



HC Precast System
Sdn. Bhd.

20th May 2022 at 10.30am

Venue : HCPS Factory, Rasa

Lot 1, Jalan Zurah 8, Pusat Perindustrian Zurah,
Mukim Rasa, Daerah Hulu Selangor, 44200 Rasa, Selangor.



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Broadcast via live
interview and discussion.

“Case Study - HC Precast System monolithic wall system
between **Universiti Teknologi PETRONAS** (UTP) and HCPS”

Framework For Sustainable Industrialized Building System (IBS)
Implementation In Low and Mid-Rise Residential Buildings

Case Study 1



10 Units of Single Storey Terrace House, Bahau, Negeri Sembilan
Completed in 26 Days with 10 Workers (8.00 am - 7.00 pm)

Case Study 2



2 Units of Single Storey Semi-D House, Temerloh, Pahang
Completed in 9 Days with 9 Workers (8.00 am - 7.00 pm)



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Case Study Validation

This work aims to use case study to validate a framework developed based on data collected from earlier questionnaire toward sustainable IBS implementation in residential buildings which contains 3 sections:

- First part contains two tables which collect data on projects characteristics and project phases.
- Second part discuss the main three sections toward IBS implementation as follows:
 1. Rank and comment on list of blocking factors that hinder IBS implementation.
 2. Rank and comment on list of success factors that will increase IBS implementation.
 3. Rank and comment on list of sustainability indicators that will measure IBS potential.
- Third part ask general questions about an overview of the blocking factors, success factors and sustainability indicators as a framework which written in one diagram.

Regards,
PhD Candidate:
Al-Hussein M. H. Al-Aidrous
Supervisor:
Professor Dr Nasir Shafiq
Civil & Environmental Engineering Department

Part 1: Case study characteristics : HC Precast System Monolithic Wall System. - Supply & Install Superstructure Works (Frame & Wall)

Case study characteristics	Case Study 1 10 Units of Single Storey Terrace House, Bahau, Negeri Sembilan	Case Study 2 2 Units of Single Storey Semi-D House, Temerloh, Pahang
Floor area (m ²)	93 m ² / unit	133 m ² / unit
Construction begins	18 th Sept 2020	18 th Jan 2019
Construction finish	13 th Oct 2020	26 th Jan 2019
Total cost	RM 343,800.00	RM 74,000.00
Total cost/m ²	RM 369.70	RM 278.20
Equivalent conventional construction cost		
Equivalent conventional construction duration		Refer to comment - 1
Number of workers as compared to conventional construction	10 workers completed in 26 days (working hour 8.00 am - 7.00pm).	9 workers completed in 9 days (working hour 8.00 am - 7.00pm).

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Teow Beng Hur

Founder of HC Precast System Sdn. Bhd.

HCPS was founded in 2002 after years of Research and Development mainly focused on tackling the Water leakage issue. Through years of hard work and constant refinement to the system, HCPS through this Proprietary System currently holds Six (6) Intellectual Properties (IP). Among the highlights of the HCPS's system is the ability of the Structure to withstand earthquake forces (test conducted in collaboration with **UTM JOHOR**).

[Link 1](#)

Comment - 1

- **Drawings** of the aforementioned are provided. HCPS will not comment on the equivalent comparison of cost and duration against conventional system because our remarks can easily be misinterpreted as prejudice since there exists a conflict of interest with this regard.

[Link 2](#)

Case study distance from IBS factory (Km ²)	183 Km	143 Km
Number of units per case study	10 units	2 units
Prefabrication rate	RM 1,300.00 / m3	RM 1,300.00 / m3
Procurement type	Supply and install superstructure works only.	Supply and install superstructure works only.
Client (public or private)	Private	Private

Q) Is there are any 1) difficulties (D) faced, or 2) incentives (I) offered or 3) any key role (R) for your company at any the below sub-phases?

Project Phases	Sub-phases / sub-component	Case Study 1			Case Study 1		
		D	I	R	D	I	R
Concept	Project proposal						
	Feasibility study						
	Land acquisition						
	Permission and approvals						
	Arranging the finance						
Plan and design	Land arrangement and survey						
	Architectural and structural designs			✓			✓
	Detailed designs			✓			✓
	A unified design code			✓			✓
	Subcontract any IBS technical solution			✓			✓
Manufacturing and construction	Skilled Labour availability			✓			✓
	Communication and collaboration among project players			✓			✓
	Arrange components transportation			✓			✓
	Design change			✓			✓
	Assembly components arrangement			✓			✓



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Comment - 2

- **HCPS** is a one-stop solution specialist particularly in low rise residential housing, supplier and installer for superstructure (frame & wall) system.

Comment - 3

- **Not applicable**

Comment - 4

HCPS is a flexible system that can meet most architectural demands. Hence, planning and designing of the structure system by a complete IBS specialist like HCPS will definitely be witnessing evidently apparent benefits when it comes to land arrangement (including temporary storage, access path, detailing of the structural and non-structural elements such as M&E circuits). Among some of the highlights of HCSP are:

- **Produce** State-of-art Systemized Integrated 3D Digital Model
- **Sequential** Flow from Paper to Property
- **Compliance** to UBBL & BSI code
- **Supply & Install** Superstructure Works (Frame & Wall).

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Manufacturing and construction	Skilled Labour availability			✓			✓
	Communication and collaboration among project players			✓			✓
	Arrange components transportation			✓			✓
	Design change			✓			✓
	Assembly components arrangement			✓			✓

Refer to comment -5



Comment - 5

- **Industrialised Building System Provider** is one who knows the way, goes the way and shows the way.
- **Precast Elements** requirements to complete a building is sequence of work - 5 Steps
 - Step 1 Drawing conversion :
 - 2D Architect drawing to 3D IBS system drawing.
 - Original M&E drawing to M&E IBS system shop drawing.
 - Step 2 (off-site) :
 - Mould fabrication
 - Step 3 (off-site) :
 - Production sequence (advance casting)
 - Step 4 (off-site) :
 - Delivery sequence (4 options)
 - Step 5 (on-site) :
 - Installation sequence (numbering)

Part 2: The three main components toward IBS implementation:

Section 1: Blocking factors that hinder IBS implementation

This section presents to you the **main 6 blocking factors** ranked as groups and factors based on the result from the questionnaire.

Q) The below given ranking is based on early survey, please suggest a ranking based on each case study and give comments if needed.

1st: Financial Concerns:

Financial Concerns Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
High initial capital cost for setting manufacturing plant and equipment	1	6	6
High initial cost for molds for customized design in each project	2	5	5
Project location and longer transportation could increase the cost	3	3	3
Potential higher cost for projects with low economy of scale	4	4	4
Obligation for financial upfront commitment for IBS components	5	1	1
Few players determine the price and manufacturing supply of IBS system	6	7	7
Difficulties due to contractor cash flow issues and weak financial backup	7	2	2

2nd: Limitation in government regulation:

Limitation in government regulation factors	Rank	Suggest Rank Case 1	Suggest Rank Case 2
Weak policy toward construction waste dumping	1	2	2
Low support for IBS to be used for affordable housing	2	5	5
Ineffective incentives and support from government	3	4	4
Low enforcement of government policies and regulations	4	1	1
Government regulations do not motivate higher IBS implementation	5	3	3

3rd: Technical and Management Worries:

Technical and Management Worries Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Limited number of trained local workforce continue to work in IBS	1	3	3
Low level of technical knowledge and experience in operating IBS among consultants and contractors	2	1	1
Fragmentation and poor coordination and collaboration among parties from early stage	3	2	2
Low implementation of modular coordination concept and standardization	4	4	4



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Comment - 6

- **No**, it is subject to the capacity unit per year that the plant is targeting to achieve.
- **Not** true, for HCPS it is flexible, reusable aluminium mould system.
- **Yes**, it is about $\pm 5\%$.
- **No**, HCPS cost will still be maintained, if not less than 30 units per location.
- **Yes**, for HCPS it is a customized system 100% suit to architect design.
- **It is not true**. To further enhance transparent pricing, the government may establish rate for per m2 or per m3 for public to participate.
- **Yes**, but HCPS is a customized system.

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Refer to comment -7

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Comment - 7

- **State** government and local authority are not in line with the federal government policy (all government project over 10 million is **compulsary** to have 70% IBS score).
- **PELAKSANAAN SISTEM BINAAN BERINDUSTRI (IBS) DALAM PROJEK KERAJAAN** (Kuat Kuasa Pada 15 Januari 2020)

2. Panduan Pelaksanaan IBS

2.2 Kerajaan telah bersetuju untuk mewajibkan penggunaan kaedah IBS bagi projek Kerajaan bernilai RM10 juta dan ke atas dengan kadar minimum 70% nilai skor IBS serta menetapkan koordinasi modular untuk dijadikan sebagai piawaian dalam reka bentuk bangunan.

[Link 3](#)

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Low implementation of modular coordination concept and standardization	4	4	4

Refer to comment - 8



Comment - 8

- **Industrialised Building System Provider** Is one Who knows the Way, goes the Way and shows the Way.
- **One** of the main issues that causes IBS failure is the water leaking & cracks due to the construction jointing mechanism or methods.
- **Industrialised Building System (IBS) Function** as a System, not a Robotic, Machine or seperated Component.
- **Choose** Industrialized Building System (IBS) that functions as a comprehensive superstructure construction sequence with high flexibility in its customization characteristics to allow a wide range of architectural creativity to flourish.
- **Open** system and proprietary system is a technology.
- **Acceptance** of IBS Challenging when we have more guidelines?

4th: Traditional Stakeholders' Concerns:

Traditional Stakeholders' Concerns Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Contractors' fear of reduced profit	1	3	3
Reluctance in adaptation with IBS due to traditional mindset	2	2	2
Traditional professionals fear of limiting their role and position	3	1	1

Refer to comment -9

5th: Design Restrictions:

Design Restrictions Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Difficult and expensive late design change	1	1	1
IBS systems restrict any future renovation	2	2	2

6th: Negative Perception:

Negative Perception Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
No clear benefit or incentive for the developer and buyer to adopt IBS	1	4	4
Misconception towards aesthetic value and limited designs in IBS	2	3	3
Negative perception on the flexibility of IBS systems	3	2	2
Potential poor workmanship, leakage, and crack problems	4	1	1

Ranking For the main blocking factors:

Main Blocking Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Financial Concerns	1	5	5
Limitation in government regulation	2	4	4
Technical and Management Worries	3	3	3
Traditional Stakeholders' Concerns	4	6	6
Design Restrictions	5	2	2
Negative Perception	6	1	1

If you have any comment regarding any factor or want to suggest new factor, please state your view:

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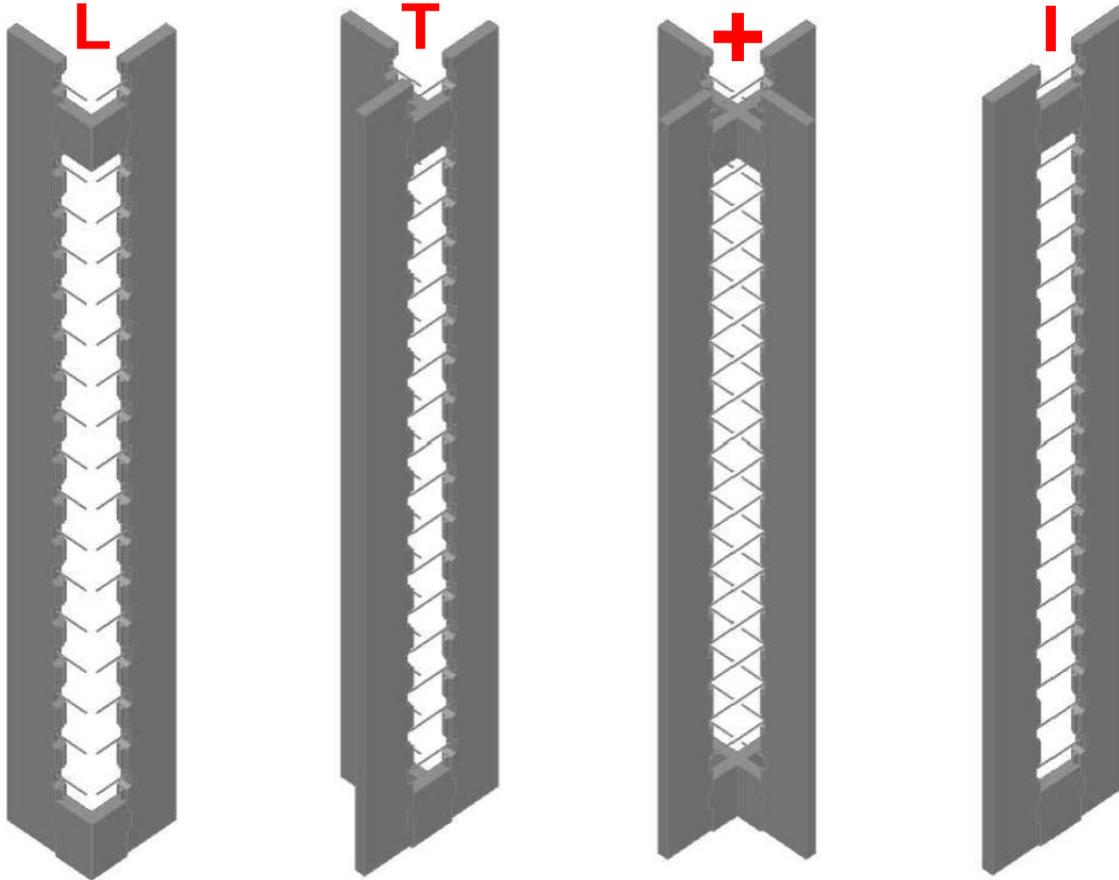
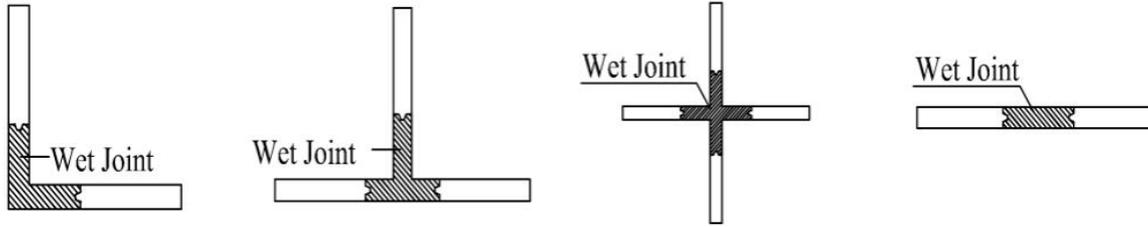
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Comment - 9

- **HCPS** can suit to wider range of Architectural demand due to the in-house mould design, engineering and fabrication to have a proper construction sequence which is the number one key feature in any IBS construction method.
- **4** elements shape required to complete a building: **L, T, + & I** shape wet joint with modular shear keys and precast element panel with coping (one cast and using reusable modular mould).
- We have observed that some of the completed units have already been renovated by the home owners without any issues due to the fact that HCPS is a full monolithic precast system, rather than component IBS. What's the difference between component IBS and monolithic system?

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*Success weighs heavily where most precast solutions have **failed**. Our **revolutionary** patented "**shear key joint**" system have managed to resolve the very issue which have plagued the precast industry, **water leakages** and **crack**.*



*This patented system has helped to **eradicate** the most common issue with **Precast Concrete** construction, **water leakages**.*

- *Wet joint*
- *Tongue and groove*
- *Seamless interfacing*



HCPS can **suit** to wider range of **Architectural** demand due to the in-house mould design, engineering and fabrication to have a proper construction sequence which is the number one key feature in any **IBS construction method**.

4 elements **shape** required to **complete** a building : **L, T, + & I** shape **wet joint** with modular **shear keys** and precast element **panel** with **coping** (**one cast** and using **reusable** modular mould).

+ shape wet joint

I shape wet joint

T shape wet joint

L shape wet joint

Reusable modular mould system

Coping one cast with panel

Coping one cast with panel



4th: Traditional Stakeholders' Concerns:

Traditional Stakeholders' Concerns Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Contractors' fear of reduced profit	1	3	3
Reluctance in adaptation with IBS due to traditional mindset	2	2	2
Traditional professionals fear of limiting their role and position	3	1	1

5th: Design Restrictions:

Design Restrictions Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Difficult and expensive late design change	1	1	1
IBS systems restrict any future renovation	2	2	2

Refer to comment -10

6th: Negative Perception:

Negative Perception Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
No clear benefit or incentive for the developer and buyer to adopt IBS	1	4	4
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Ranking For the main blocking factors:

Main Blocking Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Financial Concerns	1	5	5
Limitation in government regulation	2	4	4
Technical and Management Worries	3	3	3
Traditional Stakeholders' Concerns	4	6	6
Design Restrictions	5	2	2
Negative Perception	6	1	1

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Comment - 10

- **HC PRECAST SYSTEM SDN. BHD. (HCPS)**'s success weighs heavily where most precast solutions have failed.
- **Our** revolutionary patented “shear key joint” system have managed to resolve the very issue which have plagued the precast industry, water leakages and crack.
- **This** is proven by our Rasa double story training unit has excellent water proving capability and it is exposed to weather for **14** years without roof till date, owing thanks to our patented revolutionary shear key joint system which also prevents joint crack.

IBS is a system, ***Not*** merely a ***Component***.

*It consists of the main component - the structural component but it requires an efficient and cost effective connection system to prevent the commonly-faced water leakage and crack at connection or joint which impede further the acceptance level of **IBS**.*



HCPS precast system that emulates the monolithic Multi-box system has excellent water proving capability. This is proven by our Rasa double story training unit that was exposed to weather for **14 years** without roof till date, owing thanks to our **patented revolutionary shear key joint system** which also prevents joint crack.

4th: Traditional Stakeholders' Concerns:

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Traditional professionals fear of limiting their role and position	3	1	1

5th: Design Restrictions:

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Difficult and expensive late design change	1	1	1
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6th: Negative Perception:

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Traditional Stakeholders' Concerns	4	6	6
Design Restrictions	5	2	2
Negative Perception	6	1	1

If you have any comment regarding any factor or want to suggest new factor, please state your view:

[Refer to comment - 11](#)



Comment - 11

Propose to Government and Private Developer

Invite industrialized building system provider with manufacturing facility (flexibility to suit all architectural demands) to participate to built the show unit with work below and superstructure without finishing for the Government & Private Developer to identify the system in terms of green, environment, quality and speed for supply in its development.

1. Architect :

- Appointed by the Government & Private Developer.
- Design of single storey bungalow of 1,000 ft2 (affordable home), up to superstructure without finishing.
- With M&E requirement.
- Wall finishing with plaster or skim coat only.
- Door and window frame opening.
- Ground floor without tiling.

2. **Industrialized** building system manufacturer have formed their BQ for superstructure (in terms of wall area) and to submit work program with sequence of work for record purposes.

3. **Proper** record by the Government & Private representative during construction, in terms of labour and machinery involved per day up to completion (superstructure only).

4. **Cost** Comparison for each Industrialized Building System Manufacturer by the Government & Private Developer (for superstructure only). Cost will be fixed for the selected manufacturer and supply to its development.

Section 2: Success factors for higher use of IBS

This section presents to you the **main 4 success factors** ranked as groups and factors based on the result from the questionnaire.

Q) The below given ranking is based on early survey, please suggest a ranking based on each case study and give comments if needed.

1st: Strategic Planning:

Strategic Planning Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Early planning to implement IBS system	1	1	1
Extended training for local labour to strengthen skills in IBS	2	9	9
Effective communication and collaboration among players from early phase	3	10	10
Evaluate project location and accessibility	4	11	11
Adopt standard dimensions and modular coordination to reduce cost	5	12	12
Team agreement on project deliverables	6	3	3
Manufacturer readiness to provide training before installation of components	7	7	7
Freeze the design early to reduce any possible rework	8	5	5
Implement a standard procedure for onsite and offsite inspection/supervision work	9	8	8
Adopt procurement system that suits IBS construction method	10	2	2
Adopt role and business strategies that support IBS	11	4	4
Manufacturer involvement role in design and construction	12	6	6

2nd: Policies & Incentives:

Policies & Incentives Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Provide incentives for IBS implementation including tax privilege and loan support	1	5	5
Implement a preferential policy for IBS which can motivate developers and buyers to adopt IBS	2	6	6
Clear plan and policy that can ensure IBS implementation	3	2	2
Adopt non-financial incentives for IBS, e.g., faster approval procedure, exemption from some building requirements.	4	3	3
Commitment of agencies and local authorities in the state toward the implementation of IBS policy	5	1	1
Implement higher taxes and penalty for building waste dumping to reduce dependence on conventional construction	6	4	4

3rd: Technology Advancement

Technology Advancement Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Continuous R&D to improve current practices and reach competitive advancement	1	2	2
Ensuring effective design and installation using Building Information Modeling (BIM)	2	4	4
Adopt advance technologies including cloud and real-time collaboration, advance building materials and internet of things (IoT)	3	3	3
Use at least a semi-automated production toward automation and robotic construction	4	1	1

4th: Industry Maturity:

Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Skills and competency of project players	1	2	2
Sufficient experience of contractors and designers in IBS	2	1	1
Increasing the number of high-quality IBS housing units will increase buyer's acceptability	3	3	3
Competitive labour wage rate	4	4	4

Ranking For the main success factors:

Main Success Factors	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Strategic Planning	1	3	3
Policies & Incentives	2	2	2
Technology Advancement	3	1	1
Industry Maturity	4	4	4

If you have any comment regarding any factor or want to suggest new factor, please state your view:

Refer to comment - 12



Comment - 12

- **One** of the main issues that causes IBS failure in leaking & cracks on the connection mechanism, has nothing to do with the Architect & C&S consultant design adhering to UBBL & BSI codes.
- **Choose** Industrialised Building System (IBS) for Economical Construction. Industrialised Building System (IBS) functions as a comprehensive superstructure construction system at which its flexibility and highly customizable allows full creativity of Architect's to be turned into reality.
- **The** most important feature is the joint / joints connecting between different precast components.
- Joints can be classified as vertical joints in wall panels, and, or Horizontal joints at beams and wall panels.
- **Other** joints are filler joints or make up joints etc. These joints can be either dry or wet joints.
- **For** tropical country like Malaysia, dry joints are not suitable and will be problematic in application.
- **Wet** joints are easier to apply and function with less problem.

Section 3: Indicators for Sustainable IBS Implementation

This section presents to you the **main 3 sustainability indicators** ranked based on the result from the questionnaire.

Q) The below given ranking is based on early survey, please suggest a ranking based on each case study and give comments if needed.

1st: Environmental indicators:

Environmental indicators	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Reduced on-site construction waste.	1	3	3
Well-managed material consumption during design and construction phase.	2	1	1
Energy efficient consumption during construction.	3	2	2
Carbon emission reduction.	4	4	4
Less water consumption during construction.	5	5	5
High potential for reuse and recycle.	6	6	6

2nd: Social indicators:

Social indicators	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Efficient design and layout for IBS housing units.	1	1	1
Avoiding site disruption and lower impact on surrounding areas.	2	2	2
Simplified method of construction.	3	4	4
Safe and better working condition for workers.	4	5	5
Occupants comfort within the building environment.	5	3	3
Flexible design to accommodate future changes.	6	6	6
Affordability of IBS house construction for the buyers.	7	7	7
Higher opportunities for local employment.	8	8	8

3rd: Economic indicators

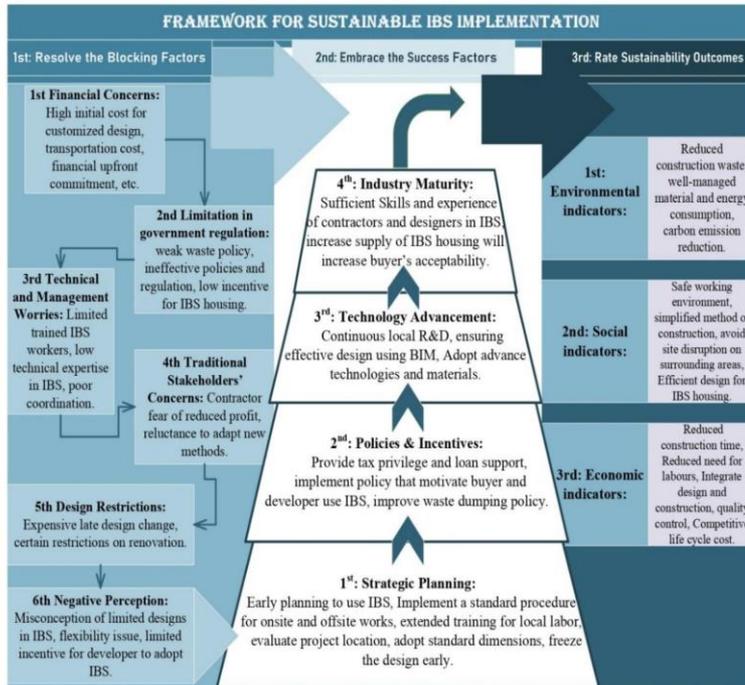
Economic indicators	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Reduced construction duration and faster house handover.	1	3	3
Integrated management during design and construction.	2	2	2
Reduced need for labour onsite.	3	1	1
Quality control and less damage potential during construction.	4	4	4
Competitive life cycle cost.	5	6	6
Long service life of a building with low potential of maintenance.	6	5	5

Ranking for the main sustainability indicators:

Sustainability Indicators	Rank	Suggest Rank for Case 1	Suggest Rank for Case 2
Environmental indicators	1	3	3
Social indicators	2	2	2
Economic indicators	3	1	1

Part 3: Framework of Sustainable IBS Implementation: Overview

The framework addresses the main three elements that need to be investigated in implementing IBS (blocking factors, success factors, and indicator for IBS implementation). Please express your view on this framework by writing or ticking (1) (D) Disagree, (2) (M) Maybe, or (3) (A) Agree as requested in the table below.



Framework Toward Sustainable IBS Implementation	Disagree (D)	Maybe (M)	Agree (A)
The Framework provided is clear and easy to understand.		✓	
The Framework provided is practical.		✓	
The Framework provided is user friendly.		✓	
The Framework provided is logical to be implemented.			✓
The Framework provided is generalizable.		✓	
The Framework provide contribution to the industry.		✓	

Any comments of the proposed framework or in general:

Refer to comment - 13

End of Validation
Thanks

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Comment - 13

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