CONSTRUCTION INDUSTRY COUNCIL
建造業議會

BIM

BIM Adoption Survey 2020

Foreword

I am pleased to present the BIM Adoption Survey 2020 report.

In 2018, the Construction Industry Council (CIC) conducted the first-ever non-scientific Building Information Modelling (BIM) adoption survey, as a quick reference for reviewing the roadmap for increasing BIM adoption in the local construction industry.

In 2019, the CIC has commissioned Strategic Building Innovation (SBI) • bimSCORE to conduct the first industry-scale BIM Adoption Survey, i.e. a scientific survey, to gauge the local BIM adoption situation. The survey was organisation-based with more than 1,400 organisations reached. The survey results provided an overview of the attitude of different stakeholders towards BIM adoption in their projects and recommendations to increase and advance the BIM adoption in the industry.

To keep track on the local BIM adoption rate and situation, the CIC has commissioned Llewellyn and Partners Co. Ltd. (an HKU BIM Innovation and Technology Start-up) to conduct a similar BIM adoption survey in 2020. As you read this report you will find a lot of familiar yet improved adoption and use of BIM compared to the results of 2019. The comparisons are intriguing yet expected as the industry strikes to adopt BIM following the strong directive from the government. We had also collected some information from the survey for your information, and to pave our way for advancement in construction digitalisation.

This report again revealed that there is still much work to be done, especially for many of the Small and Medium Enterprises (SMEs), before our industry fully adopts BIM across all spectrum of the built environment. For this and other matter that you find important, I sincerely wish to receive your feedback after reading this report so that we could move ahead in agreed directions for a better future in BIM adoption.

On behalf of the CIC, I would like to thank everyone who has contributed to this report, in particular to the hundreds of practitioners answering the survey questions. Without their participation this report could never be meaningful.

Ar. Ada FUNG, BBS
Chairperson
Committee on Building Information Modelling
Construction Industry Council
February 2021

Executive Summary

Objectives of the Survey

Hong Kong's Construction Industry Council (CIC) commissioned Llewellyn and Partner Co. Ltd. (LPC), a building information modelling (BIM) innovation start-up of the University of Hong Kong (HKU), to conduct the BIM Adoption Survey 2020 ("this Survey") for the architecture, engineering, construction, owner and operator (AECOO) industry of Hong Kong to:

- Study the situation of BIM technology adoption in the construction industry in Hong Kong as of 31 March 2020;
- Identify the current BIM penetration and adoption;
- Assess and compare with the baseline data of the BIM Adoption Survey 2019 ("the Survey 2019") on:
  1. The BIM use level,
  2. The positive BIM impacts on different groups of BIM users,
  3. The factors that may hinder BIM adoption, and
  4. A sector-based analysis;
- Compare and contrast with the findings from the Survey 2019;
- Carry out cross-sector comparisons among the seven target groups;
- Tap the status of digitalisation in the construction industry in Hong Kong;
- Identify insights derived from the results and data analysis of this Survey; and
- Recommend an appropriate breadth and depth of the survey for subsequent surveys in the future.

One of the Largest Industry Surveys on BIM Adoption

This year reached **1497 organisations** and received **483 responses** from the sampled organisations in the seven stakeholder groups below:

1. Government Departments
2. Statutory Bodies
3. Main Contractors
4. Subcontractors
5. AEC Consultants
6. BIM Consultants
7. Real Estate Developers and Asset Owners

This study adopted **a new sampling method** in Groups 3 and 4. This new method allows a better understanding of the adoption of different trades. The results of this Survey have achieved a **90% confidence interval** at a **10% margin of error** for Groups 3 and 4 and covered **100% of the populations** of Groups 1 2, 5, 6, and 7 (Based on the CIC's internal lists).

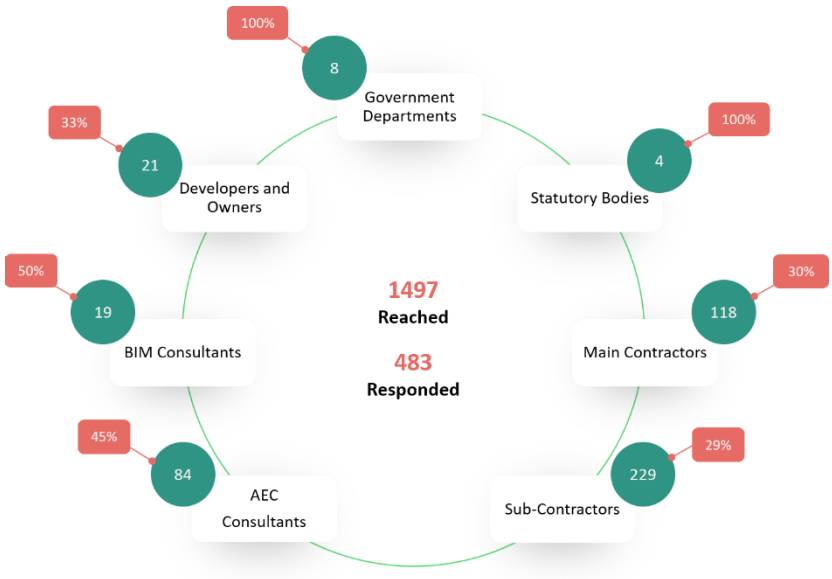

Fig. 1. Stakeholder groups reached in 2020

(Note: The numbers in teal circles show the number of responses collected from their respective groups, while the percentages in red rectangles show the percentages of the stakeholder population who responded to the survey.)

Executive Summary

BIM Uses, Hurdles, Motivations, and Impacts

The top six BIM uses have been consistent over the last three years, and the adoption rates have surged by over 30% during this period.

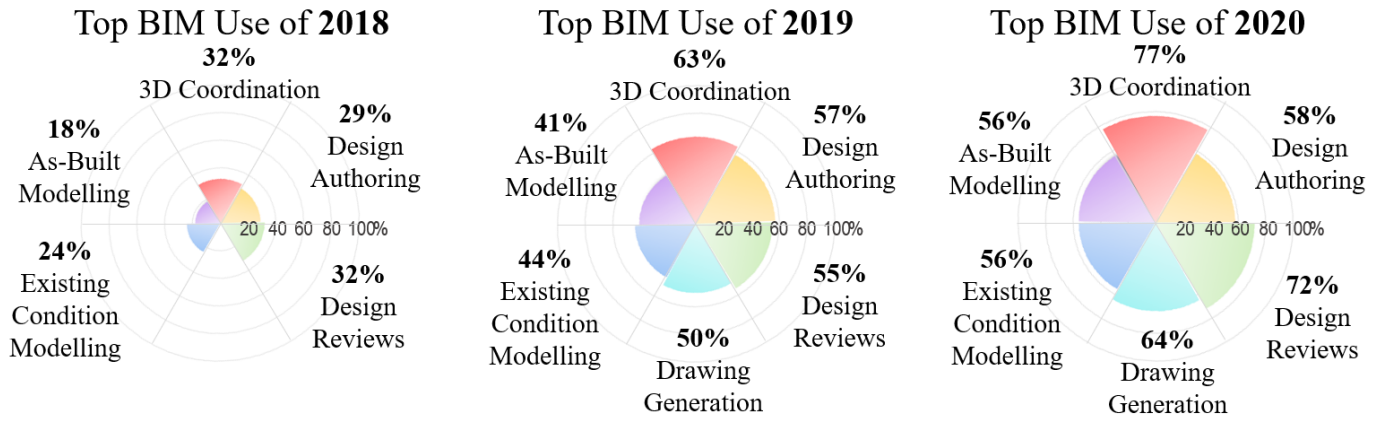

Fig. 2. Top BIM uses of 2018 (left), 2019 (middle), and 2020 (right)

Below is the full summary of BIM hurdles, motivations and impacts. Lack of BIM expertise (Hurdles), motivation by Hong Kong client requirements/government policy, and enhancement of communication ranked top, respectively.

Rank	BIM Hurdles	% Selected
1	Lack of BIM expertise	49%
2	Lack of BIM project experience	45%
3	Absence of BIM requirement by the client	36%
4	Difficulty of changing workflow and multi-party collaboration	29%
5	Lack of free BIM Objects available	26%
6	Uncertain return of BIM investment	25%
7	Difficulties of changing current practices for professionals	24%
8	Difficulty of changing mindset and culture	24%
9	Interoperability of BIM software/ data	15%
10	Absence of contractual liabilities and obligations	13%
11	Absence of policy of BIM promotion in governmental schemes	13%
12	Lack of standards and guidelines	12%
13	Lack of support from senior leadership in organisations for BIM adoption	11%
14	Low competitive advantage in market	8%
15	Issues in Intellectual Property (IP) Rights and model ownership	4%

Rank	BIM Motivations	% Selected
1	Hong Kong client requirements	62%
2	Government policy	62%
3	Reduction of errors, omissions, rework or abortive work	44%
4	Reduction of risks (or improvement of predictability)	33%
5	Enhancement of organisation's image	31%
6	Organisation policy	24%
7	Reduction of planning or analysis time	23%
8	Enhancement of quality management	21%
9	Global market demands	21%
10	Enhancement of drawing production efficiency	16%
11	Enhancement of cost management	16%
12	Enhancement of sustainability	16%
13	Enhancement of time management	15%
14	Enhancement of design options generation efficiency	15%
15	Enhancement of informed decision making	14%
16	Enhancement of facility & asset management	12%
17	Benefits received from BIM contributions by other stakeholders	11%
18	Enhancement of safety management	5%

Rank	BIM Impacts	% Selected
1	Enhance communication	76%
2	Reduce error and omission	75%
3	Enhance organisation's image	69%
4	Enhance quality management	63%
5	Improve planning and analysis process/outcome	60%
6	Reduce rework/abortive work	60%
7	Enhance efficiency	58%
8	Enhance asset and facility management	54%
9	Enhance sustainability	52%
10	Enhance risk management	50%
11	Enhance time management	47%
12	Enhance cost management	40%
13	Enhance safety management	37%

Fig. 3. The overall ranking of BIM hurdles, motivations and impacts in 2020

Executive Summary

Two Main Recommendations for Hong Kong BIM Adoption

Support for SMEs BIM Adoption

In this study, we have investigated the adoption of BIM by Small and Medium Enterprises (**SME)s in Groups 3, 4, and 5**. The adoption of BIM in SMEs is found to be significantly lagging that of non-SMEs in this survey, with **80% BIM Laggers overall**. According to the study, SMEs have more laggers and fewer adopters and leaders. The biggest hurdle to BIM adoption for SMEs is the lack of BIM project experience. The lack of client requirement and the absence of government policy could act as contributing factors to the hurdles to adoption. With the introduction of the Construction Innovation & Technology Fund (CITF), it may be the right time to review the effect of the CITF on the adoption of BIM by SMEs.

Push-pull Approach for Private Sector

Adoption of BIM in the private sector is slow. The number of laggers is six times higher in the private sector than in the public sector. Lacking BIM project experience remained the No.1 hurdle to the private sector's adoption of BIM. The result supports Hong Kong client requirements as the No.1 motivation for BIM adoption in the local market. From the client's point of view, the result has shown a notable change in the ranking of facility and asset management as motivation for the private client. Improvement in this high-value BIM use and BIM benefits would drive the use of BIM from the private client side.

The Way Forward

Key Performance Indicators (KPIs) for the Push-pull Approach

a) 4% improvement in BIM adoption; b) 5% improvement in BIM index; c) 12% improvement in BIM maturity; d) 30% improvement in top 6 BIM uses and; e) 39% improvement in BIM uses with 50%+ Benefits.

Investment for the BIM Talent

From this study, it is found that the ratio between BIM managers, BIM coordinators and BIM engineers/ modellers is consistent with that in BIM Leaders and BIM Adopters: about 1 to 3 to 6. The figure would facilitate the need for training and certification of the CIC-Certified BIM managers (CCBM) and the CIC-Certified BIM coordinators (CCBC).

OpenBIM Approach and Common Data Environment

Surprisingly, 17% of the industry stakeholders have not heard about Common Data Environment (CDE). Promotion in CDE, the use of an OpenBIM approach and BIM contract protocol is positively encouraged.

Culture Change for SME Leaders

80% of the surveyed SMEs are BIM Laggers, but they are predicted to increase 297% investment in the area in the next three years. It is worth investigating the effect of the CITF, the Continuing Education Fund (CEF) and Reindustrialisation and Technology Training Programme (RTTP) on SMEs in terms of upgrading hardware, software, and training in the last few years.

A Showcase of BIM Leaders with Innovative Practices

The CIC should continue to facilitate the industry's documentation and sharing of best practices of BIM use in visualisation and coordination, as well as optimisation and automation. We recommend conducting a return on investment (ROI) analysis of BIM application for organisations that have applied for the CITF so that the government can understand the effectiveness of the fund and better make policies, provide funds, and support the future development of the construction industry.

Survey Methodology

Population of Interest

This Survey collects views on BIM adoption from the following seven stakeholder groups (see Table 1).

Table 1. The sample size for the seven stakeholder groups in this Survey

Stakeholder's Group	Sample Size (Population)	Target Sample Size
1. Government Departments	8 (8)	8
2. Statutory Bodies	4 (4)	4
3. Main Contractors	400 (871)	100
4. Subcontractors	800 (~7,000)	200
5. AEC Consultants	187 (187)	80
6. BIM Consultants	38 (38)	5
7. Real Estate Developers and Asset Owners	63 (63)	15

1497 organisations reached

483 organisations responded

Government Departments include eight government departments: the (1) Architectural Services Department, (2) Civil Engineering and Development Department, (3) Drainage Services Department, (4) Electrical and Mechanical Services Department, (5) Highways Department, (6) Lands Department, (7) Planning Department, and (8) Water Supplies Department.

Note: the Buildings Department is not included, as it is a regulator.

Statutory Bodies include four statutory bodies: the (1) Housing Authority, (2) Housing Society, (3) Hospital Authority, and (4) Urban Renewal Authority.

AEC Consultants include organisations on the Architectural and Associated Consultants Selection Board (AACSB), and Engineering & Associated Consultants Selection Board (EACSB). A total of 187 organisations have been identified, making for 20 more samples than last year.

BIM Consultants include the 38 BIM consultants from the CIC's internal list.

Real Estate Developers and Asset Owners consist of a total of 63 organisations. It includes the asset owners of 10 institutions/organisations – Airport Authority, Chu Hai College of Higher Education, City University of Hong Kong, Hong Kong Institute of Vocational Education (IVE), MTR Corporation (MTRC), the Chinese University of Hong Kong, the Hong Kong Polytechnic University, the Hong Kong University of Science and Technology, the University of Hong Kong, , and West Kowloon Cultural District (WKCD) – and an estimated 53 real estate developers of different scales in Hong Kong.

New Sampling Method for Main Contractors and Subcontractors

In this Survey, a new sampling method was adopted for Groups 3 and 4 – Main Contractors and Subcontractors. The new method aims to cover different trades in the subcontractor group and evaluate the main contractors' adoption based on their eligibility of tendering for public works contracts of different values.

To enable the analysis of BIM adoption in both SMEs and large enterprises, the 871 organisations were divided into four sub-groups based on the list of approved contractors for public works of the Development Bureau (DevB) and list of registered general building contractors (RGBC). The four groups are Group A, Group B, Group C and unlisted group (Group N). According to the DevB, the definitions of the three groups are:

- Group A may tender for public works contracts of value up to HK$100 million.
- Group B may tender for public works contracts of value up to HK$300 million.
- Group C may tender for public works contracts of any value exceeding HK$300 million.
- Group N provides contractors from the RGBC list but is not approved contractors for public works of the DevB.

For Sub-contractors: The sampling was based on two registration schemes: those for (a) registered subcontractors (RS) and (b) registered specialist trade contractors (RSTCS). For RS, the sampling was based on three groups: (a) structural and civil, (b) finishing, and (c) electrical and mechanical (E&M). The random sampling was carried out at the group level rather than the trade level, but the sample size for the three groups was more balanced in the new method. For RSTCS, the level of confidence and margin of error have both met the minimum requirement because we increased the sample size in each stakeholder group in this Survey.

Table 2. The sample size of RSTCS in this Survey

Trade	No. of Registers	No. of Sampled Organisations
Concreting	823	64
Concreting Formwork	863	65
Curtain Wall	149	47
Demolition	306	57
Erection of Concrete Precast Component	233	53
Reinforcement Bar Fixing	831	64
Scaffolding	451	60

Quality Assurance

This year, there was a total of a 10% increase in response rate compared with that in the Survey 2019. Quality assurance actions on the data collection with the consultancy support of the Social Sciences Research Centre (HKUSSRC) from the University of Hong Kong include:
(a) Sending 1,500 mail invitations to all the sampled organisations;
(b) Sending 1,500 email invitations and three rounds of email reminders to all sampled organisations, and
(c) Calling all 1,500 sampled organisations at least three times after sending the email invitation.

BIM Diffusion and Maturity

Surveyed organisations are categorised by their BIM diffusion and maturity based on their responses to the BIM Adoption Survey 2020. Organisations are divided into different types: (a) BIM Lagger if the respondent has not heard of BIM or does not have any active BIM project experience (as of 31 March 2020) and (b) BIM Adopter or BIM Leader based on their BIM project penetration, BIM exposure, and perceived BIM benefits. 41% of surveyed organisations are using or have used BIM. The top 22% of these 41% of organisations (or 9% overall) are identified as BIM Leaders based on the BIM diffusion and maturity calculations.

BIM Adoption in Hong Kong

Push-pull Approach to BIM Adoption

As the way forward in the Survey 2019, one of the recommendations for the CIC and industry stakeholders was to implement a BIM-led workflow with a value-driven mindset. Recommendations from last year's survey include:

1. Best practices demonstration (recognise exemplary projects, conduct case studies, establish industry KPIs and benchmarks),
2. Workflow re-engineering (BIM contract templates, BIM as central submission format and supply chain automation tool), and
3. Re-align BIM training (management and professional education, project-based training).

BIM, as a tool, promotes disruptive workflows that involve people, processes, and technologies. As demonstrated in many countries, the successful delivery of industry-scale BIM adoption is based on the push-pull approach. Over the past 12 months, the CIC has facilitated the industry in balancing of the supply of and demand for BIM talents (e.g., CIC-Certified BIM Managers and CIC-Certified BIM Coordinators), promoted the adoption of BIM-led workflows, and explored and demonstrated best practices for using BIM on different levels and in different disciplines within the industry. In parallel, most stakeholders are proactively involved in tapping the most value from BIM adoption at the organisation level.

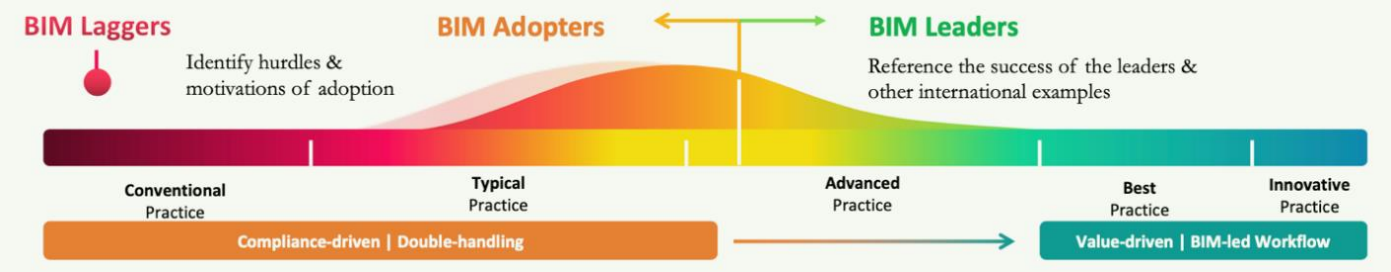

Fig. 4. Recommendations for the CIC and industry stakeholders in 2019[1]

4% Improvement in Normalised Overall BIM Adoption 2020

It has been observed that overall BIM adoption has improved in 2020 based on the normalised[2] distribution of BIM Leaders, BIM Adopters, and BIM Laggers. As is evident from Fig. 5, there has been a 4% overall industry improvement in the adoption of BIM. This included a 13.8% decrease in BIM Laggers and 21% increase in BIM Leaders as compared to the normalised results of the Survey 2019. The increase in BIM Leaders is a result of more implementation of BIM-led workflows with value-driven mindset of them.

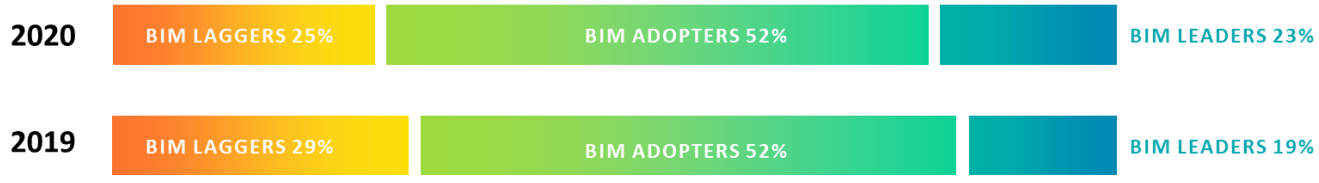

Fig. 5. Normalised distribution of BIM Leaders, BIM Adopters, and BIM Laggers in the Hong Kong industry

[1] CIC (2019) BIM Adoption Survey 2019. Online: https://www.bim.cic.hk/en/resources/publications_detail/73?sorting=most_view&back=%2fen%2fresources%2fpublications%3fsorting%3dmost_view [Assessed 8 Dec 2020]

[2] Suarez-Alvarez, M.M., Pham, D.-T., Prostov, M.Y. and Prostov. Y.I. (2012) Statistical approach to normalization of feature vectors and clustering of mixed datasets, *Proceedings of the Royal Society A*, 468, pp. 2630–2651

Value-driven Industry

The 4% improvement in overall BIM adoption is reflected in many parameters of this Survey. With a successful push-pull approach delivered by the CIC, the general BIM index and maturity increased by about 5% and 12% respectively in 2020, with only a 2% drop in BIM diffusion. A decrease in the total number of projects and hence the BIM diffusion may be associated with the global and regional pandemic impact (see Fig. 6).

	2019	2020
INDUSTRY BIM DIFFUSION	20%	18% ↓
INDUSTRY BIM MATURITY	35%	47% ↑
INDUSTRY BIM INDEX	28%	33% ↑

Fig. 6. Comparison of the industry BIM diffusion, maturity, and index in 2019 and 2020.
(Note: a red arrow denotes a decline in percentage, while a green one denotes an increase in percentage)

The respondents were surveyed about the 20 BIM uses listed in the DevB Technical Circular (Works) on Adoption of BIM. Based on Fig. 7, increases in the percentage of projects using BIM and the number of BIM uses are observed among the BIM Leaders in 2020.

In particular, the count of benefited BIM uses shows a 109% increase in BIM Adopters and a 69% increase in BIM Leaders. However, there is a 5% decrease in BIM usage for projects which has an impact on the overall BIM diffusion (see Fig. 7). While public and private client requirements (see motivations on the next page) are the most cited motivation across BIM Leaders, Adopters, and Laggers, we see that BIM Leaders recognise more motivations related to process and project performance outcomes.

	2019		2020	
	BIM ADOPTERS	BIM LEADERS	BIM ADOPTERS	BIM LEADERS
BIM USAGE PROJECTS %	36%	86%	31% ↓	89% ↑
BIM USES COUNTS	4.4	12.7	5.7 ↑	13.0 ↑
BENEFITED BIM USES COUNTS	2.3	7.0	4.8 ↑	11.8 ↑

Fig. 7. Comparison of pattern of benefited BIM usages in 2019 (left) and 2020 (right)
(Note: a red arrow denotes a decline in ranking, while a green one denotes an increase in ranking)

The adoption of BIM by clients (Groups 1, 2, and 7), AEC consultants (Group 4), and BIM consultants (Group 5) recorded an increase in 2020. The top 22% are identified as the BIM Leaders of the Hong Kong construction industry, which is composed of 27% of surveyed clients, 4% of contractors, 9% of AEC consultants, and 74% of BIM consultants. BIM Laggers (who have not heard of BIM or do not have active BIM projects) account for 15% of surveyed clients, 73% of the surveyed contractors, and 31% of the surveyed AEC consultants.

With the use of a new and better sampling method, the BIM adoption by contractors (Groups 3 and 4) shows a lower percentage compared with that in the Survey 2019. This 6% increase in BIM Laggers among contractors also allows a better understanding of adoption in different trades among subcontractors (see Fig. 8a–c).

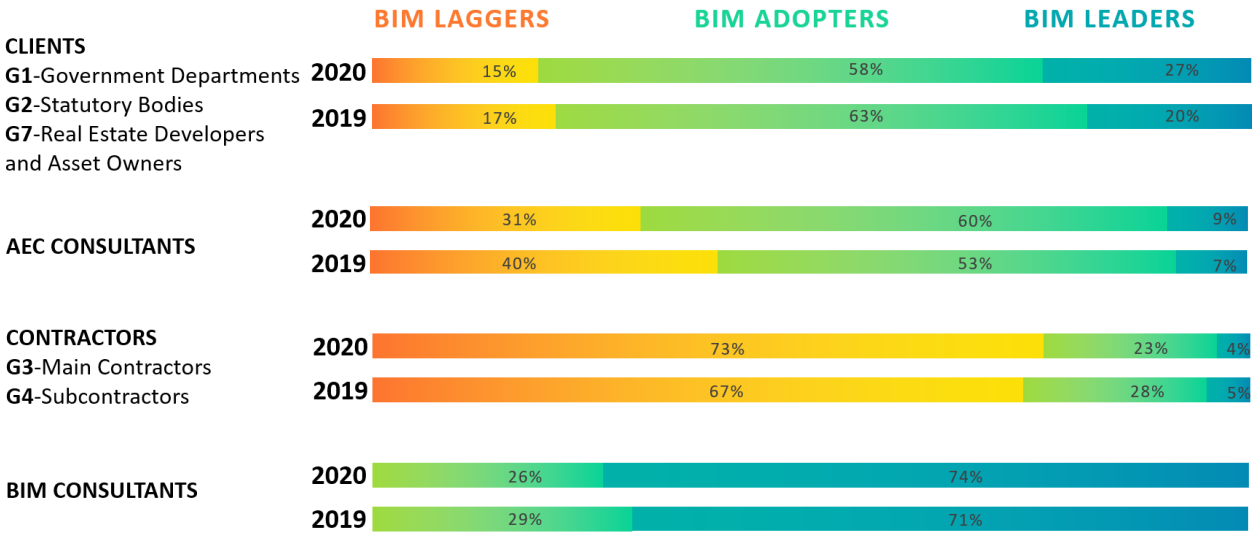

Fig. 8a BIM adoption distribution in the four groups

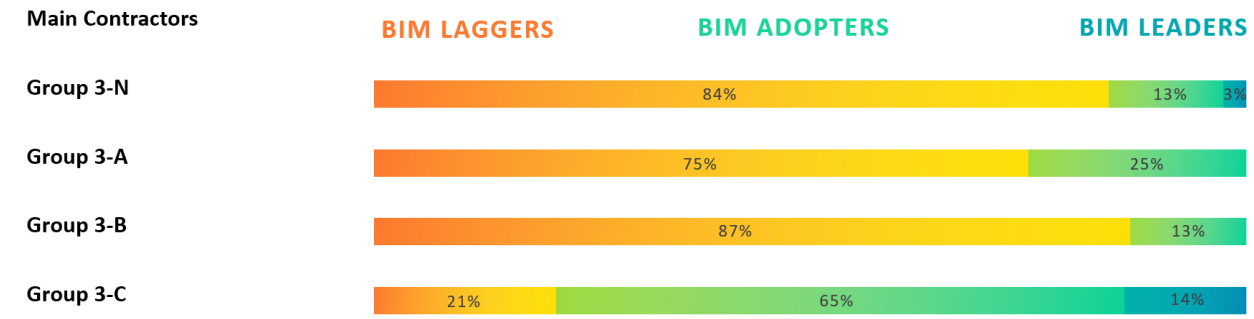

Fig. 8b. BIM adoption distribution in the four sub-groups in Group 3 (this Survey)

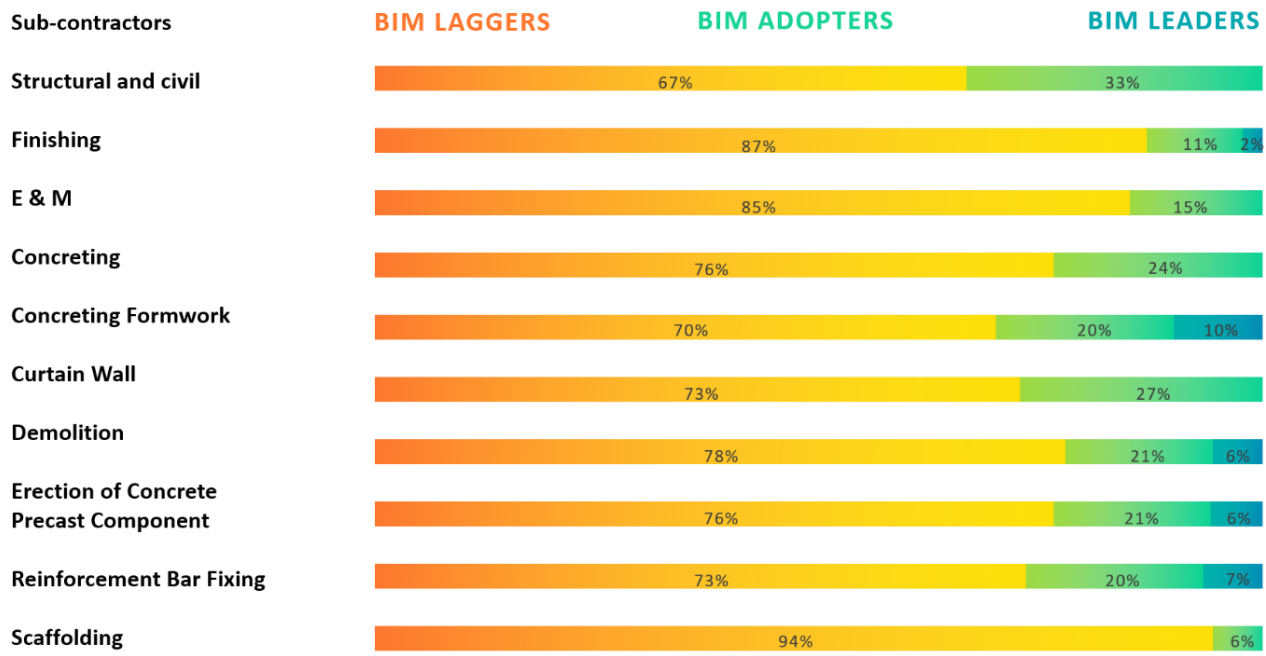

Fig. 8c. BIM adoption distribution in the ten sub-groups in Group 4 (this Survey)

BIM Uses and Benefits in Hong Kong

Start with the End in Mind for High-value BIM Uses

The immediate value of the use of BIM as a tool for 3D coordination ranks top again in 2020, and adoption has climbed from 63% in 2019 to 77% this year (see Fig. 9). In comparison to 2019, the use of BIM in 2020 has increased by around 10% for visualisation and coordination, optimisation and automation, and asset and facility management. Benefits of the use of BIM for "site utilisation planning" and "space programming" climbed up to third and fourth places, respectively, especially for the client, while "cost estimation" got more attention from the AEC consultants. High-value BIM uses and their associated benefits in asset and facility management stage got attention from the clients and BIM consultants but are still considered under-adopted. 31 out of 80 (about 39%) BIM uses demonstrated more than 50% adoption with benefits (see Fig. 10).

	2019			2020		
	Rank	BIM Use	% Adopted	Rank	BIM Use	% Adopted
Visualisation & Coordination	1	3D Coordination	63%	1	3D Coordination	77%
	2	Design Authoring	57%	2	Design Reviews	72% ↑1
	3	Design Reviews	55%	3	Drawing Generation	64% ↑1
	4	Drawing Generation	50%	4	Design Authoring	58% ↓2
	5	Existing Conditions Modelling	44%	5	Existing Conditions Modelling	56%
	6	As-Built Modelling	41%	6	As-Built Modelling	56%
	7	3D Control and Planning	36%	7	Site Analysis	50% ↑2
	8	Phase Planning (4D Modelling)	35%	8	Phase Planning (4D Modelling)	50%
	9	Site Analysis	33%	9	3D Control and Planning	49% ↓2
Optimisation & Automation	10	Engineering Analysis	31%	10	Site Utilisation Planning	43% ↑3
	11	Space Programming	31%	11	Engineering Analysis	42% ↓1
	12	Cost Estimation	30%	12	Space Programming	36% ↓1
	13	Site Utilisation Planning	26%	13	Cost Estimation	35% ↓1
	14	Digital Fabrication	21%	14	Digital Fabrication	30%
Asset & Facility Management	15	Asset Management	17%	15	Asset Management	26%
	16	Project Systems Analysis	16%	16	Space Management and Tracking	21% ↑1
	17	Space Management and Tracking	16%	17	Project Systems Analysis	16% ↓1
	18	Sustainability Evaluation	15%	18	Maintenance Scheduling	14% ↑2
	19	Facility Energy Analysis	12%	19	Facility Energy Analysis	13%
	20	Maintenance Scheduling	10%	20	Sustainability Evaluation	13% ↓2

Fig. 9. Comparison of the ranking of BIM uses in 2019 and 2020

BIM Benefits

	Rank	CLIENTS	% Adopted	CONTRACTORS	% Adopted	AEC CONSULTANTS	% Adopted	BIM CONSULTANTS	% Adopted
Visualisation & Coordination	1	3D Coordination	75%	Drawing Generation	64% ↑2	3D Coordination	66%	Design Reviews	88% ↑1
	2	Design Reviews	68%	3D Coordination	63% ↓1	Design Reviews	64%	Drawing Generation	88% ↑1
	3	Site Analysis	54% ↑3	Existing Conditions Modelling	59% ↑2	Design Authoring	62% ↑1	Design Authoring	82% ↑1
	4	Drawing Generation	54% ↓1	Site Analysis	59% ↑2	Drawing Generation	55% ↓1	3D Coordination	82% ↓3
	5	Site Utilisation Planning	50% ↑5	Design Reviews	57% ↓3	Existing Conditions Modelling	38%	Phase Planning (4D Modelling)	82% ↑3
	6	Existing Conditions Modelling	46% ↓1	3D Control and Planning	53% ↑3	Cost Estimation	34% ↑7	Existing Conditions Modelling	76% ↓1
	7	Design Authoring	43% ↓3	As-Built Modelling	51% ↑1	Phase Planning (4D Modelling)	34%	Site Utilisation Planning	71% ↑3
Optimisation & Automation	8	Space Programming	43% ↑4	Site Utilisation Planning	50% ↑2	Engineering Analysis	32% ↑3	As-Built Modelling	71%
	9	Phase Planning (4D Modelling)	43% ↓2	Design Authoring	47% ↓5	Space Programming	32% ↑3	Asset Management	65% ↑6
	10	3D Control and Planning	43% ↓1	Phase Planning (4D Modelling)	47% ↓3	As-Built Modelling	32% ↓2	Site Analysis	59% ↓5
	11	As-Built Modelling	43% ↓3	Engineering Analysis	37%	Site Analysis	28% ↓5	3D Control and Planning	59% ↓2
	12	Engineering Analysis	36% ↓1	Digital Fabrication	26% ↑2	3D Control and Planning	26% ↓3	Space Programming	53%
	13	Asset Management	36% ↑2	Cost Estimation	24%	Sustainability Evaluation	17% ↑6	Digital Fabrication	53% ↑1
Asset & Facility Management	14	Digital Fabrication	32%	Space Programming	23% ↓2	Digital Fabrication	17%	Maintenance Scheduling	53% ↑3
	15	Maintenance Scheduling	29% ↑2	Asset Management	21%	Site Utilisation Planning	17% ↓5	Cost Estimation	47% ↓2
	16	Cost Estimation	25% ↓3	Project Systems Analysis	19% ↑2	Project Systems Analysis	11% ↑2	Space Management and Tracking	47%
	17	Space Management and Tracking	21% ↓1	Space Management and Tracking	16% ↓1	Facility Energy Analysis	9% ↑3	Engineering Analysis	41% ↓6
	18	Sustainability Evaluation	18% ↑1	Facility Energy Analysis	7% ↑2	Maintenance Scheduling	9% ↓1	Sustainability Evaluation	29% ↑1
	19	Project Systems Analysis	11% ↓1	Maintenance Scheduling	7% ↓2	Space Management and Tracking	9% ↓3	Project Systems Analysis	24% ↓1
	20	Facility Energy Analysis	7%	Sustainability Evaluation	4% ↓1	Asset Management	9% ↓5	Facility Energy Analysis	18%

Fig. 10. Comparison of ranking of BIM benefits among groups and average ranking in 2020 (Note for both figures 9 and 10: a red arrow denotes a decline in ranking, while a green one denotes an increase in ranking)

Top BIM Hurdles in Hong Kong

Urgent need of BIM Talent

Compared to the results from the Survey 2019, the top three BIM hurdles ranked the same this year: (1) lack of BIM expertise, (2) lack of BIM project experience, and (3) absence of BIM requirement by the client (see Fig. 11). This indicates that there is still an urgent need for BIM talent in the industry.

The lack of free BIM objects available and uncertainty about the return on BIM investment ranked 5th and 6th respectively this year. With a drastic increase in the use of BIM in the past year, industry stakeholders see the need for a more significant return on BIM from improved employee productivity throughout the life cycle of projects, within the team and at the organisation level.

The difficulty of changing the mindset and culture is ranked overall 8th this year. However, this is considered as a significant hurdle by both clients and BIM consultants, with 59% of the clients and 42% of BIM consultants selecting this as a top hurdle (see Fig. 11 and 12).

Rank	BIM Hurdles	% Selected
1	Lack of BIM expertise	49%
2	Lack of BIM project experience	45%
3	Absence of BIM requirement by the client	36%
4	Difficulty of changing workflow and multi-party collaboration	29%
5	Lack of free BIM Objects available	26%
6	Uncertain return of BIM investment	25%
7	Difficulties of changing current practices for professionals	24%
8	Difficulty of changing mindset and culture	24%
9	Interoperability of BIM software/ data	15%
10	Absence of contractual liabilities and obligations	13%
11	Absence of policy of BIM promotion in governmental schemes	13%
12	Lack of standards and guidelines	12%
13	Lack of support from senior leadership in organisations for BIM adoption	11%
14	Low competitive advantage in market	8%
15	Issues in Intellectual Property (IP) Rights and model ownership	4%

Fig. 11. Ranking of BIM hurdles in 2020

Following the publication of the CIC BIM Standards – General in August 2019, a lack of standards and guidelines is ranked 12th in the table. However, this hurdle's ranking has risen from 12 to 7 for clients. The sudden increase in the need of a standard for the client shows a gap in developing one, e.g., on asset management, especially for the private sector.

Hurdles of BIM Adoption

Rank	CLIENTS	% Selected	CONTRACTORS	% Selected	AEC CONSULTANTS	% Selected	BIM CONSULTANTS	% Selected
1	Difficulty of changing mindset and culture	59% ↑7	Lack of BIM expertise	47%	Lack of BIM expertise	55%	Difficulty of changing workflow and multi-party collaboration	53% ↑3
2	Difficulty of changing workflow and multi- party collaboration	56% ↑2	Lack of BIM project experience	46%	Lack of BIM project experience	50%	Lack of BIM expertise	42% ↓1
3	Difficulties of changing current practices for professionals	53% ↑4	Absence of BIM requirement by the client	38%	Difficulty of changing workflow and multi-party collaboration	45% ↑1	Difficulty of changing mindset and culture	42% ↑5
4	Lack of BIM expertise	50% ↓3	Lack of free BIM objects available	25% ↑1	Uncertain return of BIM investment	38% ↑2	Absence of BIM requirement by the client	37% ↓1
5	Lack of BIM project experience	34% ↓3	Uncertain return of BIM investment	24% ↑1	Difficulty of changing mindset and culture	36% ↑3	Absence of contractual liabilities and obligations	37% ↑5
6	Interoperability of BIM software/ data	31% ↑3	Difficulty of changing workflow and multi-party collaboration	21% ↓2	Lack of free BIM objects available	35% ↓1	Difficulties of changing current practices for professionals	26% ↑1
7	Lack of standards and guidelines	28% ↑5	Difficulties of changing current practices for professionals	19%	Absence of BIM requirement by the client	33% ↓4	Interoperability of BIM software/ data	26% ↑2
8	Lack of free BIM objects available	22% ↓3	Difficulty of changing mindset and culture	15%	Difficulties of changing current practices for professionals	32% ↓1	Lack of support from senior leadership in organisations	21% ↑5
9	Absence of contractual liabilities and obligations	22% ↑1	Absence of policy of BIM promotion in governmental schemes	12% ↑2	Interoperability of BIM software/ data	21%	Absence of policy of BIM promotion in governmental schemes	21% ↑2
10	Absence of BIM requirement by the client	19% ↓7	Lack of standards and guidelines	12% ↑2	Lack of support from senior leadership in organisations	10% ↑3	Lack of BIM project experience	16% ↓8
11	Absence of policy of BIM promotion in governmental schemes	19%	Absence of contractual liabilities and obligations	12% ↓1	Absence of policy of BIM promotion in governmental schemes	10%	Uncertain return of BIM investment	16% ↓5
12	Uncertain return of BIM investment	13% ↓6	Lack of support from senior leadership in organisations	11% ↑1	Low competitive advantage in market	9% ↑2	Lack of free BIM objects available	16% ↓7
13	Lack of support from senior leadership in organisations	6%	Interoperability of BIM software/ data	11% ↓4	Absence of contractual liabilities and obligations	8% ↓3	Low competitive advantage in market	11% ↑1
14	Issues in Intellectual Property (IP) Rights and model ownership	6% ↑1	Low competitive advantage in market	8%	Lack of standards and guidelines	6% ↓2	Lack of standards and guidelines	11% ↓2
15	Low competitive advantage in market	6% ↓1	Issues in Intellectual Property (IP) Rights and model ownership	4%	Issues in Intellectual Property (IP) Rights and model ownership	5%	Issues in Intellectual Property (IP) Rights and model ownership	5%

Fig. 12. Comparison of the ranking of BIM hurdles among groups and average ranking in 2020
(Note: a red arrow denotes a decline in ranking, while a green one denotes an increase in ranking)

Top BIM Motivations in Hong Kong

Compliance-driven Mindset

Hong Kong client requirements and government policy remain atop of the BIM Motivations ranking. In the Survey 2019, it was reported that compliance-driven BIM adoption was the last of the top three hurdles in Hong Kong. The top three hurdles remain unchanged. Some BIM benefits – (1) reduction of errors, omissions, rework, or abortive work and (2) reduction of risks (or improvement of predictability) – are ranked 3rd and 4th respectively in this Survey. This shows **an early sign of benefit-driven BIM adoption** in the industry. Stakeholders are starting to recognise the enhancement of corporate image say the local and global market demand via the (proposed) use of high-value BIM (see Fig. 13).

To tackle last year's hurdles of compliance-driven mindset, double-handing, and insufficient expertise, the CIC facilitates the BIM-benefits motivation by demonstrating best practices through awareness talks, webinars, trainings, and symposiums on the CIC BIM portal and BIM space, and matching these benefits with the related stakeholders. For example, the enhancement of facility and asset management ranked 16th and was only selected by 12% of the surveyed organisations. There is an immense potential for improvement in demonstrating these benefits to encourage benefits-driven or value-driven BIM adoption in future, especially for the client with a tremendous increase in motivation to adopt this high-value BIM use as a BIM Leader (see Fig. 14).

Rank	BIM Motivations	% Selected
1	Hong Kong client requirements	62%
2	Government policy	62%
3	Reduction of errors, omissions, rework or abortive work	44%
4	Reduction of risks (or improvement of predictability)	33%
5	Enhancement of organisation's image	31%
6	Organisation policy	24%
7	Reduction of planning or analysis time	23%
8	Enhancement of quality management	21%
9	Global market demands	21%
10	Enhancement of drawing production efficiency	16%
11	Enhancement of cost management	16%
12	Enhancement of sustainability	16%
13	Enhancement of time management	15%
14	Enhancement of design options generation efficiency	15%
15	Enhancement of informed decision making	14%
16	Enhancement of facility & asset management	12%
17	Benefits received from BIM contributions by other stakeholders	11%
18	Enhancement of safety management	5%

Fig. 13. Ranking of BIM motivations in 2020

Motivations of BIM Adoption

Rank	CLIENTS	% Selected	CONTRACTORS	% Selected	AEC CONSULTANTS	% Selected	BIM CONSULTANTS	% Selected
1	Organisation policy	50% ↑5	Hong Kong client requirements	73%	Hong Kong client requirements	78%	Hong Kong client requirements	68%
2	Reduction of errors, omissions, rework or abortive work	50% ↑1	Government policy	64%	Government policy	72%	Government policy	68%
3	Government policy	43% ↓1	Reduction of errors, omissions, rework or abortive work	51%	Enhancement of organization's image	40% ↑2	Organisation policy	37% ↑3
4	Enhancement of facility & asset management	43% ↑12	Reduction of risks (or improvement of predictability)	38%	Global market demands	36% ↑5	Reduction of errors, omissions, rework or abortive work	37% ↓1
5	Reduction of risks (or improvement of predictability)	40% ↓1	Enhancement of organisation's image	32%	Reduction of errors, omissions, rework or abortive work	33% ↓2	Reduction of risks (or improvement of predictability)	37% ↓1
6	Enhancement of quality management	40% ↑2	Reduction of planning or analysis time	28% ↑1	Enhancement of drawing production efficiency	24% ↑4	Enhancement of organisation's image	32% ↓1
7	Reduction of planning or analysis time	37%	Enhancement of quality management	21% ↑1	Organisation policy	22% ↓1	Enhancement of cost management	32% ↑4
8	Enhancement of time management	27% ↑5	Enhancement of cost management	19% ↑3	Reduction of risks (or improvement of predictability)	22% ↓4	Enhancement of sustainability	32% ↑4
9	Enhancement of sustainability	27% ↑3	Organisation policy	18% ↓3	Enhancement of design options generation efficiency	21% ↑5	Enhancement of facility & asset management	32% ↑7
10	Enhancement of design options generation efficiency	23% ↑4	Enhancement of drawing production efficiency	18%	Benefits received from BIM contributions by other stakeholders	21% ↑7	Enhancement of informed decision making	32% ↑5
11	Enhancement of informed decision making	23% ↑4	Global market demands	17% ↓2	Enhancement of quality management	16% ↓3	Global market demands	21% ↓2
12	Enhancement of organisation's image	20% ↓7	Enhancement of time management	16% ↑1	Reduction of planning or analysis time	12% ↓5	Enhancement of time management	21% ↑1
13	Enhancement of cost management	17% ↓2	Enhancement of sustainability	15% ↓1	Enhancement of informed decision making	10% ↑2	Enhancement of quality management	21% ↓5
14	Global market demands	10% ↓5	Enhancement of design options generation efficiency	11%	Enhancement of sustainability	9% ↓2	Benefits received from BIM contributions by other stakeholders	21% ↑3
15	Hong Kong client requirements	3% ↓14	Enhancement of informed decision making	11%	Enhancement of time management	7% ↓2	Reduction of planning or analysis time	16% ↓8
16	Enhancement of drawing production efficiency	3% ↓6	Enhancement of safety management	9% ↑2	Enhancement of cost management	7% ↓5	Enhancement of drawing production efficiency	11% ↓6
17	Enhancement of safety management	3% ↑1	Benefits received from BIM contributions by other stakeholders	8%	Enhancement of facility & asset management	7% ↓1	Enhancement of design options generation efficiency	11% ↓3
18	Benefits received from BIM contributions by other stakeholders	3% ↓1	Enhancement of facility & asset management	4% ↓2	Enhancement of safety management	2%	Enhancement of safety management	0%

Fig. 14. Comparison of the ranking of BIM motivations among groups and average ranking in 2020
(Note: a red arrow denotes a decline in ranking, while a green one denotes an increase in ranking)

Top BIM Impacts in Hong Kong

BIM Enhances Communication

The industry has a multiple-silo, long supply chain[3] with the introduction of different digital technologies, not just BIM, that various stakeholders are handling.[4] Various issues are raised by the use of those technologies, mainly:

- A mix of open/proprietary formats,
- Information tagging issues,
- Information uncertainty, and
- The need for high-value data/information.

Enhancement of communication is rated as the most significant impact of BIM adoption in Hong Kong in this Survey. Reduction of error and omission ranks second. Some other BIM benefits are rated over 60% (e.g., enhancing the organisation's image), and this is another early sign of a change to benefit-driven BIM adoption as organisations have been receiving more benefits from BIM in the past year (see Fig. 15).

Rank	BIM Impacts	%Selected
1	Enhance communication	76%
2	Reduce error and omission	75%
3	Enhance organisation's image	69%
4	Enhance quality management	63%
5	Improve planning and analysis process/outcome	60%
6	Reduce rework/abortive work	60%
7	Enhance efficiency	58%
8	Enhance asset and facility management	54%
9	Enhance sustainability	52%
10	Enhance risk management	50%
11	Enhance time management	47%
12	Enhance cost management	40%
13	Enhance safety management	37%

Fig. 15. Ranking of BIM impacts in 2020

Value-driven BIM Adoption: Fig. 16. shows that organisations select BIM uses based on the BIM benefits they can receive. Although BIM compliance (e.g., client requirements and government policy) is still the biggest driver of BIM adoption in Hong Kong, BIM benefits can also be considered as one of the main drivers (see Fig. 16).

20 BIM USAGES LISTED BY CIC

	Rank	BIM Use	% Adopted	Rank	BIM Benefits	% Adopted
Visualisation & Coordination	1	3D Coordination	77%	1	3D Coordination	68%
	2	Design Reviews	72%	2	Design Reviews	64%
	3	Drawing Generation	64%	3	Drawing Generation	62%
	4	Design Authoring	58%	4	Design Authoring	54%
	5	Existing Conditions Modelling	56%	5	Existing Conditions Modelling	52%
	6	As-Built Modelling		6	Site Analysis	49%
	7	Site Analysis	50%	7	Phase Planning (4D Modelling)	46%
	8	Phase Planning (4D Modelling)	50%	8	As-Built Modelling	46%
Optimisation & Automation	9	3D Control and Planning	49%	9	3D Control and Planning	44%
	10	Site Utilisation Planning	43%	10	Site Utilisation Planning	43%
	11	Engineering Analysis	42%	11	Engineering Analysis	36%
	12	Space Programming	36%	12	Space Programming	32%
	13	Cost Estimation	35%	13	Cost Estimation	30%
	14	Digital Fabrication		14	Digital Fabrication	27%
Asset & Facility Management	15	Asset Management		15	Asset Management	25%
	16	Space Management and Tracking		16	Space Management and Tracking	18%
	17	Project Systems Analysis		17	Maintenance Scheduling	16%
	18	Maintenance Scheduling	14%	18	Project Systems Analysis	15%
	19	Facility Energy Analysis	13%	19	Sustainability Evaluation	13%
	20	Sustainability Evaluation	13%	20	Facility Energy Analysis	9%

Fig. 16. Direct relationship on BIM uses and their associated benefits

[3] Tang, L.C.M., Zhao, Yuyang, Austin, S.A., Darlington, M.J. and Culley, S.J. (2010) Codification vs. personalisation: A study of the information evaluation practice between aerospace and construction industries, *International Journal of Information Management*, 30(4), pp. 315–325.
[4] Tang, L., Bew, M., Wen, Y. and Lee, Y.S. (2019) ISO19650 – An international approach to the journey of industry integration, digitalisation and innovation. The 39th Annual Seminar, Geotechnical Division, Hong Kong Institution of Engineers, 'Transformation in Geotechnical Engineering', 11 April 2019, Hong Kong.

Digitalisation Investment in Hong Kong

Investment in BIM-related Digitalisation

Investment in digitalisation is one of the new focuses in this Survey. By adding the filled percentages (digitalisation investment not related to BIM in %) from respondents up and divided by number of respondents, an average percentage of digitalisation not related to BIM was obtained. Then the investment related to BIM was also determined (as both values added up equal to 100%). For different stakeholders, the investment related to BIM was similar in the past year. Except for AEC consultants, other groups put at least 46% of their investment into BIM, including both BIM Leaders and BIM Laggers (see Fig. 17a).

The range of digitalisation investment related to BIM was segmented into six intervals from HK$0 to HK$3,000,000. Multiplying the average investment of each interval with the respondents who chose the interval, it is reasonable to obtain a corresponding interval's gross investment. Adding all gross investment of six intervals and then divided by the number of respondents to this investment question, an average investment per organisation can be evaluated.

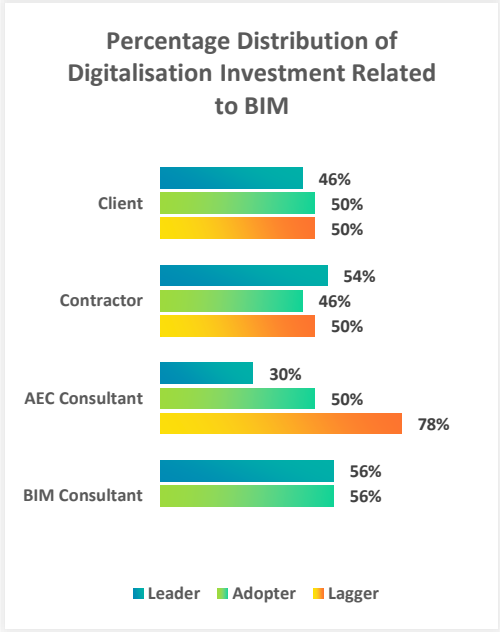

Fig. 17a. Distribution of BIM investment in digitalisation

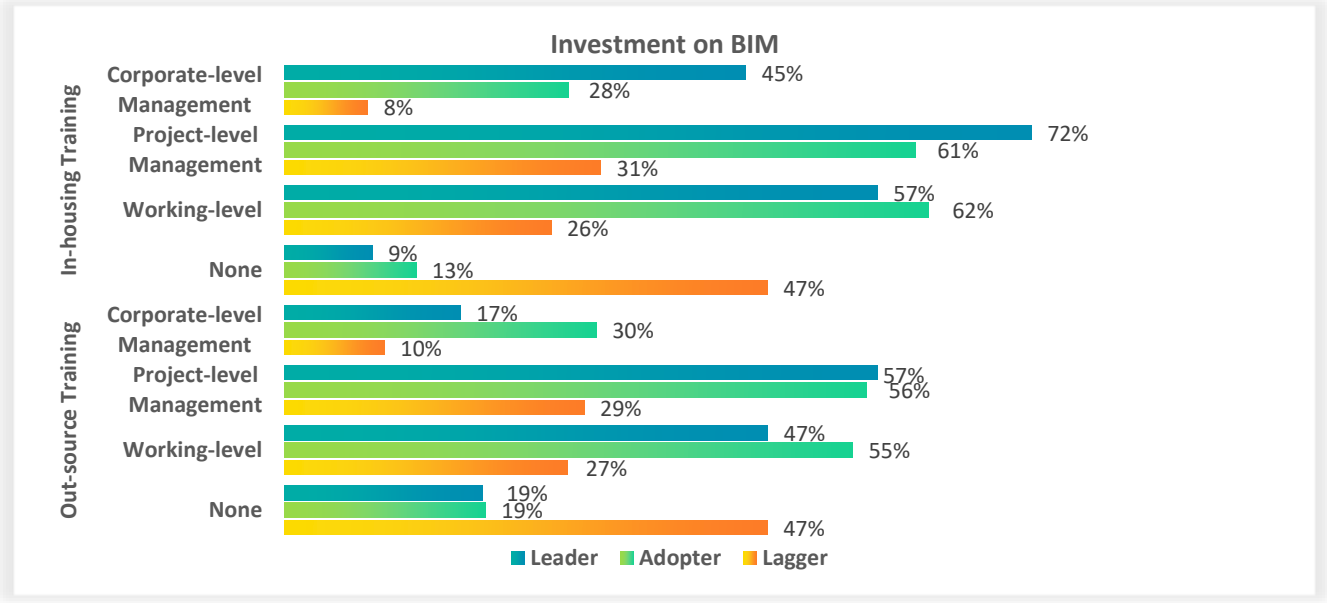

Fig. 17b. In-house or outsourced BIM investment at different levels

	Average (Unit: HK$)
BIM LEADERS	779,000
BIM ADOPTERS	675,000
BIM LAGGERS	71,000

Fig. 18a. Investment in digitalisation in the past year

	Average (Unit: HK$)
BIM LEADERS	1,142,000
BIM ADOPTERS	1,057,000
BIM LAGGERS	285,000

Fig. 18b. Investment in digitalisation in the next three years

Using this evaluation method, it is concluded that BIM Leaders spent an average of approximately HK$779,000 last year. BIM Adopters spent about HK$675,000 on average, while BIM Laggers invested approximately HK$71,000 (see Fig. 18a). Their investment emphasised in-house capacity for project-level management (see Fig 17b). In the next three years, all three groups are going to invest more in digitalisation, with around 46%, 56%, and 297% increases for BIM Leaders, BIM Adopters, and BIM Laggers, respectively. The BIM Laggers intend to spend four times more on digitalisation than they did in the past year, which is the most drastic increase among the groups (see Fig. 18b). This serves as an essential benchmark for organisations that want to excel in their BIM and digitalisation adoption in the next 1–3 years.

Investment Ratio 1:3:6 in BIM Talents

The top hurdle is the lack of BIM expertise, according to this Survey and the Survey 2019. It is evident from Fig. 19 that the ratio of employment of BIM managers, BIM coordinators, and BIM engineers/modellers is about 1 to 3 to 6, which is consistent for BIM Leaders and BIM Adopters. They have a ratio of roughly one BIM manager to three BIM coordinators and six BIM engineers as part of their investment to realise BIM's benefits.

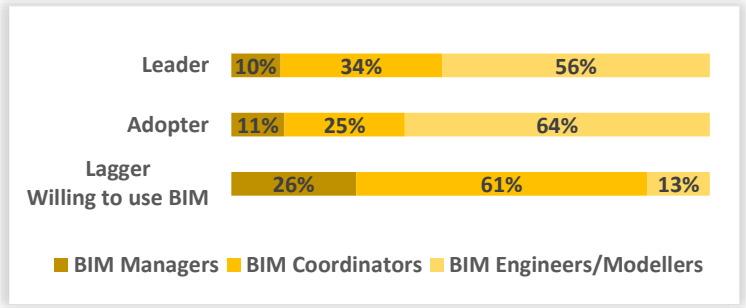

Fig. 19. BIM employment status by occupation

Digital Transformation

The increased usage of high-value BIM adoption with clear benefits is speeding up a digital transformation that is changing the industry.[5] One crucial factor for BIM Leaders to adopt a digital solution is solution readiness. The percentage of BIM Leader with solution readiness is 62%, which is much higher than for BIM Adopters (19%) and higher than for BIM Laggers (50%) (see Fig. 20). Another crucial factor for BIM Leaders is the production value and time.

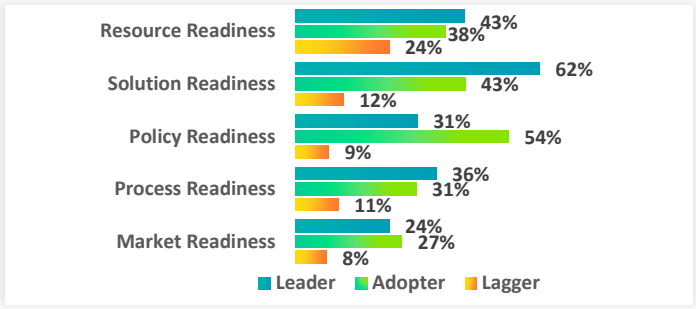

Fig. 20. Readiness to use

The third crucial factor for BIM Leaders is the value of a smart environment; the percentage of BIM Leaders who chose this option is 64% (see Fig. 21). BIM adoption, as a technological change and an enabler with higher maturity this year, an industry digital transformation roadmap [6] on approach, governance, and commons, e.g., how the CIC defines the direction of the construction digitalisation and its development, could be created.

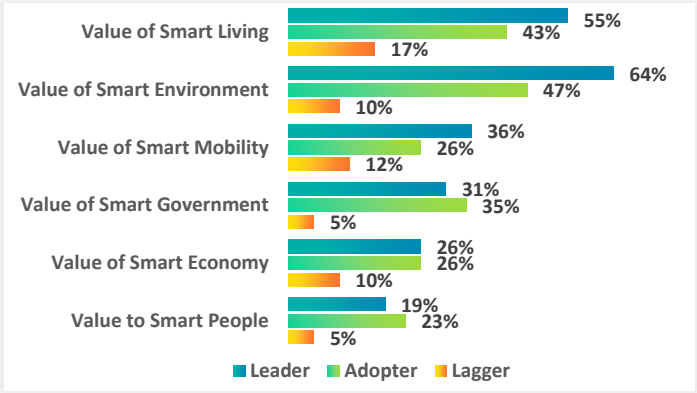

Fig. 21. Value of use at the society level

[5] NBS (2020) The 2020 BIM Report, NBS Enterprises Ltd.
[6] Enzer, M., Bolton, A., Boulton, C., Byles, D., Cook, A., Dobbs, L., Keaney, E., et al. (2019) Roadmap for delivering the information management framework for the built environment. [Webpages]. https://doi.org/10.17863/CAM.38227

Recommendation One for Hong Kong BIM Adoption

Support for SMEs BIM Adoption

More than 98% of organisations in Hong Kong are SMEs, and they cover 45% of total employment in the private sector in Hong Kong[7]. SMEs play a vital role in the development of the economy, as well as the success of BIM adoption in the Hong Kong construction industry.

In this study, we have investigated the adoption of BIM by SMEs in Groups 3, 4, and 5. The adoption of BIM in **SMEs** is found to be significantly lagging that of non-SMEs in this survey, with **80% BIM Laggers overall**. According to the study, SMEs have more laggers and fewer adopters and leaders (see Fig. 22).

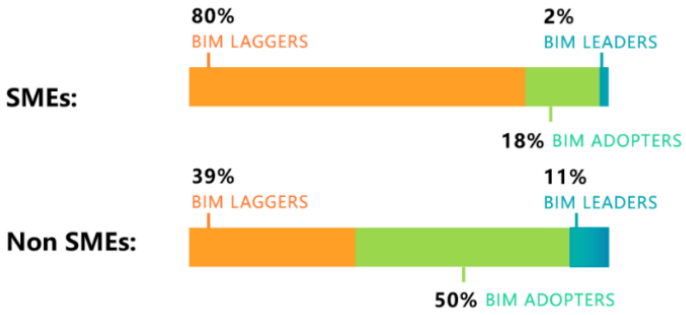

Fig. 22. BIM adoption by SMEs

Small practices see BIM as irrelevant in the UK.[8] The biggest hurdle to BIM adoption for SMEs is the lack of BIM project experience. The lack of client requirement and the absence of government policy could act as contributing factors to the hurdles to adoption. Uncertain ROI for BIM investment and the lack of free BIM objects readily available are pain points for SMEs looking to boost their BIM adoption (see Fig. 23a).

SMEs

Rank	Hurdles of BIM Adoption	% Selected
1	Lack of BIM project experience	50%
2	Lack of BIM expertise	45%
3	Absence of BIM requirement by the client	37%
4	Uncertain return of BIM investment	29%
5	Lack of free BIM objects available	28%

Fig. 23a. Top 5 BIM hurdles for SMEs

In the CIC's roadmap to BIM adoption published in 2014, there was an initiative to provide support to SMEs. With the introduction of the Construction Innovation & Technology Fund (CITF), it may be the right time to review the effect of the CITF on the adoption of BIM by SMEs, e.g., to help them to gain the necessary tools and skills for the transformation, and hence their corporate image via funding or subsidies as the requirement from the client and government policy remain the strongest motivations (see Fig. 23b).

SMEs

Rank	Motivations of BIM Adoption	% Selected
1	Hong Kong client requirements	68%
2	Government policy	61%
3	Reduction of errors, omissions, rework or abortive work	39%
4	Enhancement of organisation's image	33%
5	Reduction of risks (or improvement of predictability)	26%

Fig. 23b. Top 5 BIM motivations for SMEs

[7] Trade and Industry Department (2020) Support to Small and Medium Enterprise. Online: https://www.tid.gov.hk/english/smes_industry/smes/smes_content.html [Accessed 8 December 2020]

[8] NBS (2020) The 2020 BIM Report, NBS Enterprises Ltd.

Recommendation Two for Hong Kong BIM Adoption

Push-pull Approach for Private Sector

Adoption of BIM in the private sector is slow. The number of laggers is six times higher in the private sector than in the public sector. As mentioned in the public-facing report in 2019, one of the characteristics of local BIM adoption is that it is compliance-driven. Client requirement or the use of the so-called push-pull approach is needed to promote the use of BIM in the private sector.

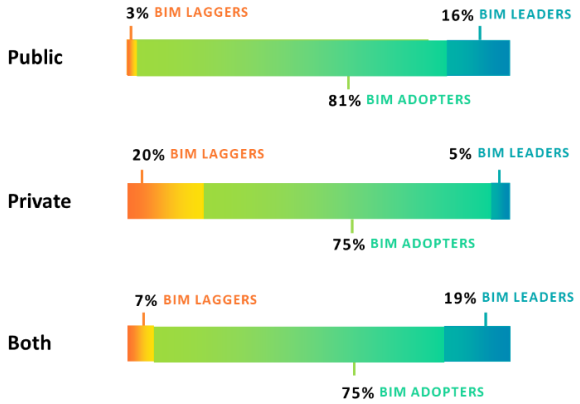

Fig. 24. BIM adoptions by project types

Lacking BIM project experience remained the No.1 hurdle to the private sector's adoption of BIM. The result supports Hong Kong client requirements as the No.1 motivation for BIM adoption in the local market. The existence of client requirements from the developers in Hong Kong would drive the adoption of BIM in the private sector (see Figs. 25 and 26).

As mentioned in an earlier section, BIM adoption tends to be based on BIM benefits. From the client's point of view, the result has shown a notable change in the ranking of facility and asset management as motivation for the private client. Improvement in this high-value BIM use and BIM benefits would drive the use of BIM from the private client side. To fill the gap in the development of private industry standards, they can make reference to the existing government standards and develop their own in the coming years (see Fig. 28).

	Impacts for PRIVATE PROJECTS	% Selected
1	Enhance communication	69%
2	Reduce error and omission	66%
3	Enhance quality management	55% ↑1
4	Enhance organisation's image	55% ↓1
5	Enhance efficiency	52% ↑2

Fig. 27. BIM impacts for private clients

	Motivations for PRIVATE PROJECTS	% Selected
1	Hong Kong client requirements	69%
2	Government policy	49%
3	Reduction of errors, omissions, rework or abortive work	31%
4	Reduction of risks (or improvement of predictability)	31%
5	Enhancement of organisation's image	26%

Fig. 25. BIM motivations for private projects

	Hurdles for PRIVATE PROJECTS	% Selected
1	Lack of BIM project experience	61% ↑1
2	Lack of BIM expertise	55% ↓1
3	Absence of BIM requirement by the client	43%
4	Difficulty of changing mindset and culture	36% ↑4
5	Uncertain return of BIM investment	34% ↑1

Fig 26. BIM hurdles for private projects

Rank	Standards Used	% Selected
1	CIC Building Information Modelling Standards (General)	69%
2	BS EN ISO 19650-1, 19650-2	39%
3	CIC BIM Standards for Mechanical, Electrical & Plumbing	34%
4	CIC BIM Standards / Guidelines for Statutory Plan Submission	33%
5	CIC Production of BIM Object Guide	27%
6	BIM Guides and Standards by ArchSD	26%
7	Electrical and Mechanical Services Department BIM-AM Standards and Guide Version 2.0	26%
8	CIC BIM Standards for Underground Utilities	25%
9	Hong Kong Housing Authority and Housing Department - Standards and Guide Version 2.0	24%
10	Building Plans Submission by Buildings Department (BD)	23%
11	CAD Standard for Works Projects by DevB	20%
12	Guidelines for Using Building Information Modelling in General	16%
13	Drainage Services Department - BIM Modelling Manual Second Edition	15%
14	None of the above	5%

Fig. 28. Usage of local and international BIM standards

The Way Forward

KPIs for the Push-pull Approach

Similar to the finding of the Survey 2019, organisations' decision to adopt BIM is still primarily driven by client requirements and government policy. These two hurdles ranked the highest in all the different groups, stakeholders' groups, SMEs, and various project types. Compliance is influential in organisations' decision to adopt BIM, but the result also shows signs of the emergence of benefits-driven BIM adoption in the local market. The result demonstrates a similar ranking of BIM uses and BIM benefits. In the UK, the achieved target of savings on the costs of capital projects by 2015 was 15–20%, and a 33% cost reduction is the target in 2025 – not just in the initial cost of construction but in the whole life cost of built assets.[9] This Survey shows a great improvement in BIM adoption (see note in Fig. 29). By 2023, the increase in the percentage of improvement will likely be in the range of 10–20% in the following BIM Adoption KPIs.

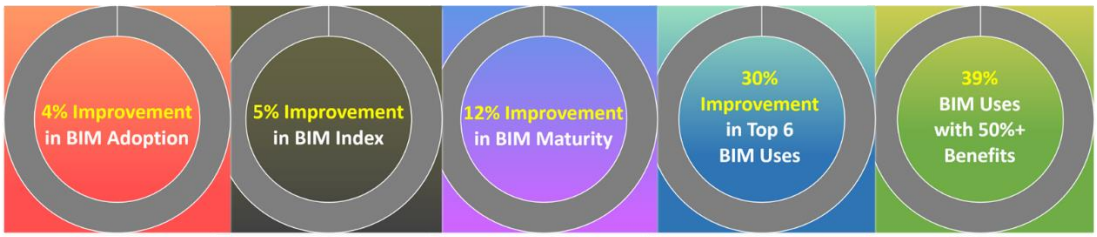

Fig. 29. Key Performance Indicators (KPIs) for BIM Adoption

(Note : 4% improvement is after normalisation – see Fig. 3; and % improvement shown are 2020 results compared with 2019)

Investment for the BIM Talent

While at least 46% of the investment in digitalisation is BIM-related for both BIM Leaders and BIM Adopters in 3 out of 4 groups (see Fig. 17a), BIM modeller is one of the top ten hot jobs in 2020,[10] and a lack of BIM expertise is still the top hurdle. The ratio between BIM managers, BIM coordinators and BIM engineers/ modellers is consistent with that in BIM Leaders and BIM Adopters: about 1 to 3 to 6. A further study is suggested to investigate the supply of and demand for BIM talents in the next 1–3 years and see if the certification scheme of the CIC-Certified BIM managers (CCBM) and the CIC-Certified BIM coordinators (CCBC) can meet market demand, e.g., if the academic qualifications of these CCBM and CCBCs will give indications of matching the course modules offered by the professional and higher education institutions. These will help facilitate these education providers to fill any gaps in educating BIM talents.

Fig. 30 Golden ratio for BIM Talent Investment

[9] HM Government (2013) Construction 2025.
[10] Kelly Services Inc. (2020) Hong Kong Salary Guide 2020.

OpenBIM Approach and Common Data Environment

Enhancement of communication is the most influential impact of BIM adoption this year. The release of the "CIC Building Information Modelling (BIM) Standards – General (Version 2 – December 2020)" will provide a useful practice guide for the use of a common language for BIM adoption locally and internationally. Surprisingly, 17% of the industry stakeholders have not heard about the term Common Data Environment (CDE). CDE is an agreed source of information for the project team to streamline the BIM and project data delivery processes with the support of a solution.[11] It delivers digital twins, which play a crucial role in cutting capital expenditures (CapEx) and operating expenses (OpEx) for the asset owners and project team. Further, the use of an OpenBIM approach and BIM contract protocol (e.g., the HKIS BIM Contract Conditions, New Engineering Contract, Integrated Project Delivery) is highly encouraged in project and asset delivery.

Culture Change for SME Leaders

80% of SMEs are BIM Laggers. The top hurdles are lack of BIM project experience and expertise. Increasingly significant hurdles include lack of support from leadership and low competitive advantage in the market. In the coming three years, there is predicted to be an increase in investment in digitalisation from BIM Leaders, BIM Adopters, and BIM Laggers of around 46, 56%, and 297%, respectively. It is worth investigating the effect of the CITF, the Continuing Education Fund and Reindustrialisation and Technology Training Programme (RTTP) on SMEs in terms of upgrading hardware, software, and training in the last few years.

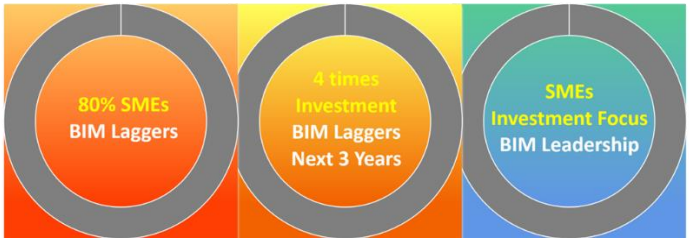

Fig. 31 Change in SMEs Leadership

A Showcase of BIM Leaders with Innovative Practices

The CIC should continue to facilitate the industry's documentation and sharing of best practices of BIM use in visualisation and coordination, as well as optimisation and automation (e.g., central submission format as "the single source of truth", "BIM + MiC", "BIM + DfMA", "BIM + Safety", "BIM + cloud computing" and "BIM + virtual, augmented and mixed reality", automation of estimation and design, automation of fabrication and installation, etc.).

In asset and facility management, the CIC could take the lead in showcasing BIM Leaders (including well-performing SMEs) with innovative practices for the industry stakeholders. The uses of BIM in asset and facility management have been among the lowest in the last two years of study. This clearly shows a lack of interest and benefits in these areas at the moment.

The CITF has been made available to support the development and innovation of the construction industry since late 2018. We recommend conducting a return on investment (ROI) analysis of BIM application for organisations that have applied for the CITF so that the government can understand the effectiveness of the fund and better make policies, provide funds, and support the future development of the construction industry. BIM is taking the journey of digitalisation to another level and transforming the whole industry. There is a need to develop through R&D and adopt a scientific measure of a digitalisation index to facilitate further adoption and measurement of BIM digitalisation and innovation in the Hong Kong construction industry.

[11] CIC (2020) CDE Webinar Series. Online: https://www.bim.cic.hk/en/bim_showcases/page/cde_webinar [Accessed 8 December 2020]

Acknowledgements

CIC Project Steering Group

Director, Industry Development : Ir Dr. Richard PANG

Chairperson of CIC BIM-COM : Ar. Ada FUNG

Senior Manager – Building Information Modelling : Mr. Alex HO

Manager – Building Information Modelling : Ir Dr. George WONG

Assistant Manager – Building Information Modelling: Ms. Ella POON

Assistant Officer – Data Analytics : Mr. Kelvin NGAN

Cover Page Designer : Ms. Shirley LAM

Consultant and Author Team

Project Director : Ir Dr. Llewellyn TANG, Founder of LPC Ltd.

Project Manager : Dr. Greg CHAN

Core Project Team Members : Dr. Chao CHEN
Mr. Zenan ZHANG
Mr. Yu ZHENG
Ms. Xiaoyue YI
Ms. Ada MOK
Ms. Didi MAK

Quality Assurance Advisors : Mr. Xiongyi LI
Mr. Jeffery YANG

Data Collection Consultant : Social Sciences Research Centre (HKUSSRC), the University of Hong Kong

-END-

Construction Industry Council

Address : 38/F, COS Centre
56 Tsun Yip Street
Kwun Tong, Kowloon
Tel : (852) 2100 9000
Fax : (852) 2100 9090
Email : enquiry@cic.hk
Website : www.cic.hk