GRAIN STORAGE COST INDEX (GSCI)

BER
BUREAU FOR ECONOMIC RESEARCH

Overview

Background:
- Why we developed a GSCI?
- Price indices in general
- Purpose of the study
- International practice

Methodology:
- Process
- Questionnaire
- Survey
- Calculation

Results:
- GSCI vs. PPI graphs
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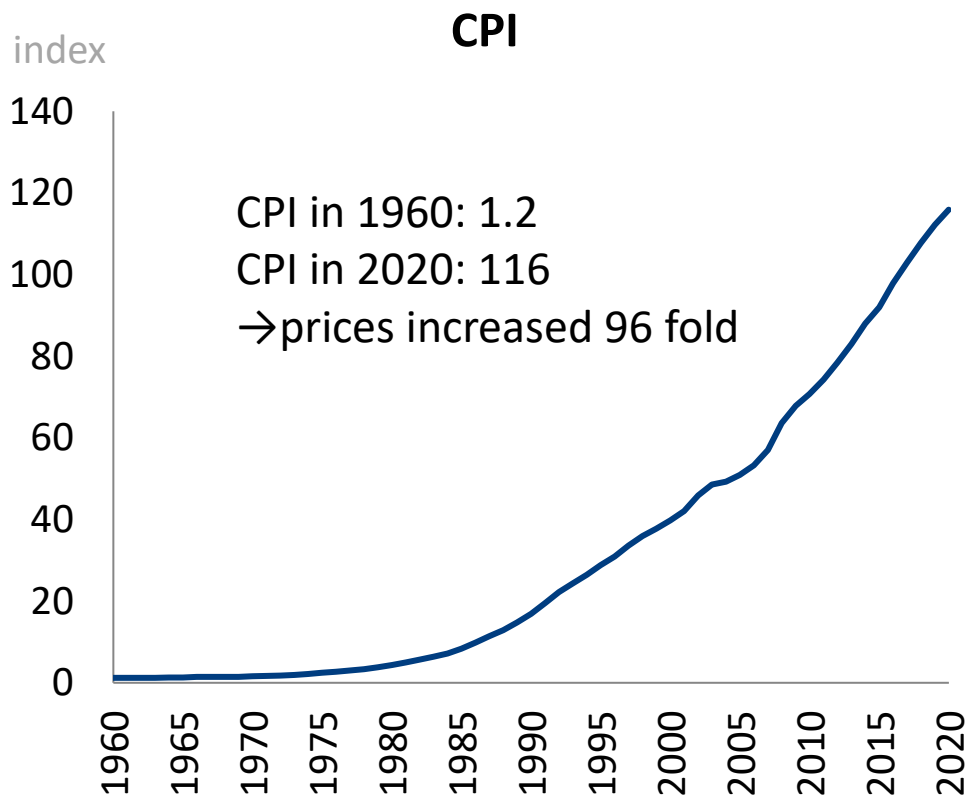
Background

Why did we develop a GSCI?

- The **JSE** uses the producer price index (**PPI**) do adjust storage fees of future contracts every year.
- **Concerns** by industry representatives that the cost increases differ from PPI.
- So Agbiz **tasked** the BER to investigate if that is so and develop an alternative index

Price indices in general:

- International Labour Organization (**ILO**) develop method a century ago
- Is essentially a time series that capture price changes **cumulatively**.
- Allows one to make valid **comparisons** of the price of goods and services over time
- Well know example is the Consumer Price Index (**CPI**) used to capture consumer inflation.



Background: international practice

United States
- CBOT don’t adjust annually, only as the need arise.
- Get industry feedback on costs; don’t use a price index.
- They only adjust the floor rate of the VSR ($0.00165/bu/day)
- VSR: Variable Storage Rate: aims to make the spot and nearby price converge

Australia
- Companies that run the bulk of storage capacity have different storage charges.
- Usually based on a monthly fee and is not regulated.

Brazil
- High inflation country.
- Long term contracts could include an inflation clause (based on official CPI).
- Short term contracts don’t provide for inflation.
- Private warehouses could charge up to 5% of the cost of grain.

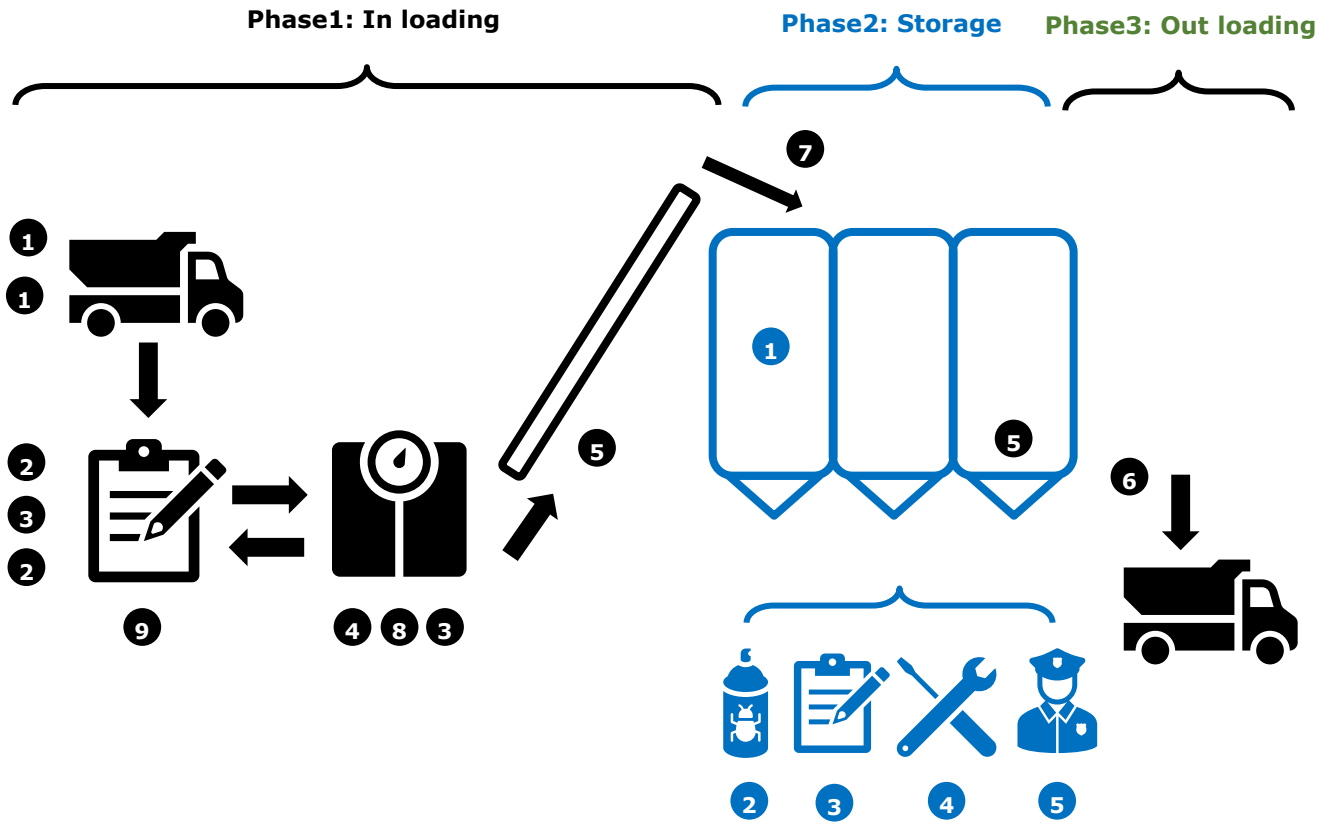
Methodology: develop a stage cost index

ILO methodology:

- Identify a **basket** of good & services, with weights.
- Obtain **price trackers** for each item in the basket.
- Calculate a **weighted average** of the basket over time.

Analyse the grain storage process:

- **Interviews** with silo managers
- Important to focus on the **storage component** (filter out handling)
- **Challenge**: these two processes are intertwined in book keeping.
- **Flow diagram** identified that capital, chemicals, maintenance and labour are key.



Methodology: questionnaire

- Developed a questionnaire in **consultation** with industry members.
- **Purpose** of the questionnaire was threefold:
  1. Identify the main cost **items** in the total cost basket of grain storage.
  2. Determine the relative **weights** that each item carry in the total basket.
  3. To track the annual percentage changes in **labour costs**.
- Was set up in Excel and consisted of a list of 34 cost items.
- Instructed respondents to fill in total costs (handling and storage activity) for the operation of a **particular silo**.
- Asked to ascribe a percentage to their **storage function** specifically.

- Also **included** questions on the:
  1. **financial** position of the silo operation,
  2. number of **employees,**
  3. average annual increase in **remuneration**,
  4. storage **fees**, and
  5. **tonnage** handled

Methodology: extract from questionnaire in Excel

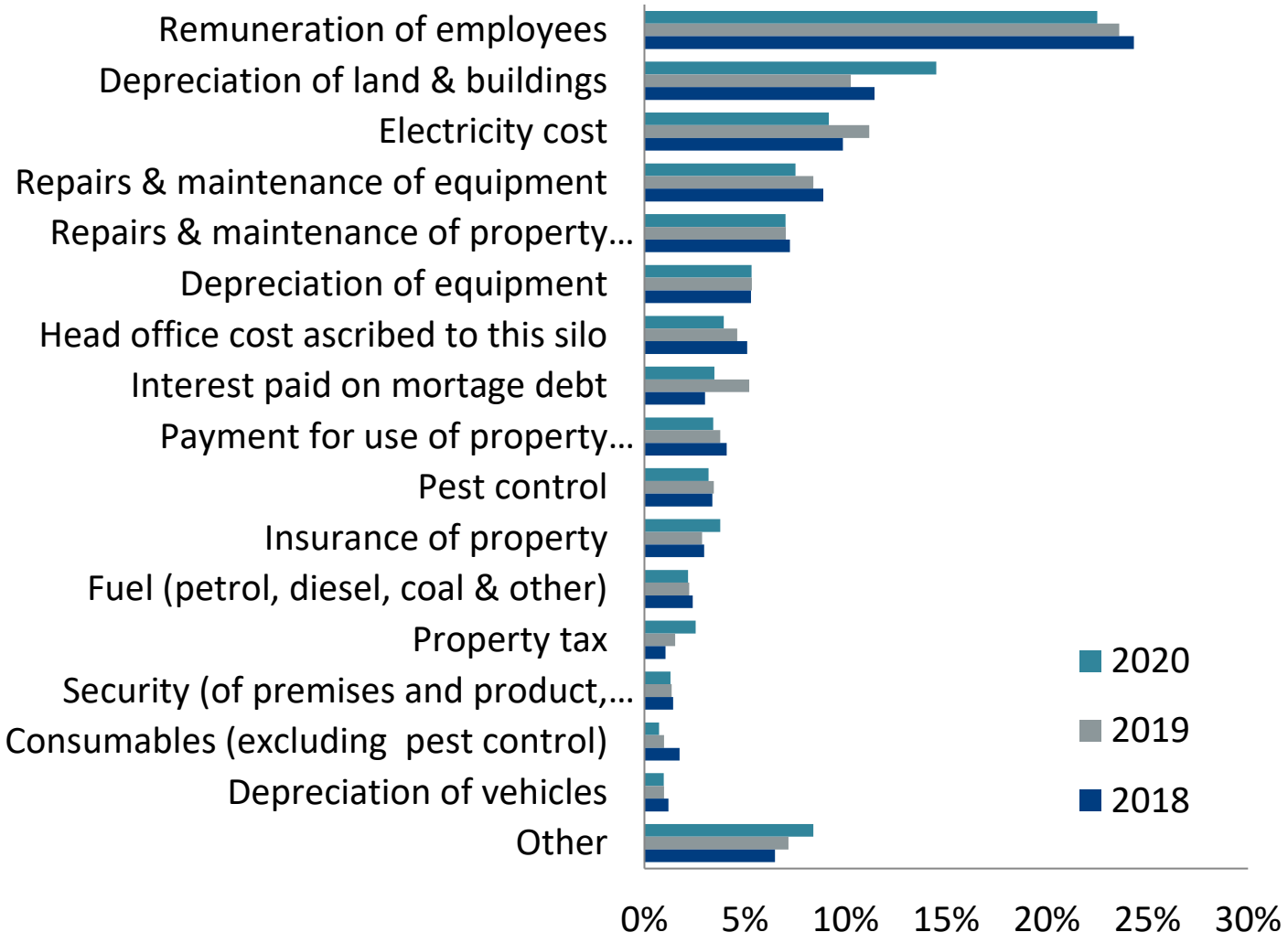
	Expenditure for each category below (in rand)	Total silo operation (handling[2] & storage)			*Percentage ascribed to storage*		
		2018	2019	2020	*2018*	*2019*	*2020*
		R0	R0	R0			
10	Remuneration[1] of employees						
10a	*Management staff*						
10b	*Administrative staff*						
10c	*Operative staff*						
10d	*Maintenance staff*						
10e	*Security staff*						
11	Depreciation of land & buildings				*100%*	*100%*	*100%*
12	Interest paid on mortage debt				*100%*	*100%*	*100%*
13	Insurance of property				*100%*	*100%*	*100%*
14	Repairs & maintenance of property (excluding equipment)				*100%*	*100%*	*100%*
15	Payment for use of property (rent/fee/etc.)				*100%*	*100%*	*100%*
16	Property tax				*100%*	*100%*	*100%*
17	Pest control				*100%*	*100%*	*100%*
18	Depreciation of equipment						
19	Depreciation of vehicles						
20	Interest paid on operating (non-mortage) debt						
21	Insurance of equipment & vehicles						
22	Repairs & maintenance of equipment						
23	Repairs & maintenance of vehicles						
24	Rental of equipment & vehicles						
25	Electricity cost						
26	Fuel (petrol, diesel, coal & other)						

Methodology: survey

- Sent to **15 JSE-registered** grain storage firms.
- Collectively operate more than **283 silos** across South Africa.
- Big firms were asked to **fill out** for more silos:
  - 2 biggest filled in for 5 silos
  - Middle 8 filled for 3 silos
  - 1 firms filled for 2 silos
  - Smallest 4 filled for 1 silo each
- Only 11 of the 15 firms responded – resulting in a **sample of 32** silos
- Sample to population **ratio**: 11% (Stats SA labour force survey: 0.13%).
- Data **preparation and cleaning**: outliers & gaps interpolated with industry average

Methodology: Calculating the weights

- The **average spending** per category of 32 silos used to calculate the weights.
- For each of the **three calendar** years 2018, 2019 & 2020.
- Weights was relatively **stable** from year-to-year, an indication that the sample was large enough
- **Top 16** items are 93% of the expense/weights
- Lowest 14 items lumped together as "**Other**" (7%)



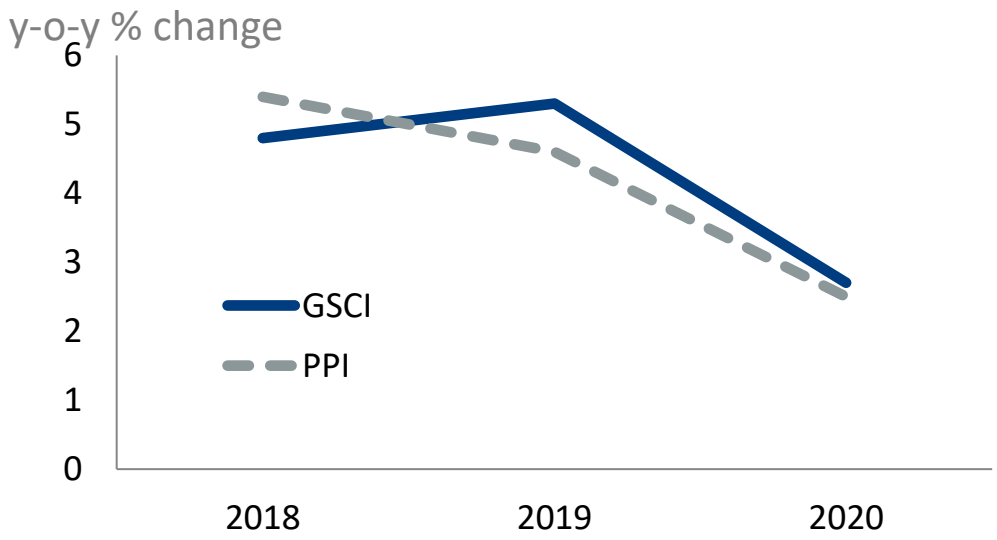
Methodology: Price indices

Expenditure category	Average Weights (2018 – 2020)	Price index	Source
Remuneration of employees	23.4%	Remuneration index	Survey
Depreciation of land & buildings	12.2%	CMPI Commercial or Industrial Buildings	Stats SA
Electricity cost	10.1%	PPI Electricity	Stats SA
Repairs & maintenance of equipment	8.2%	CPI Maintenance and repair	Stats SA
Repairs & maintenance of property (excl.equipment)	7.1%	CPI Maintenance and repair	Stats SA
Depreciation of equipment	5.3%	PPI General and special purpose mach.	Stats SA
Head office cost ascribed to this silo	4.5%	CPI for services	Stats SA
Interest paid on mortgage debt	3.9%	Interest rate index	BER calcs
Payment for use of property (rent/fee/etc.)	3.7%	CPI Owners equivalent rent	Stats SA
Pest control	3.3%	PPI Chemicals, rubber and plastic	Stats SA
Insurance of property	3.2%	CPI Insurance	Stats SA
Fuel (petrol, diesel, coal & other)	2.3%	CPI Fuel	Stats SA
Property tax	1.8%	CPI for Regulated prices	Stats SA
Security (of premises and product, excluding wages)	1.4%	CPI for services	Stats SA
Consumables (excluding pest control)	1.1%	CPI Headline	Stats SA
Depreciation of vehicles	1.0%	CPI New vehicles	Stats SA
Other	7.4%	PPI Final manufactured goods	Stats SA

Results: Grain storage cost index (GSCI)

- Price indices above were set to 100 in 2017 (as a **base year**).
- For each year, **multiply** the price index of each expenditure category with its respective weight and then sum the results.

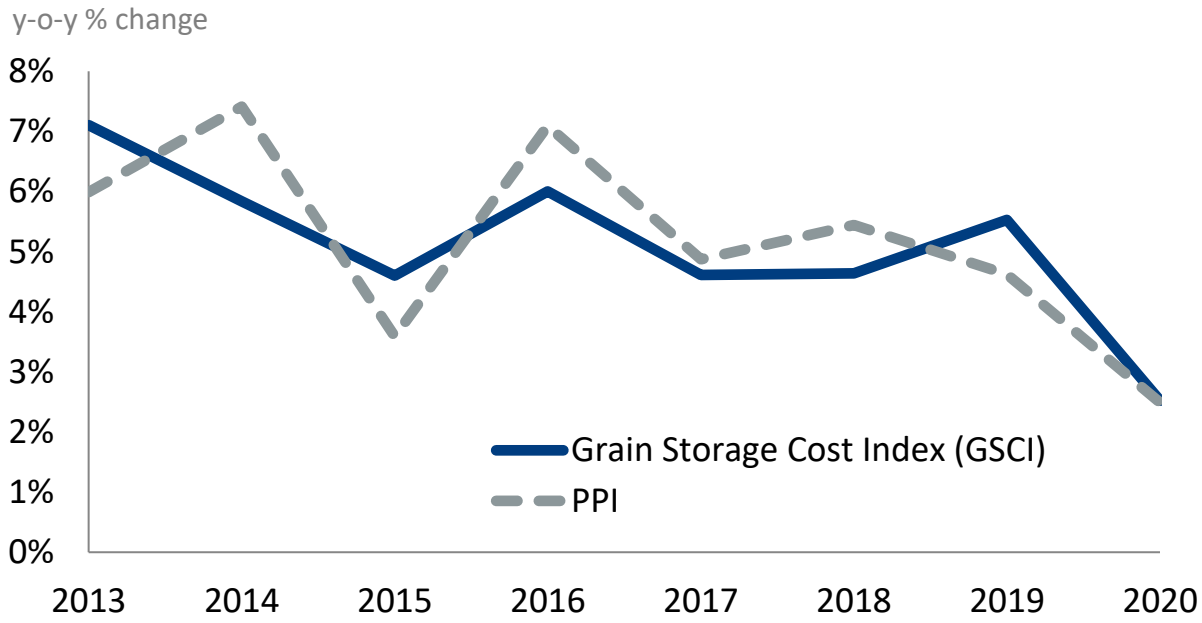
Year	GSCI	PPI
Index		
2017	100.0	100.0
2018	104.8	105.4
2019	110.4	110.3
2020	113.3	113.1
y-o-y % change		
2018	4.8%	5.4%
2019	5.3%	4.6%
2020	2.7%	2.5%



- The GSCI moves very **closely to the PPI**. In 2018, the GSCI was 0.6 percentage points (% pts) below the PPI. For 2019 and 2020, the GSCI was respectively 0.7 and 0.2% pts higher than PPI

Results: Long run comparison

- **Question**: was the close correlation coincidence?
- Can be tested for a longer period, **price trackers** go back to 2012.
- Except for the **salary index** that comes from the survey.
- Can use a **proxy** for it: from Stats SA's QES - Food, beverages and tobacco (it correlates the best with our survey index)



From 2012 to 2020:

- PPI increased by a cumulative 50%, GSCI-proxy increased by 49%.
- **Conclusion:** over the longer run, these two indices escalate at similar average rates.
- However, PPI is more **volatile**… could it introduce income volatility?

Other results: sample-average silo

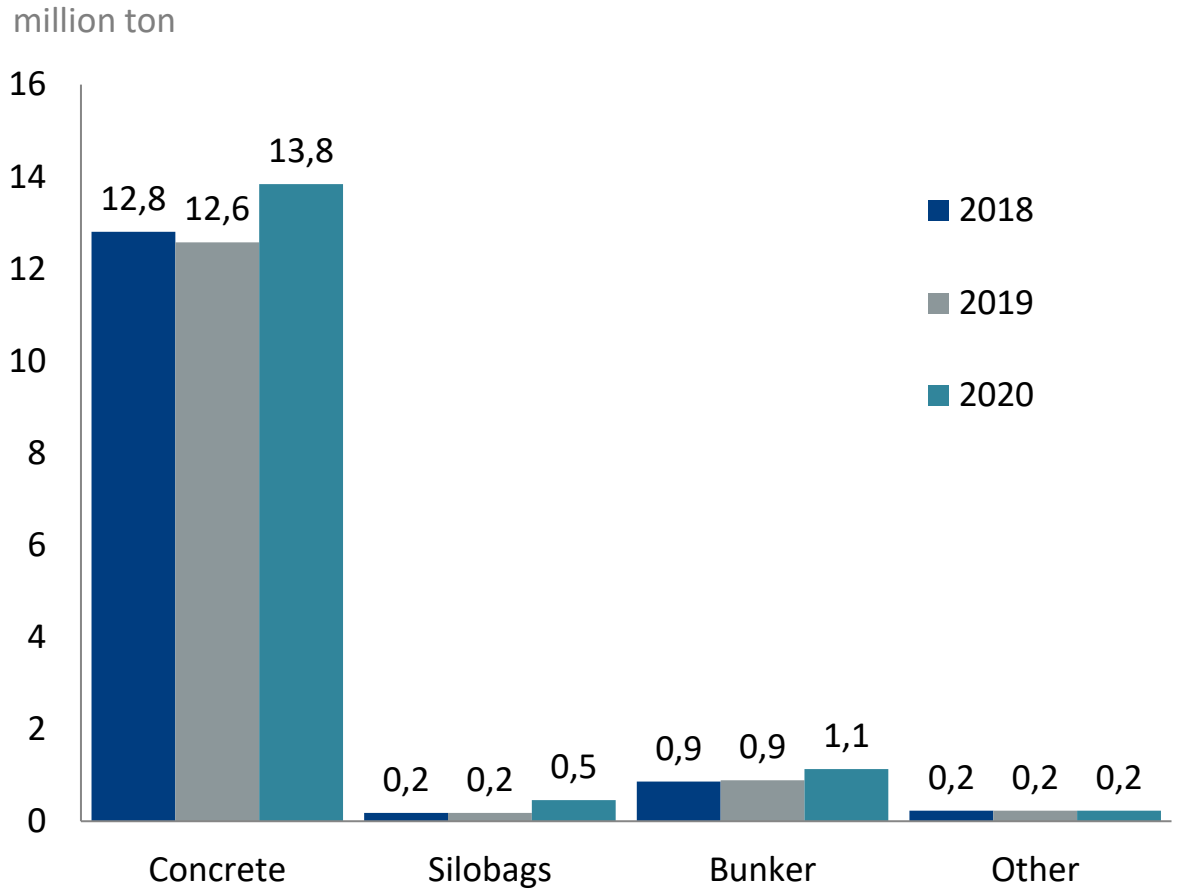
- **Employs** 14 people:
  - six work in handling grain
  - eight are involved in the storage activities.
- Constructed of **concrete**.
- A **storage capacity** of just more than 70 000 ton.
- **Valued** at about R125 million in 2021.
- **Handles** 57 to 64 thousand ton of grain in a year.
- Gross annual **income** of between R9.9 million to R11.3 million.
- Operating **expenses** ranging from R6.6 million to R7.5 million.
- **Profit** of R2.8 million to R3.7 million per year.
- **Real yield** of 2.1% to 3.0% on the value of the property.

  Below the 5-year average earnings yield on the JSE was 5.3% (2016 to 2020)

Other results: profile of silo capacity

- 10 firms reported they operate a combined **number** of 283 silos.

- Total **capacity** is 15.66 million ton
  - 88% are concrete silos
  - 7% are bunker silos
  - 3% are silo bags, and
  - 2% the rest (steel).

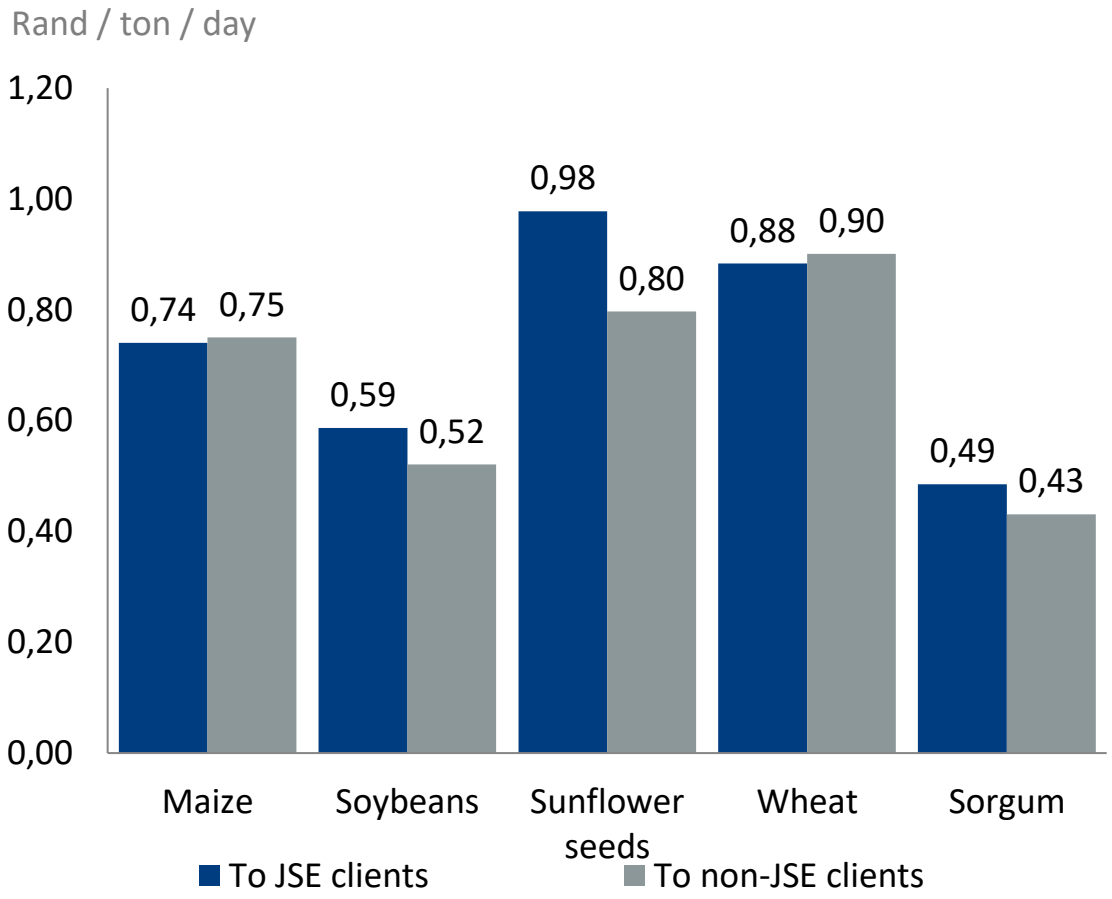


Other results: daily storage fees

- For sorgum, sunflower seeds and soybeans: **non-JSE** clients paid somewhat **less**.

This imply that:

- Adequate **competition**.
- JSE prescriptions are mostly **not** keeping **fees** artificially low.



Conclusion

- Developed a GSCI that tracks the **unit cost changes** of the resources/inputs that firms require to provide grain storage.
- The GSCI moves **very closely to the PPI** when a longer period is allowed for.
- The GSCI is less **volatile** than the PPI.