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DIRECT AND INDIRECT IMPACTS OF TECHNOLOGICAL CHANGE ON POVERTY ALLEVIATION IN INDONESIA

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BACKGROUND INTRODUCTION

- Despite of its abundance with natural resources, Indonesia is listed in middle income countries, with 11-17% of poor people (2004-2013 data).
- Technological progress is expected to overcome poverty problems through increasing economic growth.
- In some cases technological application limiting employment opportunities creates unemployment, especially in the economy with excessive labour forces, like Indonesia.
- The objective of the research is to analyse the impact of technological progress on poverty reduction, via economic growth and unemployment as moderating variables.

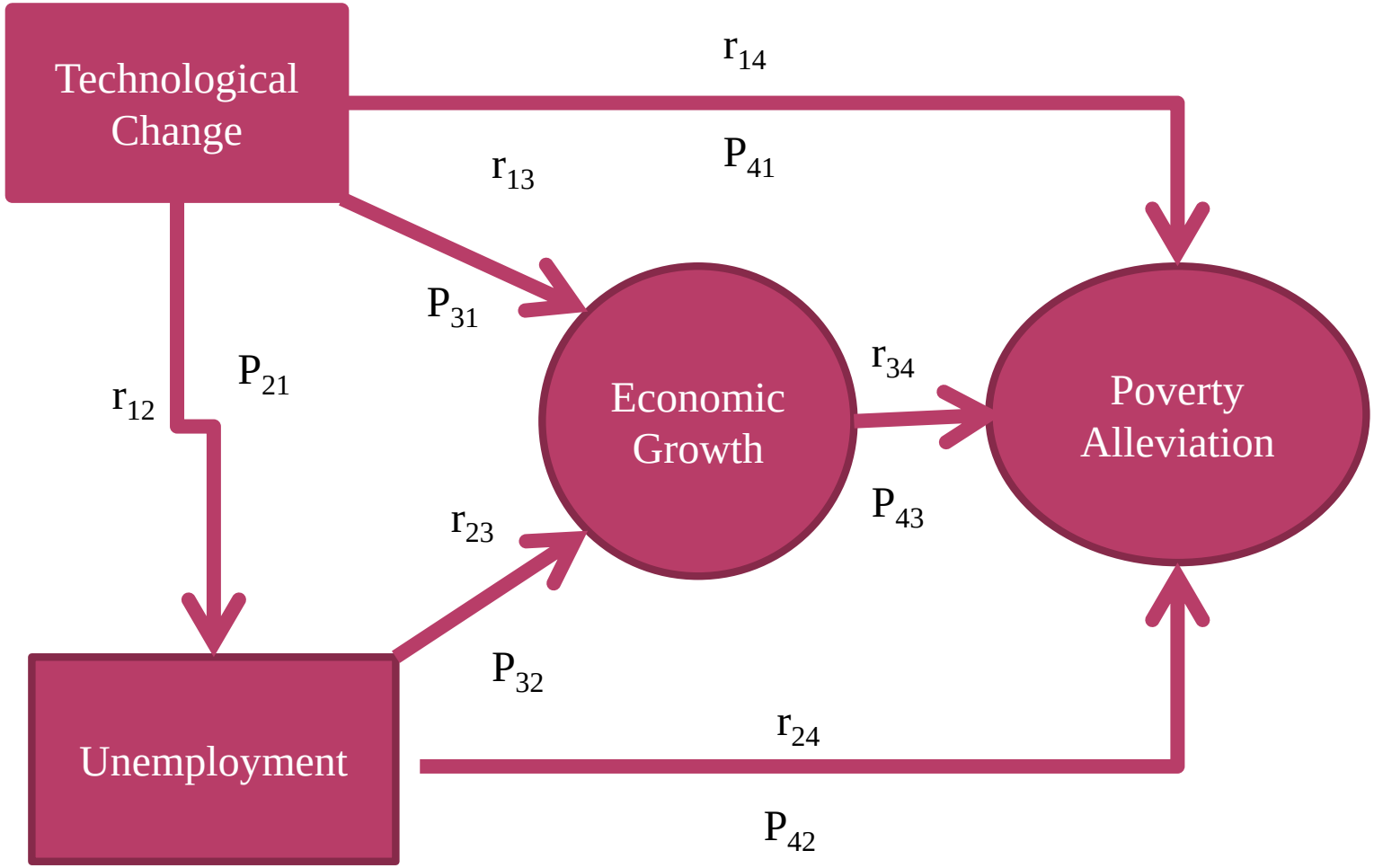


Figure 1. Research Paradigm

THEORETICAL DESCRIPTIONS

Poverty :

- ...general scarcity, dearth, or the state of one who lacks a certain amount of material possessions or money (*Merriam-Webster).*
- … inability of having choices and opportunities; not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit (United Nations).
- … poverty is pronounced deprivation in well-being, and comprises many dimension; low incomes and the inability to acquire the basic goods and services necessary for survival with dignity (World Bank, 2011).

Economic growth :

- … the increase in the inflation-adjusted market value of the goods and services produced by an economy over time, measured the percent rate of increase in real GDP, usually in per capita terms (IMF, 2012).
- … been used as a single development indicator for a long period of time.

THEORETICAL DESCRIPTIONS

Unemployment rate :

- .. occurs when people who are without work are actively seeking paid work (ILO, 1982).
- .. a measure of the prevalence of unemployment = a percentage by dividing the number of unemployed individuals by all individuals currently in the labour force (The Saylor Foundation, 2012).

Technological change :

- .. the overall process of invention, innovation, and diffusion of technology or processes.
- .. the invention of technologies and their commercialization via research & development, the continual improvement of technologies, and the diffusion of technologies throughout industry or society.
- In short, technological change is based on both better and more technology.
- .. Measured by total factor productivity (TFP) using decomposition method of economic growth ; growth accounting method.

RESEARCH HYPOTHESIS : DIRECT AND INDIRECT IMPACT

Direct Impact :

- **Path-1 (P_{41}) : Hypothesis-1 :** Technological change had significant direct impact on Poverty alleviation

Indirect Impacts :

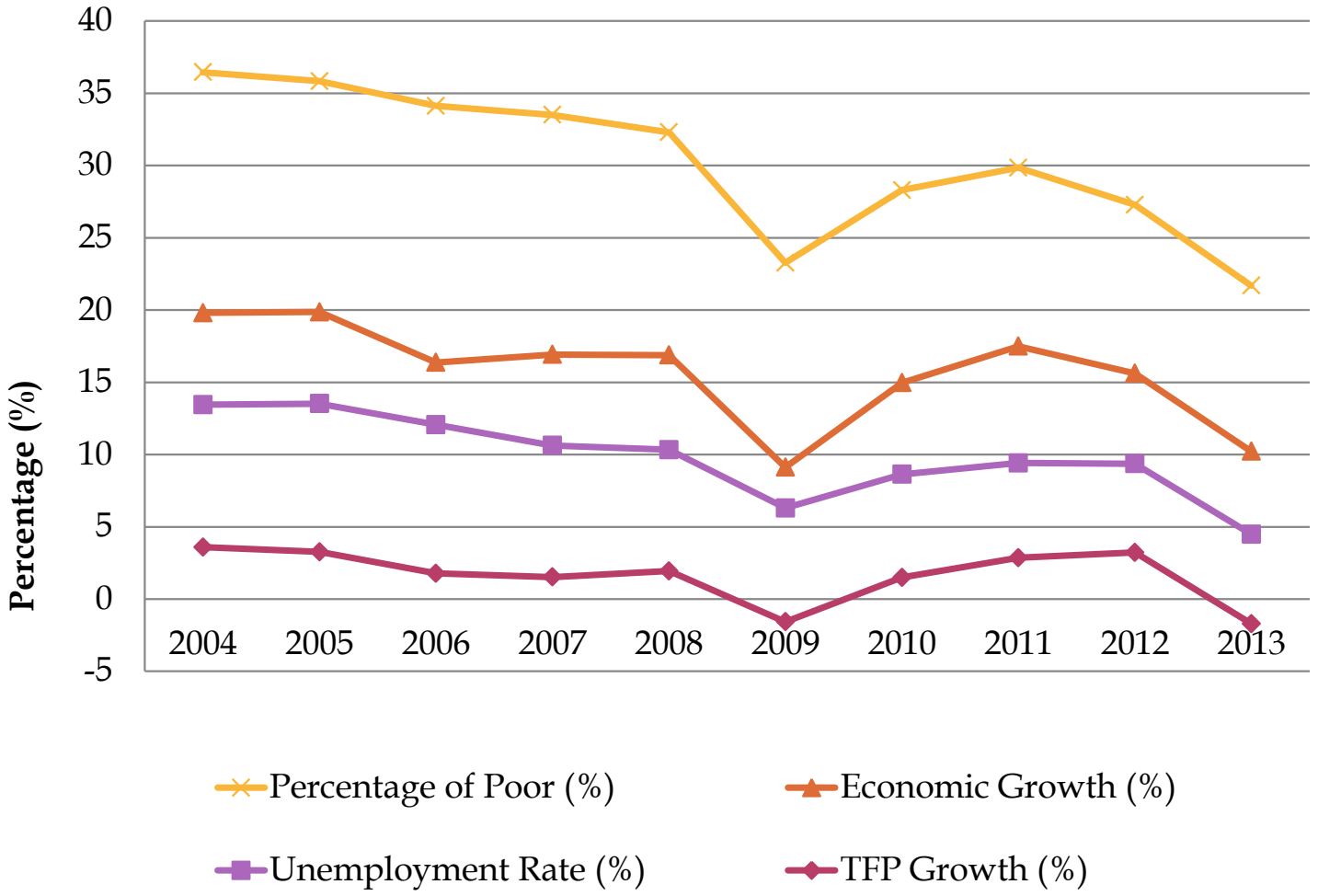
- **Path-2 : (P_{43} x P_{31}) : Hypothesis-2 :** Technological change had significant indirect impact on Poverty alleviation, through Economic growth.
- **Path-3 : (P_{43} x P_{32} x P_{21}) : Hypothesis-3 :** Technological change had significant indirect impact on Poverty alleviation, through Economic growth and Unemployment.
- **Path-4 : (P_{42} x P_{21}) : Hypothesis-4** : Technological change had significant indirect impact on Poverty alleviation, through Unemployment.

PATH EQUATIONS

1). $r_{12} = p_{21}$ Direct efect (DE)	4). $r_{14} = p_{41} + p_{42}\, r_{12} + p_{43}\, r_{13}$ DE + IE
2). $r_{13} = p_{31} + p_{32}\, r_{12}$ DE + Indirect efect (IE)	5). $r_{24} = p_{41}\, r_{12} + p_{42} + p_{43}\, r_{23}$ DE + IE + S
3). $r_{23} = p_{31}\, r_{12} + p_{32}$ Spuriuos (S) + DE	6). $r_{34} = p_{41}\, r_{13} + p_{42}\, r_{23} + p_{43}$ DE + S

Source :
http://faculty.cas.usf.edu/mbrannick/regression/Pathan.html

TFP GROWTH, UNEMPLOYMENT RATE, ECONOMIC GROWTH AND PERCENTAGE OF THE POOR IN INDONESIA 2004-2013



PATH & CORELLATION COEFFICIENTS

Corellation Coefficients		Path Coefficients	
r_{12} =	0.34	P_{21} =	0.34
r_{13} =	0.63	P_{31} =	0.80
r_{23} =	-0.22	P_{32} =	-0.50
r_{34} =	-0.23	P_{43} =	-0.33
r_{24} =	0.96	P_{42} =	0.81
r_{14}=	0.30	P_{41} =	0.02

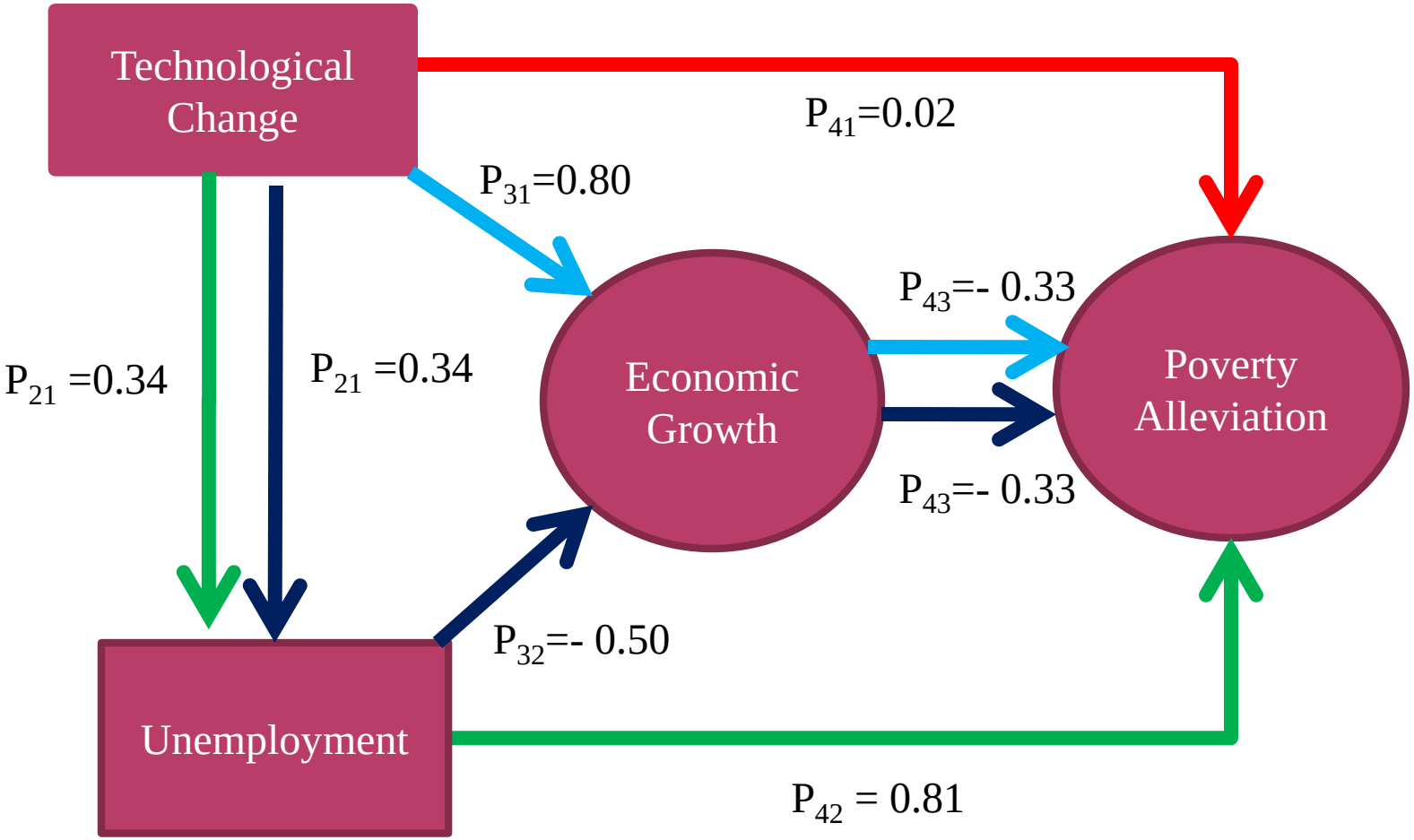


Figure 2. Path Coefficients

TESTING THE HYPOTHESIS

- **On Path-1**, technological change had positive direct impact on poverty alleviation, path coef, P_{41} = 0.02. It was not a significant impact.
- **On Path-2**, technological change had negative indirect impact on poverty alleviation, path coef, (P_{13}xP_{34}) = -0.264. It is a significant impact. The higher the growth of TFP, the smaller the percentage of poor people. Technological change had a positive impact on economic growth, but economic growth had a negative impact on poverty alleviation. It was suspected that other variable made this correlation negative was income disparities. Economic growth increased income disparities, and income disparities decrease percentage of poor people.

TESTING THE HYPOTHESIS

- **On Path-3**, technological change had positive indirect impact on poverty elleviation, path coef ($P_{21}xP_{23}$ x P_{34})= 0.056. It is a significant impact. The higher the rate TFP growth, the higher the percentage of poor people. Technological change had a positive impact on unemployment, but unemployment had negative impact on economic growth, and economic growth had a negative impact on poverty alleviation.
- **On Path-4**, technological change had positive indirect impact on poverty elleviation, path coef ($P_{21}xP_{42}$)=0.275. It is a significant impact. The higher the rate TFP growth, the higher the percentage of poor people. Technological change had a positive impact on unemployment, and unemployment had positive impact on poverty alleviation.

CONCLUSIONS

- **Direct impact** of technological change on poverty alleviation **was positive**, but it **was not** statistically **significant**, Path-1 (P_{41})
- **Indirect impact** of technological change on poverty alleviation varied depend on the path.
  - **On Path-2 (P_{31}-P_{43}),** the impact was negative and significant.
  - **On Path-3 (P_{21}-P_{32}-P_{43}),** the impact was positive and significant.
  - **On Path-4 (P_{21}-P_{42}),** the impact was also positive and significant.