CHAPTER V

CONCLUSION AND RECOMENDATION

5.1 Conclusion

According to the data analysis of respondent answer toward questionnaire, several conclusions are obtained;

1. The construction companies in Yogyakarta nowadays are aware toward the benefits of Building Information Modeling implementation on the construction industry. This particular matter can be seen as majority of respondent (97%) agreed that by adopt this concept will be beneficial for them.

2. The construction companies in Yogyakarta nowadays are understand about Building Information Modeling concept as most of the respondent (83%) stated that they use this concept on their project. Software that commonly used by the construction companies in Yogyakarta is AutoCAD Civil 3D and AutoCAD Architecture.Level of Building Information Modeling implementation in Yogyakarta according to the maturity level of BIM by UK Government is Level: 0, or starter level. It is because in the planning stage, the data is not yet well managed. Therefore, integration of several information for the advance use of planning stage are not yet able to be done.

3. The impact of Building Information Modeling implementation in the construction is

   a. In the construction stage, benefit of Building Information Modeling implementation mostly on the Handover the project work category on the first rank of respondents answer with 3.80 mean value and 0.80 standard deviation value.
   b. In the project activity, benefit of Building Information Modeling implementation mostly on the Visualization design facility activity is the top of rank according to the respondents answer by 3.83 mean value and 0.74 standard deviation value
   c. In the project performance, benefit of Building Information Modeling implementation mostly on the Minimize the risk of miscommunication is the top of the rank according to the respondents answer with 4.03 mean value and 0.71 standard deviation value

5.2 Recommendation

According to the result of the research and conclusion above, several recommendations can be obtained;

1. One of the most crucial factor in order to achieve successful construction project is a proper planning stage. It is essential for construction company to understand deeply about Building Information Modeling, and able to gather the information required in

order to reach it maximum level because it potential benefit to increase the quality of construction design.

2. In order to achieve a more detailed data regarding the value of construction project that implementing BIM in Yogyakarta, the dominant project value (0 to 20 Billion) can be separated into several range.
3. It is essential in the future study to conduct a research with higher number of respondent and company in order to provide a better information regarding the BIM Implementation.

ATTACHMENT

RESEARCH QUESTIONAIRE

IDENTIFICATION OF BUILDING INFORMATION MODELING (BIM) SIGNIFICANCE TOWARD SUCCESSFULNESS OF THE CONSTRUCTION PROJECT IN YOGYAKARTA

The Technical Marketing Manager of Autodesk. Inc., Anthony Governati (2012), express that BIM is not just a tool, but a process that support virtual designing construction methodology. Point all stakeholder together throughout entire design in construction process and beyond to the operation and maintenance of the building.

According to BIM Handbook, it give three definition of BIM which are: (1)"design and process of construction that more integrated than its traditional way which provide an infrastructure in a better quality at a lower cost also shorter duration of project"; (2)"a model that include a precise geometry and data required to support progress of fabrication and construction itself" and (3) "accommodate the required functions to support the project life cycle, provide a fundamental aspect to the new design, construction ability and relation toward the team member" (Eastman et al. 2007).

This questionnaire research conducted as final project requirement, it will distribute among contractors and consultants that been involved in construction project. Considering the importance of this research, it is expected to fill this questionnaire earnestly. Thank you for the attention.

A. RESPONDENT INFORMATION

1. Company Name : ……
2. Company Address : ……
3. Respondent Type :

   a. Consultant b. Contractor ` c. Other : …….
4. How much your company's business amount in the last year?

   a. Rp. 0-20 Billion b. Rp. 21-50 Billion c. > Rp. 51 Billion
5. Current project that your company working on: ……
6. How many projects does your company have now, and what is the biggest amount project?

   a. Rp. 0-20 Billion b. Rp. 21-50 Billion c. > Rp. 51 Billion
7. Your position in the project :

   a. Project Manager c. Quality Controller

   b. Site Engineer d. Other : ……
8. What is your latest education status?

   a. High school d. Master

   b. Diploma e. Doctoral

   c. Bachelor f. Other : ……....
9. How long are you working for your company?

   a. <5 years b. 5-10 years c. >10 years

B. THE CURRENT AND FUTURE USAGE OF BIM

a. What is your knowledge and experience of BIM?

a. I know it very well and I have experience to use it.

b. I know it but I do not have experience to use it.

c. I am interesting it and studying it now.

d. I only know the word BIM.

e. No, I do not know it at all.

b. Company response toward BIM

1. Did your project use BIM?

f. Yes b. No

If the answer is yes, how long your project has been implemented BIM to the real construction?

a. <1 year experience
b. 1-2 years' experience
c. 3-4 years' experience
d. ≥5 years' experience

What kinds of software do your projects use? (May be more than one)

a. Cadpipe HVAC Modeler
b. Revit Architecture
c. AutoCad Architecture
d. Revit Structure
e. Revit MEP
f. AutoCAD MEP
h. Cadpipe Comercial Pipe
i. DProfiler
j. Bentley BIM suite
k. Fastrak
l. SDS/2
m. Digital Project
o. MEP
p. HydraCAD
q. FireCad
r. CAD-Duct
s. RISA
t. PowerCivil

g. AutoCAD Civil 3D n. ArchiCAD r. Affinity

Other: …….

According to the project experience, the implementation of BIM to the construction project is:

a. Beneficial because of the potential profit
b. Did not produce any benefit

2. How do you express your ability in implementing BIM?
   a. Beginner user c. Advance user
   b. Moderate user d. Expert user
3. According to your experience, how many staff required to implement BIM in a construction project?
   a. 1-3 staff b. 4-6 staff c. > 7 staff
4. How much percentage of the total project cost required for implement BIM?
   a. <1% b. 1-2 % c 3-4% d. ≥ 5%
5. Do you think your company will use BIM for projects in the next 5 years?
   a. Yes b. No

c. Budget allocation in the future

Effectiveness stated in the scale of 1 to 5

1: No at all 3: Moderate 5: Extremely high

2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Type of Investment	1	2	3	4	5
1	Conduct a study of BIM implementation in the company					
2	Purchase BIM Software					
3	Conduct a BIM training for the staff					
4	Create a BIM library and database					
5	Invent the company's BIM procedures or manuals					
6	Collaborate with other company regarding BIM effective procedure					
7	Held a general training of BIM to public					

C. BENEFITS OF BIM

a. Level of BIM significance in the construction stages

Effectiveness stated in the scale 1 to 5
1: No at all 3: Moderate 5: Extremely high
2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Stage of Construction	1	2	3	4	5
1	Feasibility study					
2	Conceptual design					
3	Basic design					
4	Detail design					
5	Construction documents					
6	Bidding preparation					
7	Fabrication					
8	Construction					
9	Drawing of construction work					
10	Submission of tender offer					
11	Handover the project work					
12	Operation and Maintenance					

b. Level of BIM significant in the project activities

Effectiveness stated in the scale 1 to 5
1: No at all 3: Moderate 5: Extremely high
2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Type of Project Activity	1	2	3	4	5
1	Conflict detection					
2	Cost estimation project					
3	Energy analysis					
4	Facility room planning					
5	Saving time of a certain activity					
6	Finish and handover the job					
7	Estimate the proportion of work					
8	Scheduling					
9	Construction drawing process					
10	Tender submission process					
11	Visualization design facility					

c. Level of BIM significance in the project performance

Effectiveness stated in the scale 1 to 5

1: No at all 3: Moderate 5: Extremely high

2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Type of Project Activity	1	2	3	4	5
1	Reduce the information request					
2	Reduce resubmission activity					
3	Reduce conflict					
4	Reduce the risk of violence in the project					
5	Reduce the risk of rework					
6	Reduce the cost of project					
7	Reduce the changes of project order					
8	Minimize the risk of miscommunication					

D. SUCCESSFULNESS OF PROJECT

Give a checklist (√) to the preferred choice in the available slot toward the successfulness of your project regarding the concept of BIM in your company that you were working on. The amount of scale expressed in the range 1 to 5;

1: No at all 3: Moderate 5: Extremely high

2: Small 4: High

No	Type of Project Activity	Level				
		1	2	3	4	5
1	On time					
2	Precise cost					
3	Quality assurance					
4	Customer satisfaction					
5	Occupational health and safety					

RESEARCH QUESTIONAIRE

IDENTIFICATION OF BUILDING INFORMATION MODELING (BIM) SIGNIFICANCE TOWARD SUCCESSFULNESS CONSTRUCTION PROJECT IN YOGYAKARTA

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According to BIM Handbook, it give three definition of BIM which are: (1)"design and process of construction that more integrated than its traditional way which provide an infrastructure in a better quality at a lower cost also shorter duration of project"; (2)"a model that include a precise geometry and data required to support progress of fabrication and construction itself" and (3) "accommodate the required functions to support the project life cycle, provide a fundamental aspect to the new design, construction ability and relation toward the team member" (Eastman et al. 2007).

This questionnaire research conducted as final project requirement, it will distribute among contractors and consultants that been involved in construction project. Considering the importance of this research, it is expected to fill this questionnaire earnestly. Thank you for the attention.

A. RESPONDENT INFORMATION

1. Company Name (*Nama Perusahaan*) : ……
2. Company Address (*Alamat Perusahaan*) : ……
3. Respondent Type (*Tipe Responden*) :

   a. Consultant b. Contractor ` c. Other : …….
4. How much your last year company salary?

   (*Berapa pendapatan perusahaan anda setahun kemarin*?)

   a. Rp. 0-20 Billion b. Rp. 21-50 Billion c. > Rp. 51 Billion
5. Current project that your company working on

   (*Proyek yang sedang perusahaan anda kerjakan sekarang*)

   : ……
6. How much the value of your company current project?

   (*Berapa nilai proyek yang perusahaan anda kerjakan sekarang*?)

   a. Rp. 0-20 Billion b. Rp. 21-50 Billion c. > Rp. 51 Billion
7. Your position in the project (*Jabatan anda di proyek*) :

   a. Project Manager c. Quality Control

   b. Site Manager d. Other : ……
8. What is your latest education status? (*Apa pendidikan terakhir anda*?)

   a. High school d. Master

   b. Diploma e. Doctoral

   c. Bachelor f. Other : ……....

9. How old your company that you have working on? (*Berapa usia tempat perusahaan anda bekerja*?)

   a. <5 years b. 5-10 years c. >10 years

B. THE CURRENT AND FUTURE USAGE OF BIM

a. Company response toward BIM (*Respons perusahaan terhadap BIM*)

1. Did your project use BIM? (*Apakah proyek anda menggunakan BIM?*)

   a. Yes b. No

   If the answer is yes, how long your project has been implemented BIM to the real construction? (*Jika ya, berapa lama proyek anda telah menerapkan BIM pada konstruksi?*)

   a. <1 year experience c. 3-4 years' experience

   b. 1-2 years' experience d. ≥5 years' experience

   What software that your project use? (May be more than one)

   (*Software apa yang digunakan dalam proyek anda?*)

a. Cadpipe HVAC	h. Cadpipe Comercial Pipe	o. MEP Modeler
b. Revit Architecture	i. DProfiler	p. HydraCAD
c. AutoCad Architecture	j. Bentley BIM suite	q. FireCad
d. Revit Structure	k. Fastrak	r. CAD-Duct
e. Revit MEP	l. SDS/2	s. RISA
f. AutoCAD MEP	m. Digital Project	t. PowerCivil
g. AutoCAD Civil 3D	n. ArchiCAD	r. Affinity

   Other: …….

   According to the project experience, the implementation of BIM to the construction project is:

   (*Berdasarkan pengalaman, penerapan BIM pada proyek konstruksi adalah*)

a. Beneficial because of the potential profit

b. Did not produce any benefit

2. How you express your ability in implementing BIM?

   (*Bagaimana tingkat kemampuan anda dalam menerapkan BIM?*)

   a. Beginner user c. Advance user

   b. Moderate user d. Expert user

3. According to you how many staff required to implement BIM in a construction project? (*Menurut anda berapa staff yang dibutuhkan untuk menerapkan BIM pada proyek?*)

   a. 1-3 staff b. 4-6 staff c. > 7 staff

4. How many percent from the total project cost required to implement BIM?

   (*Berapa persen biaya yang dibutuhkan untuk menerapkan BIM dari total biaya proyek?*)

   a. <1% b. 1-2 % c 3-4% d. ≥ 5%

5. Would your company still use BIM for project in the next 5 years?

   (*Apakan perusahaan anda akan menggunakan BIM untuk 5 tahun kedepan?*)

   a. Yes b. No

b. Budget allocation in the future (*Alokasi budget di masa depan*)

Amount stated in the scale of 1 to 5

1: No at all 3: Moderate 5: Extremely high

2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Type of Investment	1	2	3	4	5
1	Conduct a study of BIM implementation in the company					
2	Purchase BIM Software					
3	Conduct a BIM training for the staff					
4	Create a BIM library and database					
5	Invent the company's BIM procedures or manuals					
6	Collaborate with other company regarding BIM effective procedure					
7	Held a general training of BIM to public					

C. BENEFITS OF BIM

a. Level of BIM significance in the construction stages (*Tingkat signifikan BIM dalam tahapan konstruksi)*

Amount stated in the scale 1 to 5
1: No at all 3: Moderate 5: Extremely high
2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Stage of Construction	1	2	3	4	5
1	Feasibility study					
2	Initial design					
3	Final design					
4	Construction documents					
5	Bidding preparation					
6	Fabrication					
7	Construction					
8	Drawing of construction work					
9	Submission of tender offer					
10	Handover the project work					
11	Operation and Maintenance					

b. Level of BIM significant in the project activities (*Tingkat signifikan BIM pada aktifitas proyek*)

Amount stated in the scale 1 to 5
1: No at all 3: Moderate 5: Extremely high
2: Small 4: High

Give a checklist (√) toward the preferred choice(s)

No	Type of Project Activity	1	2	3	4	5
1	Conflict detection					
2	Cost estimation project					
3	Energy analysis					
4	Facility room planning					
5	Saving time of a certain activity					
6	Finish and handover the job					
7	Estimate the proportion of work					

8	Scheduling					
9	Construction drawing process					
10	Tender submission process					
11	Visualization design facility					

c. Level of BIM significance in the project performance (*Tingkat signifikan BIM pada kinerja proyek)*

Amount stated in the scale 1 to 5

1: No at all
2: Small
3: Moderate
4: High
5: Extremely high

Give a checklist (√) toward the preferred choice(s)

No	Type of Project Activity	1	2	3	4	5
1	Reduce the information request					
2	Reduce resubmission activity					
3	Reduce conflict					
4	Reduce the risk of violence in the project					
5	Reduce the risk of rework					
6	Reduce the cost of project					
7	Reduce the changes of project order					
8	Minimize the risk of miscommunication					

D. SUCCESSFULNESS OF PROJECT

Give a checklist (√) to the preferred choice in the available slot toward the successfulness of your project regarding the concept of BIM in your company that you were working on. The amount of scale expressed in the range 1 to 5; (*Berikan tanda cek (√) pada kotak yang tersedia untuk tingkat kesuksesan konsep BIM pada proyek anda dengan menggunakan skala 1 sampai 5*)

1: No at all 3: Moderate 5: Extremely high

2: Small 4: High

No	Type of Project Activity	Level				
		1	2	3	4	5
1	On time					
2	Precise cost					
3	Quality assurance					
4	Customer satisfaction					
5	Occupational health and safety					

REFERENCES

Abdirad, H., and Pishdad-Bozorgi, P., 2014, *Trends of Assessing BIM implementation in Construction Research*, ASCE, Computing in Civil and Building Engineering, 496-503.

AlNasseri, H., and Aulin, R., 2015*, Assessing Understanding of Planning and Scheduling Theory and Practice on Construction Projects*, Engineering Management Journal, Vol 27 No. 2.

Andersen, E.S., 1996, *Warning: Activity plan is hazardous to your project's health!*, Internaltional Journal of Project Management, 14(2), 89-94.

Chrisna, Putu A.P., 2013, *The Relationship Between Leadership Style and Frequency of Accidents*, Thesis, Universitas Atma Jaya Yogyakarta.

Chua, D.K., & Godinot, M., 2006, *Use of a WBS matrix to improve interface management in projects*, Journal of Construction Engineering and Management, 132(1), 67-79.

Demeulemeester, E.L. and Herroelen, W.S., 2012, *Project Scheduling: A research handbook*, Norwell, MA: Kluwer Academic Publisher.

De Snoo, C., Van Wezel, W., & Jorna, R.J., 2011, *An empirical investigation of scheduling performance criteria*, Journal of Operation Management, 29(3), 181-193.

Dipohusodo, I., 1996, *Manajemen Proyek dan Konstruksi, Jilid I*, First Edition, Kanisius Publisher, Yogyakarta.

Eastman, C.M., Teicholz, P., Sacks, R., and Liston, K. 2008. *BIM Handbook: A Guide To Building Information Modeling For Owners, Managers, Architects, Engineer, Contractors, And Fabricators*, Wiley, Hoboken, N.J.

Ervianto,W.I., 2005, *Manajemen Proyek Konstruksi (Edisi revisi)*, Penerbit Andi, Yogyakarta.

Haughan, G.T., 2002, *Project planning and scheduling, Leesburg Pike*, VA: Management Concept Press.

John Boktor, Awad Hanna, Ph.D., P.E., M.ASCE and Carol C. Menassa, Ph.D., A.M. ASCE, 2014, *State of Practice of Building Information Modeling in the Mechanical Construction Industry*, Journal of Construction Engineering and Management, ASCE, Vol. 30 No. 1, January 2014.

Kerner, H., 2001, *Project Management, 7th edition*, John Wiley Sons, Inc., New York.

Kusayanagi, S (2015), *Jakarta Mass Rapid Transit Seminar*, [Professor fom Koochi University of Technology], 5 March.

Laslo, Z., 2010, *Project portfolio management: An integrated method for resource planning and scheduling to minimize planning/scheduling-dependent expenses*, International Journal of Project Management, 28(6), 609-618.

Liang, J.A., 2015, *Kajian Terhadap Praktik Building Information Modeling Pada Industri Konstruksi di Indonesia*, Thesis, MTS, Universitas Atma Jaya Yogyakarta, Yogyakarta.

Nam Nguyen Duc, *01 – Implementing BIM in Construction* (By Anthony Governati), Online video clip, Youtube, Youtube, April 2, 2012. Web, February 23, 2016.

Mehmet F. Hergunsel, 2011, *Benefits of Building Information Modeling For Construction Managers and BIM Based Secheduling*, Worcester Polytechnic Institute, Worchester.

Oberlender, G.D., 2000, *Project management for engineering and construction*. Boston, MA: McGraw-Hill.

Oglietti, M., 2005*, Understanding planning with incomplete information and sensing*. Artificial Intelligence, 164(1-2), 171-208.

Project Management Institute (PMI), 2001, *A Guide To The Project Management Body of Knowledge*, 2000 Edition, Nemtown Square, Pennsylvania USA.

Rayendra, Biemo W. Soemardi, 2014, *Studi Aplikasi Teknilogi Building Information Modeling Untuk Pra-Konstruksi*, Simposium Nasional Rapi XIII – 2014.

Soeharto, I., 1997, *Manajemen Proyek dari Konseptual sampai Operasional*, Erlangga, Jakarta.

Winch, G.M., & Kesley, J., 2005, *What do construction project planners do? International Journal of Project Management*, 23(2), 141-149.

Yang, J.B., 2007, *How the critical chain scheduling method is working for construction*. Cost Engineering, 49(4), 25-32.

Yulian, Aan., 2016, *Building Information Modeling (BIM) Implementation in Indonesia*, Thesis, Universitas Diponegoro

RESPONDENT PROFILE

No	Company Name	Project Name	Address	Respondent Type	Project Value	Number of Questionnaire
1	PT. Greatech Artanindo	Proyek Pembangunan Condotel Innside Melia, Yogyakarta	Ruko Sentra Niaga Puri Indah Blok T4 no 10, Jakarta Barat 11610	Contractor	0 – 20 Billion	1
2	PT. Sketsa Megah	Hotel and Apartment Building	Komplek Pertokoan Harmoni Blok O-14 Jl. Raden Patah, Batam	Consultant	0 – 20 Billion	1
3	PT. WIKA GEDUNG	Apartment Uttara The Icon Yogyakarta	Jl. Kaliurang km 5.5 Yogyakarta	Contractor	> 51 Billion	1
4	PT. Adhi Persada Gedung	Proyek Hotel Platinum	Jl. Raya Pasar Minggu KM 18	Contractor	> 51 Billion	1
5	PT.Bhineka Utama Bangun Perkasa	Proyek Hotel Tara	Jl. Parangtritis B5 Yogyakarta	Contractor	0 – 20 Billion	1
6	PT. Sinar Mandiri Semesta	Proyek Hotel Tara	Jl. Magelang No 129	Contractor	0 – 20 Billion	1
7	Bangunindo Perkasa	Proyek Hotel Tara	Randukuning II RT 4/3 Pati	Sub-Contractor	0 – 20 Billion	1
8	PT. Putra Mataram Indah Sejati	Hotel Ambarukmo Plaza	Jl. Laksada Adisucipto No 81 Yogya	Developer	21-50 Billion	1
9	Mentari Prima Karsa	Proyek Twin Building UMY	Jl. Pendidikan No. 88, Yogyakarta	Contractor	> 51 Billion	1
No	Company Name	Project Name	Address	Respondent	Project	Number of

				Type	Value	Questionnaire
10	PT. Epiterma	WS 4	Jl. Inti 2, Cikarang, Bekasi	Fabrication	> 51 Billion	1
11	PT. Theofilas Makmur Sejahtera	Government Project	Brontokusuman, Yogyakarta	Consultant	> 51 Billion	1
12	PT. Waskita Karya (persero) Tbk.	Proyek Jalan Tol Solo - Ngawi - Kertosono	Jl. MT. Haryono Cawang, Jakarta Timur	Contractor	> 51 Billion	1
13	PT. Sketsa Megah	Hotel and Apartment Building	Komplek Pertokoan Harmoni Blok O-14 Jl. Raden Patah, Batam	Other	0 – 20 Billion	1
14	CV. Dipta Dytama	Condotel Innside by Melia	Surabaya	Contractor	> 51 Billion	1
15	PT. Gapura		Jl. Retno Dumilan No 19 Kotagede, Yogyakarta	Contractor	0 – 20 Billion	1
16	CV. Sarana Jaya Mulya	Proyek Jalan	Ngengir, Sitimulyo, Piyungan, Bantul	Contractor	0 – 20 Billion	1
17	CV. Jaya Makmur	Proyek Jalan	Tegalyoso, Sitimulyo, Piyungan, Bantul	Contractor	0 – 20 Billion	1
18	PT. Sketsa Megah	Hotel and Apartment Building	Komplek Pertokoan Harmoni Blok O-14 Jl. Raden Patah, Batam	Consultant	0 – 20 Billion	1
19	PT. Greatech Artanindo	Proyek Pembangunan Condotel Innside Melia, Yogyakarta	Ruko Sentra Niaga Puri Indah Blok T4 no 10, Jakarta Barat 11610	Consultant	21-50 Billion	1
No	Company Name	Project Name	Address	Respondent Type	Project Value	Number of Questionnaire

20	PT. WIKA GEDUNG	Apartment Uttara The Icon Yogyakarta	Jl. Kaliurang km 5.5 Yogyakarta	Contractor	21-50 Billion	1
21	PT. Adhi Persada Gedung	Proyek Hotel Platinum	Jl. Raya Pasar Minggu KM 18	Contractor	21-50 Billion	1
22	PT. Putra Mataram Indah Sejati	Hotel Ambarukmo Plaza	Jl. Laksada Adisucipto No 81 Yogya	Contractor	0 – 20 Billion	1
23	Mentari Prima Karsa	Proyek Twin Building UMY	Jl. Pendidikan No. 88, Yogyakarta	Contractor	21-50 Billion	1
24	PT. Epiterma	WS 4	Jl. Inti 2, Cikarang, Bekasi	Consultant	0 – 20 Billion	1
25	PT. Theofilas Makmur Sejahtera	Government Project	Brontokusuman, Yogyakarta	Contractor	21-50 Billion	1
26	PT. Gapura		Jl. Retno Dumilan No 19 Kotagede, Yogyakarta	Consultant	0 – 20 Billion	1
27	PT. Greatech Artanindo	Proyek Pembangunan Condotel Innside Melia, Yogyakarta	Ruko Sentra Niaga Puri Indah Blok T4 no 10, Jakarta Barat 11610	Consultant	21-50 Billion	1
28	CV. Dipta Dytama	Condotel Innside by Melia	Surabaya	Contractor	0 – 20 Billion	1
29	CV. Dipta Dytama	Condotel Innside by Melia	Surabaya	Consultant	0 – 20 Billion	1
30	PT. Sketsa Megah	Hotel and Apartment Building	Komplek Pertokoan Harmoni Blok O-14 Jl. Raden Patah, Batam	Contractor	0 – 20 Billion	1

RESPONDENT PROFILE

No	Company Name	Position	Yearly Company Salary	Latest Education	Age of Company	Experience od BIM Implementation	Required Staff	Cost Percentage
1	PT. Greatech Artanindo	Site Manager	>50 Billion	Bachelor	>10 Years	< 1 Year	> 7	1 - 2%
2	PT. Sketsa Megah	Constructor	0 – 20 Billion	Master	>10 Years	≥ 5 Years	1 – 3	1 - 2%
3	PT. WIKA GEDUNG	Engineer	>50 Billion	Bachelor	>10 Years	-	4 – 6	≥ 5%
4	PT. Adhi Persada Gedung	Project Engineering Manager	>50 Billion	Bachelor	>10 Years	≥ 5 Years	1 – 3	3 - 4%
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	21 – 50 Billion	Master	5 – 10 Years	1 – 2 Years	> 7	3 - 4%
6	PT. Sinar Mandiri Semesta	Head of Warehouse	0 – 20 Billion	Master	<5 Years	< 1 Year	1 – 3	≥ 5%
7	Bangunindo Perkasa	Sub-Contractor	0 – 20 Billion	Bachelor	<5 Years	3 – 4 Years	1 – 3	< 1%
8	PT. Putra Mataram Indah Sejati	Project Manager	21 – 50 Billion	Bachelor	>10 Years	-	4 – 6	3 - 4%
9	Mentari Prima Karsa	Site Manager	21 – 50 Billion	Bachelor	>10 Years	-	1 – 3	3 - 4%
10	PT. Epiterma	Project Engineer	>50 Billion	Bachelor	>10 Years	≥ 5 Years	> 7	≥ 5%
No	Company Name	Position	Yearly	Latest	Age of	Experience od	Required	Cost

			Company Salary	Education	Company	BIM Implementation	Staff	Percentage
11	PT. Theofilas Makmur Sejahtera	Project Engineer	>50 Billion	Bachelor	5 – 10 Years	1 – 2 Years	4 – 6	1 - 2%
12	PT. Waskita Karya (persero) Tbk.	Other	21 – 50 Billion	Bachelor	>10 Years	≥ 5 Years	> 7	1 - 2%
13	PT. Sketsa Megah	Other	21 – 50 Billion	Bachelor	<5 Years	< 1 Year	4 – 6	1 - 2%
14	CV. Dipta Dytama	Project Manager	>50 Billion	Bachelor	>10 Years	≥ 5 Years	1 – 3	< 1%
15	PT. Gapura	Other	0 – 20 Billion	Bachelor	>10 Years	3 – 4 Years	1 – 3	1 - 2%
16	CV. Sarana Jaya Mulya	Site Manager	0 – 20 Billion	High School	>10 Years	-	1 – 3	1 - 2%
17	CV. Jaya Makmur	Project Manager	0 – 20 Billion	High School	>10 Years	-	1 – 3	< 1%
18	PT. Sketsa Megah	Other	0 – 20 Billion	Bachelor	5 – 10 Years	3 – 4 Years	4 – 6	1 - 2%
19	PT. Greatech Artanindo	Quality Control	21 – 50 Billion	Bachelor	5 – 10 Years	1 – 2 Years	1 – 3	1 - 2%
20	PT. WIKA GEDUNG	Project Manager	21 – 50 Billion	Master	<5 Years	1 – 2 Years	> 7	≥ 5%
21	PT. Adhi Persada Gedung	Site Manager	21 – 50 Billion	Bachelor	>10 Years	1 – 2 Years	4 – 6	1 - 2%
22	PT. Putra Mataram Indah Sejati	Site Manager	21 – 50 Billion	Master	>10 Years	3 – 4 Years	1 – 3	≥ 5%
23	Mentari Prima Karsa	Project Manager	21 – 50 Billion	Bachelor	5 – 10 Years	1 – 2 Years	4 – 6	3 - 4%
No	Company Name	Position	Yearly Company	Latest Education	Age of Company	Experience od BIM	Required Staff	Cost Percentage

			Salary			Implementation		
24	PT. Epiterma	Project Manager	21 – 50 Billion	Bachelor	<5 Years	3 – 4 Years	4 – 6	3 - 4%
25	PT. Theofilas Makmur Sejahtera	Site Manager	21 – 50 Billion	Bachelor	5 – 10 Years	1 – 2 Years	1 – 3	1 - 2%
26	PT. Gapura	Quality Control	0 – 20 Billion	Master	5 – 10 Years	3 – 4 Years	4 – 6	1 - 2%
27	PT. Greatech Artanindo	Quality Control	21 – 50 Billion	Bachelor	5 – 10 Years	1 – 2 Years	4 – 6	3 - 4%
28	CV. Dipta Dytama	Project Manager	0 – 20 Billion	Master	5 – 10 Years	1 – 2 Years	1 – 3	3 - 4%
29	CV. Dipta Dytama	Site Manager	0 – 20 Billion	Bachelor	5 – 10 Years	3 – 4 Years	1 – 3	< 1%
30	PT. Sketsa Megah	Site Manager	21 – 50 Billion	Bachelor	<5 Years	1 – 2 Years	> 7	≥ 5%

IDENTIFICATION OF COMPANY BUDGET ALLOCATION IN THE FUTURE

No	Company Name	Position	1	2	3	4	5	6	7
1	PT. Greatech Artanindo	Site Manager	5	4	5	4	3	4	1
2	PT. Sketsa Megah	Constructor	4	2	2	2	2	3	3
3	PT. WIKA GEDUNG	Engineer	3	3	3	3	3	3	3
4	PT. Adhi Persada Gedung	Project Engineering Manager	4	4	4	4	4	4	4
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	3	4	4	4	4	4	3
6	PT. Sinar Mandiri Semesta	Head of Warehouse	4	4	4	4	4	4	4
7	Bangunindo Perkasa	Sub-Contractor	4	4	4	4	4	4	4
8	PT. Putra Mataram Indah Sejati	Project Manager	3	3	4	4	3	4	3
9	Mentari Prima Karsa	Site Manager	4	3	4	4	3	3	4
10	PT. Epiterma	Project Engineer	3	5	3	4	3	2	3
11	PT. Theofilas Makmur Sejahtera	Project Engineer	3	2	3	2	2	2	3
12	PT. Waskita Karya (persero) Tbk.	Other	4	4	5	3	4	3	2
13	PT. Sketsa Megah	Other	3	3	3	3	3	3	3
14	CV. Dipta Dytama	Project Manager	1	3	1	1	1	1	1
15	PT. Gapura	Other	3	3	3	3	3	4	3
16	CV. Sarana Jaya Mulya	Site Manager	3	4	3	3	4	4	2
17	CV. Jaya Makmur	Project Manager	3	3	4	4	4	3	3
18	PT. Sketsa Megah	Other	3	3	4	4	5	2	3
19	PT. Greatech Artanindo	Quality Control	4	4	3	3	3	3	4
20	PT. WIKA GEDUNG	Project Manager	3	3	3	3	4	4	3
21	PT. Adhi Persada Gedung	Site Manager	5	5	4	4	4	4	4
22	PT. Putra Mataram Indah Sejati	Site Manager	4	4	4	3	3	3	4
23	Mentari Prima Karsa	Project Manager	3	4	4	4	3	4	2

No	Company Name	Position	1	2	3	4	5	6	7
24	PT. Epiterma	Project Manager	3	3	3	3	4	4	3
25	PT. Theofilas Makmur Sejahtera	Site Manager	3	3	3	4	4	5	5
26	PT. Gapura	Quality Control	4	4	4	4	4	4	4
27	PT. Greatech Artanindo	Quality Control	4	4	3	2	3	4	3
28	CV. Dipta Dytama	Project Manager	3	3	4	5	2	2	3
29	CV. Dipta Dytama	Site Manager	2	3	3	4	4	4	3
30	PT. Sketsa Megah	Site Manager	3	3	2	3	4	3	5

Mean	3.367	3.467	3.433	3.400	3.367	3.367	3.167
Standard Deviation	0.809	0.730	0.858	0.855	0.850	0.890	0.950
Ranking	4	1	2	3	5	6	7

IDENTIFICATION OF BIM SIGNIFICANCE IN THE DEVELOPMENT STAGES

No	Company Name	Position	1	2	3	4	5	6	7	8	9	10	11
1	PT. Greatech Artanindo	Site Manager	4	4	4	5	5	5	5	5	5	5	5
2	PT. Sketsa Megah	Constructor	4	4	4	3	4	3	3	3	2	3	2
3	PT. WIKA GEDUNG	Engineer	3	3	3	3	3	3	3	3	3	3	3
4	PT. Adhi Persada Gedung	Project Engineering Manager	5	4	4	3	3	3	4	4	4	4	3
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	4	4	2	3	3	2	4	4	3	3	3
6	PT. Sinar Mandiri Semesta	Head of Warehouse	3	3	4	4	3	4	4	3	3	3	3
7	Bangunindo Perkasa	Sub-Contractor	3	3	4	4	3	4	4	3	3	3	3
8	PT. Putra Mataram Indah Sejati	Project Manager	3	3	4	4	4	5	5	4	4	4	5
9	Mentari Prima Karsa	Site Manager	4	3	3	4	3	3	4	4	3	3	3
10	PT. Epiterma	Project Engineer	2	3	3	2	4	4	2	5	2	3	3
11	PT. Theofilas Makmur Sejahtera	Project Engineer	3	2	4	4	4	1	1	2	3	4	3
12	PT. Waskita Karya (persero) Tbk.	Other	3	5	4	3	5	4	2	5	3	4	3
13	PT. Sketsa Megah	Other	3	4	5	3	5	4	5	5	4	5	4
14	CV. Dipta Dytama	Project Manager	3	3	3	4	4	5	5	5	4	4	3
15	PT. Gapura	Other	4	3	4	5	4	3	4	4	4	4	3

No	Company Name	Position	1	2	3	4	5	6	7	8	9	10	11
16	CV. Sarana Jaya Mulya	Site Manager	4	4	4	4	4	5	5	4	4	3	5
17	CV. Jaya Makmur	Project Manager	2	2	3	2	3	3	4	4	4	5	5
18	PT. Sketsa Megah	Other	5	5	4	2	3	4	2	4	4	5	2
19	PT. Greatech Artanindo	Quality Control	3	3	4	4	4	4	4	4	4	4	4
20	PT. WIKA GEDUNG	Project Manager	3	3	3	3	3	3	2	2	2	3	4
21	PT. Adhi Persada Gedung	Site Manager	3	3	3	3	3	4	4	4	4	4	4
22	PT. Putra Mataram Indah Sejati	Site Manager	3	3	3	4	4	4	4	4	4	4	4
23	Mentari Prima Karsa	Project Manager	4	4	4	4	3	3	3	3	3	3	3
24	PT. Epiterma	Project Manager	2	2	4	4	4	4	3	4	5	5	5
25	PT. Theofilas Makmur Sejahtera	Site Manager	4	4	4	5	5	4	4	4	3	3	3
26	PT. Gapura	Quality Control	3	3	3	3	3	3	3	3	3	3	3
27	PT. Greatech Artanindo	Quality Control	4	4	5	5	4	3	3	3	4	5	5
28	CV. Dipta Dytama	Project Manager	4	4	4	3	3	3	3	4	4	4	5
29	CV. Dipta Dytama	Site Manager	4	4	4	3	3	3	3	3	3	3	3
30	PT. Sketsa Megah	Site Manager	3	4	5	3	2	3	1	4	4	5	5

Mean	3.400	3.433	3.733	3.533	3.600	3.533	3.433	3.767	3.500	3.800	3.633
Standard Deviation	0.770	0.774	0.691	0.860	0.770	0.900	1.135	0.817	0.777	0.805	0.964
Ranking	11	9	3	6	5	7	10	2	8	1	4

IDENTIFICATION OF BIM SIGNIFICANCE IN THE PROJECT ACTIVITIES

No	Company Name	Position	1	2	3	4	5	6	7	8	9	10	11
1	PT. Greatech Artanindo	Site Manager	4	5	4	4	5	4	4	5	4	4	4
2	PT. Sketsa Megah	Constructor	4	4	4	4	4	3	3	4	4	3	4
3	PT. WIKA GEDUNG	Engineer	3	3	3	3	3	3	3	3	3	3	3
4	PT. Adhi Persada Gedung	Project Engineering Manager	3	3	4	3	4	4	3	3	4	4	4
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	3	3	3	4	4	4	4	4	4	3	4
6	PT. Sinar Mandiri Semesta	Head of Warehouse	3	3	3	3	3	3	3	3	4	3	3
7	Bangunindo Perkasa	Sub-Contractor	3	3	3	3	3	3	3	3	4	3	3
8	PT. Putra Mataram Indah Sejati	Project Manager	5	5	4	3	4	4	4	5	4	4	4
9	Mentari Prima Karsa	Site Manager	4	4	3	3	4	4	4	4	4	3	5
10	PT. Epiterma	Project Engineer	3	5	4	4	4	4	3	3	4	3	4
11	PT. Theofilas Makmur Sejahtera	Project Engineer	2	3	3	3	3	3	3	4	1	3	2
12	PT. Waskita Karya (persero) Tbk.	Other	4	5	3	4	5	2	4	5	5	3	4
13	PT. Sketsa Megah	Other	3	4	4	4	3	4	4	3	5	5	5
14	CV. Dipta Dytama	Project Manager	3	3	3	3	3	3	3	3	4	4	4
15	PT. Gapura	Other	4	4	4	3	3	4	4	3	4	3	4

No	Company Name	Position	1	2	3	4	5	6	7	8	9	10	11
16	CV. Sarana Jaya Mulya	Site Manager	5	5	4	4	5	5	3	3	4	5	4
17	CV. Jaya Makmur	Project Manager	3	4	4	5	4	4	5	2	3	3	4
18	PT. Sketsa Megah	Other	2	2	3	4	3	3	5	3	3	4	5
19	PT. Greatech Artanindo	Quality Control	3	3	3	3	3	3	3	3	3	3	3
20	PT. WIKA GEDUNG	Project Manager	3	3	4	3	3	3	3	3	3	3	4
21	PT. Adhi Persada Gedung	Site Manager	4	4	4	4	4	4	4	4	4	4	4
22	PT. Putra Mataram Indah Sejati	Site Manager	3	3	4	5	4	4	4	3	3	3	4
23	Mentari Prima Karsa	Project Manager	3	3	3	3	3	3	3	3	3	3	3
24	PT. Epiterma	Project Manager	2	2	3	4	4	4	5	3	3	4	4
25	PT. Theofilas Makmur Sejahtera	Site Manager	3	3	4	4	4	4	5	4	3	3	3
26	PT. Gapura	Quality Control	3	3	3	3	3	3	3	3	3	3	3
27	PT. Greatech Artanindo	Quality Control	3	3	3	4	5	5	3	4	4	5	3
28	CV. Dipta Dytama	Project Manager	5	5	5	4	4	3	4	3	3	4	4
29	CV. Dipta Dytama	Site Manager	4	4	4	4	4	4	4	4	5	5	5
30	PT. Sketsa Megah	Site Manager	3	4	5	5	3	4	3	3	5	4	5

Mean	3.333	3.600	3.600	3.667	3.700	3.600	3.633	3.433	3.667	3.567	3.833
Standard Deviation	0.802	0.894	0.621	0.661	0.702	0.675	0.718	0.728	0.844	0.728	0.747
Ranking	11	8	6	3	2	7	5	10	4	9	1

IDENTIFICATION OF BIM SIGNIFICANCE IN THE PROJECT PERFORMANCE

No	Company Name	Position	1	2	3	4	5	6	7	8
1	PT. Greatech Artanindo	Site Manager	3	3	3	4	1	5	4	5
2	PT. Sketsa Megah	Constructor	3	3	3	4	3	4	3	3
3	PT. WIKA GEDUNG	Engineer	3	3	3	3	3	3	3	3
4	PT. Adhi Persada Gedung	Project Engineering Manager	3	3	3	3	3	3	3	3
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	2	2	3	5	4	4	4	4
6	PT. Sinar Mandiri Semesta	Head of Warehouse	4	4	4	3	4	4	3	4
7	Bangunindo Perkasa	Sub-Contractor	4	4	4	3	4	4	3	4
8	PT. Putra Mataram Indah Sejati	Project Manager	3	3	4	4	3	4	4	5
9	Mentari Prima Karsa	Site Manager	3	3	4	3	5	5	5	4
10	PT. Epiterma	Project Engineer	3	3	3	3	4	3	3	4
11	PT. Theofilas Makmur Sejahtera	Project Engineer	2	3	3	2	3	2	2	3
12	PT. Waskita Karya (persero) Tbk.	Other	4	4	4	5	4	3	2	3
13	PT. Sketsa Megah	Other	4	4	2	2	3	3	2	3
14	CV. Dipta Dytama	Project Manager	3	3	4	3	4	4	3	4
15	PT. Gapura	Other	3	3	4	3	4	4	4	4
16	CV. Sarana Jaya Mulya	Site Manager	3	4	4	4	5	4	4	5
17	CV. Jaya Makmur	Project Manager	3	4	4	4	4	5	5	5
18	PT. Sketsa Megah	Other	3	3	4	5	5	5	4	5
19	PT. Greatech Artanindo	Quality Control	4	4	4	4	4	3	3	3

No	Company Name	Position	1	2	3	4	5	6	7	8
20	PT. WIKA GEDUNG	Project Manager	3	4	4	5	5	5	5	5
21	PT. Adhi Persada Gedung	Site Manager	4	4	4	4	4	4	4	4
22	PT. Putra Mataram Indah Sejati	Site Manager	4	4	4	4	4	4	4	4
23	Mentari Prima Karsa	Project Manager	4	4	4	4	4	4	4	4
24	PT. Epiterma	Project Manager	3	3	4	4	4	5	5	4
25	PT. Theofilas Makmur Sejahtera	Site Manager	4	4	4	3	3	3	3	4
26	PT. Gapura	Quality Control	3	3	3	4	4	4	4	4
27	PT. Greatech Artanindo	Quality Control	3	3	4	5	4	5	4	5
28	CV. Dipta Dytama	Project Manager	4	4	4	4	3	4	4	4
29	CV. Dipta Dytama	Site Manager	4	4	5	5	5	5	4	5
30	PT. Sketsa Megah	Site Manager	5	5	4	4	4	4	4	4

Mean	3.367	3.500	3.700	3.767	3.800	3.967	3.633	4.033
Standard Deviation	0.669	0.630	0.596	0.858	0.847	0.809	0.850	0.718
Ranking	8	7	5	4	3	2	6	1

IDENTIFICATION OF BIM SUCCESSFULNESS TOWARD CONSTRUCTION PROJECT

No	Company Name	Position	1	2	3	4	5
1	PT. Greatech Artanindo	Site Manager	5	5	5	5	5
2	PT. Sketsa Megah	Constructor	4	4	4	4	4
3	PT. WIKA GEDUNG	Engineer	3	3	3	3	3
4	PT. Adhi Persada Gedung	Project Engineering Manager	3	3	3	3	4
5	PT.Bhineka Utama Bangun Perkasa	Field Executor	3	3	2	3	3
6	PT. Sinar Mandiri Semesta	Head of Warehouse	4	4	4	4	4
7	Bangunindo Perkasa	Sub-Contractor	4	4	4	4	4
8	PT. Putra Mataram Indah Sejati	Project Manager	4	4	4	4	4
9	Mentari Prima Karsa	Site Manager	4	3	3	3	3
10	PT. Epiterma	Project Engineer	4	3	4	4	4
11	PT. Theofilas Makmur Sejahtera	Project Engineer	4	3	3	4	3
12	PT. Waskita Karya (persero) Tbk.	Other	3	4	3	4	3
13	PT. Sketsa Megah	Other	3	2	3	3	2
14	CV. Dipta Dytama	Project Manager	2	2	2	2	2
15	PT. Gapura	Other	4	4	4	4	4
16	CV. Sarana Jaya Mulya	Site Manager	4	4	5	4	4
17	CV. Jaya Makmur	Project Manager	3	4	4	4	4
18	PT. Sketsa Megah	Other	4	4	5	3	3
19	PT. Greatech Artanindo	Quality Control	3	3	3	3	3
20	PT. WIKA GEDUNG	Project Manager	4	4	4	4	4
21	PT. Adhi Persada Gedung	Site Manager	4	4	4	4	4
22	PT. Putra Mataram Indah Sejati	Site Manager	4	4	4	4	4
23	Mentari Prima Karsa	Project Manager	4	4	4	4	4

No	Company Name	Position	1	2	3	4	5
24	PT. Epiterma	Project Manager	3	3	4	4	4
25	PT. Theofilas Makmur Sejahtera	Site Manager	4	4	4	5	5
26	PT. Gapura	Quality Control	3	3	3	4	3
27	PT. Greatech Artanindo	Quality Control	3	3	3	3	3
28	CV. Dipta Dytama	Project Manager	5	5	5	5	5
29	CV. Dipta Dytama	Site Manager	5	5	4	4	5
30	PT. Sketsa Megah	Site Manager	5	5	5	5	5

Mean	3.733	3.667	3.733	3.800	3.733
Standard Deviation	0.740	0.802	0.828	0.714	0.828
Ranking	2	5	3.5	1	3.5