THE FUTURE OF MALAYSIA'S AGRICULTURE SECTOR BY 2030

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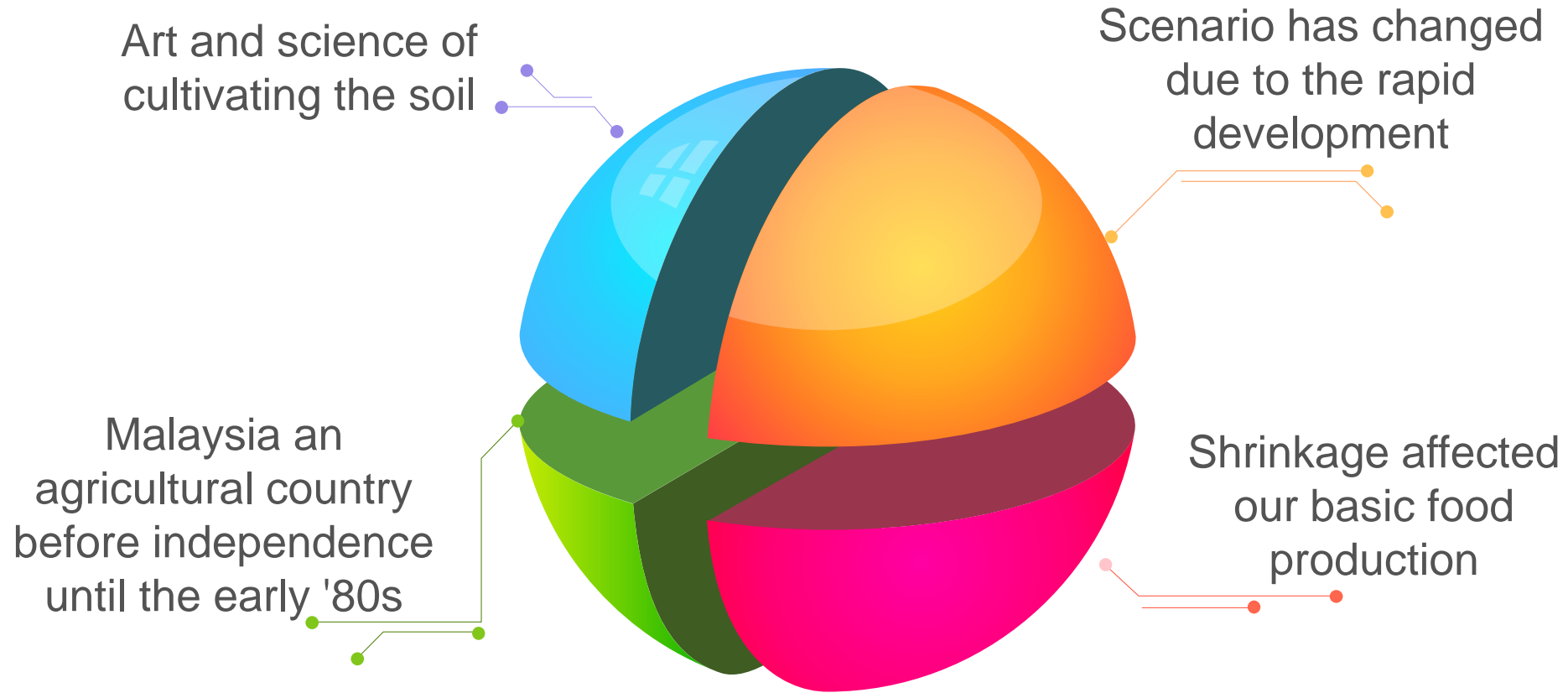Department of Mathematics and Statistics, School of Quantitative Sciences, Universiti Utara Malaysia
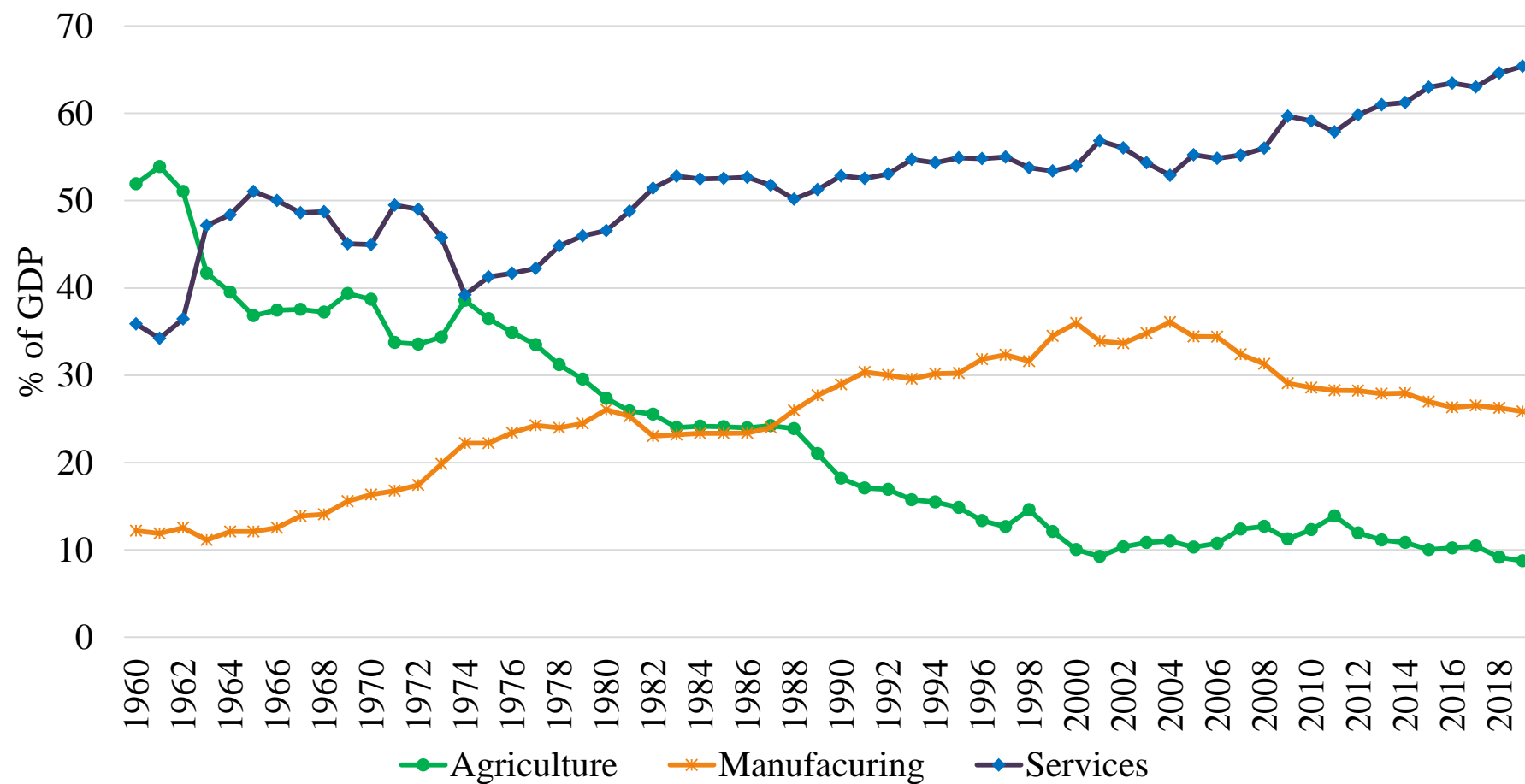
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CONTENTS

THE FUTURE OF MALAYSIA'S AGRICULTURE SECTOR BY 2030

Introduction

Art and science of cultivating the soil

Scenario has changed due to the rapid development

Malaysia an agricultural country before independence until the early '80s

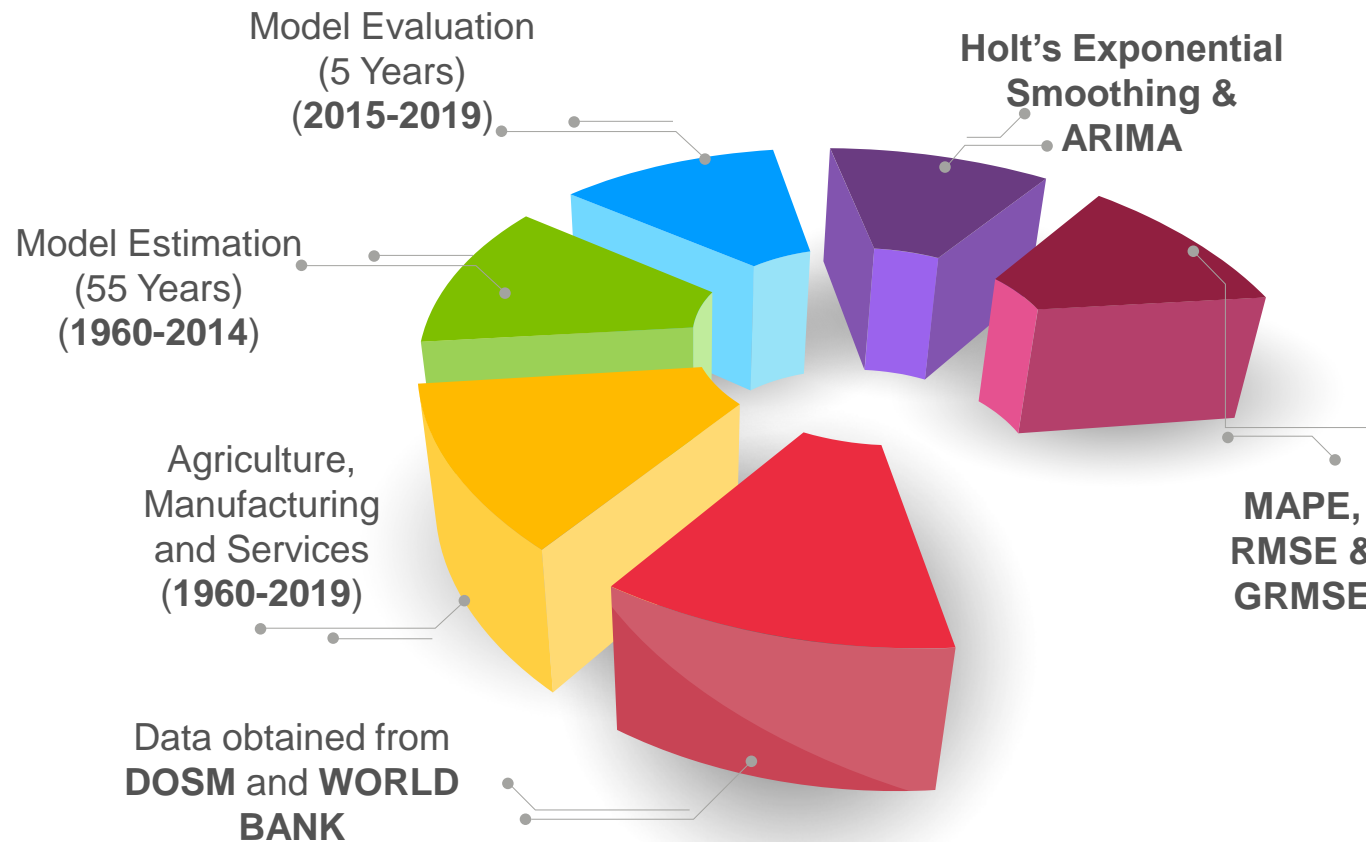Shrinkage affected our basic food production

Introduction

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Objectives

Forecast the agriculture sector by 2030 compared it to the manufacturing and services sectors

Methodology

Model Evaluation (5 Years) (**2015-2019**)

Holt's Exponential Smoothing & ARIMA

Model Estimation (55 Years) (**1960-2014**)

Agriculture, Manufacturing and Services (**1960-2019**)

MAPE, RMSE & GRMSE

Data obtained from **DOSM** and **WORLD BANK**

Forecasting Techniques

Holt's Exponential Smoothing

Smoothens the trend and the slope

A

$$S_t = \alpha y_t + (1-\alpha)\,(S_{t-1} + T_{t-1}) \quad 0 \le \alpha \le 1$$
$$T_t = \beta(S_t - S_{t-1}) + (1-\beta)T_{t-1} \quad 0 \le \beta \le 1$$
$$F_{t+m} = S_t + T_t \times m$$

ARIMA

Describe the autocorrelations in data

B

$$y'_t = c + \emptyset_1 y'_{t-1} + \cdots + \emptyset_p y'_{t-p} - \emptyset_1 \varepsilon_{t-1} - \emptyset_q \varepsilon_{t-q} + \varepsilon_t$$

Error Measurement

MAPE

Comparisons for different time intervals

$$\sum_{t=1}^{n} \frac{| \left(\frac{e}{y}\right) * 100}{n}$$

RMSE

Gives equal weights to all errors

$$\sqrt{\frac{\sum_{t}^{n} e_{t+1}^2}{n}}$$

GRMSE

Overcome existence of an outlier

$$\prod_{t}^{n} e_{itM^2}^2 \Bigg)^{\frac{1}{2n}}$$
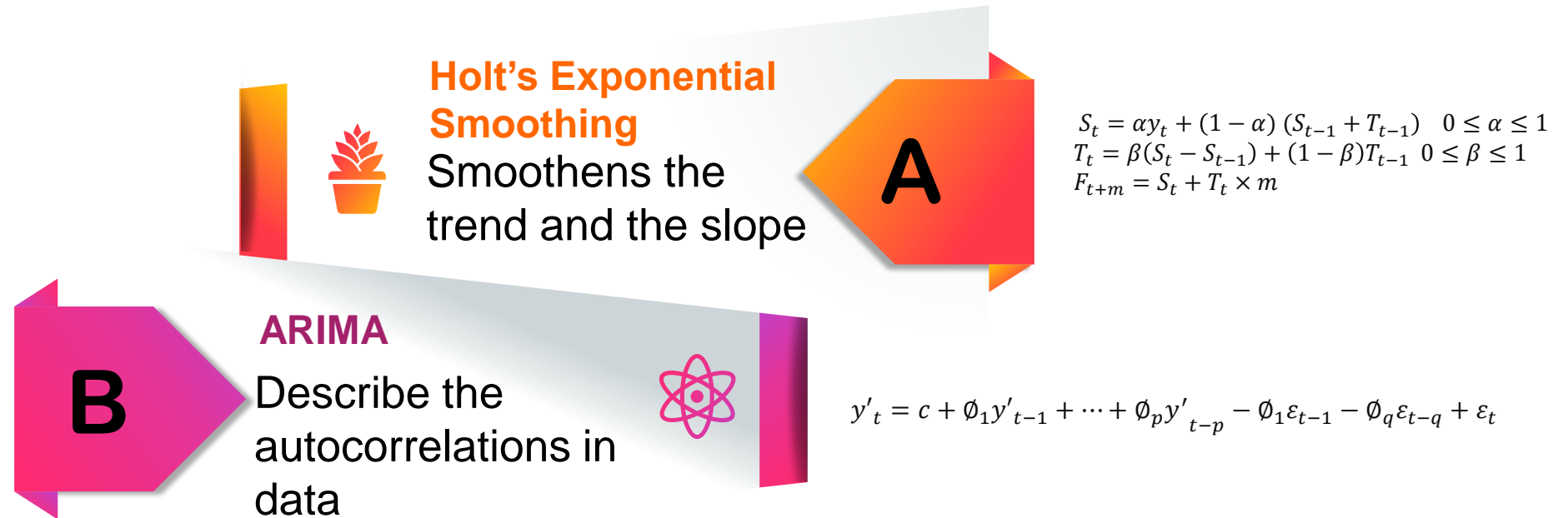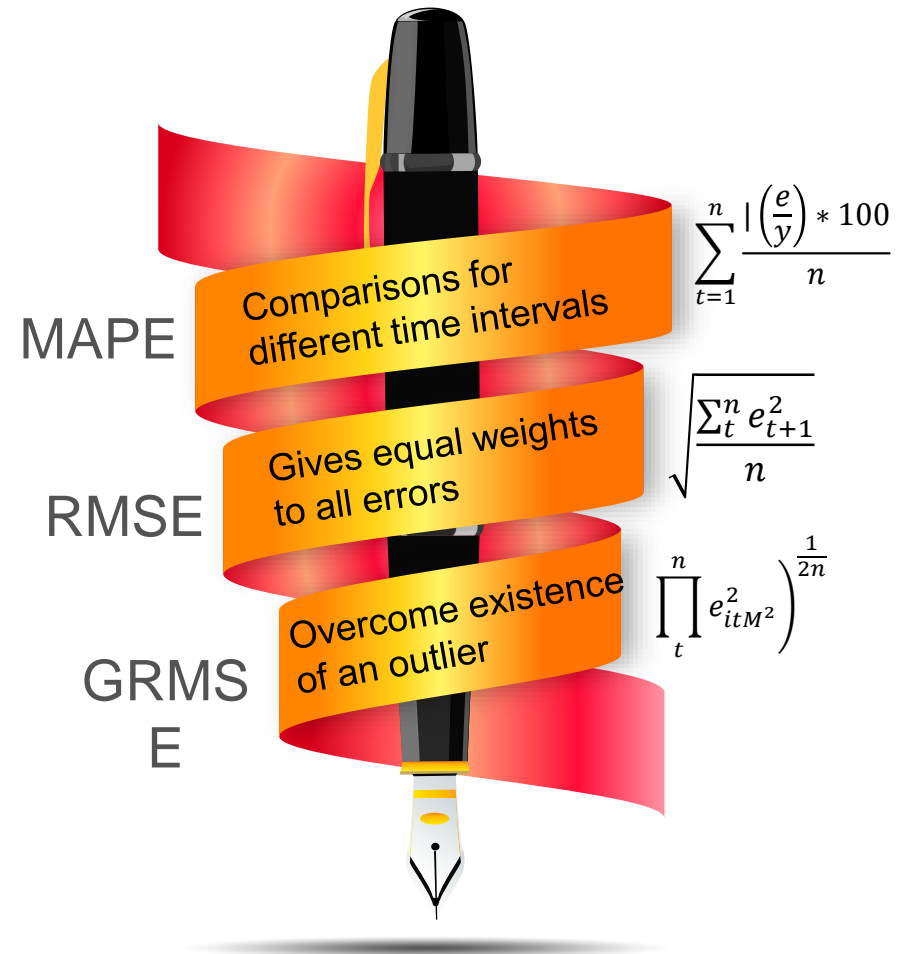
Results

Sector	Agriculture		Manufacturing		Services	
Techniques	Holt's ES	ARIMA	Holt's ES	ARIMA	Holt's ES	ARIMA
RMSE	0.4832(1)	0.5314(2)	1.0924(1)	3.1572(2)	1.1812(2)	0.7161(1)
GRMSE	0.2470(1)	0.3736(2)	1.0524(1)	2.7823(2)	0.9165(2)	0.6196(1)
MAPE	4.5472(1)	5.0637(2)	4.0753(1)	11.3562(2)	1.7032(2)	1.0508(1)

Results

Sector	FORECAST										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Agriculture	8.49	**8.24**	7.99	7.75	7.51	7.28	7.05	6.83	6.61	6.40	**6.20**
Manufacturing	25.55	25.25	24.95	24.66	24.38	24.09	23.82	23.55	23.29	23.04	22.79
Services	65.95	66.51	67.06	67.59	68.11	68.63	69.13	69.62	70.09	70.56	71.01

Discussions

Factors of Shrinkage

- Labor Shortages
- Increment of cost production
- Low productivity and quality
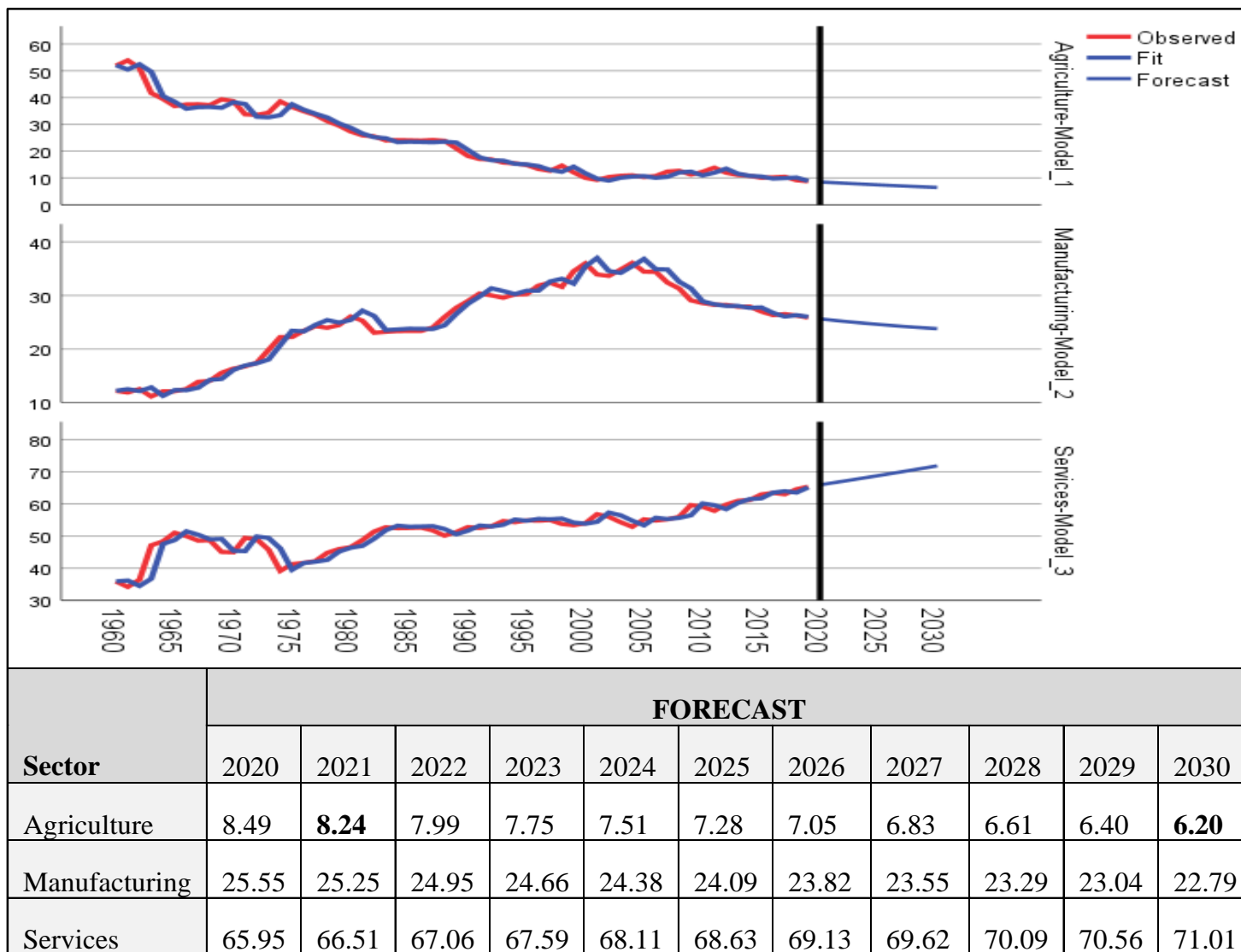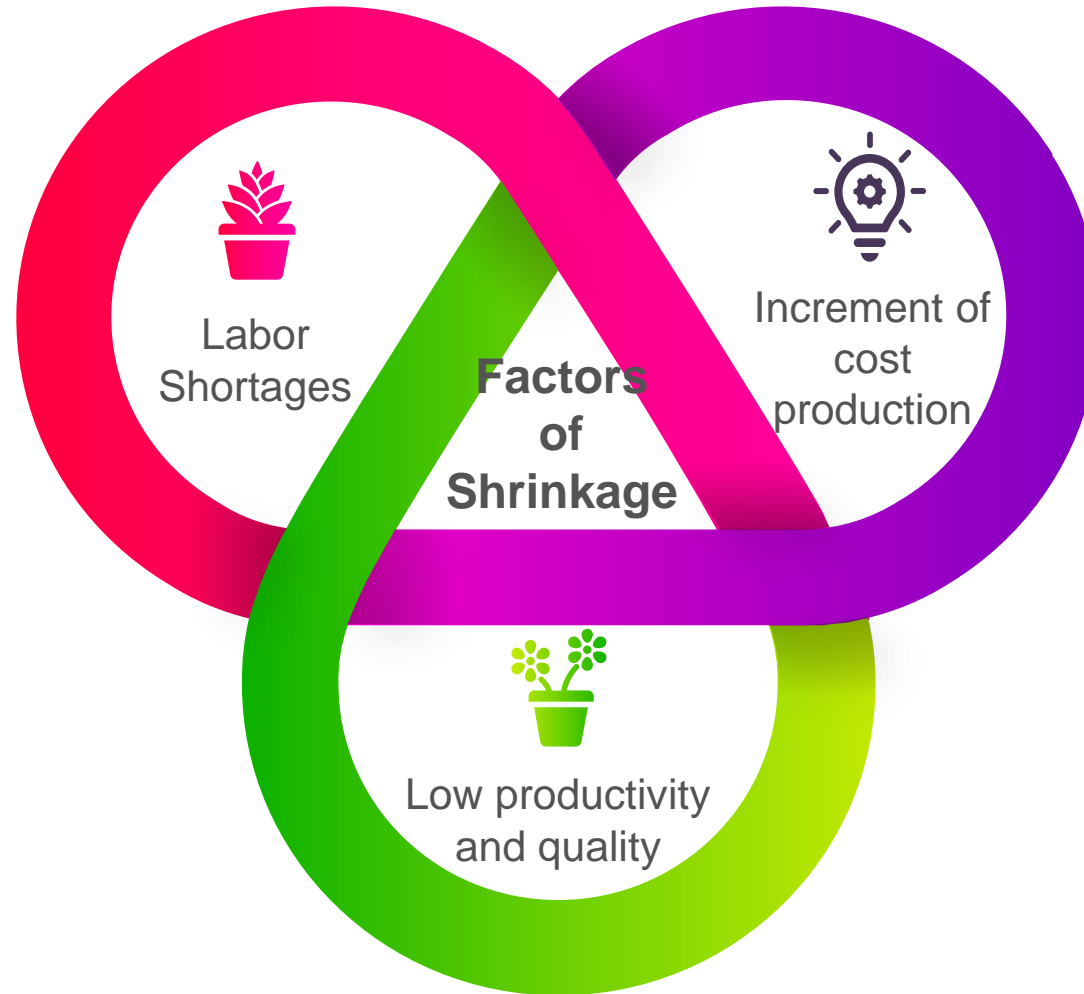
Conclusions

01 Shrinking of the agriculture sector is very hazardous

02 Drastic strategic agricultural policy planning needs to be establish

03 Self-sustaining basic food production

THANK YOU