Turkish Economic Review
www.kspjournals.org
Volume 5 December 2018 Issue 4

An introduction to the theories of national and regional economic development

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Abstract. This conceptual paper analyses the concept of development that is a process of progressive growth that generates a transition from simple to complex system. In economics, development is a multidimensional process that generates changes in economic, political, social and institutional structures to support an accelerated growth and improvementof nations for achieving and sustaining a comprehensive wellbeing of people in society. Some theories of economic development are briefly discussed, considering national and regional economic systems. Finally, some critical contradictions of the process of economic development in society are discussed to conclude this study.
Keywords. Economic development, Economic growth, Human development, Development economics, Social progress.
JEL. F63, O10, O20.

1. Introduction

The concept of development in economics is associated with the concept of social progress: "the full happiness of each, and therefore to the greatest happiness of all" (Spencer, 1902, p.253). The fundamental elements of development in society are health, wealth, sociability, knowledge, beauty, etc. (cf., Woods, 1907). This development is achieved in appropriate social structures with high democracy, good governance, high education, and high innovative outputs (Coccia, 2010, 2014, 2018). Economic development can be explained with different theories that are discussed in next sections (Figure 1).

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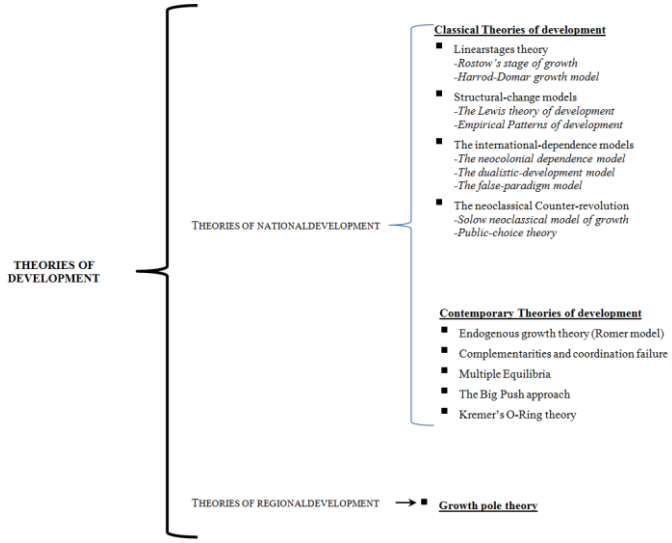

Figure 1. *Theories of development*

2. Theories of development

The study of economic development is one of the most important research fields in economics and political economy (Kuznets, 1966; Nafziger, 2005; Spolaore & Wacziarg, 2013). Classical and neoclassical economics analyze the development with the efficient allocation of scarce productive resources that support the optimal growth, produce and ever-expanding range of goods and services. Instead, new economic approach of development analyzes socioeconomic, political and institutional mechanismsthat accelerate economic growth, improve levels of living for people and reduce poverty, income inequality and violent crime (Todaro & Smith, 2003; Coccia, 2017). A traditional economic measure of development is given by Gross Domestic Product (GDP) per capita: the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Contemporary studies have added non-economic indicators for measuring development in society, such as Human Development Index (HDI): "a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. … The health dimension is assessed by life expectancy at birth, the education dimension is measured by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school entering age. The standard of living dimension is measured by gross national income per capita" (Human Development Reports 2018, 2018a).

In this context, theories of development can be divided in two macro categories (Figure 1):

- Theories of development of national systems
- Theories of regional development

3. Theories of development of national economic systems

3.1. Classical Theories of Economic Development

Linear stages theories: Rostow's stages of growth and the Harrod-Domar growth model (Rostow, 1960; Harrod, 1939, Domar, 1946). The theory of stage of growth suggests that more saving and investment can lead to accelerated rates of economic growth. However, the theory of stages does not always explain economic development in underdeveloped nations, because the drivers of this theory are necessary but not sufficient conditions for supporting economic growth. Advanced

nations, such as European countries after WWII, receivedphysical capital but they also possessed good institutionsand high-skilled human resources (e.g., educated workforce, democratic societies, good institutions and governance). Of course, these conditions are lacking in many developing nations, such that higher physical capital may not generatehistorical paths of economic development.

Structural-change models. This approach focuses on mechanisms that poor nations can transform economic structure from traditional agriculture to industrial and service system. Structural-change approach is based on neoclassical price and resource allocation theory. Two main approaches here are: model of two-sector surplus labor by Lewis (1954) and econometric analysis of the patterns of development by Chenery and colleagues (Chenery & Syrquin, 1975). The model of Lewis (1954) considers a process of modern-sector self-sustaining growth and employment expansion that are assumed to continue until all surplus of rural labor is absorbed in the new industrial sector. The structural transformation of the economy is driven by a balance of economic activity shifting from traditional rural agriculture to modern urban industry. However, a limitation of the model by Lewis (1954) is the assumption of diminishing returns in industrial sector, whereas empirical evidence shows increasing returns in that sector.

The development analysis of structural change focuses on the sequential process that an underdeveloped economy is transformed over time to permit new industries to replace traditional agriculture as engine of growth. Empirical patterns of development are the steady accumulation of physical and human capital, the change in consumer demands from food and basic necessities to manufactured goods and services, the growth of cities and firmsbecause ofpeople that migrate from farms and small towns, decline of family size and of population growth. These models suggest that appropriate economic policies can generate beneficial patterns of self-sustaining growth. However, economic policies based on this approach in many cases have not generated pathways of development within and between countries.

The international-dependence models consider developing countries in a relationship of dependence with rich countries. Major approaches are: neocolonial-dependence, false-paradigm and dualistic models. Theseapproaches reject neoclassical theory of development designed to accelerate growth of Gross National Product (GNP); moreover, they also reject the empirical results by Chenery about empirical characteristics that poor countriesshould pursue (Todaro & Smith, 2003). These international-dependence models stress the international power imbalances between rich and poor countries. According to Wallerstein (1974), the world-system has*core* and *periphery regions*, in which powerful and wealthy "core" societies dominate and exploit weak and poor peripheral societies. The strong nations reinforce and increase the flow of surplus to core regions because they provide "extra-economic" assistance to their capitalist classes on world market. The major weakness of this approach isthe actual experience of Least Developed countries (LCDs) that have had industrial nationalization and state-run production with negative effects on patterns of economic growth (cf., Lewellen, 1995).

Neoclassical counter-revolution considers underdevelopment as an internally induced LCD phenomena caused by government intervention and bad economic policies. Neoclassical counter-revolution's approach suggests that market price allocation usually produces better results than state intervention. Liberalization of national markets generates additional domestic and foreign investments that increase the rate of capital accumulation. The neoclassical growth model of Solow (1956) expanded the Harrod-Domar model, adding to growth equation a second factor,

labor, and inserting a third independent variable, technology[1]. Solow's model shows diminishing returns to labor and capital separately and constant returns to both factors jointly. Technological progress is the residual factor that explains long-run growth.The output growth here is due to increases in labor quantity and quality (population growth and education), increases in capital (through saving and investment) and improvements in technology and innovation[2]. Closed economies grow more slowly, whereas open economies have income convergence at higher levels because capital flows from rich countries to poor countries where capital-labor ratios are lower and returns on investments are higher (Barro, 1989). However, free markets and open economies may also increase income inequality and public debts that reduce a general welfare (cf., Coccia, 2017, 2017a).

3.2. Contemporary models of development (cf., Todaro & Smith, 2003)

Endogenousgrowth theory argues that Gross Domestic Product (GDP) growth is determined by the system governing the production processes rather than by forces outside that system (Aghion & Howitt, 1998; Lucas, 1988; Rebelo, 1991). This new growth theory endeavors to explain growth rate differentials across countries and factors of the rate of growth of GDP that are left unexplained and exogenously determined in the Solow neoclassical modelof growth (i.e., Solow residual; cf., Solow, 1956). In general, investments in human capital generate external economies and productivity improvements that offset to explain the existence of increasing returns to scale. Endogenous growth models explain anomalous international flows of capital that generate wealth inequalities between rich and poor nations. However, the high rates of return on investmentwithin developing economies with low capital-labor ratios are eroded by low levels of investments in education, infrastructure and R&D. Criticism of new growththeory is that it depends on a number of neoclassical premises that are inappropriate for LCD economies. Moreover, empirical studies show a limited support of the predictions of endogenous growth theory (Todaro & Smith, 2003).

New theory of economic development stresses complementarities between several conditions necessary for successful development of nations. Investments have to be done by many agents to produce results for any individual agents. When complementarities are present, an action taken by one firm, worker, organization or government increases the incentives for other agents to take similar actions. In particular, complementarities involve investments whose returns depend on otherinvestmentsdone by other agents. In this context, the Model of Big Push suggests that production decisions by modern-sector firms are mutually reinforcing (cf., Todaro & Smith, 2003). Instead, Kremer's O-ring model (1993) reveals that the value of the upgrading skills or quality depends on similar upgrading by other agents: production function is based on many tasks, all of which must be proficiency all completed to have a full value of product. Mistakes can be extremely costly, reducing the product's value (The name O-ring comes from the accident of the space shuttle Challenger that exploded because one of the components, the O-rings, failed). Underdevelopment can be due to a coordination failure: a state of affairs in which agents' inability to coordinate their behavior (choices) leads to an outcome (equilibrium) that leave all agents worse off than in an alternative situation that is an equilibrium (cf., Jones, 2013).

[1] Coccia, 2005, 2009, 2009a, 2010, 2010a, 2010b, 2010c, 2011, 2014, 2014a, 2014b, 2014c, 2014d, 2015, 2015a, 2017, 2017a, 2017b, 2017c, 2018, 2018a, 2018b, Coccia & Benati, 2018; Coccia & Bellitto, 2018; Coccia & Cadario, 2014; Coccia & Rolfo, 2010; Coccia *et al.,* 2015.

[2] cf., Coccia, 2005a, 2015b, 2016, 2017b, 2018e, 2018f

4. Theories of regional development

Geoeconomic space has regional disparities that can generate poverty, unemployment, social issues, income inequality, violent crime and underdevelopment (Coccia, 2009, 2017). The purpose of the theory of regional development is to reduce regional disparities within countries to support a general development of nations as a whole system. Development was defined by Perroux (1955, p.308) as: "a selective, cumulative process which does not appear everywhere at the same time but becomes manifest at certain points in space with variable intensity". Perroux (1955, p.309) also argues that: growth does not appear everywhere at the same time; it appears at points or poles of growth with varying intensity; it spreads along various channels and with different effects on the whole economy (cf., Parr, 1999). Growth-pole theory was proposed for solving regional problems within developed as well as developing nations. Perroux (1950, 1955, 1964) confined the growth pole concept to an abstract (economic) space. A growth pole was defined as a large group of industries strongly related through input-output linkages around a leading industry (propulsive industry or *industrie motrice*). Propulsive industry and inter-related industries innovate and grow faster than industries external to the pole. In particular, a propulsive industry (*industrie motrice*) is the engine of developmentby its capacity to innovate and stimulate, as well as, to dominate other industries (*industries mues*) in the geoeconomic space.

The concept of growth pole in geographical space was subsequently developed by Aydalot (1965) and Boudeville (1966) considering a set of expanding industries located in an urban area that induce development of economic activity throughout its zone of influence (Boudeville, 1966, p.11; Richardson & Richardson, 1975, p.163ff). The essence of growth pole analysis is that spatial concentration, agglomeration of population and of economic activities are the most efficient ways toorganize resources in geoeconomic space. Although agglomeration of industries is a key element in spatial organizational efficiency, of course it is not the sole element supporting regional growth (Coccia, 2009). The natural growth pole has to be based on a substantial magnitude (at least 250 000 population) before the above-mechanisms become apparent and function within geo-economic space (Parr, 1999). Other factors supporting economic growth, associated with propulsive industry, are education and higher education systems, low corruption, low criminality, democratic institutions, good economic governance, high innovative output and technology, etc. (Coccia, 2010, 2010a, 2014, 2014a, 2017b, 2018). From the viewpoint of policymakers, the major advantage of this approach is the opportunity for integrating industrial policy, physical planning, and inter-regional and intra-regional economic planning.

5. Contradictions of economic development on environment and human health: some concluding remarks

Current scholars arealso considering the environmental issues generated by paths of development (Coccia, 2015).

The global and industrial society, driven by new technology, is generating an economic growth rather than a sustainable development in the long term (Coccia, 2015). In particular, Crutzen & Stoermer (2000) assert that the main effects of development on the environment are due to pollution of the Industrial Age in the 18th century, driven by the technical change of steam engine, the internal combustion engine, etc. In fact, this economic development is also causing environmental and climate change (Foley *et al.,* 2013, p.83). In particular, European, North American and Chinese development is generating socioeconomic progress and well-being but also the diffusion of some mutagens and genotoxic carcinogens

from industrialization (e.g., pollutants, pesticides in agriculture, several chemicals, asbestos, processed or chemically preserved food, etc.) whose effects persist in the long run (Coccia, 2015). Irigaray *et al.,* (2007) emphasize that the growing incidence of a variety of cancers in advanced countries, after World War II, is due to environmental carcinogens generated by pollution ascribable to increasing the industrialization of economic development process. Hence, development generally can increase both economic growth and pollution, with negative consequences on environment, health, and food safety in society (cf., Coccia, 2015, p.62; Zeliger 2011, p.434).

In conclusion, the concept of development is driven by the expanding content of human life interests, using new technology and science advances. However, development is also affected by economic, social, psychological, anthropological, and perhaps biological factors that can generate uncertain and unknown long-term effects in society. Overall, then, economic development theories should focus on social well-being of people based on a sustainable development, rather than economic growth also associated with environmental, social, and health issues in the long run.

References

Aghion, P., & Howitt, P. (1998). *Endogenous Growth Theory*. MIT Press, Cambridge, MA.

Aydalot, P. (1965). Note sur les économies externes et quelques notions connexes, *Revue Economique*, 16(6), 944-973. doi. 10.3406/reco.1965.407687

Barro, R.J. (1989). Economic growth in a cross section of countries, *NBER Working Paper*, No.3120. doi. 10.3386/w3120

Boudeville, J.R. (1966). *Problems of Regional Economic Planning*. Edinburgh University Press, Edinburgh.

Chenery, H.B., & Syrquin, M. (1975). *Patterns of Development, 1957–1970*. Oxford University Press, London.

Coccia, M. (2005a). A Scientometric model for the assessment of scientific research performance within public institutes, *Scientometrics*, 65(3), 307-321. doi. 10.1007/s11192-005-0276-1

Coccia, M. (2005b). Metrics to measure the technology transfer absorption: analysis of the relationship between institutes and adopters in northern Italy. *International Journal of Technology Transfer and Commercialization*, 4(4), 462-486. doi. 10.1504/IJTTC.2005.006699

Coccia, M. (2009). What is the optimal rate of R&D investment to maximize productivity growth?, *Technological Forecasting & Social Change*, 76(3), 433-446. doi. 10.1016/j.techfore.2008.02.008

Coccia, M. (2010). Democratization is the driving force for technological and economic change, *Technological Forecasting & Social Change*, 77(2), 248-264. doi. 10.1016/j.techfore.2009.06.007

Coccia, M. (2010a). The asymmetric path of economic long waves, *Technological Forecasting & Social Change*, 77(5), 730-738. doi. 10.1016/j.techfore.2010.02.003

Coccia, M. (2010b). Spatial patterns of technology transfer and measurement of its friction in the geo-economic space, *International Journal of Technology Transfer and Commercialisation*, 9(3), 255-267. doi. 10.1504/IJTTC.2010.030214

Coccia, M. (2010c). Public and private investment in R&D: complementary effects and interaction with productivity growth, *European Review of Industrial Economics and Policy*, 1, 1-21.

Coccia, M. (2011). The interaction between public and private R&D expenditure and national productivity. *Prometheus-Critical Studies in Innovation*, 29(2), 121-130. doi. 10.1080/08109028.2011.601079

Coccia, M. (2014). Religious culture, democratisation and patterns of technological innovation. *International Journal of Sustainable Society*, 6(4), 397-418. doi. 10.1504/IJSSOC.2014.066771

Coccia, M. (2014a). Structure and organisational behaviour of public research institutions under unstable growth of human resources, *Int. J. Services Technology and Management*, 20(4/5/6), 251–266. doi. 10.1504/IJSTM.2014.068857

Coccia, M. (2014b). Driving forces of technological change: The relation between population growth and technological innovation-Analysis of the optimal interaction across countries, *Technological Forecasting & Social Change*, 82(2), 52-65. doi. 10.1016/j.techfore.2013.06.001

Coccia, M. (2014a). Emerging technological trajectories of tissue engineering and the critical directions in cartilage regenerative medicine. *Int. J. Healthcare Technology and Management*, 14(3), 194-208. doi. 10.1504/IJHTM.2014.064247

Coccia, M. (2014). Socio-cultural origins of the patterns of technological innovation: What is the likely interaction among religious culture, religious plurality and innovation? Towards a theory of socio-cultural drivers of the patterns of technological innovation, *Technology in Society*, 36(1), 13-25. doi. 10.23760/2421-7158.2017.004

Coccia, M. (2015). The Nexus between technological performances of countries and incidence of cancers in society. *Technology in Society*, 42, 61-70. doi. 10.1016/j.techsoc.2015.02.003

Coccia, M. (2015a). Patterns of innovative outputs across climate zones: the geography of innovation, *Prometheus. Critical Studies in Innovation*, 33(2), 165-186. doi. 10.1080/08109028.2015.1095979

Coccia, M. (2015b). Technological paradigms and trajectories as determinants of the R&D corporate change in drug discovery industry. *International Journal Knowledge and Learning*, 10(1), 29-43. doi. 10.1504/IJKL.2015.071052

Coccia, M. (2016). Problem-driven innovations in drug discovery: co-evolution of radical innovation with the evolution of problems, *Health Policy and Technology*, 5(2), 143-155. doi. 10.1016/j.hlpt.2016.02.003

Coccia, M. (2017). Sources of technological innovation: Radical and incremental innovation problem-driven to support competitive advantage of firms. *Technology Analysis & Strategic Management*, 29(9), 1048-1061. doi. 10.1080/09537325.2016.1268682

Coccia, M. (2017a). The source and nature of general purpose technologies for supporting next K-waves: Global leadership and the case study of the U.S. Navy's Mobile User Objective System, *Technological Forecasting & Social Change*, 116, 331-339. doi. 10.1016/j.techfore.2016.05.019

Coccia, M. (2017b). Asymmetric paths of public debts and of general government deficits across countries within and outside the European monetary unification and economic policy of debt dissolution, *The Journal of Economic Asymmetries*, 15, 17-31. doi. 10.1016/j.jeca.2016.10.003

Coccia, M. (2018). A theory of the general causes of long waves: War, general purpose technologies, and economic change. *Technological Forecasting & Social Change*, 128, 287-295. 10.1016/j.techfore.2017.11.013
Coccia, M. (2018a). The relation between terrorism and high population growth, *Journal of Economics and Political Economy*, 5(1), 84-104.
Coccia, M. (2018c). Violent crime driven by income Inequality between countries, *Turkish Economic Review*, 5(1), 33-55.
Coccia, M. (2018d). The origins of the economics of innovation, *Journal of Economic and Social Thought*, 5(1), 9-28.
Coccia, M. (2018e). Theorem of not independence of any technological innovation, *Journal of Economics Bibliography*, 5(1), 29-35.
Coccia, M. (2018e). Theorem of not independence of any technological innovation, *Journal of Social and Administrative Sciences,* 5(1), 15-33.
Coccia, M. (2018f). Classification of innovation considering technological interaction, *Journal of Economics Bibliography*, 5(2), 76-93.
Coccia, M. (2018g). An introduction to the methods od inquiry in social sciences, *Journal of Social and Administrative Sciences,* 5(2), 116-126.
Coccia, M. (2018h). Growth rate of population associated with high terrorism incidents in society, *Journal of Economics Bibliography*, 5(3), 142-158.
Coccia, M. (2018i). Measurement and assessment of the evolution of technology with a simple biological model, *Turkish Economic Review*, 5(3), 263-284.
Coccia, M. (2018j). Functionality development of product innovation: An empirical analysis of the technological trajectories of smartphone, *Journal of Economics Library*, 5(3), 241-258.
Coccia, M. (2018k). A theory of classification and evolution of technologies within a generalized Darwinism, *Technology Analysis & Strategic Management*, doi. 10.1080/09537325.2018.1523385
Coccia, M. (2018l). Optimization in R&D intensity and tax on corporate profits for supporting labor productivity of nations, *The Journal of Technology Transfer*, 43(3), 792-814. doi. 10.1007/s10961-017-9572-1
Coccia, M., & Bellitto, M. (2018). Human progress and its socioeconomic effects in society, *Journal of Economic and Social Thought*, 5(2), 160-178.
Coccia, M., & Igor, M. (2018). Rewards in public administration: a proposed classification, *Journal of Social and Administrative Sciences,* 5(2), 68-80.
Coccia, M., & Cadario, E. (2014). Organisational (un)learning of public research labs in turbulent context, *International Journal of Innovation and Learning*, 15(2), 115-129. doi. 10.1504/IJIL.2014.059756
Coccia, M., Falavigna, G., & Manello, A. (2015). The impact of hybrid public and market-oriented financing mechanisms on scientific portfolio and performances of public research labs: a scientometric analysis, *Scientometrics*, 102(1), 151-168. doi. 10.1007/s11192-014-1427-z
Coccia, M., & Rolfo, S. (2010). New entrepreneurial behaviour of public research organizations: opportunities and threats of technological services supply, *International Journal of Services Technology and Management*, 13(1/2), 134-151. doi. 10.1504/IJSTM.2010.029674
Crutzen, P.J., & Stoermer E.F. (2000). The anthropocene. *Global IGBP Change Newsletters*, 41, 17-18.
Domar, E. (1946). Capital expansion, rate of growth, and employment. *Econometrica*. 14(2), 137-147. doi. 10.2307/1905364
Foley, S.F., Gronenborn, D., Andreae, M.O., Kadereit, J.W., Esper, J., Scholz D., *et al.,* (2013). The Palaeoanthropocene e the beginnings of anthropogenic environmental change. *Anthropocene*, 3, 83-88. doi. 10.1016/j.ancene.2013.11.002
Harrod, R.F. (1939). An essay in dynamic theory. *The Economic Journal*. 49(193), 14-33. doi. 10.2307/2225181
Human Development Reports, (2018). Data. [Retrieved from].
Human Development Reports, (2018a). Data. [Retrieved from].
Irigaray, P., Newby, J.A., Clapp, R., Hardell, L., Howard, V., Montagnier, L., *et al.,* (2007). Dossier: cancer: influence of environment lifestyle-related factors and environmental agents causing cancer: an overview. *Biomed Pharmacother*, 61(10), 640-58.
Jones, G. (2013). The O-ring sector and the foolproof sector: An explanation for skill externalities. *Journal of Economic Behavior & Organization,* 85, 1–10. doi. 10.1016/j.jebo.2012.10.014
Kremer, M. (1993). The O-Ring theory of economic development. *The Quarterly Journal of Economics*. 108(3), 551–575. doi. 10.2307/2118400
Kuznets, S. (1966). *Modern Economic Growth*, Yale University Press, New Haven, CT.
Lewellen, T.C. (1995). *Dependency and Development: An Introduction to the Third World*, Westport, Conn. Bergin & Garvey.
Lewis, W.A. (1954). Economic development with unlimited supplies of labor. *The Manchester School,* 22(2), 139-191. doi. 10.1111/j.1467-9957.1954.tb00021.x

Lucas, R.E. (1988). On the mechanics of economic development, *Journal of Monetary Economics*, 22(1), 3–42. doi. 10.1016/0304-3932(88)90168-7
Nafziger, E.W. (2005). Theories of economic development. In: *Economic Development*. (pp. 123–164). doi. 10.1017/CBO9780511805615.006
Parr, J.B. (1999). Growth-pole strategies in regional economic planning: A retrospective view. Part 1. Origins and advocacy, *Urban Studies*, 36(7), 1195-1215. doi. 10.1080/0042098993187
Perroux, F. (1950). Economic space, theory and applications, *Quarterly Journal of Economics*, 64(1), 90-97. doi. 10.2307/1881960
Perroux, F. (1955). Note sur la Notion de Pole de Croissance, Économie appliquée, n. 8, 307-320. doi. 10.2307/1881960
Perroux, F. (1964). *L'Economie de XX Siecle*. Press Universitaire de France, Paris.
Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of Political Economy*, 99(3), 500-521. doi. 10.1086/261764
Richardson, H.W., & Richardson, M. (1975). The relevance of growth center strategies to Latin America, *Economic Geography*, 51(2), 163-178.
Rostow, W.W. (1960). *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge University Press, Cambridge.
Solow, R.M. (1956). A contribution to the theory of economic growth, *The Quarterly Journal of Economics*, 70(1), 65-94. doi. 10.2307/1884513
Spencer, H. (1902). *Social Statics, Abridged and Revised; Together with the Man versus the State*, Williams and Norgate, Oxford.
Spolaore, E., & Wacziarg, R. (2013). How deep are the roots of economic development?, *Journal of Economic Literature*, 51(2), 1-45. doi. 10.1257/jel.51.2.325
Todaro, M.P., & Smith, S.C. (2003). *Economic Development*, Parson, Addison Wesley Harlow, England.
Wallerstein, I. (1974). The rise and future demise of the world capitalist system: Concepts for Comparative Analysis. Comparative Studies in Society and History, vol. 16 (September), pp. 387-415.
Woods, E.B. (1907). Progress as a sociological concept. *American Journal of Sociology*, 12(6), 779-821. doi. 10.1086/211550
Zeliger, H. (2011). *Human Toxicology of Chemical Mixtures-toxic Consequences Beyond the Impact of One-component Product and Environmental Exposures*. 2nd ed. Elsevier Inc.