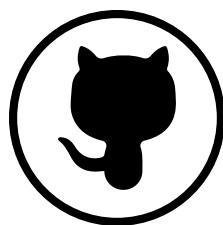


RELATION BETWEEN RICE PRICES AND GDP IN SOUTHEAST ASIA



[Link Github for Data and code](#)





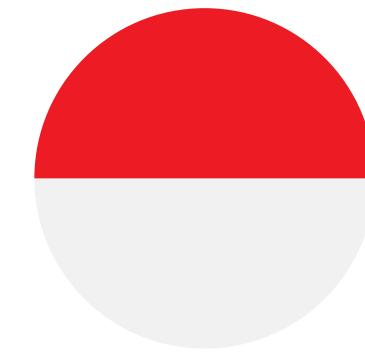
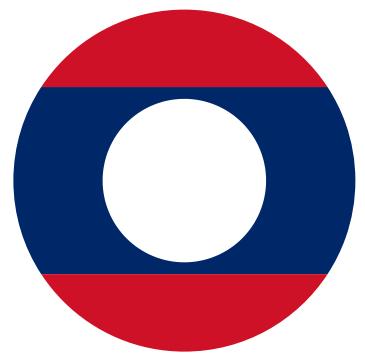
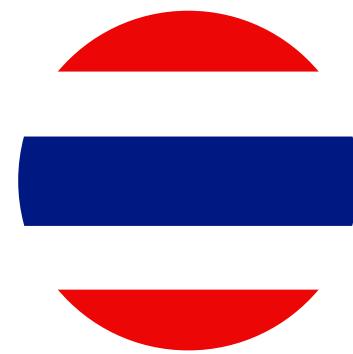
FAOSTAT



Price rice



GDP



FAQ ?



Food and Agriculture Organization of the United Nations



FAOSTAT

www.fao.org/faostat/en/#data



Food and Agriculture Organization
of the United Nations

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FAOSTAT



Data

Selected Indicators

Compare Data

Rankings

Definitions and Standards

FAQ

Search an Indicator or Commodity

Data

DOMAINS DOMAINS TABLE

▶ Production

▶ Food Security and Nutrition SDG indicators

▶ Food Balances

▶ Trade

▶ Prices

▶ Population and Employment

▶ Investment SDG indicator

▶ Macro-Economic Indicators

▶ Food Value Chain

▶ Climate Change: Agrifood systems emissions



Domain	Area	Element	Item	Year	Months	Unit	Value
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	1995	Annual value	USD	1947.2
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	1996	Annual value	USD	2099.3
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	1997	Annual value	USD	2175.4
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	1998	Annual value	USD	1828.4
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	1999	Annual value	USD	1876.1
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2000	Annual value	USD	1792.3
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2001	Annual value	USD	1758.1
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2002	Annual value	USD	1720.1
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2003	Annual value	USD	1722
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2004	Annual value	USD	1721.7
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2005	Annual value	USD	1634.2
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2006	Annual value	USD	1825.2
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2015	Annual value	USD	909.1
Producer Prices	Brunei Darussalam	Producer Price (USD/tonne)	Rice	2016	Annual value	USD	904.9

Price rice
215 Row, 8 Column

Domain	Area	Element	Item	Year	Unit	Value
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1970	million USD	224.9
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1971	million USD	248.1
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1972	million USD	340.1
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1973	million USD	544
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1974	million USD	1348.4
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1975	million USD	1467.4
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1976	million USD	1787.3
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1977	million USD	2176.3
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1978	million USD	2438.6
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1979	million USD	3521.6
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1980	million USD	6190.5
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1981	million USD	5483.9
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1982	million USD	5355.8
Macro Indicators	Brunei Darussalam	Value US\$	Gross Domestic Product	1983	million USD	4828.8

GDP
573 Row, 8 Column

GDP			
Year	Million SLC	Million USD	Change rate
2001	3548472	7633.9	0.002151320343
2002	5625255	10369.1	0.001843311992
2003	7716616	9924.9	0.001286172592
2004	9078929	10253.8	0.001129406343
2005	12286765	11930.8	0.0009710285824
2006	16852758	13851.6	0.0008219188812
2007	23336113	18232.5	0.000781299782
2008	29233288	25864.4	0.0008847584986
2009	33894039	32934.8	0.0009716988878
2010	39776764.9	41444.9	0.001041937425
2011	46307887.7	57888.5	0.001250078612
2012	51259260	61013.7	0.001190296153
2013	58011626	62139.5	0.001071155978
2014	65261890.2	66299.8	0.001015903766
2015	72714021.2	62543.5	0.000860129848
2016	78457884.7	63535.4	0.0008098026125
2017	87744489.35	64501	0.0007351002949
2018	99023727.95	69256.7	0.0006993949979
2019	109014112.7	71802.2	0.0006586505015
2020	110487724.3	79969.7	0.0007237880996

Price rice			
Year	SLC / tonne	Change rate	USD / tonne
2001	74286	0.002151320343	159.812983
2002	103042	0.001843311992	189.9385543
2003	95709	0.001286172592	123.0982926
2004	91540	0.001129406343	103.3858566
2005	110231	0.0009710285824	107.0374517
2006	173854	0.0008219188812	142.8938852
2007	179964	0.000781299782	140.605834
2008	174932	0.0008847584986	154.7725737
2009	179797	0.0009716988878	174.7085449
2010	195540	0.001041937425	203.7404441
2011	182609	0.001250078612	228.2756053
2012	177739	0.001190296153	211.562048
2013	206421	0.001071155978	221.1090882
2014	455350	0.001015903766	462.5917796
2015	548450	0.000860129848	471.7382151
2016	544550	0.0008098026125	440.9780126
2017	587500	0.0007351002949	431.8714233
2018	475000	0.0006993949979	332.212624
2019	520000	0.0006586505015	342.4982608
2020	700000	0.0007237880996	506.6516697

Price rice & GDP

215 Row, 4 Column

Area	Year	rice price	GDP
Indonesia	1991	161.9	149934.1
Philippines	1991	173.6	51784.1
Thailand	1991	160.2	101246.7
Cambodia	1992	86.8	2393.7
Indonesia	1992	162.4	162740
Philippines	1992	188.9	60422.3
Thailand	1992	150.5	115577.3
Cambodia	1993	130.2	2433.9
Indonesia	1993	147.3	184838.7
Philippines	1993	199.1	62036.5
Thailand	1993	127	128889.3
Cambodia	1994	149.3	2676.2
Indonesia	1994	180.9	206931.7
Philippines	1994	223.3	73159.3

Area : 10 country

Year : 1991 – 2022

Rice price (Unit : USD / tonne)

GDP (Unit : million USD)

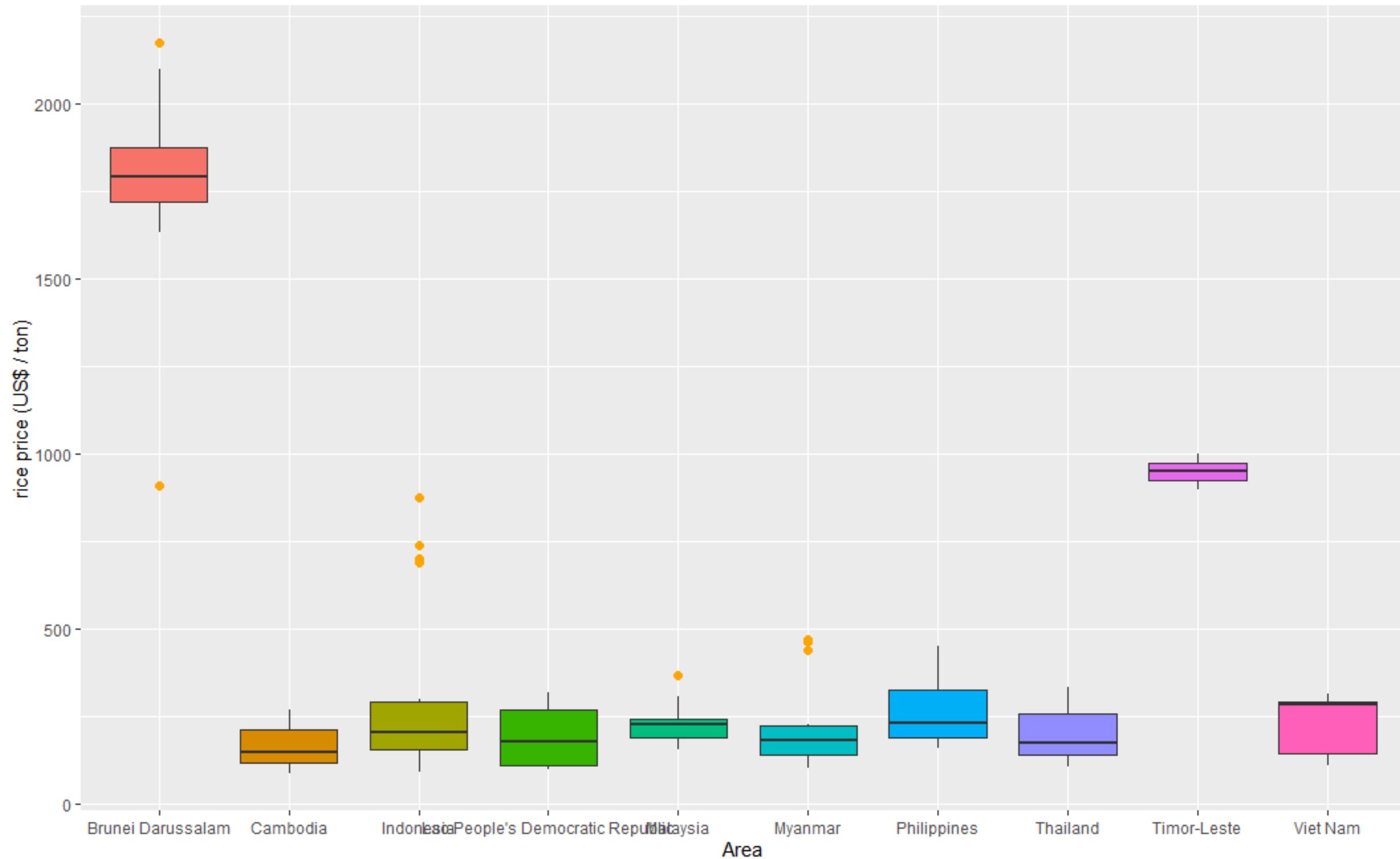
Outlier (z - score)

Area	Year	rice_pric	GDP	z	Yz
Timor-Leste	2021	1457.4	3622	3.06979869	-0.931
Timor-Leste	2020	1490	2162.6	3.16466437	-0.936
Brunei Darussalam	2006	1825.2	12709.9	4.14009307	-0.899
Brunei Darussalam	2005	1634.2	10561.3	3.58428495	-0.907
Brunei Darussalam	2004	1721.7	8722.8	3.83890909	-0.913
Brunei Darussalam	2003	1722	7265.9	3.83978209	-0.918
Brunei Darussalam	2002	1720.1	6474.7	3.83425311	-0.921
Brunei Darussalam	2001	1758.1	6206.2	3.94483273	-0.922
Brunei Darussalam	2000	1792.3	6649.7	4.0443544	-0.921
Brunei Darussalam	1999	1876.1	5096.5	4.28821157	-0.926
Brunei Darussalam	1998	1828.4	4487.5	4.14940504	-0.928
Brunei Darussalam	1997	2175.4	5758.1	5.15917163	-0.924
Brunei Darussalam	1996	2099.3	5668.2	4.93772138	-0.924
Brunei Darussalam	1995	1947.2	5245.4	4.49511187	-0.926

Area	Year	rice_pric	GDP	z	Yz
Indonesia	2022	349.7	1319100.2	-0.15359742	3.755
Indonesia	2021	334.6	1186505.5	-0.19753827	3.283
Indonesia	2019	371	1119099.9	-0.09161463	3.043

Box plot (Rice price)

rice price and Area

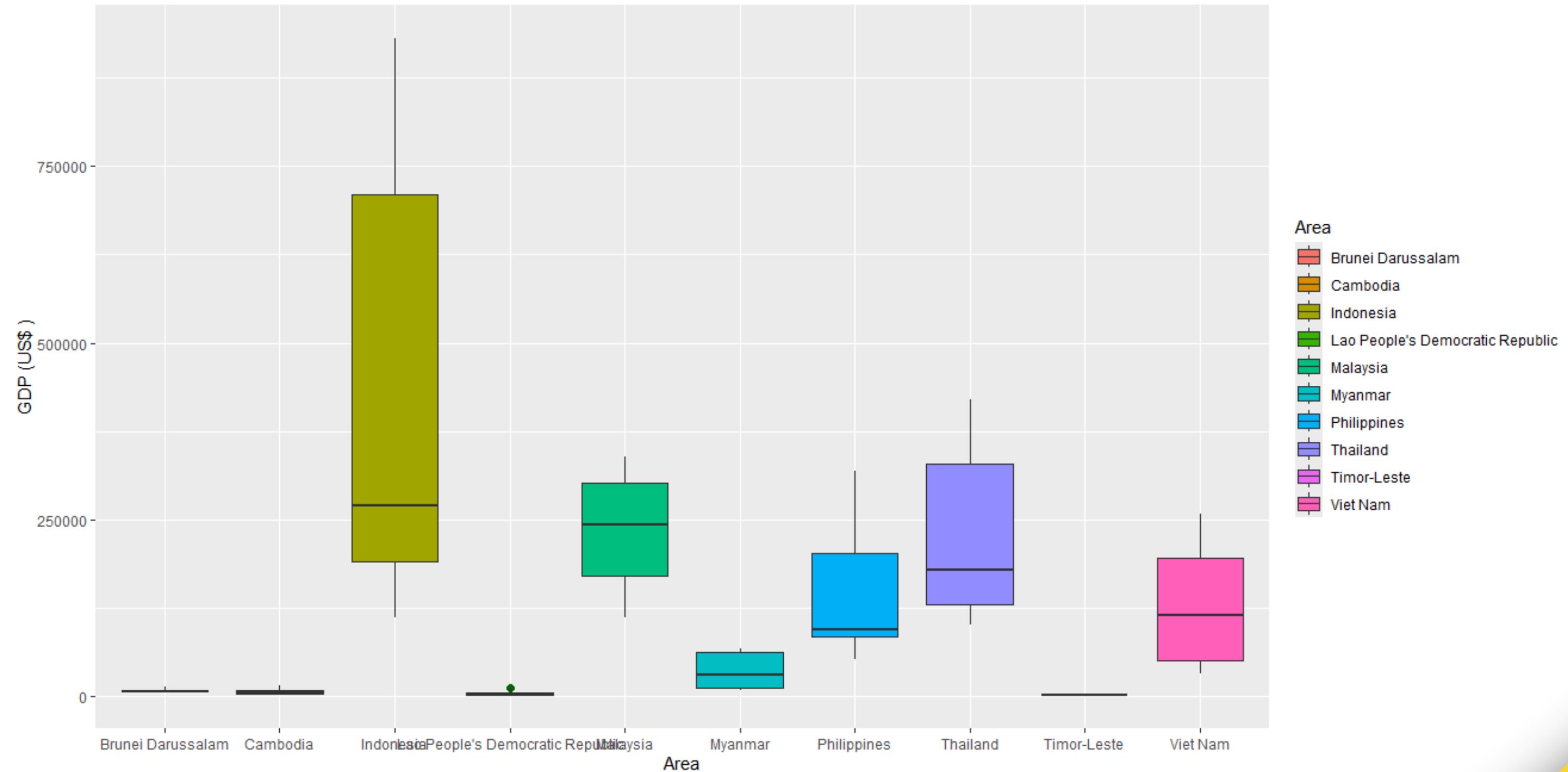


Area

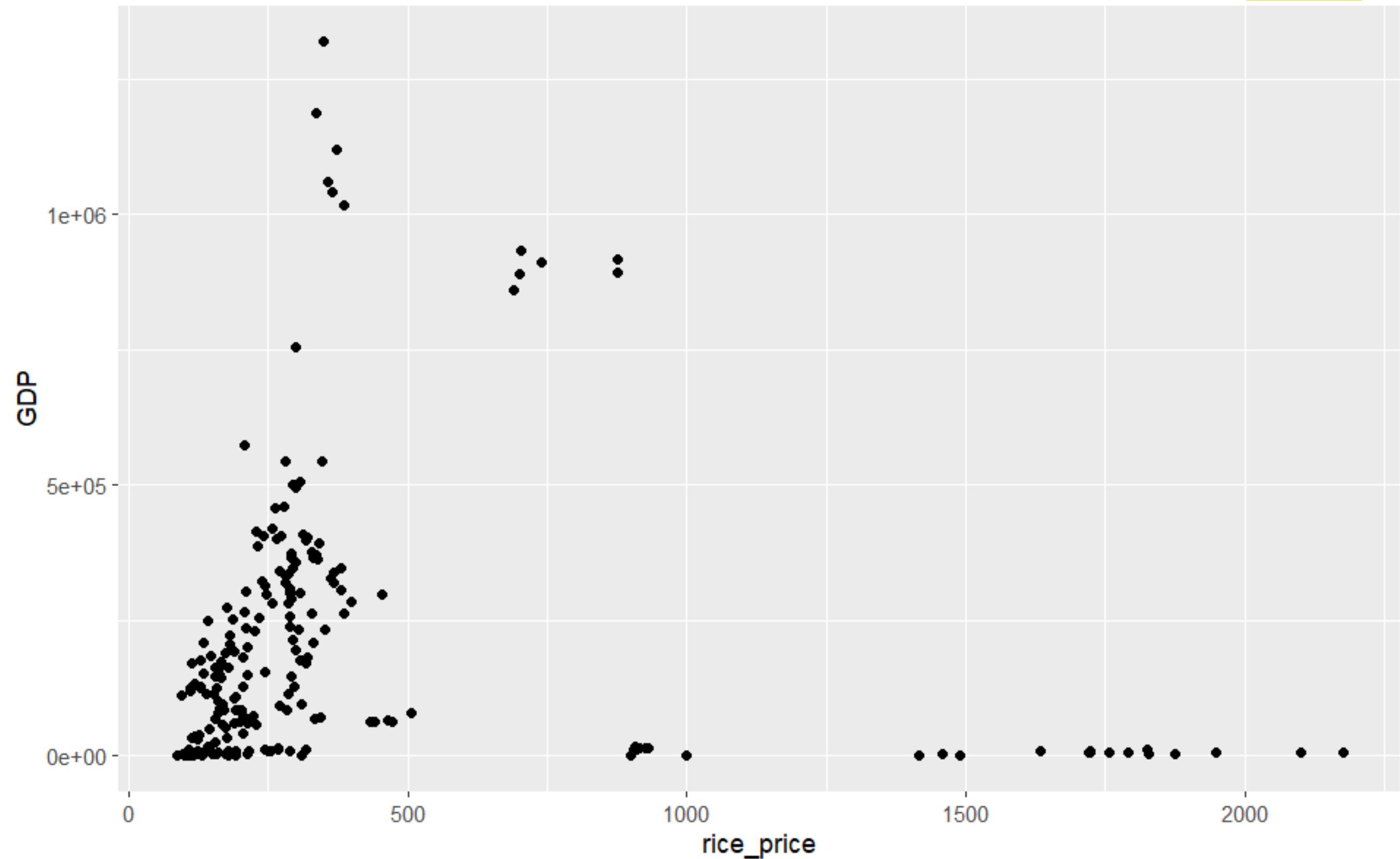
- Brunei Darussalam
- Cambodia
- Indonesia
- Lao People's Democratic Republic
- Malaysia
- Myanmar
- Philippines
- Thailand
- Timor-Leste
- Viet Nam

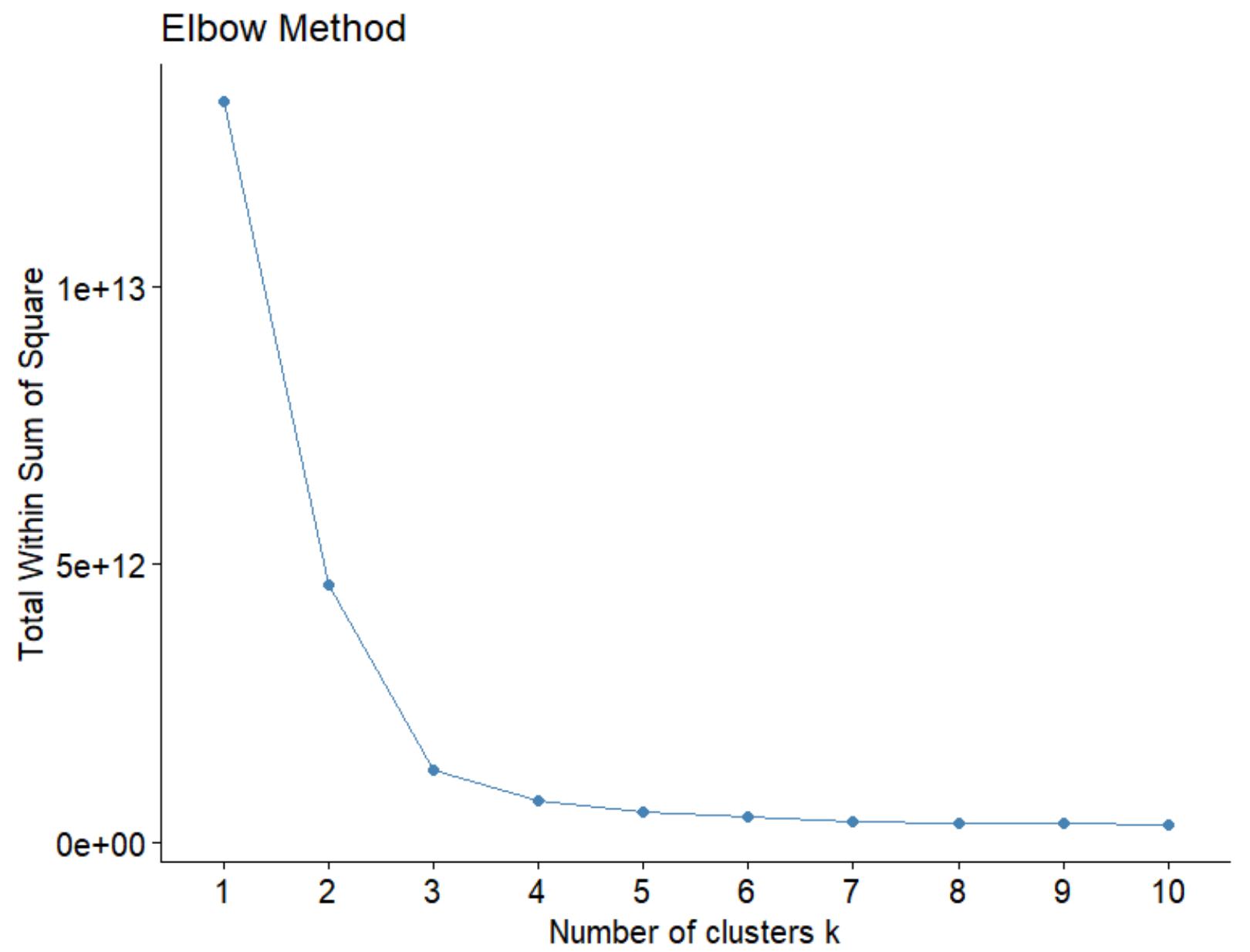
Box plot (GDP)

GDP and Area

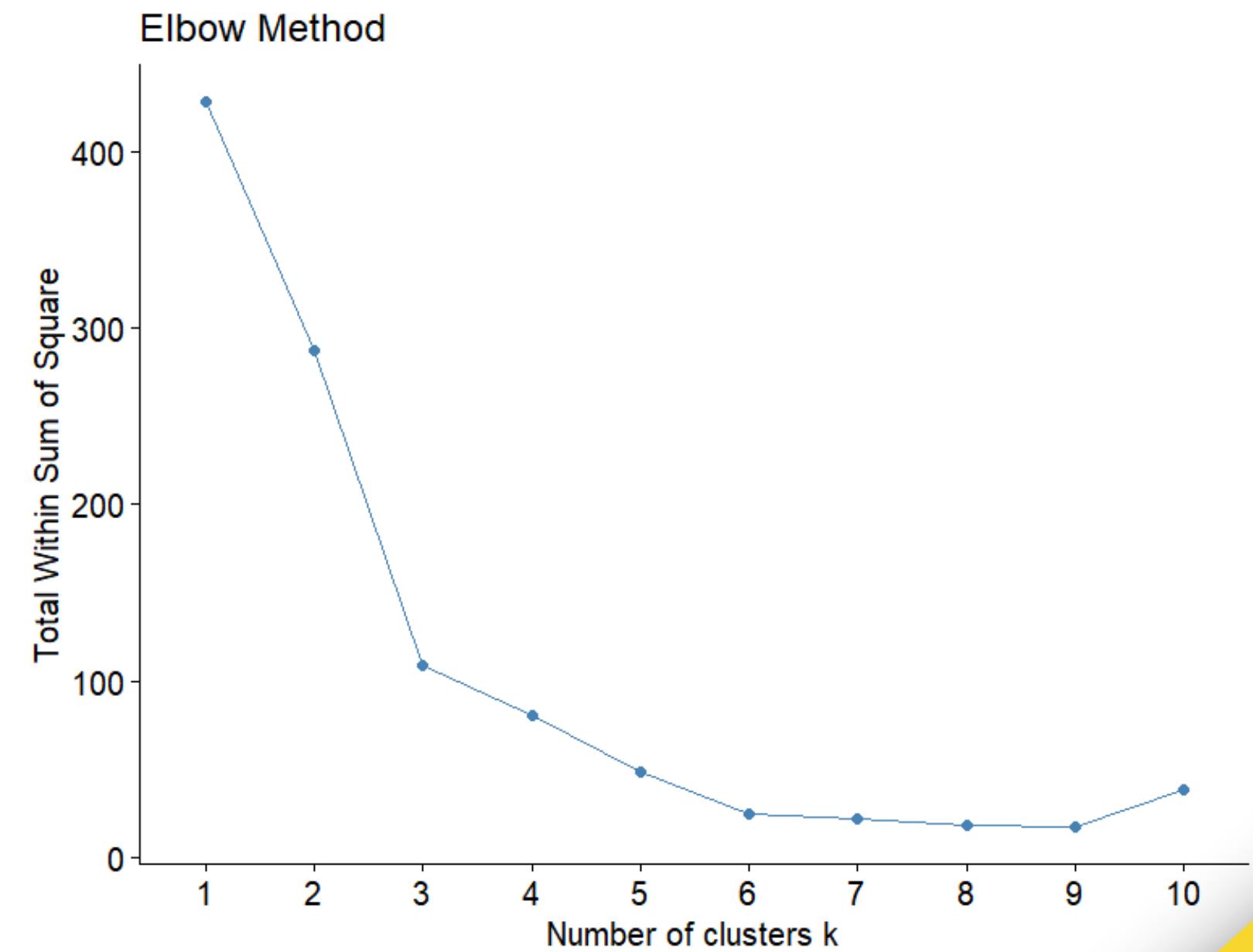


Scatter plot

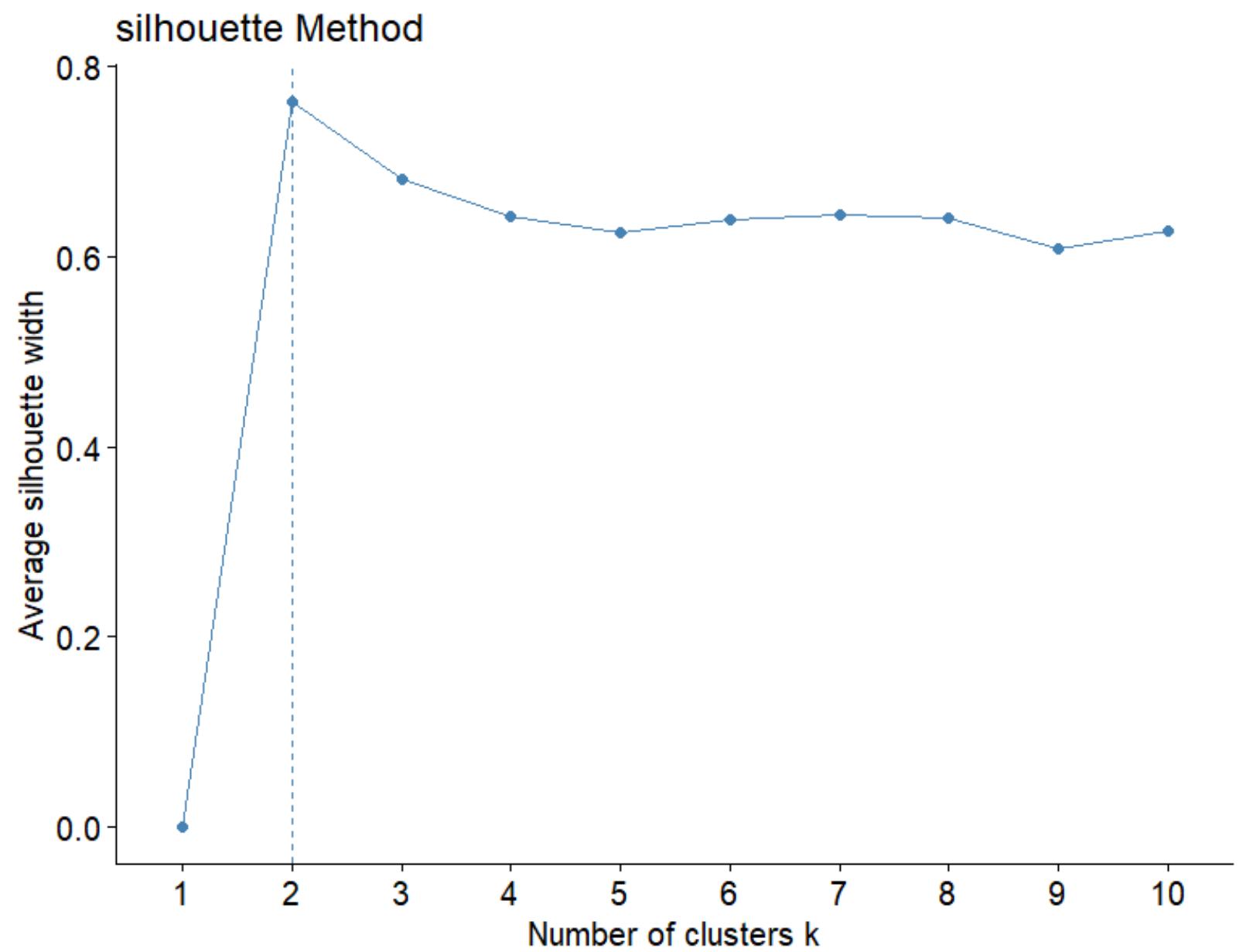




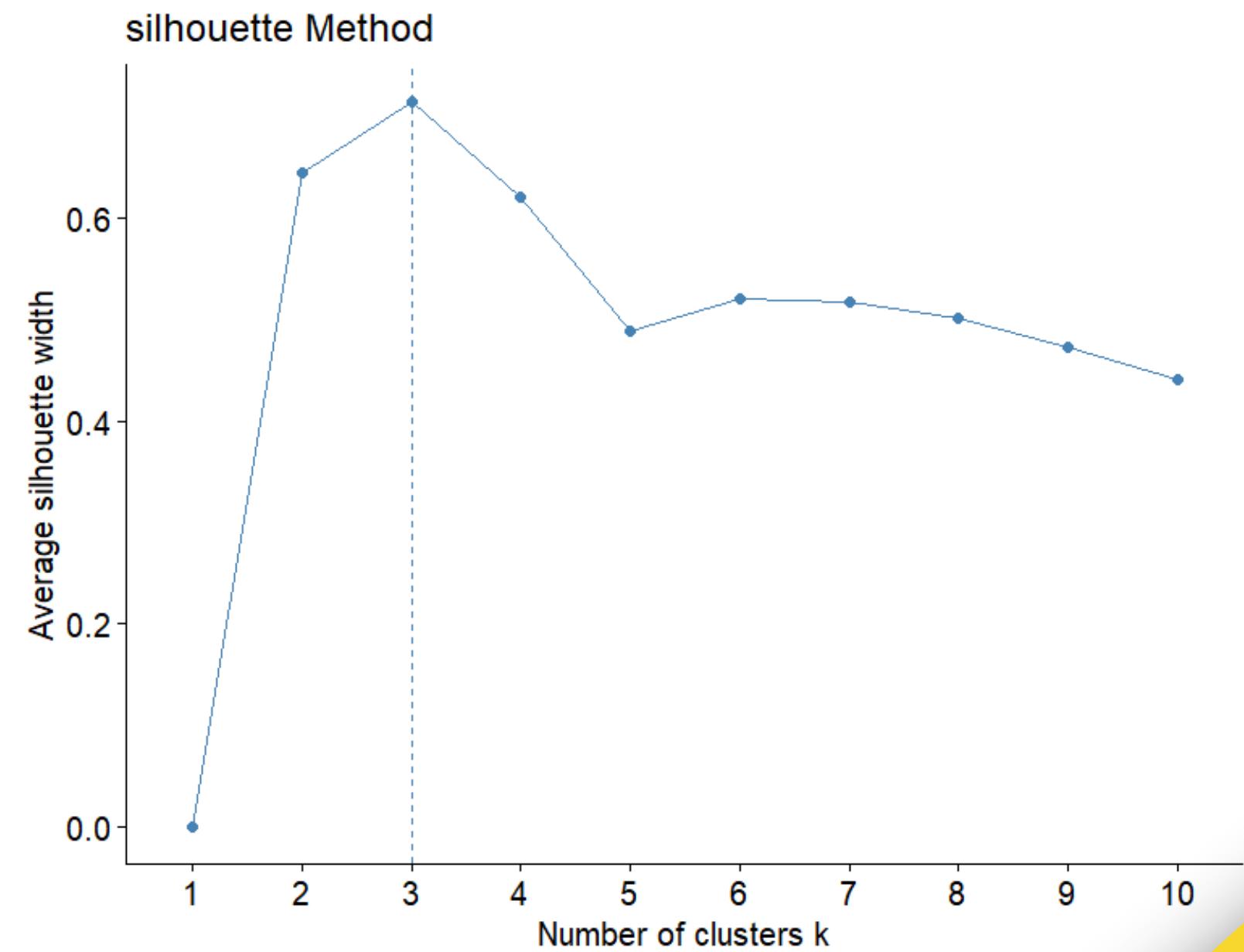
Non - Scaling Data



Scaling Data



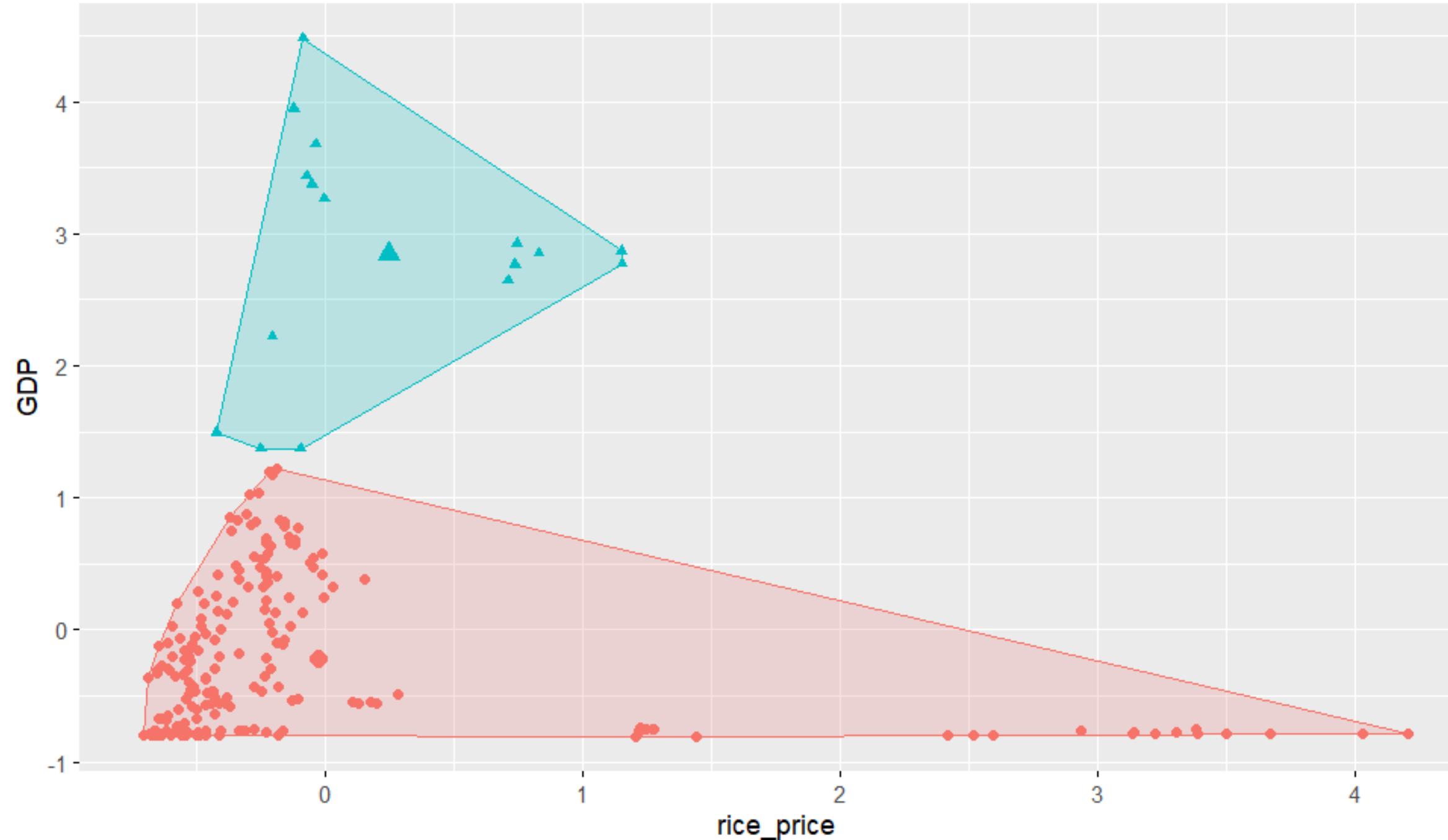
Non - Scaling Data



Scaling Data

Non - Scaling Data

K-mean Clustering Results



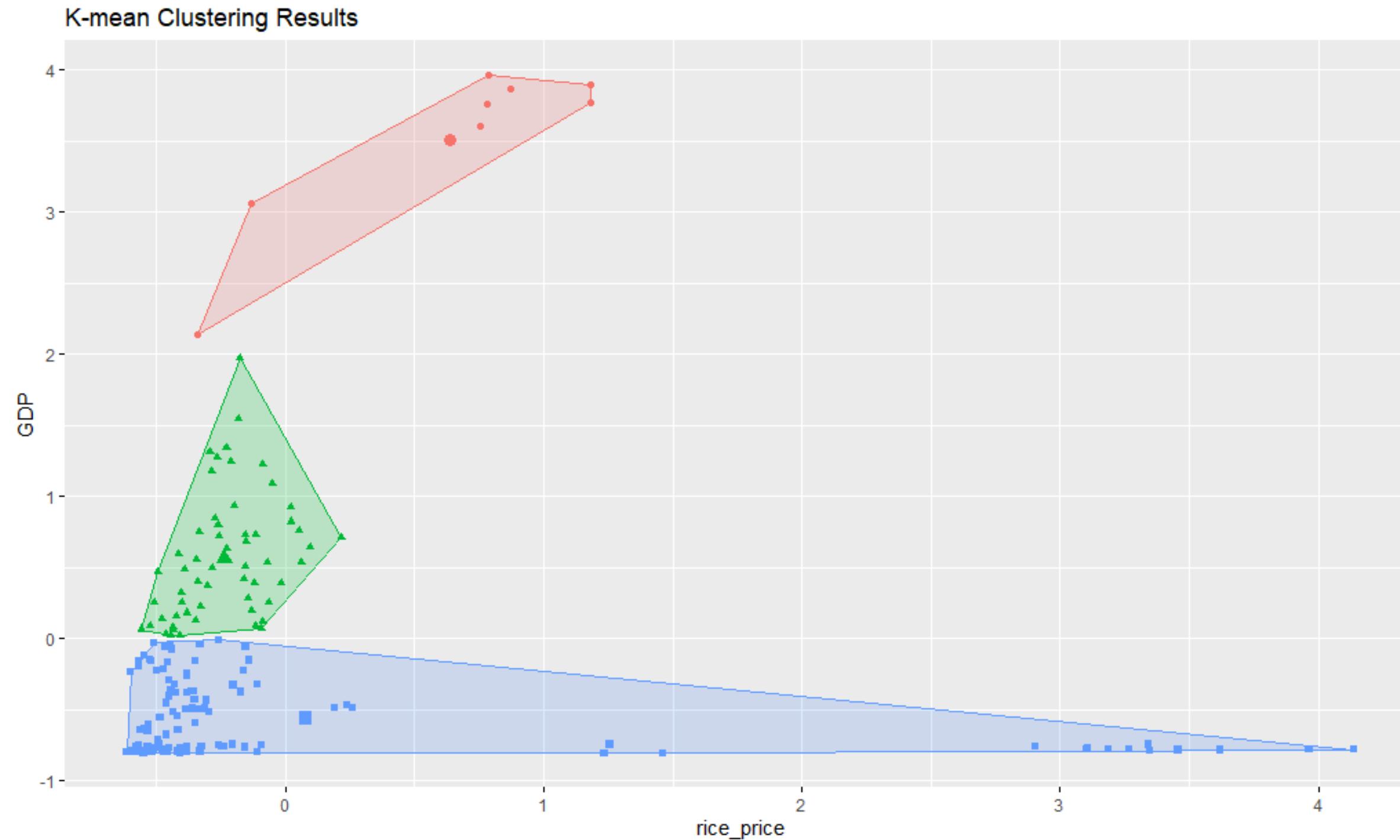
K = 2

Dunn Index: 0.0470

Sillhouette Score: 0.7631

**Calinski-Harabasz Index
: 399.5372**

Non - Scaling Data $K = 3$



$K = 3$

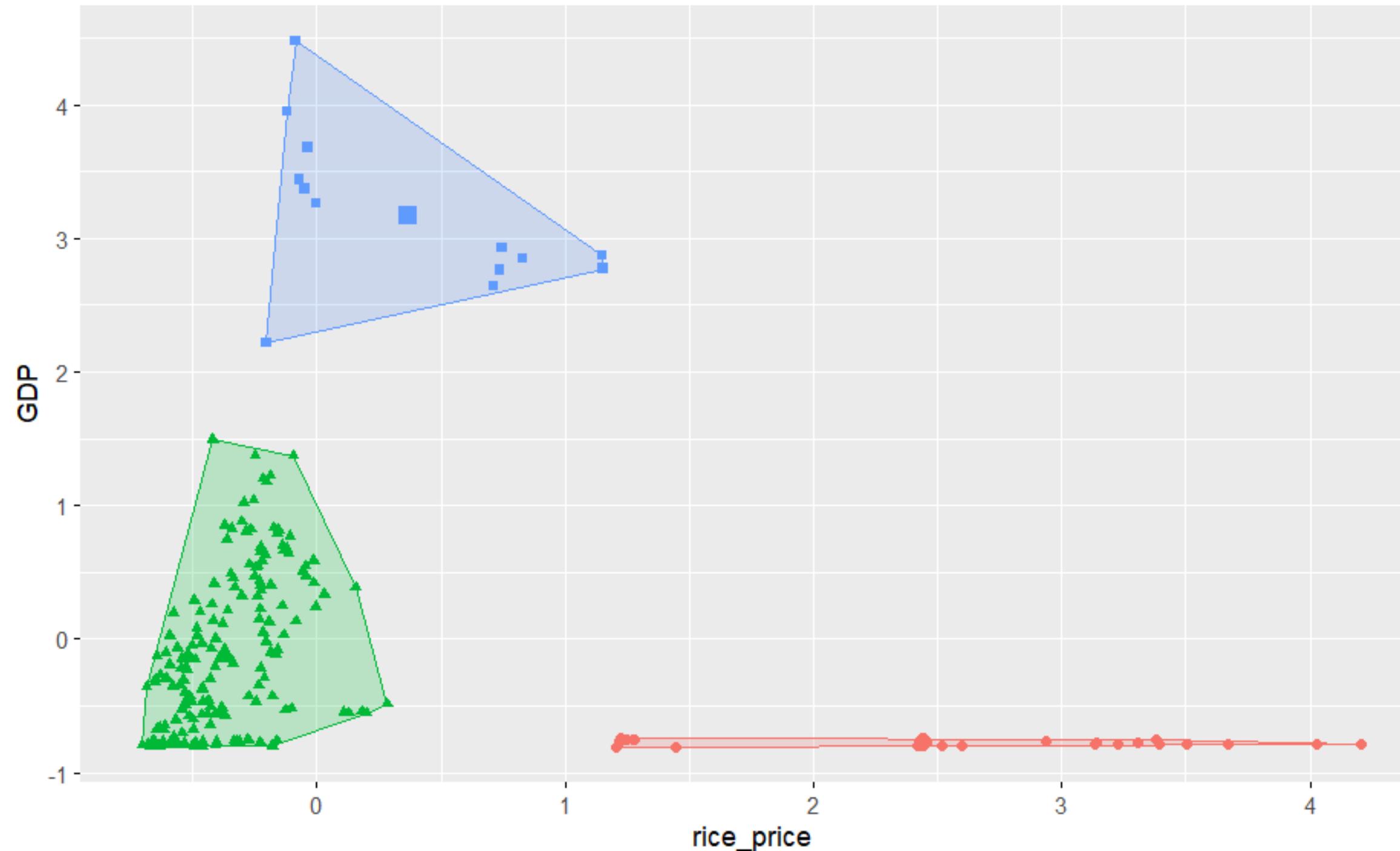
Dunn Index: 0.0176

Sillhouette Score: 0.6488

Calinski-Harabasz Index
: 617.8356

Scaling Data K = 3

K-mean Clustering Results

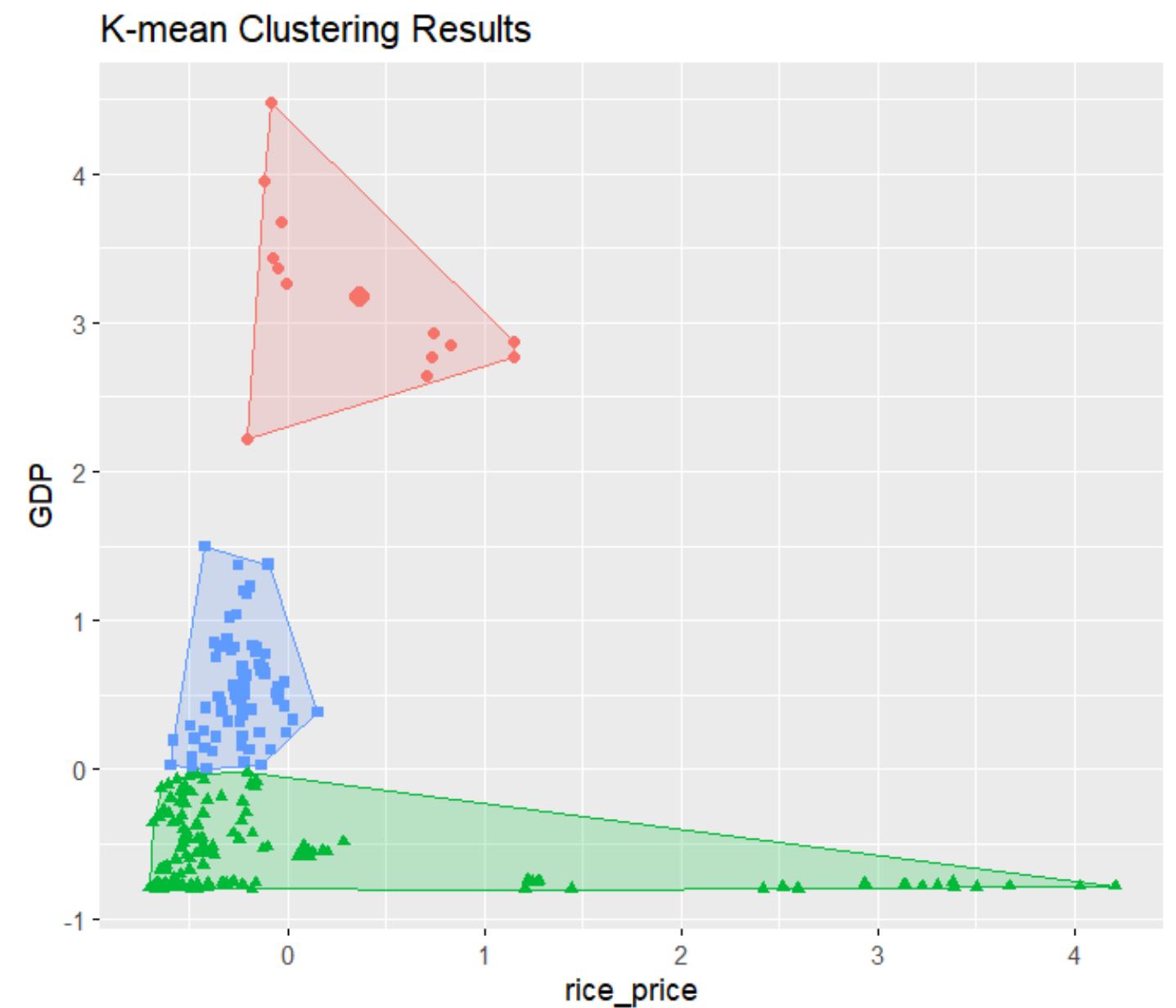


K = 3

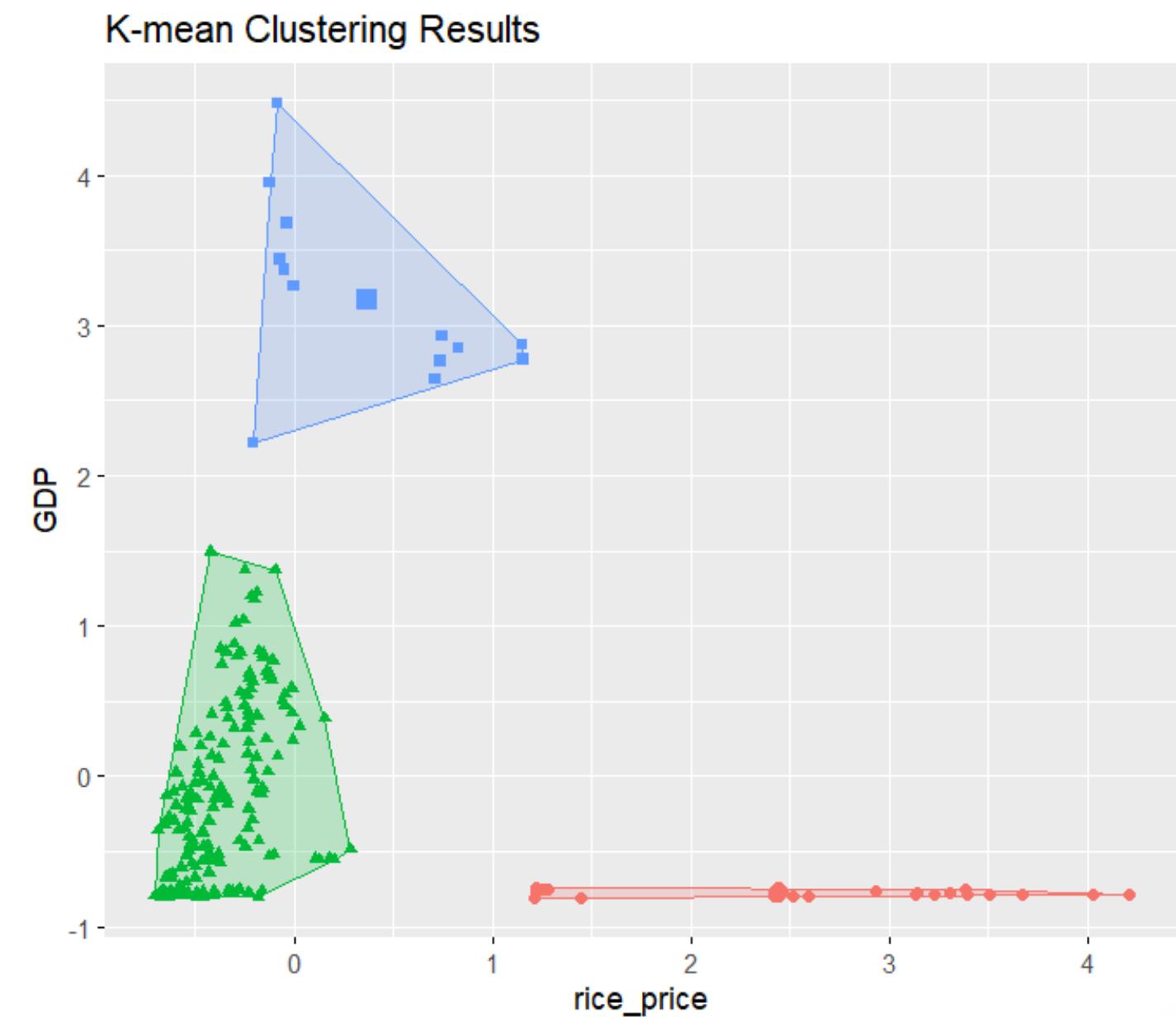
Dunn Index: 0.0786

Sillhouette Score: 0.7480

**Calinski-Harabasz Index
: 285.1254**



Non - Scaling Data



Scaling Data

	Non - Scaling Data			Scaling Data		
	K = 2	K = 3	K = 4	K = 2	K = 3	K = 4
Dunn Index:	0.0470	0.0176	0.0109	0.1833	0.0786	0.0198
Sillhouette Score:	0.7631	0.6488	0.6429	0.6485	0.7480	0.5855
Calinski-Harabasz Index:	399.5372	617.8356	1158.773	163.9526	285.1254	468.2562

Scaling ?

Scaling (Standardization)

ปรับข้อมูลทุกตัวแพรอยู่ในมาตราส่วนเดียวกัน โดยการแปลงข้อมูลให้มีค่าเฉลี่ยเป็น 0 และส่วนเบี่ยงเบนมาตรฐานเป็น 1



Advantages

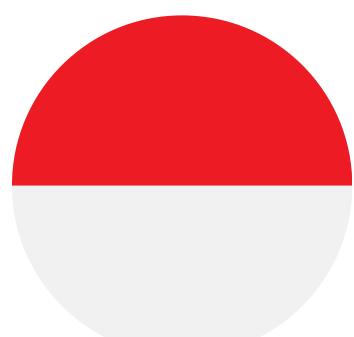
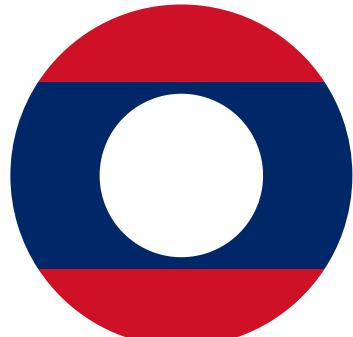
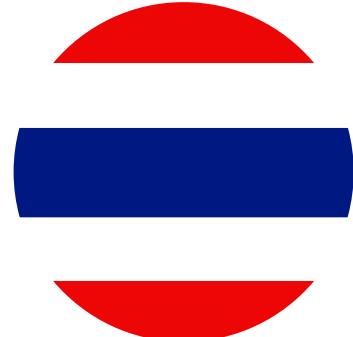
- ลดเวลาในการฝึกโมเดล
- เพิ่มความแม่นยำของโมเดล
- ป้องกันปัญหาตัวแปรโดดเด่น
- ตีความผลลัพธ์ได้ง่ายขึ้น

When ?

- ข้อมูลมีหน่วยวัดที่แตกต่างกัน เช่น ราคาข้าว (บาท) และ GDP (ล้านบาท)
- ช่วงของค่าข้อมูลแตกต่างกันมาก: เช่น ค่าหนึ่งมีช่วง 0-100 อีกค่าหนึ่งมีช่วง 0-10,000
- ใช้อัลกอริทึมที่ไม่ต่อมาตราส่วนของข้อมูล : เช่น K-means, SVM, Neural Networks



Group 1

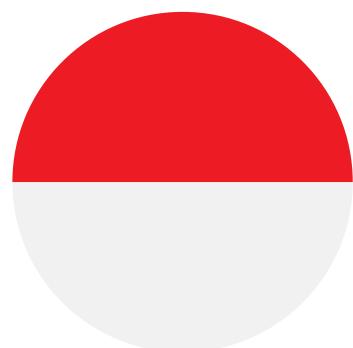


1991 – 2009

Group 2



Group 3



2010 – 2022

Clustering



Group 1



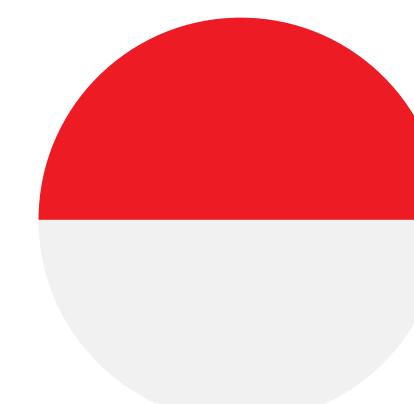
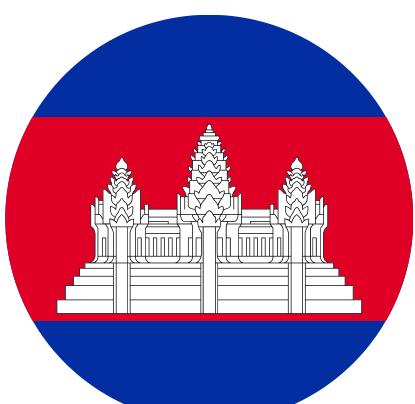
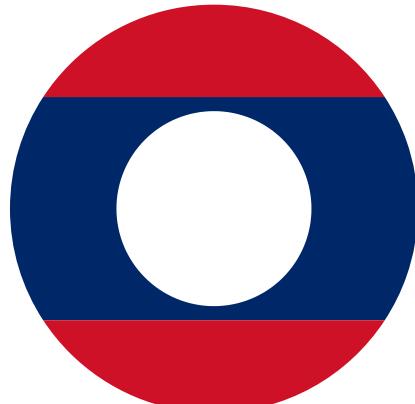
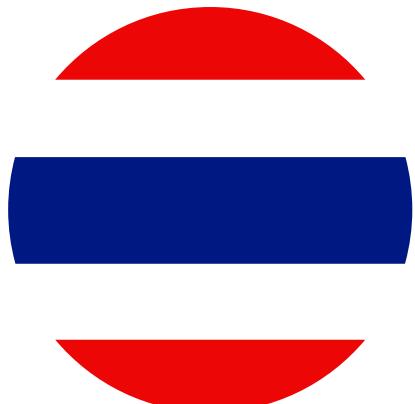
Group 2



Group 3



Group 1



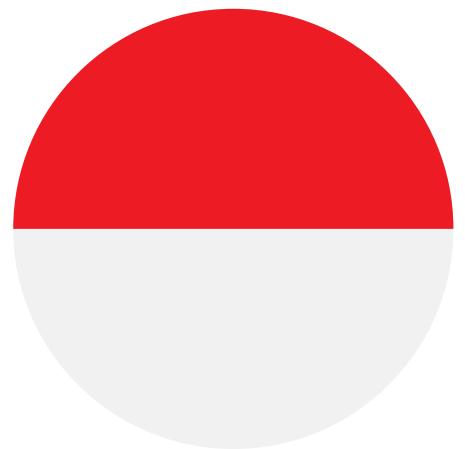
1991 – 2009



Group 2



Group 3



2010 – 2022



Thank You!

For Your Attention

