INDUSTRIALISED BUILDING SYSTEM

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TUANKU SULTANAH BAHIYAH

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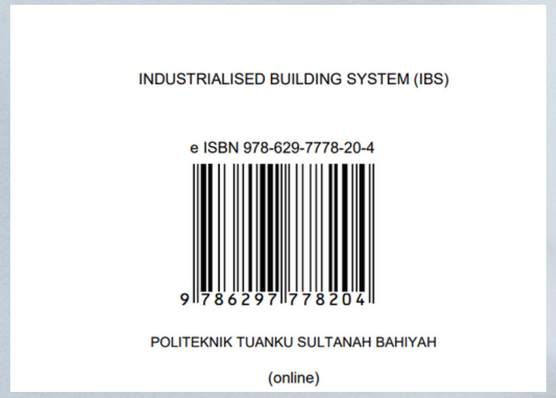
e ISBN : 978-629-7778-20-4



Perpustakaan Negara Malaysia

PUBLISHED BY :
Politeknik Tuanku Sultanah Bahiyah
Kementerian PengajiannTinggi

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ACKNOWLEDGMENT

First of all, thanks god almighty for his guidance and blessing. We had succeeded in completing this Industrialised Building System (IBS) E-Book. We want to express our
gratitude to our Head Department Of Civil Engineering Mr Mohd Kharul Anuar bin Haron, who supported us in grabbing this opportunity.
Not to forget, the E-Learning team because it provided us with this opportunity and guides using making this E-Book.
Besides, we also extendour gratitude to all friends and our lovely families for their kindness and sincere assistance in adding us to finish up this E-Book. Indeed, we have appreciated them.
We hopes are, may this E-Book helps students out there to understand about building system. Lastly, we hope this E-Book could ease everyone to understand and could fulfill everybody needs.

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WHAT IS INDUSTRIALISED BUILDING SYSTEM (IBS) ?

Definition of

Industrialized Building Systems (IBS)

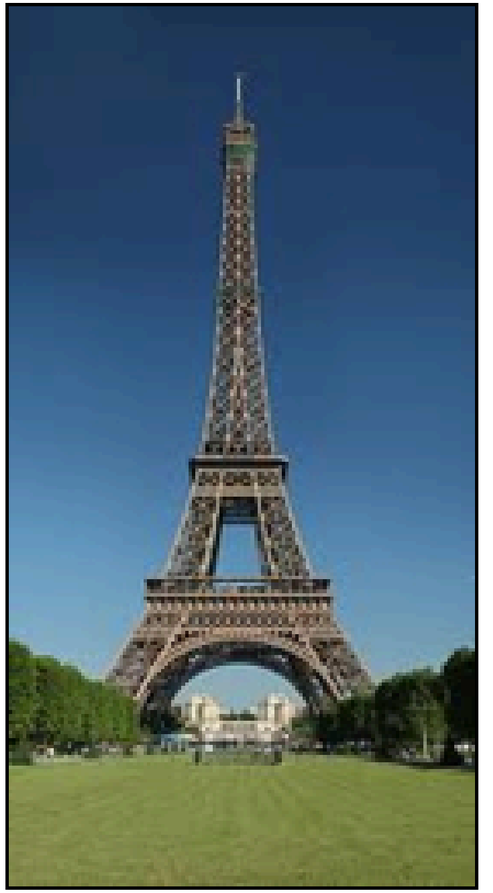
"A construction technique in which components are manufactured in a controlled environment (on or off site), transported, positioned and assembled into a structure with minimal additional site works"

"Sistem atau kaedah pembinaan di mana komponennya dihasilkan di dalam keadaan terkawal (di kilang atau di tapak bina), diangkut dan dipasang dalam kerja pembinaan dengan menggunakan pekerja yang minimum di tapak bina"

History of IBS

- Concept IBS is not new and can be traced back to as early 1624
- In 1624, panelized timber houses were shipped from England to the new settlement in North America
- 1851 Crystal Place in Hyde Park, London and 1889 Eiffel Tower Paris

Eiffel Tower Paris during construction



History of IBS in Malaysia

- Concept IBS in Malaysia is not new
- In 1966 the two pilot project started by using IBS concept. Namely?

  i) Pekeliling Flat, KL

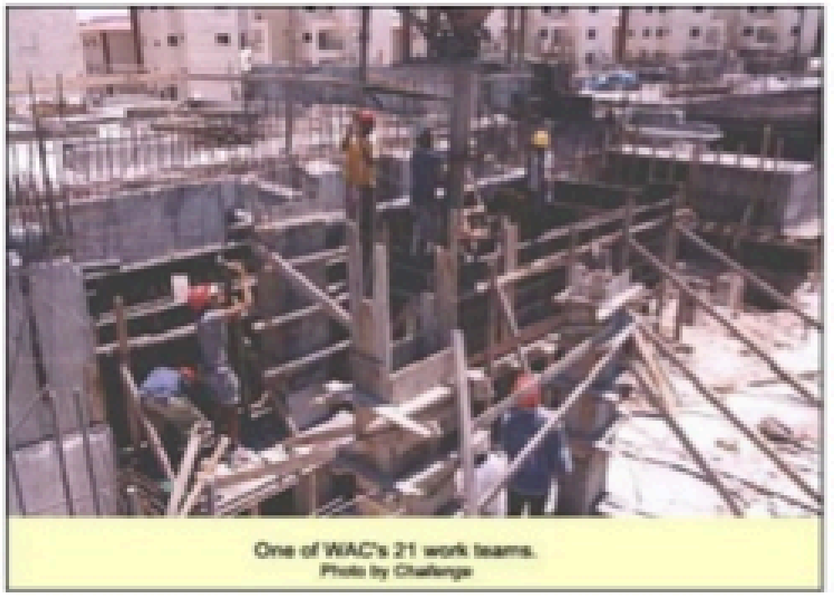
  ii) The Rifle Range Flat, Penang
- In 1981-1993 PKNS acquired pre-cast concrete technology from Praton Hans International, Germany to built housing project

Characteristics of IBS

Five Characteristics of IBS are :

- Industrial production of components though prefabrication
- Reduced labour during prefabrication of components and site works
- Modern design and manufacturing method using CAD/CAM
- Systematic Quality Control i.e ISO 9000
- Open Building System i.e permitting hybrid applications

2.1 The Current Scenario of Malaysian Construction Industry



One of WAC's 21 work teams.
Photo by Challenge

This can contributes : Messy Sites, High Wastage, Labour Intensive, Low Quality and Delays

11

TYPES OF IBS

- TYPE 1
  - PRECAST CONCRETE FRAME, PANEL & BOX SYSTEMS
- TYPE 2
  - STEEL FORMWORK SYSTEMS
- TYPE 3
  - STEEL FRAME SYSTEMS
- TYPE 4
  - PREFABRICATED TIMBER FRAME SYSTEMS
- TYPE 5
  - BLOCKWORK SYSTEMS
- TYPE 6
  - INNOVATIVE PRODUCT SYSTEMS

TYPE 1:
PRECAST CONCRETE FRAME, PANEL & BOX SYSTEMS

PC columns, beams, slabs, 3D-components (balconies, staircases, toilets, lift chambers, box girders, etc)

TYPE 2:
STEEL FORMWORK SYSTEMS

Tunnel forms, beams and column moulding forms, permanent steel formworks (metal decks), etc.

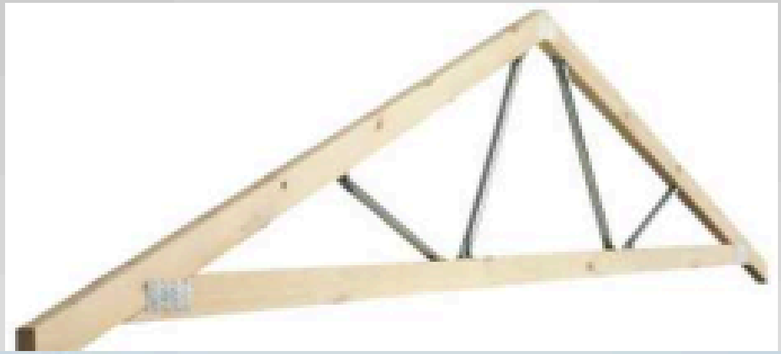
TYPE 3 :
STEEL FRAME SYSTEMS

Steel beams and columns, portal frames, roof trusses, etc

TYPE 4:

PREFABRICATED TIMBER FRAME SYSTEMS

Timber frames, pre-fab timber roof trusses, etc.



TYPE 5 :
BLOCKWORK SYSTEMS

Interlocking concrete masonry unit (CMU), lightweight concrete blocks, etc.

TYPE 6 :
INNOVATIVE PRODUCT SYSTEMS

Evolution of ibs

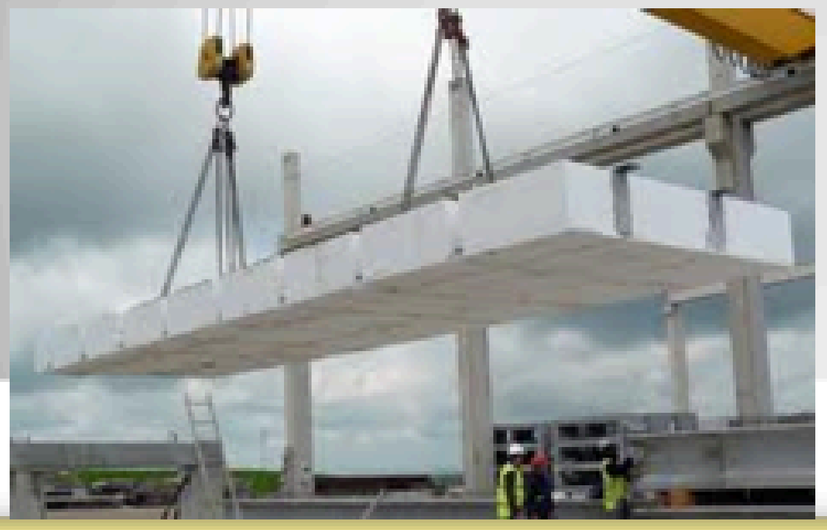
- With impact of globalization, more efficient methods have been introduced in industries system.
- IBS is one of the modern construction technique in which components are manufactured in a factory , on or off site, positioned and assembled into a structure with minimal additional site works.
- IBS are much more evolved from the traditional prefabrication or precast method and it requires a major overhaul of the current industry practise.

Classification on ibs

- Conventional column-beam-slab frame system with timber and plywood as formwork
- Cast in situ system with steel or aluminium as framework
- Prefabricated system
- Composite building

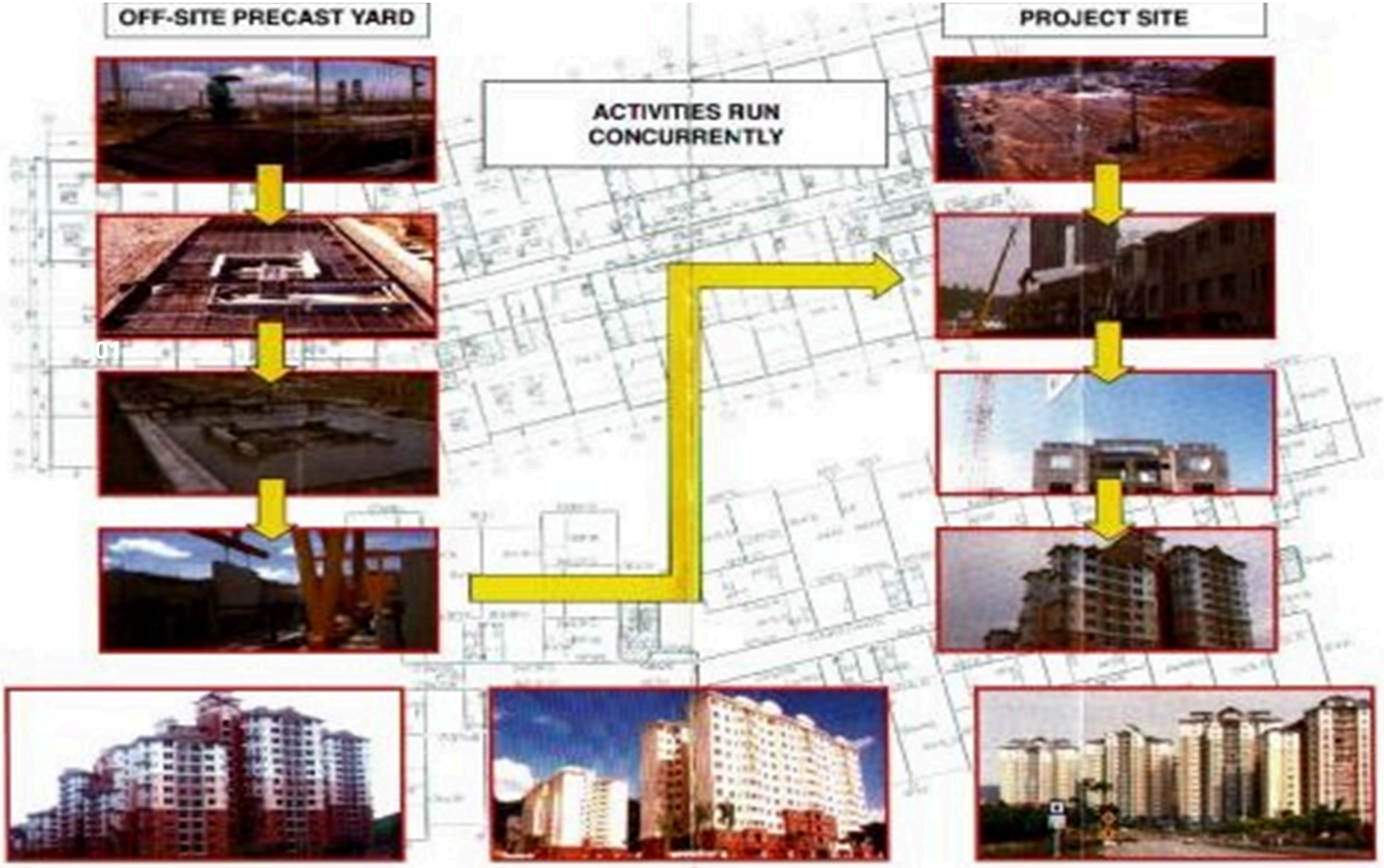
Advantages of ibs

- reduction of unskilled workers
- reduce wastage
- increase in quality
- safer working environment in construction site
- reduce construction period



Disvantages of IBS

- higher transportation and building cost
- insufficient skilled workers, consultants and contractors
- completed structures can't be renovate
- improper planning will lead to failure
- Low standardisation of components(moulds need to custom made and adjusted to suit o


OFF-SITE PRECAST YARD
PROJECT SITE
ACTIVITIES RUN CONCURRENTLY

It consists of :

Innovative mould systems

Precast component systems

Prefabricated timber structures

Fabricated steel structures

Blockwork systems

Brigitte Schwartz

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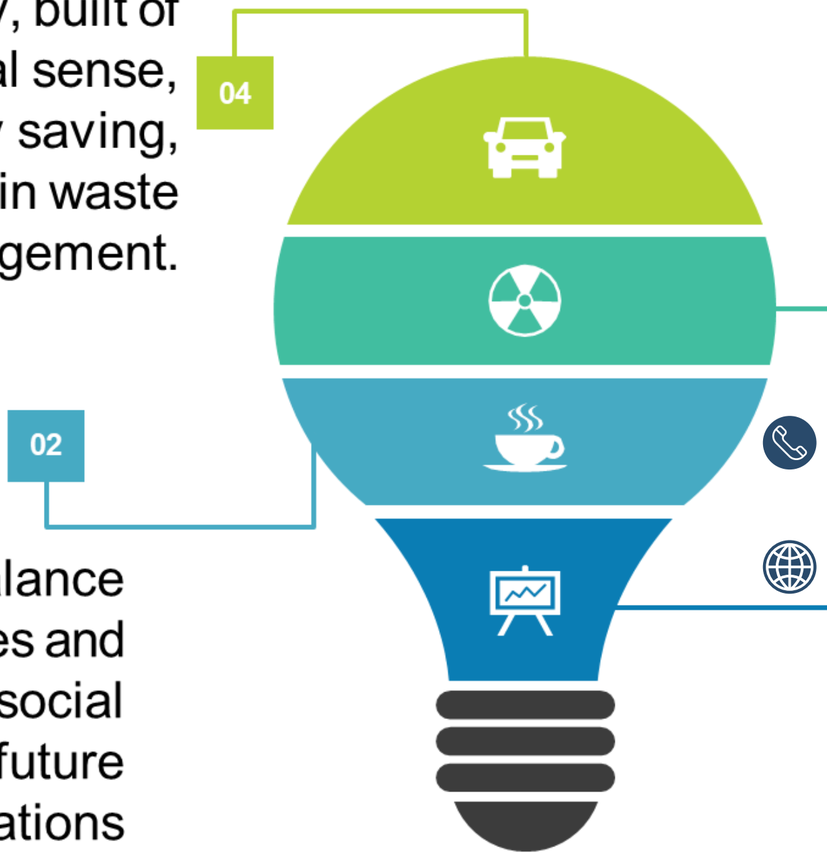
sustainable construction?

- ✓ Intelligent building
- ✓ Green building construction
- ✓ Sustainable design
- ✓ Sustainable construction
- ✓ Eco-friendly design and integrated design

Sustainable construction

sustainable construction should be available in sufficient supply, built of high quality in technical sense, affordable, energy saving, ecological and sustainable in waste management.



main principle in designing house/building in which one of the important dimensions to be considered is quality

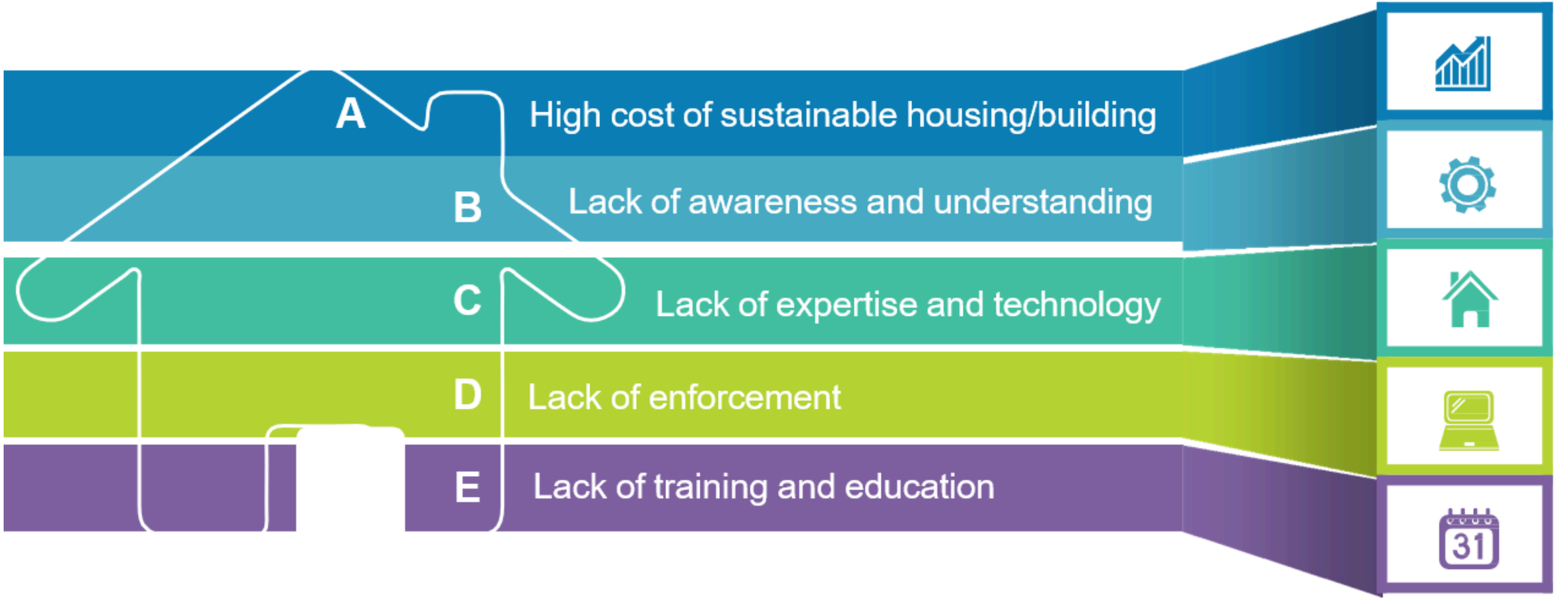
is vital to achieve a balance between human activities and nature without jeopardising social and economic systems for future generations

sustainable construction should be socially acceptable, economically viable, environmentally friendly and technically feasible

Advantage of sustainable construction

- Cost effectiveness
- Environmental friendly
- Durable construction
- Preserved livestock
- Healthy habitat for the occupant
- Natural resources based
- Controlled use of resources
- Pollution control

Challenges and barriers of sustainable construction



Sustainable construction

3 main indicator

- ✓ Social
- ✓ Economic
- ✓ environmental

Social perspective

Provide shelter and also a sense of protection to a community

Economic perspective

Generates significant contribution to the construction industry sector and leads to increase the GDP year by year

Environmental perspective

Reduce a green house gas emission, optimize usage of energy and material and control waste

GREEN MATERIALS AND PRODUCTS IN CONSTRUCTION

Green Building

Building that ensure the waste is minimized at every stage during the construction and operation of the building, resulting in low costs, according to experts in the technology

CRITERIA

- RESOURCE EFFICIENCY
- ENERGY EFFICIENCY
- INDOOR AIR QUALITY
- WATER CONSERVATION
- AFFORDABILITY

Criteria 1 : Resources of efficiency

can be accomplished by utilizing materials that meet one or more by the following criteria:

1

Reusable or recycleable

Selected materials that can be easily dismantled and reused or recycled at the end of their use life

2

Recycled or recyclable product packaging

Products enclosed in recycled content or recyclable packaging.

3

Durable

Materials that are longer lasting or are comparable to conventional products with long life expectancies.

4

Locally available:

Building materials, components, and systems found locally or regionally, saving energy and resources in transportation tothe project site

Criteria 2 : Indoor air quality

can be enhanced by utilizing materials that meet one or more of the following criteria:

01 **Low or non-toxic** : Materials that emit few or no carcinogens, reproductive toxicants, or irritants as demonstrated by the manufacturer through appropriate testing

02 **Moisture resistant** : Products and systems that resist moisture or inhibit the growth of biological contaminants in building

03 **Healthy environment maintained** : Materials, components, and systems that require only simple, non -toxic, or low VOC methods of cleaning.

04 **Minimal chemical emissions:** Products that have minimal emissions of Volatile Organic Compounds (VOCs). Products that also maximize resource and energy efficiency while reducing chemical emissions.

Criteria 3, 4 & 5

Energy Efficiency

03 utilizing materials, components and systems that help reduce energy consumption in buildings and facilities.

Water Conservation

04 utilizing products, materials and systems that help reduce water consumption in buildings and landscaped areas, and increase water recycling and reuse

Water Conservation

05 can be considered when building product life-cycle costs are lower or comparable to those of “conventional” products are within a project-defined percentage of the overall budget.

MANAGEMENT AND SITE SUPERVISION

SITE SUPERVISION

The quality of site supervision has a major influence on the overall performance and efficiency of construction projects. Inadequate supervision is believed to be one of the major causes of rework. Therefore, experienced and well-trained supervisors have an important role in minimising the amount of rework due to construction defects.

DUTIES OF A SITE SUPERVISOR

The duties of a Site Supervisor are as follows:

a) Update site work programmed

b)Study contract document sample on matters pertaining to regulations, specifications and plan.

c) Recruit workers (technicians, skilled and unskilled workers)

d) Carry out negotiations for the supply of equipment.

e)Assign workers to their specific work locations (store workers, workshop, site office, engineer office, construction site)

f) Check building location, work quality and material grade.

g) Evaluate work adjustment cost and the effect on progress payment

DUTIES OF A SITE SUPERVISOR (cont'd)

h) Prepare the site daily book and progress chart.

i) Check work completed and the facilities.

* Note: All site workers are under the supervisor. The site supervisor also oversees work done by the sub-contractor and is also fully responsible to the main contractor.

VIDEO IBS IN MALAYSIA

CASE STUDY

CASE STUDY 1

CASE STUDY 2

CASE STUDY 3

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THANK YOU