y	N	10deg.
A/04	Weak fastners	Improper nailing	Structural movements	Y	N	5.7deg
A/05	N	N	N	Y	N	5.7deg.
A/06	Weak fastners/cutting/drilling	Improper nailing	Settlements/Structural move.	Y	N	5.7deg.
A/07	Shortage of bolts	Improper nailing	N	N	N	10deg.
A/08	N	Improper nailing	N	Y	N	5.7deg.
A/09	Cutting/fabrication	Improper nailing/Ponding	N	Y	N	5.7deg.
A/10	N	N	N	Y	N	5.7deg.
A/11	N	N	N	Y	N	5.7deg.
A/12	N	Improper nailing/Ponding	Structural movements	Y	N	5.7deg.
A/13	Shortage of bolts	N	Inadequate stiffner column	Y	N	5.7deg.
A/14	Shortage of bolts	N	Inadequate stiffner column	Y	N	5.7deg.
A/15	Shortage of bolts	N	N	N	N	5.7deg.
A/16	N	N	N	Y	N	5.7deg.
B/17	ortage of bolts/cutting/fabricati	N	N	N	Y	10deg.
C/18	ortage of bolts/dameged secti	Improper nailing	Structural movements	Y	Y	10deg.
D/19	N	Improper nailing	Shrinkage	Y	Y	5.7deg.
D/20	N	N	Shrinkage	Y	Y	10deg.
D/21	N	Lack of lap length	Shrinkage	Y	Y	5.7deg.
D/22	N	Improper nailing	Shrinkage	Y	Y	10deg.
E/23	Shortage of bolts	Improper nailing	Settlement	Y	Y	5.7deg.
E/24	Shortage of bolts	roper nailing/lackof lap len	Structural movements	Y	Y	5.7deg.
E/25	Shortage of bolts	Improper nailing	N	Y	Y	9.5deg.
F/26	N	N	N	Y	Y	5.7deg.
F/27	N	N	N	Y	Y	5.7deg.
F/28	N	N	N	Y	N	5.7deg.
G/29	Changes in purlin length	N	Shrinkage/settlement	Y	N	10deg.
G/30	Cutting/fabrication	N	N	Y	N	5.7deg.
H/31	Shortage of downpipes	N	Structural movements	Y	Y	10deg.
H/32	ortage of bolts/cutting/fabricati	ter/downpipe bad connect	N	Y	Y	7.5deg.

Appendix B6 - Collected data on Labour Related Problems

Project	Skills of erectors	Was specialized trainer	People employed	Working hrs.	Holidays	Workers overloaded	Salary paid
A/01	Good	N	C-100 , S-15	8.5hrs	Ignored	N	Monthly
A/02	Fair	N	C -50 , S-15	8.5hrs	Ignored	N	Monthly
A/03	Fair	N	C-60 , S-10	8.5hrs	Ignored	N	Monthly
A/04	Fair	N	C-30 , S-12	8.5hrs	Ignored	Y	Monthly
A/05	Fair	N	C-35 , S-18	8.5hrs	Ignored	Y	Monthly
A/06	Fair	N	C-55 , S-12	8hrs	Ignored	N	Monthly
A/07	Fair	Y	C-40 , S-20	8hrs	Ignored	N	Monthly
A/08	Fair	N	C-25 , S-15	8hrs	Ignored	Y	Monthly
A/09	Fair	N	C-40 , S-15	8hrs	Ignored	Y	Monthly
A/10	Fair	N	C-30 , S-15	8hrs	Ignored	Y	Monthly
A/11	Fair	N	C-30 , S-15	8hrs	Ignored	Y	Monthly
A/12	Fair	N	C-30 , S-15	8hrs	Ignored	Y	Monthly
A/13	Fair	N	C-20 , S-8	8hrs	Ignored	Y	Monthly
A/14	Fair	N	C-20 , S-8	8hrs	Ignored	Y	Monthly
A/15	Fair	N	C-45 , S-20	8hrs	Ignored	Y	Monthly
A/16	Fair	N	C-40 , S-15	8hrs	Ignored	Y	Monthly
B/17	Fair	N	C-30 , S-18	8.5hrs	Ignored	Y	Monthly
C/18	Good	N	C-30 , S-12	8hrs	Ignored	Y	Weekly
D/19	Good	N	C-175 , S-20	9hrs	Ignored	N	Fortnight
D/20	Good	N	C-110 , S-15	8hrs	Poya	N	Fortnight
D/21	Good	N	C-80 , S-15	8hrs	Poya	N	Fortnight
D/22	Good	N	C-60 , S-12	8hrs	Poya	N	Fortnight
E/23	Good	N	C-75 , S-15	8.5hrs	Poya	Y	Monthly
E/24	Good	Y	C-200 , S-30	10hrs	Ignored	Y	Monthly
E/25	Good	N	C-110 , S-15	9hrs	Ignored	Y	Monthly
F/26	Fair	N	C-30 , S-10	8hrs	Ignored	Y	Fortnight
F/27	Good	N	C-20 , S-10	8hrs	Ignored	Y	Monthly
F/28	Good	N	C-15 , S-9	8.5hrs	Ignored	N	Fortnight
G/29	Fair	N	C-20 , S-8	8hrs	Ignored	N	Monthly
G/30	Fair	N	C-20 , S-8	8hrs	Ignored	N	Monthly
H/31	Good	N	C-175 , S-20	12hrs	Ignored	Y	Monthly
H/32	Good	N	C-100 , S-15	12hrs	Ignored	Y	Monthly



Appendix C - Tables of Descriptive Statistics

Descriptives

Descriptive Statistics

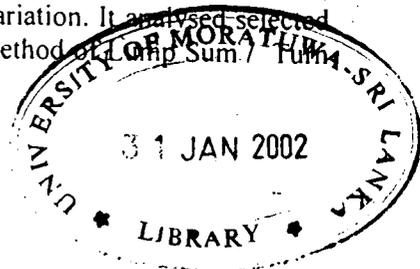
	N	Minimum	Maximum	Mean	Std. Deviation
Project Duration	21	2.50	12.00	4.9524	2.3500
Contract Sum	21	3.00	130.00	24.0476	30.0562
Payment Delay	21	13.00	45.00	23.9048	9.0272
Project Delay	17	4.00	60.00	17.2941	14.5377
Client's Variation	21	.00	1.00	.4762	.5118
Valid N (listwise)	17				

Table 5.15 a – Descriptive Statistics for Project duration, Contract sum, Payment delay, Project delay, Client's work variation. It analysed selected projects which were practicing procurement method of Design & Build.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Project Duration	8	2.00	6.00	3.7500	1.3093
Contract Sum	8	2.50	90.00	16.5875	29.8879
Payment Delay	8	2.00	30.00	13.6250	7.9989
Project Delay	8	3.00	240.00	43.6250	81.4913
Client's Variations	8	.00	1.00	.2500	.4629
Valid N (listwise)	8				

Table 5.15 b – Descriptive Statistics for Project duration, Contract sum, Payment delay, Project delay, Client's work variation. It analysed selected projects which were practicing procurement method of Lump Sum / Turn Key.



Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Project Duration	3	6.00	6.00	6.0000	.0000
Contract Sum	3	35.00	70.00	48.3333	18.9297
Payment Delay	3	40.00	49.00	43.0000	5.1962
Project Delay	2	120.00	180.00	150.0000	42.4264
Client's Variation	3	.00	1.00	.3333	.5774
Valid N (listwise)	2				

Table 5.15c - Descriptive Statistics for Project duration , Contract sum , Payment delay , Project delay , Client's work variation. It analysed selected projects which were practicing procurement method of Measure & pay