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"FACTOR AFFECTING TO IMPLEMENT IBS IN INDIAN CONSTRUCTION INDUSTRY"

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Abstract: **Industrialized Building System (IBS) is a term used for a technique of construction where by components are manufactured in a controlled environment, either at site/off site, placed and assembled into construction works. In this paper studied about Implementing Industrialized building system in construction. The knowledge base study of the factors affecting implementation. By examining its advantages, IBS can easily be considered as the most appropriate way to serve sustainable building projects. The crucial factor affecting to implement IBS in construction to be conclude.**

Keywords: Industrialized building system (IBS), sustainability, Factor affecting

INTRODUCTION

Industrialized Building System (IBS) is a term used in Malaysia for a technique of construction where by components are manufactured in a controlled environment, either at site or off site, placed and assembled into construction works. Worldwide, IBS is also known as Pre-fabricated/Pre-fab Construction, Modern Method of Construction (MMC) and Off-site Construction. CIDB Malaysia, through IBS Centre is promoting the usage of IBS to increase productivity and quality at construction sites through various promotion programs, training and incentives. The content of IBS (IBS Score) is determined based on the Construction Industry Standard; either manually, web application or fully automated CAD-based IBS Score calculator.

The fundamental idea of Industrialized Building System (IBS) is to move some effort away from construction site to manufacturing floor. In IBS construction, building components are pre-fabricated at factory and transport to site for installation. The government of Malaysia has agreed to expand the method of IBS in construction sector and endorsed the content of IBS Roadmap 2003- 2010 to guide the mission.

IBS can be seen as an alternative option to maintain sustainability in construction. It can generate more controlled human resources and cost, shorten the construction period and increase the quality of buildings. Simultaneously, it can also enhance occupational health and safety. In addition, the most advantageous solutions to reduce construction waste are based on IBS. By examining these advantages, IBS can easily be considered as the most appropriate way to serve sustainable building projects.

The importance of sustainability issues has increased among the global community and it is necessary for all parties involved – local authorities, contractors, governments, consultants and architects – to respond quickly to these changes and constraints. Several studies have been carried out regarding the sustainability of construction and building, and from these studies the importance of sustainability has been highlighted. Inappropriate selection of the IBS used will affect the performance of the buildings. Without a well-defined decision making tool the potential for IBS will not be optimized. The value of IBS is also limited since their performance is not fully utilized. The value should include not only financial but also social and environmental benefits. This is supported by other researchers who argued that less attention is given to soft issues (e.g., health and safety, waste management, occupant comfort) and the efforts to integrate these issues in decision making are still at an early stage.

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PROBLEM STATEMENT

Indian Construction industry is not so much familiar with Industrialized Building System (IBS). So, Implement of Industrialized Building System in Construction can be helpful for Cost reduction, Waste reduction, ecofriendly construction and by this concept, we can implement sustainable construction. For that, study of prefabrication and Industrialized Building System can be helpful to future Indian construction scenario.

SCOPE

- The scope of this research will be limited to the construction industry, which involves the IBS as the main components in their projects.
- Data collection for analysis the critical factor which has been collected from manufacturer, project manager, consultant and contractor
- Decision matrix will be generated with help of statistical tools.
  Research area is limited up to Surat, Navsari & Valsad district of south Gujarat region

MANUFACTURING / CASTING

Precast concrete is a construction product produced by casting concrete in a reusable mold or "form" which is then cured in a controlled environment, transported to the construction site and lifted into place. In contrast, standard concrete is poured into site-specific forms and cured on site. Precast stone is distinguished from precast concrete by using a fine aggregate in the mixture, so the final product approaches the appearance of naturally occurring rock or stone.

By producing precast concrete in a controlled environment (typically referred to as a precast plant), the precast concrete is afforded the opportunity to properly cure and be closely monitored by plant employees. Utilizing a Precast Concrete system offers many potential advantages over site casting of concrete. The production process for Precast Concrete is performed on ground level, which helps with safety throughout a project. There is a greater control of the quality of materials and workmanship in a precast plant rather than on a

construction site. Financially, the forms used in a precast plant may be reused hundreds to thousands of times before they have to be replaced, which allow cost of formwork per unit to be lower than for site-cast production.

FACTORS AFFECTING IMPLEMENTATION OF IBS

Sr.No.	MAIN FACTOR	DESCRIPTION
1	Availability	Availability of precast components and materials
2	Profitability	Profit from implementing IBS in construction
3	Design	Design related to assemble prefab components
4	Standardization & Quality	Quality as per requirement and standardization as per IS code
5	Time	Duration of construction period
6	Efficiency	Efficiency of particular material to be used
7	Transportation & lifting requirement	Material and prefab components transportation and lifting for assemble it
8	Production	Industry base construction and production of components to be ready for use.
9	Market	Market price, demand, supply
10	Knowledge & skills	Awareness of knowledge and skill labour required
11	Education	For awareness of what IBS is?
12	Technology	Use of technologies as per easiness of work
13	Architectural impact	Architectural design limitation as per its criteria
14	Environment	Environmental aspects
15	Health & safety	Health and safety during work & use of safety equipment
16	Site disruption	Disturbance by site location (naturally or artificially)
17	Pollution	Decrease Pollution during work carried out
18	Materials	Materials used in construction
19	Water	Need of water
20	Waste	Reduce waste
21	Population	Population of particular area
22	Public awareness	Knowledge of IBS
23	Public participations	public participations for implement IBS

Data Collection

Sr. No.	Respondent	Questionnaires Distributed	Responses Returned
1	Site engineer	78	38
2	Contractors	82	48
3	Consultant	60	30
4	Project Manager	48	20
5	Supplier	30	16
Total		298	152
Responses percentage			51.01%

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DATA ANALYSIS

ALL RESPONDENT			
SR.NO.	**F.NO.**	**FACTOR AFFECTING IBS**	**ΣR/(152*5)**
1	F 29	Safety, Health & living standards	0.936842105
2	F 12	Standardization & quality	0.919736842
3	F 40	Ecofriendly construction	0.896052632
4	F 1	Design cost	0.864473684
5	F 4	Construction & operation cost	0.864473684
6	F 34	Environment friendly	0.852631579
7	F 16	Skill labour	0.85
8	F 14	Structural design	0.839473684
9	F 23	Regulations and standards	0.838157895
10	F 3	Transportation cost	0.835526316
11	F 52	Research & development center	0.817105263
12	F 36	Site condition	0.810526316
13	F 51	Different size, shape available	0.806578947
14	F 2	Profitability	0.801315789
15	F 10	Labour cost	0.798684211
CONTRACTOR RESPONDENT			
SR.NO.	F.NO.	FACTOR AFFECTING IBS	ΣR/(152*5)
1	F 1	Design cost	0.854166667
2	F 10	Labour cost	0.808333333
3	F 11	Usage of Temporary structures	0.720833333
4	F 12	Standardization & quality	0.883333333
5	F 13	Time of casting	0.616666667
6	F 14	Structural design	0.808333333
7	F 15	Availability of raw material	0.783333333
8	F 16	Skill labour	0.8625
9	F 17	Procurement	0.675
10	F 18	Transportation	0.733333333
11	F 19	Easiness or flexibility	0.7125
12	F 2	Profitability	0.825
13	F 20	Specification	0.6625
14	F 21	Government support & policy	0.733333333
15	F 22	Taxation	0.5625
CONSULTANT RESPONDENT			
SR.NO.	RF.NO.	FACTOR AFFECTING IBS	ΣR/(30*5)
1	F 12	Standardization & quality	0.933333333
2	F 14	Structural design	0.92
3	F 29	Safety, Health & living standards	0.92
4	F 52	Research & development center	0.9
5	F 23	Regulations and standards	0.893333333
6	F 4	Construction & operation cost	0.886666667
7	F 40	Ecofriendly construction	0.886666667

8	F 1	Design cost	0.88
9	F 34	Environment friendly	0.88
10	F 51	Different size, shape available	0.88
11	F 16	Skill labour	0.873333333
12	F 3	Transportation cost	0.846666667
13	F 10	Labour cost	0.84
14	F 41	Geographic condition	0.84
15	F 5	market trends	0.833333333
SITE ENGINEER RESPONDENT			
SR.NO.	RF.NO.	FACTOR AFFECTING IBS	ΣR/(38*5)
1	F 12	Standardization & quality	0.942105263
2	F 29	Safety, Health & living standards	0.931578947
3	F 40	Ecofriendly construction	0.878947368
4	F 1	Design cost	0.873684211
5	F 14	Structural design	0.873684211
6	F 4	Construction & operation cost	0.868421053
7	F 34	Environment friendly	0.863157895
8	F 16	Skill labour	0.836842105
9	F 23	Regulations and standards	0.826315789
10	F 3	Transportation cost	0.821052632
11	F 8	Production cost	0.821052632
12	F 44	Disaster awareness	0.815789474
13	F 47	Performance	0.815789474
14	F 46	Training	0.810526316
15	F 9	Maintenance	0.805263158
PROJECT MANAGER RESPONDENT			
SR.NO.	F.NO.	FACTOR AFFECTING IBS	ΣR/(20*5)
1	F 29	Safety, Health & living standards	0.97
2	F 12	Standardization & quality	0.95
3	F 40	Ecofriendly construction	0.94
4	F 4	Construction & operation cost	0.91
5	F 34	Environment friendly	0.9
6	F 3	Transportation cost	0.88
7	F 1	Design cost	0.86
8	F 16	Skill labour	0.86
9	F 49	Education	0.84
10	F 36	Site condition	0.83
11	F 39	Pollution	0.83
12	F 15	Availability of raw material	0.82
13	F 43	Public awareness	0.82
14	F 52	Research & development center	0.82
15	F 14	Structural design	0.81
SUPPLIER RESPONDENT			
SR.NO.	F.NO.	FACTOR AFFECTING IBS	ΣR/(16*5)

1	F 12	Standardization & quality	0.9125
2	F 29	Safety, Health & living standards	0.9
3	F 1	Design cost	0.85
4	F 10	Labour cost	0.85
5	F 52	Research & development center	0.85
6	F 5	market trends	0.8375
7	F 8	Production cost	0.8375
8	F 37	Usage of sustainable material	0.8375
9	F 51	Different size, shape available	0.8375
10	F 40	Ecofriendly construction	0.825
11	F 6	Capital cost	0.8
12	F 9	Maintenance	0.8
13	F 34	Environment friendly	0.8
14	F 2	Profitability	0.7875
15	F 4	Construction & operation cost	0.7875

CONCLUSION

The construction industry in Malaysia has been changed due to the current technology which increases the level of quality and safety of the building. It is a construction process which is using the technique, product, and component or construction system involving the installation of construction component on construction site. The implementation of IBS has been identified as a solution to promote sustainable construction. This is possible by identifying the potential sustainable performance indicators starting from the early stage. The study will identify and integrate the different understandings to the critical issues that impact on the gap between sustainable development and IBS implementation.

SR. NO.	CONTRACTOR	CONSULTANT	SITE ENGINEER	PROJECT MANAGER	SUPPLIER
1	Design cost	Standardization & quality	Standardization & quality	Safety, Health & living standards	Standardization & quality
2	Labour cost	Structural design	Safety, Health & living standards	Standardization & quality	Safety, Health & living standards
3	Usage of Temporary structures	Safety, Health & living standards	Ecofriendly construction	Ecofriendly construction	Design cost
4	Standardization & quality	Research & development center	Design cost	Construction & operation cost	Labour cost
5	Time of casting	Regulations and standards	Structural design	Environment friendly	Research & development center
6	Structural design	Construction & operation cost	Construction & operation cost	Transportation cost	market trends
7	Availability of raw material	Ecofriendly construction	Environment friendly	Design cost	Production cost

8	Skill labour	Design cost	Skill labour	Skill labour	Usage of sustainable material
9	Procurement	Environment friendly	Regulations and standards	Education	Different size, shape available
10	Transportation	Different size, shape available	Transportation cost	Site condition	Ecofriendly construction
11	Easiness or flexibility	Skill labour	Production cost	Pollution	Capital cost
12	Profitability	Transportation cost	Disaster awareness	Availability of raw material	Maintenance
13	Specification	Labour cost	Performance	Public awareness	Environment friendly
14	Government support & policy	Geographic condition	Training	Research & development center	Profitability
15	Taxation	market trends	Maintenance	Structural design	Construction & operation cost

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