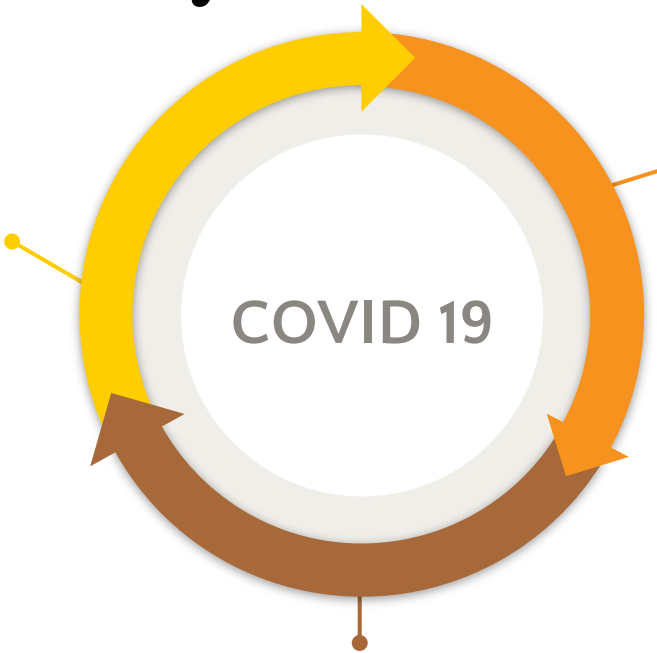
Effects of Disruption on Construction Materials

Impact of Covid-19 on the Construction Industry

Economic Cycles

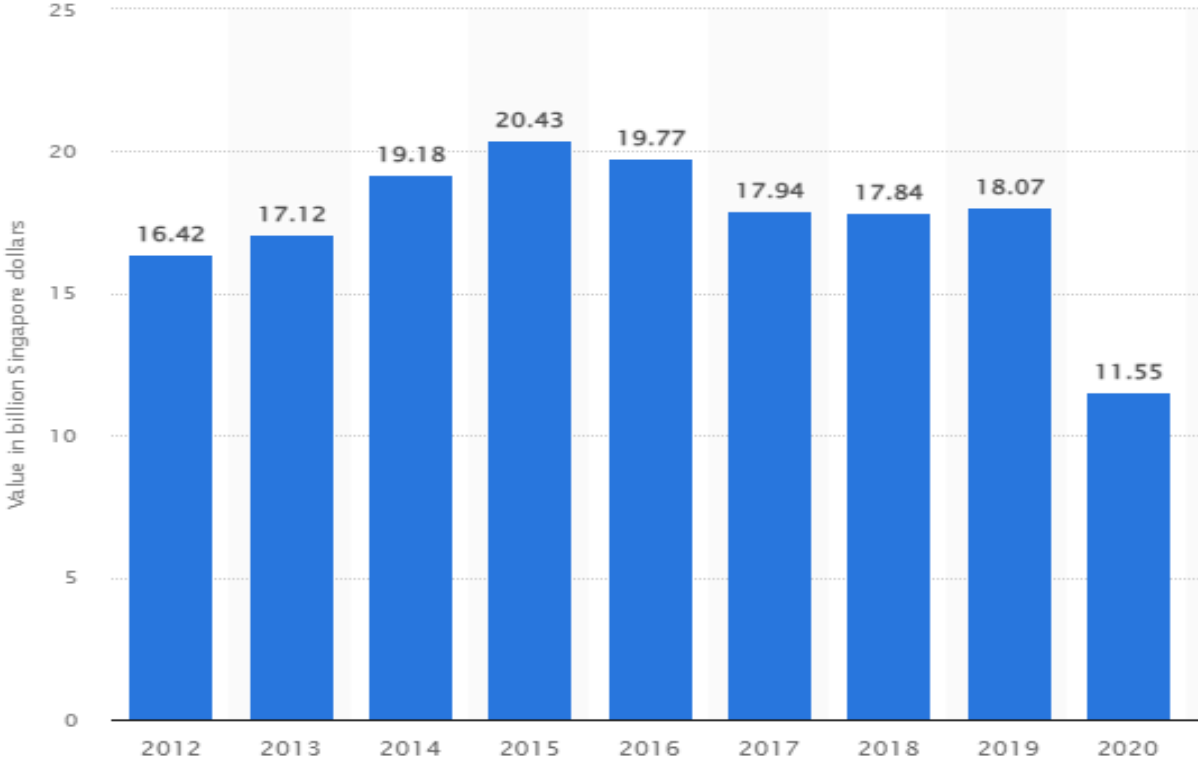


Supply chain disruption

Manufacturing Disruption

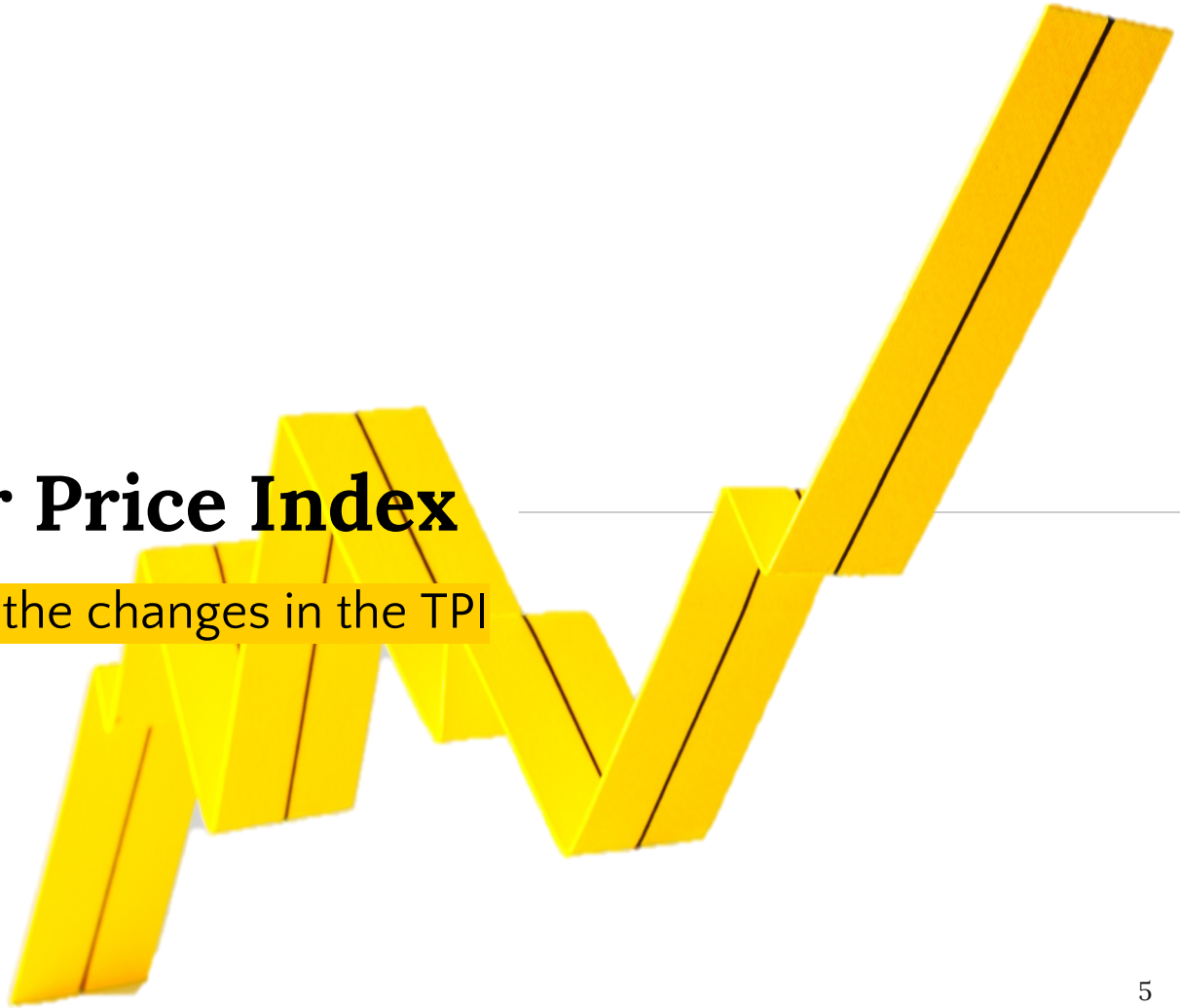
Construction Disruption

Gross domestic product (GDP) of the construction industry of Singapore from 2012 to 2020



Tender Price Index

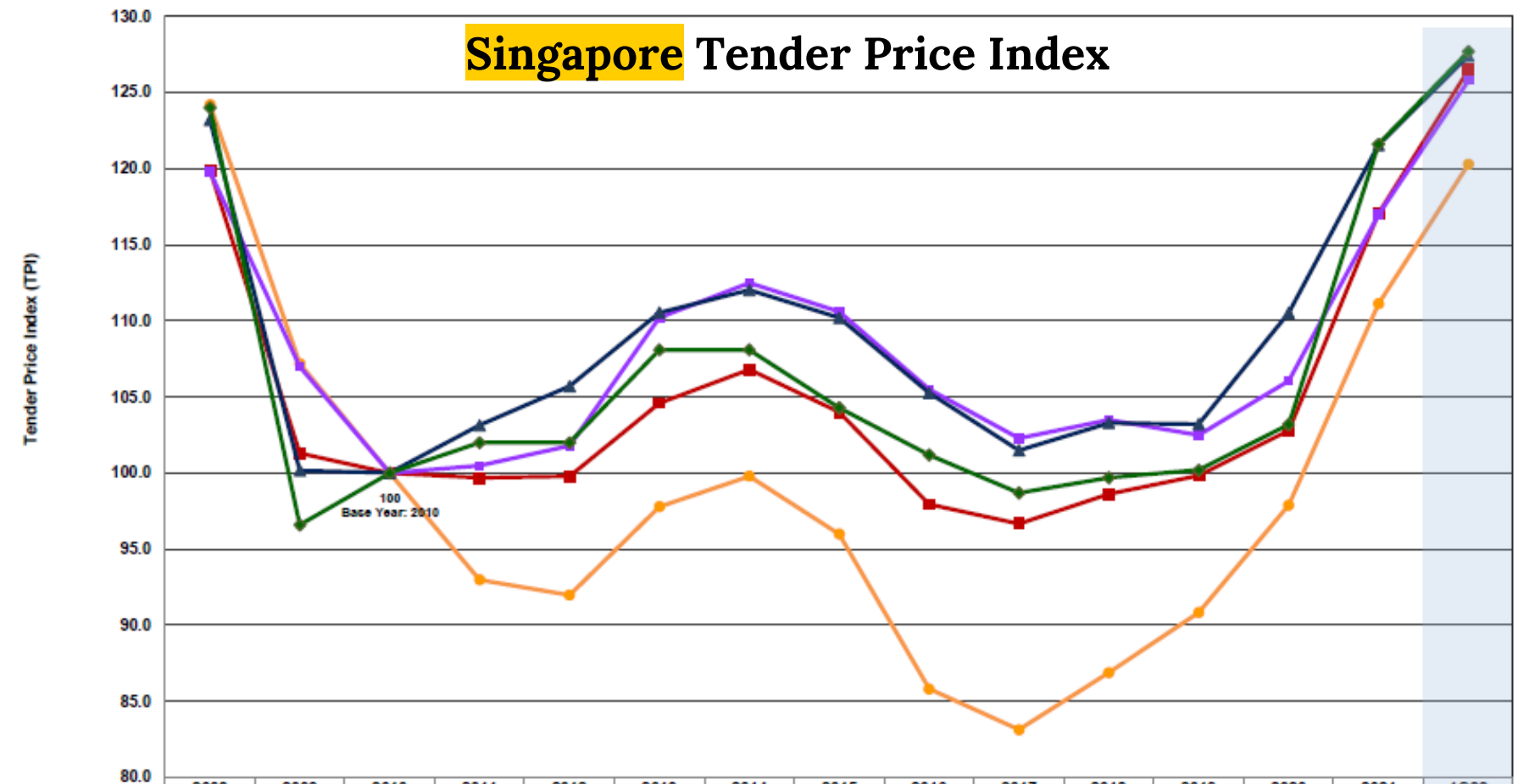
Evaluating the changes in the TPI



Factors Influencing Tender Prices

Material availability	Labour productivity	Level of profit	Project financing	Cost of manpower
Location and control of site	Zonal rates	Category of contractor	Management ability	Contract type
Method of tender selection and degree of competition	Government policy	Project definition/size	Type of development	Construction plan

Singapore Tender Price Index



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	1Q22
BCA All Buildings	119.9	101.3	100.0	99.7	99.8	104.6	106.8	104.0	98.0	96.7	98.6	99.9	102.8	117.1	126.5
HDB	124.2	107.2	100.0	93.0	92.0	97.8	99.8	96.0	85.8	83.2	86.9	90.9	97.9	111.1	120.3
AECOM	119.8	107.0	100.0	100.5	101.8	110.2	112.5	110.6	105.5	102.3	103.5	102.5	106.1	117.0	125.8
RLB	123.2	100.2	100.0	103.1	105.7	110.5	112.0	110.2	105.3	101.5	103.3	103.2	110.5	121.6	127.4
Arcadis	124.0	96.6	100.0	102.0	102.0	108.1	108.1	104.3	101.2	98.7	99.7	100.2	103.2	121.6	127.7

Singapore TPI

19%

Increase from 2019 to 2021

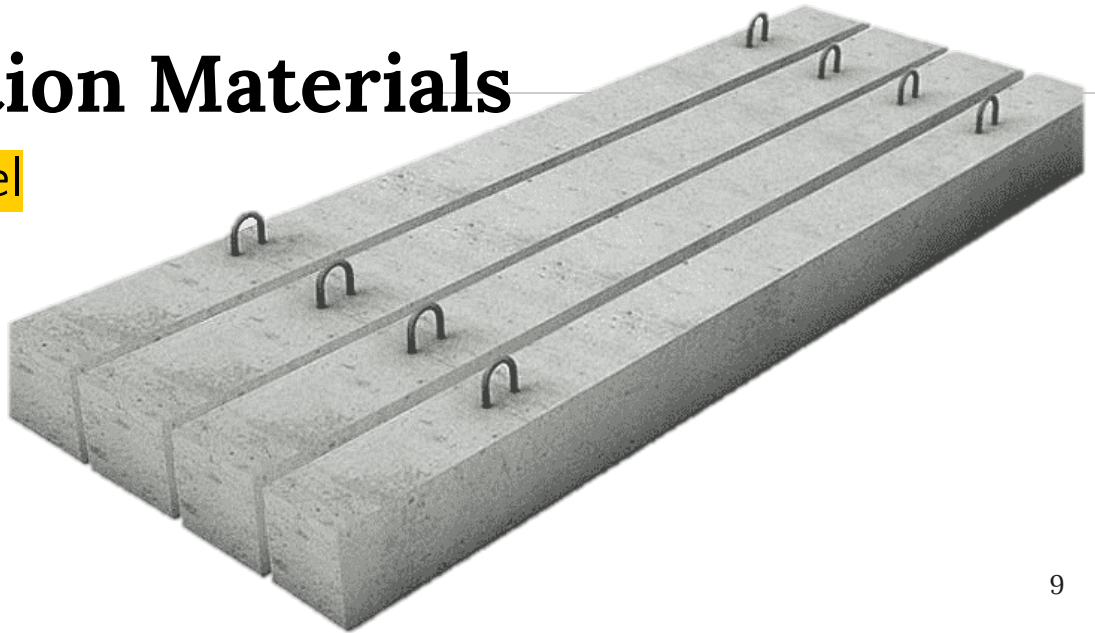
7%

Increase from 2021 to 2022

- *note that the increase from 2021 to 2022 may not be indicative of the effects solely caused by the pandemic as the Ukraine War has also affected construction material costs*

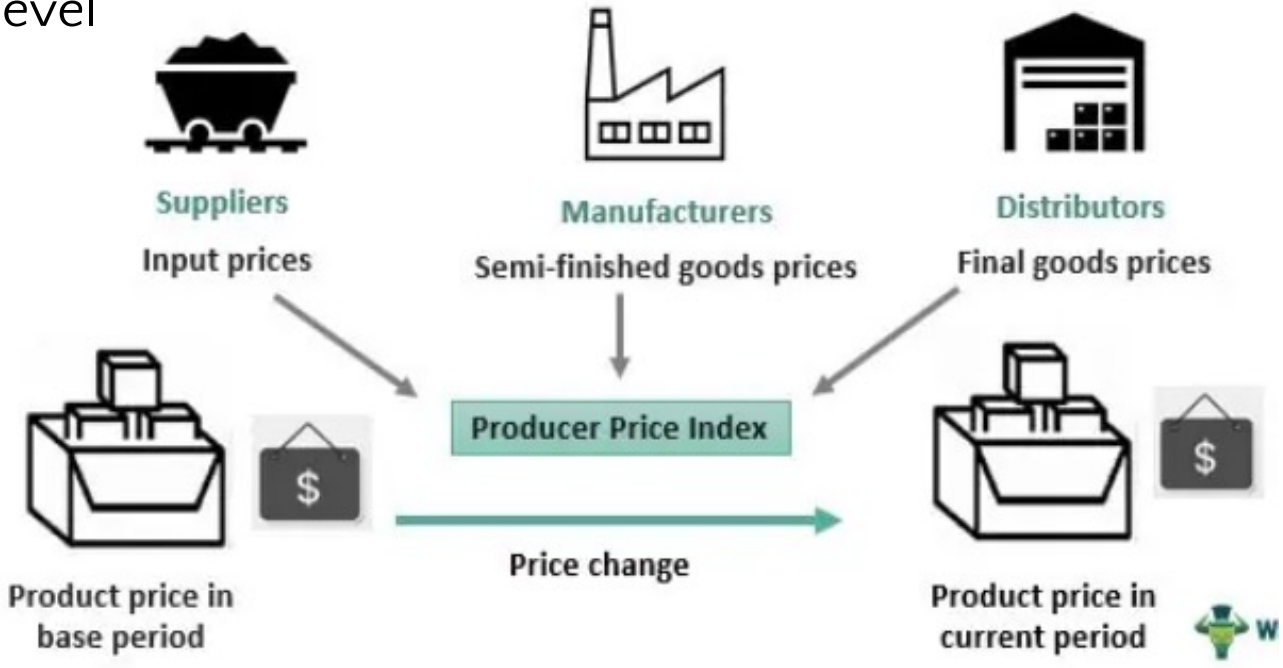
Construction Materials

Concrete & Steel

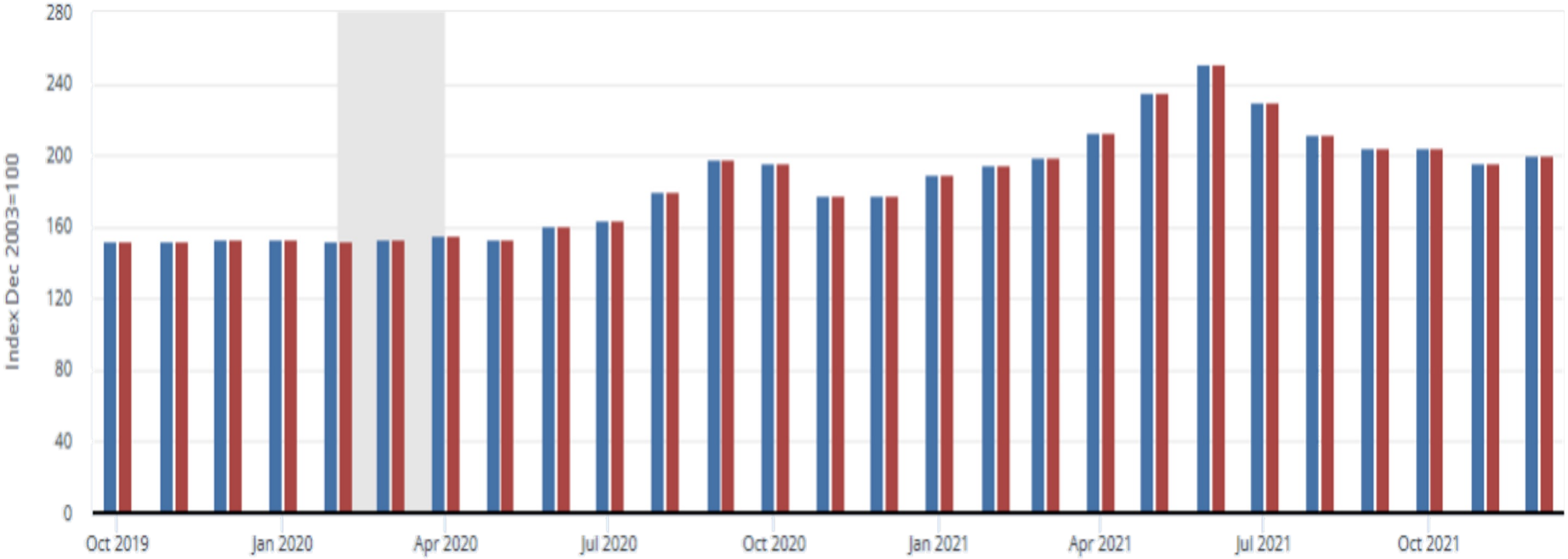


Producer Price Index (PPI)

- Reflects the overall change in prices of goods and services at the producer level



The PPI has increased by approximately 31.16% from 2019 to 2021



58.39%

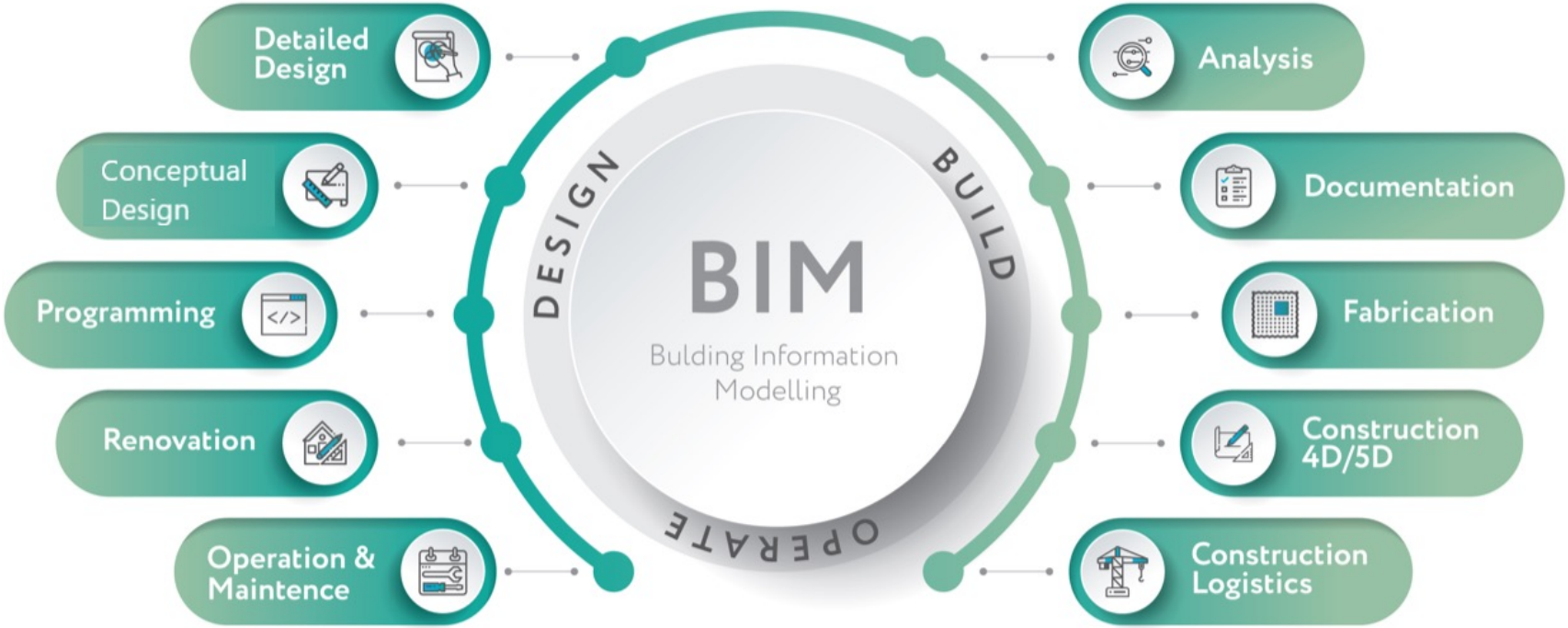
Increase in **steel** price from 2019 to 2021

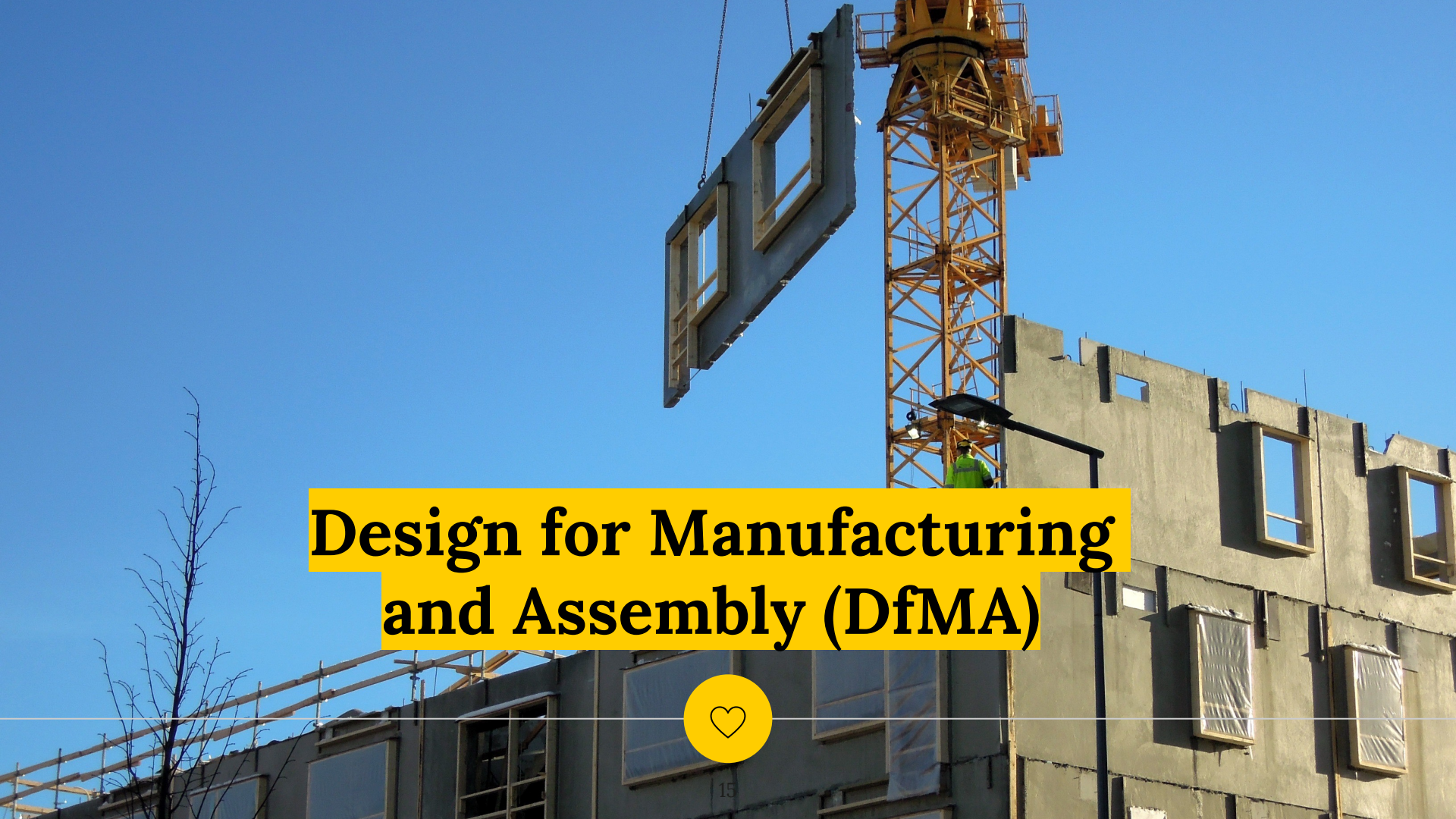
18.83%

Increase in **concrete** price from 2019 to 2021

Methods To Better Optimize And Management Project Costs

Planning with Building Information Modeling (BIM)





Design for Manufacturing and Assembly (DfMA)

Case Study

$100,000,000

Building project in Singapore

Level 1	Level 2	Level 3	Level 4	Amount (S$)
Preliminaries (10%)				$ 10,000,000.00
Builders Work (42%)	Labour (30%)			$ 12,600,000.00
	Material (70%)	Structural (50%)	Concrete (9%)	$ 1,323,000.00
			Reinforcement (36%)	$ 5,292,000.00
			Formwork (15%)	$ 2,205,000.00
			Structural Steel (40%)	$ 5,880,000.00
		Architectural (50%)		$ 14,700,000.00
Mechanical & Electrical (48%)	Labour (30%)			$ 14,400,000.00
	Material (70%)	Copper (30%)		$ 10,080,000.00
		Other materials (70%)		$ 23,520,000.00
			TOTAL	**$ 100,000,000.00**

Element Price Increase

Description	Price increase (%)	Additional cost (S$)	Percentage increase over total project value (%)
Builders Work			
Labour	30%	$ 3,780,000.00	3.8%
Concrete	10%	$ 132,300.00	0.1%
Reinforcement	54%	$ 2,857,680.00	2.9%
Mechanical & Electrical			
Labour	30%	$ 4,320,000.00	4.3%
Copper	65%	$ 6,552,000.00	6.6%
	TOTAL	**$ 17,641,980.00**	**17.6%**

Findings

- Percentage increase of 17.6% is consistent with the TPI increase of an average 19% from 2019 to 2021
- Difference of 1.4% could be attributed to other factors such as the ordinary inflation of other building materials

Conclusion

Material prices

Has not reached the peak nor stabilized. It is expect to rise because of the uncertainty in the world today

Construction

We need to keep building to keep the economy going

Demand

The demand for properties is still going strong, developers need to find solutions to manage cost

Solutions

- Building Information Modeling (BIM)
  - Shorten project by 20%
  - $2 million in savings of preliminaries cost
- Design for Manufacturing and Assembly (DfMA)
  - Shorten project by 10%
  - $1 million in savings of preliminaries cost