

## Chapter 39

# Redefining Chemical Engineering Education in Romania Between Massification, Atomization, and Performance

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### ABSTRACT

*Chemical engineering and higher education profile in Romania have a prestigious tradition. Declared a national priority, Romanian higher education has developed and has become a mass education. There was an extension and uncontrolled chemical engineering education, especially environmental engineering. In addition to traditional chemical engineering, education has appeared in places without a university tradition; new universities and faculties of study in this area and other universities and colleges have expanded the frontiers of research in education for green engineering. The study majorly focused to explore extent of chemical engineering career intention and to explore the relationship exist between engineering environment intentions with selected independent variables. The results show that demographic decline, decreased social inertia, and brain drain made the interest in chemical engineering and environmental study decline. In these circumstances, the present competition between providers of education in chemical engineering and environment is tough.*

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## INTRODUCTION

Revolution from December 1989 brought to Romania prospect of great change (Moldovan, 2012). By 1990, heavy industry was a real “engine” of the economy was centralized and seconded closely by the chemical industry; with the transition to a market economy, the situation has changed dramatically for the chemical industry (Oprean, 2007). Unable to adapt to new conditions, many chemical plants were closed and therefore employment opportunities in chemical engineering have declined severely.

In Romania, education is declared a national priority, meaning that the Romanian higher public education is free, during the legal duration of studies. In 1989, in the higher education system were 46 public universities, which numbered a total of 164 507 enrolled students. Currently, the number of students increased almost fourfold and universities (public and private) reached the number of 103. The number of students has tripled in the last decade, reaching almost one million, while the exact number of students in private universities is not known, many of them refusing to report on all entries (Nicu, 2016). Unfortunately for Romania a sad phenomenon “brain drain” of highly qualified human resources leaves the country to work on much higher salaries in the Occident. This way, the investments in such human resources who decide to emigrate have no purpose for the Romanian state (Kozma, 2008).

International experience has shown that the funding of the public higher education system in order to meet present needs is the following mixed nature: a core funding from budgetary allocations, to ensure free access to education, the quality and consistency of the learning process, an additional funding obtained by the institution through their own efforts and resources other than the State Budget (Waters-Adams, 2006). Thus, education can be supported through scholarships, study loans, fees, donations, sponsorships, own sources and other legal sources (Creswell, 2008). The financing of education is made from the following sources: state budget (central or local), sources of population shares of companies for education and education (transportation, supplies, uniforms), donations, sponsorships, own income of educational institutions (research, rent, tuition fees etc.) and other external resources (grants, external loans granted by foreign financial institutions).

Meanwhile, a milestone in the reform process was the replacement of the financing of budgetary chapters with the global finance of the university based on institutional contracts with the Ministry of Education. This change was a way to get better performance in education and research through a better management of financial resources. Thus, the financing of public universities will also be determined by performance and by efficiency criteria. Thus, since 1999, the means of financing higher education have changed, and it passed to a methodology for allocating the budget allocations based on formula (quantitative component) and based on the fundamental principle “resources follow students.” Since 2002, the methodology for allocating the budget allocations for base university funding was complemented by a qualitative component, continuously updated during 2003 - 2015. However, the state budget is the main source of funding for education (Damian, 2012).

Regarded as educational and training activity, education is materialized in two forms, closely related: first as a process of transmission - reception of information and then a lengthy process of storing and checking them gradually. In other words, on short term, education is a consuming activity of National Income and on long term an investment in human resources process (Dobbins, 2011).

In order to get a full picture of the chemical engineering educational system in Romania, we could state that there are four major universities (located in major university centers: Bucharest, Timisoara, Cluj-Napoca and Iasi) preparing graduates in areas of chemical engineering: Inorganic Chemical Technology and Environmental Protection, Organic Chemical Technology, Technology of Macromolecular

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