IMPACT OF COVID-19 PANDEMIC ON CONSTRUCTION PROJECTS IN SINGAPORE

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1. Introduction

An online survey of contractors, consultants and project owners was conducted between April 2021 to July 2021. Questionnaires were sent to randomly selected contractors (including all SCAL members), consultants and project owners. Responses were received from: 60 contractors, 35 consultants (architects, engineers and QSs) and 10 project owners. There is no statistical difference between responses of contractors and consultants and therefore their responses were analysed together. The responses of A1 contractors were compared to other contractors (termed as 'Other Smaller Contractors'), and reported when there are significant differences. The 10 responses from owners were not included in the data analysis due to the small sample size.

2. Characteristics of respondents

The characteristics of the survey respondents are shown in Table 1. The majority who completed the questionnaire are mid management. The respondents' job experience ranged from 0.5 years to 46 years, with an average of 17.6 years.

Table 1 General characteristics of respondents

Description	**Frequency**	**Percentage**
Nature of firm		
Contractors	60	63.2%
Consultants	35	36.6%
Designation		
Professional	8	8.4%
Mid Management	52	54.7%
Senior Management	35	36.8%
Working Experience		
Less than 5 years	15	15.8%
6 years to 10 years	17	17.9%
11 years to 20 years	27	28.4%
21 years to 30 years	22	23.2%
More than 30 years	14	14.7%
Job responsibilities (more than one)		
Construction Management	52	54.7%
Consultancy Service	30	31.6%
Architecture	14	14.7%
Civil Engineering	23	24.2%
Mechanical and Electrical Engineering	22	23.2%
Structural Engineering	14	14.7%
Quantity Surveyor	30	31.6%
Building Information Modelling	10	10.5%

Note: Frequency = number of respondents.

3. Characteristics of projects

79 respondents provided information about projects that were under construction stage between June 2020 and December 2020 which they were involved in. Table 2 shows the profile of the projects. There is a good spread of projects in terms of type, size (by GFA) and ownership. These projects had their fair share of workers contracting Covid-19 and/or being quarantined.

Table 2. Profile of projects that were under construction during Covid-19 pandemic

Description	Frequency	Percentage
Type of Facility / Project (n=79)		
Infrastructure (including earth works, civil engineering works)	18	22.8%
Institutional (include educational, healthcare and other public buildings)	13	16.5%
Residential	16	20.3%
Commercial (include retail shops, restaurants, hotels, medical buildings and hospitals, shops, and office buildings)	30	38.0%
Industrial	2	2.5%
Gross Floor Area (GFA in m2) (n= 70)		
Up to 10,000 m^2	25	35.7%
10,001 m^2 - 20,000 m^2	13	18.6%
20,001 m^2 - 30,000 m^2	5	7.1%
30,001 m^2 - 40,000 m^2	1	1.4%
> 40,000 m^2	26	37.1%
Ownership of Facility or Project (n=79)		
Public Sector	38	48.1%
Private Sector	39	49.4%
Public-Private Joint Venture	2	2.5%
Workers' Covid-19 status (n=75)		
Contracted Covid-19	38	50.7%
Did not contract Covid-19	37	49.3%
Workers' quarantine status (n= 71)		
Served quarantine order	48	67.6%
Did not serve quarantine order	23	32.4%

Note: There is missing data when n≠79.

4. Project delay as percentage of original contract period

The analysis of extent of project delay included the universal extension of time (EOT) of 122 days. Project delay was measured as follows:

(Total estimated project duration – Contract period)/contract period x 100%

The percentage delay ranges from 7.3% to 266.7%, with a mean of 46.3%. Table 3 shows that almost 80% of projects will need 20% or more time to be completed. Figure 1 shows that private projects are likely to suffer a higher percentage of delay than public projects. Figure 2 shows that small projects (by GFA) are likely to suffer a higher percentage of delay than large projects.

Table 3. Extent of project delay compared to original contract period (Y16)

Extent of delay beyond original contract period	Number of projects	%
< 20%	17	23%
20% to 40%	24	32%
41% to 60%	19	26%
61% to 80%	5	7%
> 80%	9	12%
Total	74	100%

Figure 1. Comparison between public and private projects: extent of delay compared to original contract period (Y16)

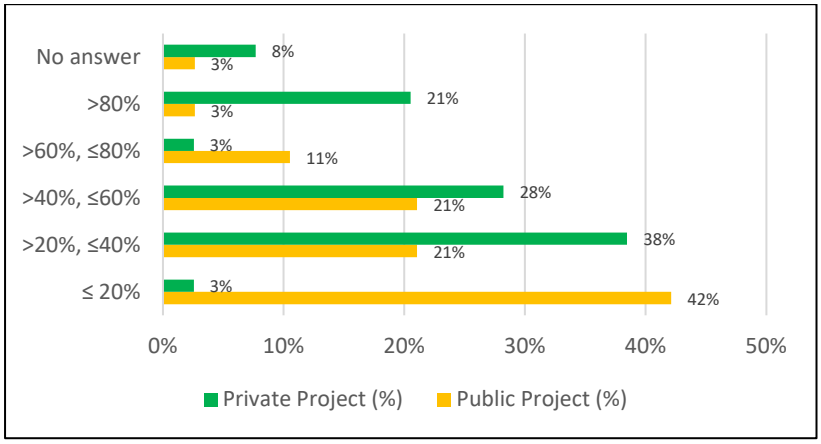
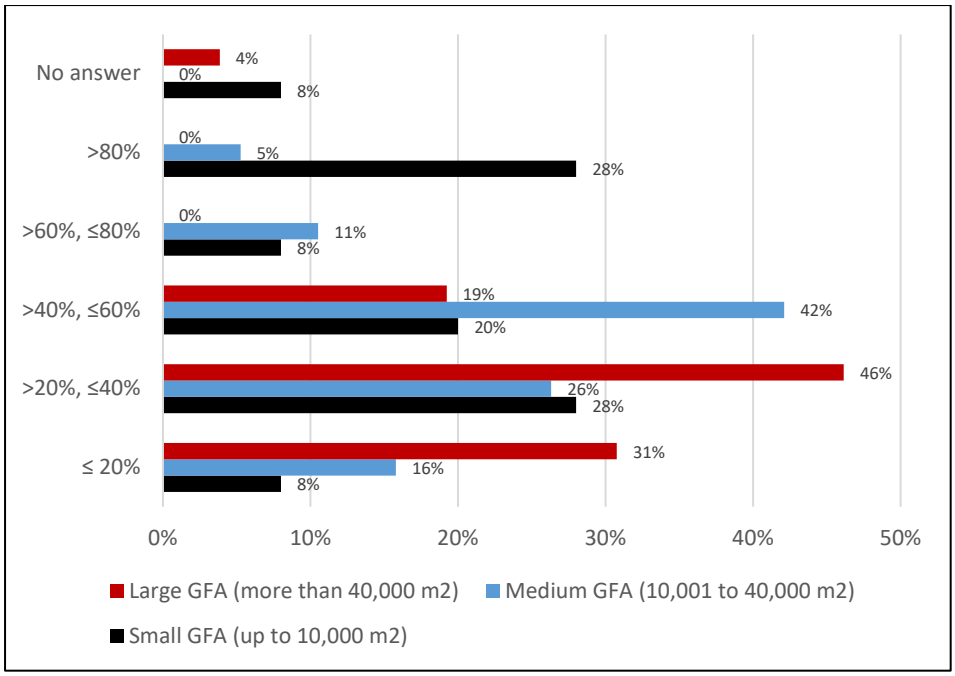


Figure 2. Comparison between projects of different sizes: extent of delay compared to original contract period (Y16)



5. Project delay in months

Including the universal EOT, projects are likely to be delayed by between 4 months and 24 months, with a mean of 12 months. Table 4 shows that the majority of projects will be delayed by 9 months or more (including universal EOT). This suggests that the universal EOT of 122 days would be insufficient for nearly all projects that were in construction stage in 2020.

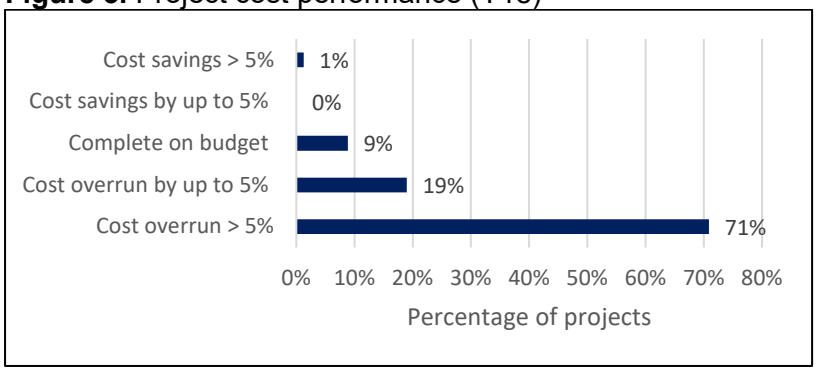
Table 4. Extent of project delay (in months)

Number of months of delay (including universal EOT)	No. of projects	Percentage
Up to 4 months	1	1%
5 - 8 months	16	22%
9 - 12 months	26	35%
13 - 16 months	22	30%
> 16 months	9	12%
Total	74	100%

6. Cost performance

Figure 3 shows that 90% of the projects will suffer cost over-run. The single project that has cost savings was probably because some parts of the contract were omitted.

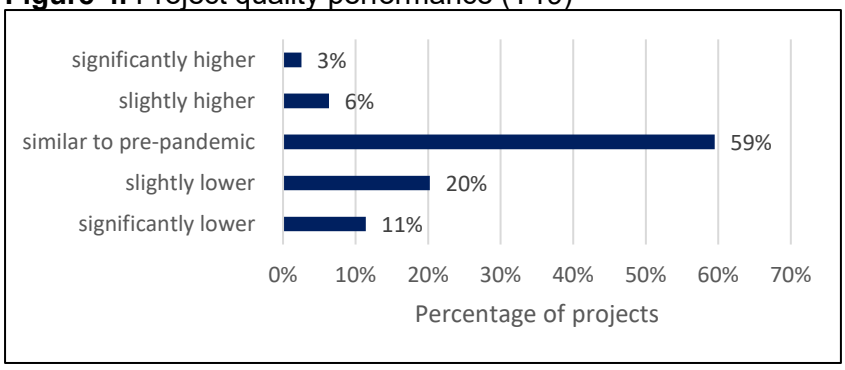
Figure 3. Project cost performance (Y18)



7. Quality performance

Figure 4 shows that the majority of projects will have similar quality as those completed before the pandemic.

Figure 4. Project quality performance (Y19)



Respondents perceived that public projects are more likely to have lower quality as compared to pre-Covid-19 times (see Figure 5). Large projects might suffer sharper drop in quality compared to small projects (see Figure 6).

Figure 5. Comparison Between Quality performance of Public and Private Projects (Y19)

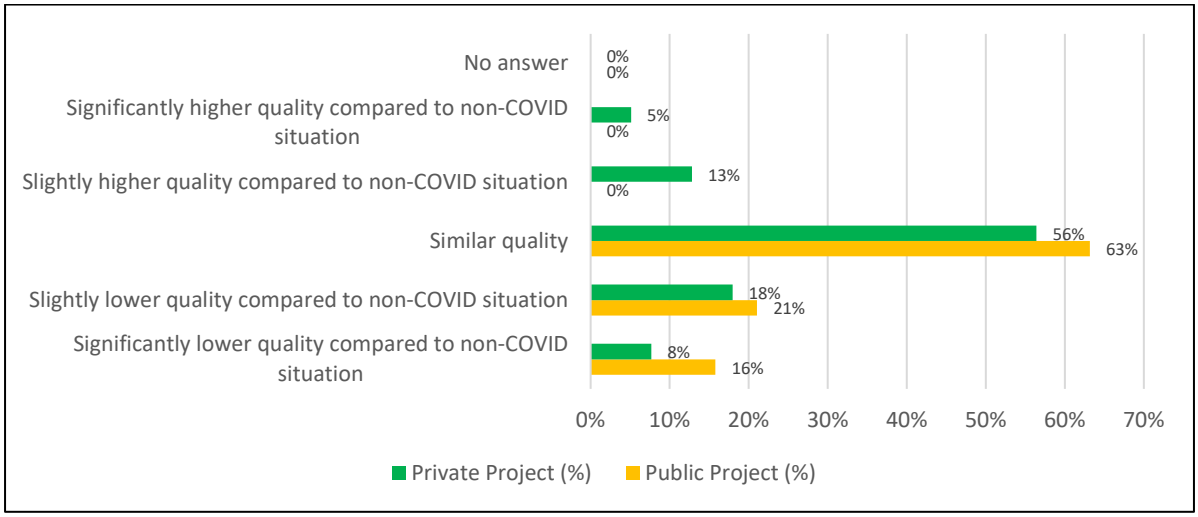
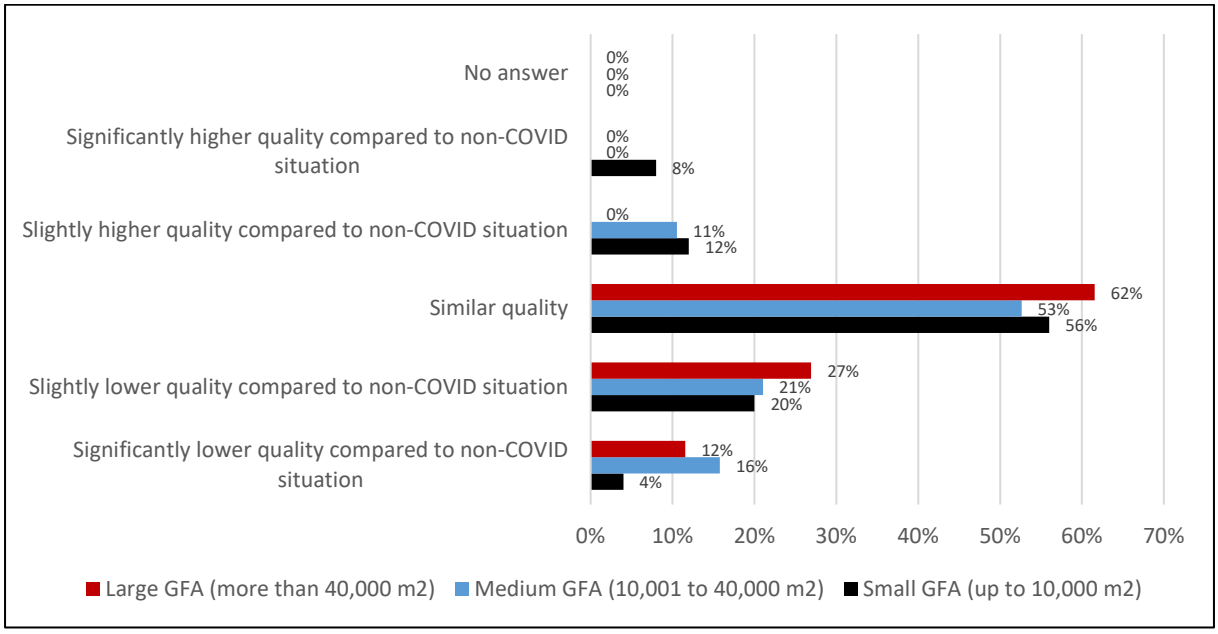


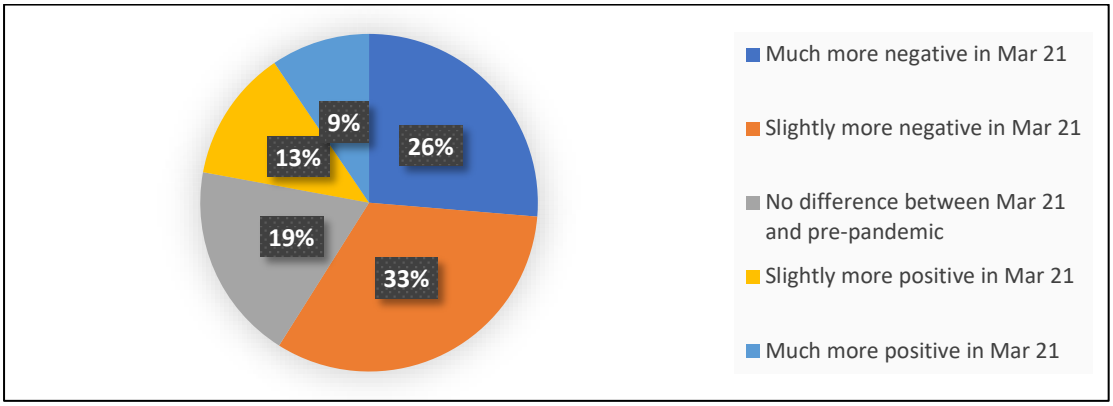
Figure 6. Comparison between quality performance of projects of different sizes



8. Impact of pandemic on revenue and opportunities

More than half of the respondents indicated that construction opportunities during Covid-19 pandemic (March 2021) is more negative compared to pre-pandemic (Y53) (see Figure 7)

Figure 7. Construction opportunities during Covid-19 compared to pre-pandemic (Y53)



9. Impact of pandemic on project productivity

Table 5 shows that the productivity of almost all projects was lower in March 2021 compared to pre-pandemic times. The respondents surmised that many projects will recover their productivity by mid-2022 (Table 6).

Table 5. Project productivity in Mar 21 compared to pre-pandemic (Q13)

Productivity in Mar 21 compared to pre-pandemic	Number of projects	%
Very significantly lower	31	40.3%
Considerably lower	29	37.7%
Moderately lower	15	19.5%
Similar to pre-pandemic	2	2.6%
Total	77	

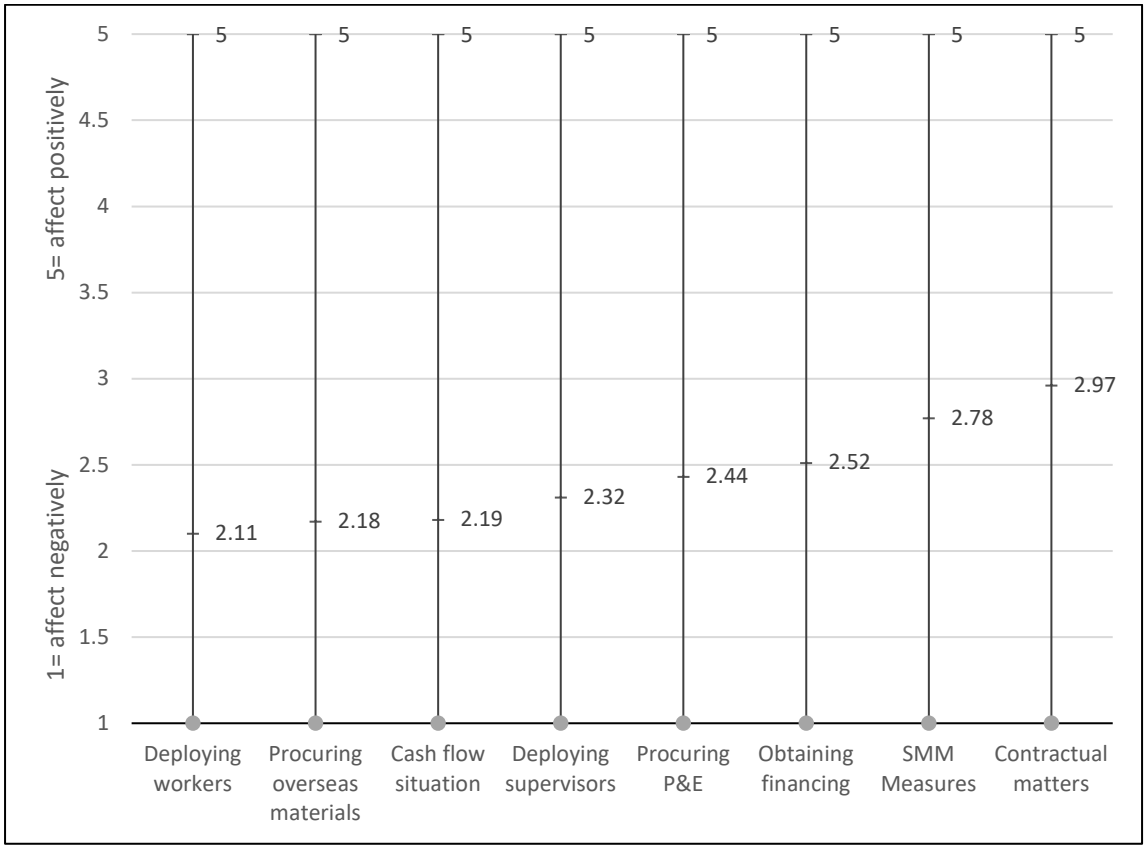
Table 6. When project productivity will return to pre-pandemic level (Y15)

When project productivity return to pre-pandemic level?	Number of projects	Percentage
2021 by Q3	17	20%
2021 Q4	17	20%
2022 Q1	12	14%
2022 Q2	8	9%
2022 Q3	1	1%
2022 Q4	9	11%
2023 & beyond	12	14%
Never return to pre-pandemic level	5	6%
Cannot tell	4	5%
Total	85	100%

10. What affected project progress/productivity during the pandemic

Figure 8 shows the factors that affected project progress or productivity during Phase 2 of the pandemic. Among these, worker deployment and material procurement impacted project progress the most. Contractual matters such as extension of time, additional monetary claims do not affect project progress significantly.

Figure 8. Factors affecting productivity/ project progress



11. Conclusion

The survey results show that Covid-19 pandemic had impacted construction projects significantly. Projects were delayed and the universal EOT of 122 days is not sufficient to cover the delay. Projects would also face cost over-run. The implication is that stakeholders might need to enter into protracted negotiation on the actual EOT that should be granted and the additional payment over and above the contract sum.

Productivity of projects had come down. The survey uncovered factors that affected project progress. Chief among these are worker unavailability for deployment and disruption to the material supply chain. There is hope that productivity of projects might recover by mid-2022 for most projects. This can only happen if migrant construction workers are allowed to enter Singapore without too many restrictions. In the long run, there is a need to deepen automation and technology adoption so as to rely less on labourers. However, this comes at a cost to project owners and end users.

Acknowledgement

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