

Chapter 2

Robots and Economics: It Is More Complex Than It Seems

Josipa Višić

Faculty of Economics, Business and Tourism, University of Split, Croatia

ABSTRACT

Robotization will eventually transform the nature of doing business and economics in general. Therefore, the aim of this chapter is to provide a broader perspective on economic repercussions of robotization covering both microeconomic and macroeconomic aspects as well as other closely related sociological aspects. This broad perspective is needed for researchers, policy makers, as well as managers while contemplating changes as stirring as robotization. Further, the chapter deals with the issue of education of future economists in the context of robotization. In that sense, it emphasizes the need to make future economists more flexible, observant, and consequently, more efficient, regardless of their position on labor market. In that sense, the chapter serves as an alarm since existent (economic) lag between countries may become even bigger if it is not addresses in a timely manner.

INTRODUCTION

High pressure on productivity is surely an important factor for increasing investments in technological progress, especially investments in robotization and artificial intelligence (AI). Significant financial resources are being invested and robotics market is expanding rapidly. For instance, market size of the entire Japanese robot industry will reach 80 billion euros by 2035, of which service robots are projected to account for about half or 40 billion euros (Nitto, Taniyama, & Inagaki, 2017). More and more people use or are exposed to robots in various situations. In addition, augmented reality, artificial intelligence and technological singularity are no longer themes reserved only for science fiction movies. Therefore, it became common, a cliché even to discuss rapid technological changes and impact of robotization on labor market. There are many studies on possible impacts of robotization and AI on labor market and there is a growing trend of research on human/worker – robot interaction. Further, analysis of robot market shows country-by-country differences in robotics development trends and differences in attitudes and acceptance of robots as well. In general, number of scientific studies dealing with different aspects and effects of technological progress is increasing.

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Robots and Economics

Regardless of one's opinion on technological progress, it will transform the nature of doing business, labor market and economics in general and it will bring new life style and consequently various sociological side effects. The pace and depth of these changes is yet to be seen but traditional divide of sciences and consequently policy and educational programs might become outdated. One may find ideas like new doctrine on Space Economy (Dirican, 2015) a Luddite perspective and just go with the flow since somehow the economy has always adjusted and somehow in the future it always will (Allen, 2017). Others might overestimate the pace and influence of technological progress on business and labor market, but whatever stand one takes, existent changes cannot be ignored. In that manner, Šabanović (2010) proposes a mutual shaping of robotics and society since the public is put in the passive position of taking up technologies after they have been constructed in robotics laboratories. Further, Harari (2017) argues that AI revolution will not be a single event after which the job market and the educational system will settle into a new equilibrium. Rather, he believes it will be a cascade of ever-bigger disruptions.

Having all stated in mind, the aim of this chapter is to raise questions about the need to overcome traditional divide of humanities/social sciences and the natural/design sciences while both analyzing robotization and educating future employees and employers, with the accent on educating future economists. Next generation will need to cope with all consequences of technological progress, especially regarding robotization and AI. Although it is hard to precisely estimate when these changes will occur, it is almost certain that new generation of economists will eventually face them during their professional life. In other words, this chapter adds to the field in several ways. It addresses various issues that robotization and technological change bring out in economy, observed both from a microeconomic and macroeconomic perspective. This broad perspective is a novelty and is needed while contemplating changes as stirring as robotization. Further, chapter emphasizes the need to adjust education of future economists in context of diversified changes caused by robotization, which is, to the author's best knowledge, a completely new issue on both scientific and policy decision level. This issue is also connected to possible additional development problems in less developed countries if changes in education do not follow technological progress. Presented implications of robotization are a framework that should be broadened over time to include all aspects of economy and society that will change in the future due to technological progress and hopefully will add to the field observed from researchers', policy makers', managers' and educators' perspective.

Microeconomic Aspects of Robotization

There are multiple microeconomic implications of robotization that we should be aware of and some of them are obvious but some of them are not so direct. In that manner, this section addresses different aspects of robotization that are related either to a company or to an individual.

Increased use of robots and AI changes production in obvious manner. Robots are at the same time both inputs and outputs in a production process. Looking it from the input perspective, robots are utilized to perform tasks faster, more precisely, cheaper and often to do things that humans are not capable of doing, or it is just too dangerous for them to do it. Further, while thinking about too dangerous tasks form humans one must think beyond activities such as mine clearance since robots can be used in medicine when it is unsafe for nurses and doctors to have a direct contact with patients.¹ Among these advantages, which are often mentioned when advocating for robots, Ivanov and Webster (2017) make an interesting point by emphasizing that unlike human employees who get bored by tedious, repetitive and intellectually unchallenging tasks, robots can entail long hours and unsafe/unhygienic conditions. Further, robots

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