

*Template Questionnaire*  
**Cost Benefit Analysis**  
**BUILDING INFORMATION MODELLING (BIM) FOR**  
**ORGANIZATION BASED**

**December 2018**

**VERSION 1**



LEMBAGA PEMBANGUNAN INDUSTRI PEMBINAAN MALAYSIA (CIDB)

**SURVEY ON COST BENEFITS ANALYSIS OF BUILDING INFORMATION MODELLING (BIM)  
IMPLEMENTATION IN MALAYSIAN CONSTRUCTION INDUSTRY 2018**

The value of BIM throughout organization is often measured by benefit and ratio of return to investment, or ROI. Difficulties in measuring all these factors reveal the need for a value chain approach that accounts for the project lifecycle. Currently, there is limited evidence of consistent recorded data of BIM internal and external company best practices between projects, industry, nations and governments. This research project aims to develop a framework that able to prove value, returns and assessment methods surrounding the technological, processes and investment required to adopt BIM.

The present survey aims to justify the initial investment and analyse the benefits of BIM through case studies. The **objectives** of the survey are as follow:

1. To analyse the relationship and use of BIM to the overall performance, benefits, implications and costs involved in the implementation of BIM.
2. To identify the overall factors involved in an organization making decisions in the use of BIM.
3. As a reference by the players industry to implement BIM.

**The results of this survey will be used solely for the CIDB research purpose and all personal information is guaranteed to be confidential.**

Thank you very much in advance for your participation.

**GENERAL INFO**

Name of organization/company : \_\_\_\_\_

CIDB Registration Number : \_\_\_\_\_

Position of respondent : \_\_\_\_\_

**LEVEL OF BIM IMPLEMENTATION IN CONSTRUCTION PROJECT**

1. Please list down the **building construction** projects involved by your company, by specifying the project title, location, and project status.

Project Title	Project	Project Status		Using BIM
(e.g. Constructing High Rise Residential Building)	Location	Government / Private	Completed / Ongoing	Yes / No

## 1.0 BACKGROUND INFORMATION

1. Please indicate your major profession:

<input type="checkbox"/> Architect	<input type="checkbox"/> Civil Engineer	<input type="checkbox"/> Manager
<input type="checkbox"/> Quantity Surveyor	<input type="checkbox"/> BIM Manager	<input type="checkbox"/> Electrical Engineer
<input type="checkbox"/> Site Engineer	<input type="checkbox"/> Mechanical Engineer	<input type="checkbox"/> BIM Coordinator
<input type="checkbox"/> BIM Modeller	<input type="checkbox"/> Others (Please specify) : _____	

2. Basic salary profession:

<input type="checkbox"/> < RM 3000	<input type="checkbox"/> RM 3001 – RM 4000	<input type="checkbox"/> RM 4001 – RM 5000
<input type="checkbox"/> RM 5001 – RM 6000	<input type="checkbox"/> RM 6001 – RM 7000	<input type="checkbox"/> RM 7001 – RM 10,000
<input type="checkbox"/> RM 10,001 – RM 15,000	<input type="checkbox"/> RM 15,001 – RM 20,000	<input type="checkbox"/> > RM 20,001

3. Types of organization in which you are engaged in:

<input type="checkbox"/> Public Client	<input type="checkbox"/> Private Client	<input type="checkbox"/> Project Consultant
<input type="checkbox"/> Main Contractor	<input type="checkbox"/> Sub - Contractor	<input type="checkbox"/> Academician/Research Institution
<input type="checkbox"/> Others (Please specify) : _____		

4. Types of **BIM Software** commonly used in your **Building Construction Projects**:

<input type="checkbox"/> Autodesk BIM	<input type="checkbox"/> Navisworks	<input type="checkbox"/> Archicad
<input type="checkbox"/> Revit	<input type="checkbox"/> Tekla	<input type="checkbox"/> Vico
<input type="checkbox"/> Others (Please specify) : _____		

5. Before using BIM, what types of software or tools used in your Building Construction Projects?

<input type="checkbox"/> AutoCad	<input type="checkbox"/> Esteem	<input type="checkbox"/> StaadPro
<input type="checkbox"/> AutoCad Architecture	<input type="checkbox"/> Revit	<input type="checkbox"/> Primavera
<input type="checkbox"/> Others (Please specify) : _____		

6. Years of professional working in construction industry:

<input type="checkbox"/> < 1 year	<input type="checkbox"/> 1 – 3 years	<input type="checkbox"/> 4 – 5 years
<input type="checkbox"/> 5 – 10 years	<input type="checkbox"/> 11 – 15 years	<input type="checkbox"/> 16 – 20 years
<input type="checkbox"/> Others (Please specify) : _____		

7. Years of professional working experience in BIM:

<input type="checkbox"/> < 1 year	<input type="checkbox"/> 1 – 3 years	<input type="checkbox"/> 4 – 5 years
<input type="checkbox"/> 5 – 10 years	<input type="checkbox"/> 11 – 15 years	<input type="checkbox"/> 16 – 20 years

8. How many projects has your company involved using BIM:

<input type="checkbox"/> 1 - 5	<input type="checkbox"/> 6 - 10	<input type="checkbox"/> 11 - 20
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☐ 21 – 25

☐ 26 – 30

☐ > 30

## 2.0 READINESS ON BIM IMPLEMENTATION

Please answer the following questions by stating **Yes** or **No**

Items	Yes	No
<b>Technical Skills and Expertise</b>		
Does your company have enough BIM manager/coordinator to monitor and conducting project using BIM?		
Does your company have enough BIM modeller to support BIM project?		
Does your company have more than 5 years of experience in conducting project using BIM?		
<b>Knowledge and Experience</b>		
Does your company have own BIM standard/guideline?		
Do you undergo several training or professional course on BIM?		
Do you understand the adoption of BIM in details?		
<b>Productivity and Efficiency</b>		
Does BIM implementation in your company enhance overall project quality, productivity, and efficiency?		
Does overall project delivery meet with the schedule compliance by using BIM?		
Does BIM implementation in your company increase the worker's productivity?		

## 3.0 IMPACT ON BIM BENEFITS

Please rate the level of agreements on the following factors as in construction projects based on your general experience using a 5 - point Likert scale:

1 - Strongly Disagree

3 - Average

5 – Strongly Agree

2 - Disagree

4 – Agree

Items	Rating Scale				
	1	2	3	4	5
<b>During the design, construction and post construction process, how do you find BIM can increase:</b>					
<b>Financial Performance</b>					
Have your company achieved Return on Investment (ROI) of BIM implementation in your company?					
Has your company gain reduction of construction works and improvement in overall project cost performance?					
Provision of cost information for early decision making					
<b>Time Productivity</b>					
Allow for time efficiency during design stage					
Ease of re-design and design changes process					
On-time completion of the overall project timeline					
Allow for clash detection before construction process					

Enhance the accuracy of as-built drawings					
Reduce time for Request for Information (RFI)					
<b>Information and Data Sharing Process</b>					
Ease of information and data sharing through a single centralised drawing					
Reduction of site-based conflicts					
Enhance information changes and employer information requirements					
Coordination of schedules with several parties involved (client – consultant – contractor)					
Improve collaboration between project team					
<b>Design Drawing</b>					
Early detection of clashes during design stage					
Production of architectural design of buildings at different perspectives					
Allow for simulation tools and building analysis such as visualization of sunlight penetration					
Increase drawing accuracy and efficiency					
Improve visualization of the projects					

#### 4.0 BARRIERS TO INTEGRATION OF BIM IN CONSTRUCTION PROJECTS

Please rate the level of agreements on the following factors as in construction projects based on your general experience using a 5 - point Likert scale:

1 - Strongly Disagree

3 - Average

5 – Strongly Agree

2 - Disagree

4 – Agree

Items	Rating Scale				
	1	2	3	4	5
<b>Organization</b>					
Lack of support and awareness from Top Management					
BIM is not being practiced by client's project					
No enforcement for BIM implementation from the stakeholders					
BIM is not being practiced through several project team					
<b>Financial Barrier</b>					
High cost of BIM investment at early stage					
High cost of BIM software, license, and hardware upgrading					
Investment in training cost and new personnel on BIM					
<b>Knowledge and Learning Curve</b>					
More time required to adapt to the new technologies					
Lack of expertise and personnel that are knowledgeable in BIM					
Lack of experience personnel in using BIM projects					

### Cost Benefit Analysis Summary Table

Cost Benefit Analysis (CBA)	Year 0 (Initial)	Year 1	Year 2	Year 3	Year 4	Year 5
Benefits						
Time						
Time Savings in Design						
Time Savings from RFI						
Cost						
Cost Savings from Clash Detection						
Cost Savings from Work Changes						
Revenue						
Total Benefits						
Costs						
Initial Stage						
Operation Stage						
Maintenance Stage						
Total Costs						

## 5.0 COST ANALYSIS

	Evaluation Method	Remarks
<b>Initial Stage</b>		
Hardware Supplies	No(s) of hardware x unit costs	- Depends on vendor - Quantity of hardware purchase
Desktops	No(s) of desktop x unit costs	- Depends on vendor - Quantity of desktop purchase
Software supplies and purchasing	No(s) of software x unit costs	- costs of software - years of licensing
Workplace installation		- new setup of workplace
Telecommunication equipment purchasing		- telephone lines, WIFI installation
Cost of management and staff dealing with procurement	No(s) of staff x monthly basis	
Cost of start-up personnel (BIM user)		
- Architect	No(s) of staff x monthly basis	
- Civil & Structure	No(s) of staff x monthly basis	
- Quantity Surveyor	No(s) of staff x monthly basis	
- Mechanical & Electrical	No(s) of staff x monthly basis	
- Drafter	No(s) of staff x monthly basis	
Cost of preparing documentation		

	Evaluation Method	Remarks
<b>Operation Stage</b>		
Consulting costs		- consult with experience BIM user/company
<b>Cost of operating BIM software / licensing</b>	Unit Costs of license x number of licenses	
Cost of communications equipment installation (telephone lines, data lines, etc.)		- lump sum value for communication costs
<b>Cost of personnel searches and hiring activities</b>		
Cost of personnel (BIM user)		
- Architect	No(s) of staff x monthly basis	- including increments/year
- Civil & Structure	No(s) of staff x monthly basis	
- Quantity Surveyor	No(s) of staff x monthly basis	
- Mechanical & Electrical	No(s) of staff x monthly basis	
- Drafter	No(s) of staff x monthly basis	
Cost for interacting with users during development		
Cost for staff training	No(s) of staff x training costs	
Rental costs	Costs per month	Office rental costs
Depreciation costs on hardware	Cost of hardware x 60% depreciation	- based on 60% Depreciation Rates for Financial Year 2017-18 & Assessment Year 2018-19
Depreciation costs on software	Cost of software x 60% depreciation	
Software licensing	Cost of license x number of software	- based on annum licensing
Server Upgrading		- lump sum



	Evaluation Method	Remarks
<b>Maintenance Stage</b>		
Workplace upgrading		- lump sum value for upgrading workplace
Cost of BIM software upgrading to fit current technology and version		
System maintenance costs – hardware	No(s) of hardware x Hardware maintenance costs	
System maintenance costs – software	No(s) of software x Software maintenance costs	
System maintenance costs – server		- lump sum for server maintenance

## 6.0 BENEFITS ANALYSIS

Monetary Benefits	Evaluation Method	Remarks
<b>Time</b>		
Time Savings in Design	Value of time = Change in time resulting from BIM (sum of days for all stakeholders with time saving) x Average daily wage including overheads	Data required: Time savings (days) from BIM for each person who saves time; daily wages (£) including overheads of the people who save time.
	Value of time = Reduction in project schedule (days) x Project Prelim cost per day	Data required: Project schedules for two similar projects with and without BIM Level 2 (days); an understanding of any project delays due to events that BIM Level 2 could not influence (e.g. delays due to poor weather); an understanding of schedule reduction that can be attributed to BIM Level 2; average daily project 'prelim' costs
Time savings from fulfilling RFIs (during build and commission)	Value of time = Change in time amount of time required to respond to RFIs resulting from using BIM (hours) x Average daily wage including overheads	Data required: RFI logs; an understanding of any changes in RFIs (both in terms of quantity issued, and time taken to respond) attributable to BIM Level 2; average daily wage including overheads

Cost		
Cost savings from clash detection	<p>Cost Savings =</p> <p>Reduction in number of clashes on site (Number) x [Average cost (time &amp; materials) of fixing on site, RM – Average cost (time and materials) of fixing one clash in design (RM)]</p>	Data required: Clash logs or other records containing the number of identified clashes for a project using BIM Level 2, and a suitable counterfactual project or knowledge of which clashes would not have been detected without BIM Level 2
Cost savings from fewer changes	<p>Cost Savings =</p> <p>Reduction in number of changes required (number) x Average cost (time &amp; materials) of change (RM)</p>	Data required: Change logs or other records containing the number of approved change requests for a BIM Level 2 project and a suitable counterfactual project. Assumptions have to be made regarding the average cost of change including time and materials cost estimates derived from changes occurring on other projects of similar type, complexity, duration and value

## 7.0 Costs and Benefits Analysis Comparison

Quantitative Analysis	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<b>Benefits</b>						
Cost Savings						
Cost Avoidance						
Revenue						
Other						
<b>Total Benefits</b>						
<b>Costs</b>						
Non-recurring						
Recurring						
<b>Total Costs</b>						
<b>Net Benefits or Costs (Benefit-Cost)</b>						

## 8.0 Return on Investment

<b>Cost Benefit Ratio = Total Costs/Total Benefits</b>						
Total Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<b>Total Benefits</b>						

## 9.0 RECOMMENDATION TO INTEGRATION OF BIM IN CONSTRUCTION PROJECTS

Please rate the level of agreements on the following factors as in construction projects based on your general experience using a 5 - point Likert scale:

1 - Strongly Disagree

3 - Average

5 – Strongly Agree

2 - Disagree

4 – Agree

Items	Rating Scale				
	1	2	3	4	5
<b>Financial Support</b>					
Government initiatives to start up BIM initiatives to increase adoption of BIM in construction projects					
Adequate construction cost allocated with respect to usage of BIM					
Training incentives to BIM's new user					
<b>Industry Level</b>					
More engagement and collaboration in terms of knowledge transfer for BIM importance					
<b>Legal and Policy</b>					
Establishment of BIM Guideline for each discipline					
Development of legal framework for BIM usage and deployments in projects					
Enforcement of BIM usage in construction project with suitable requirement and conditions					

Others (please state): \_\_\_\_\_

**- THANK YOU FOR YOUR PRECIOUS TIME -**

**References:**

<http://bimexcellence.com/scoping/>

[https://vdcscorecard.stanford.edu/sites/default/files/bim\\_deployment\\_plan\\_final\\_0.pdf](https://vdcscorecard.stanford.edu/sites/default/files/bim_deployment_plan_final_0.pdf)