10

Agriculture 4.0 and Bioeconomy: Strategies of the European Union and Germany to Promote the Agricultural Sector – Opportunities and Strains of Digitization and the Use of Bio-Based Innovations

Immo H. Wernicke
German Government (retired), Germany

INTRODUCTION

Agriculture 4.0 and Bioeconomy are new strategies of the European Union and the German Government for promoting Research and Development and the implementation of digital technologies and bio-based innovations in the agricultural sector. The programs upgrade the traditional Common Agricultural Policy and enlarge the legal and institutional framework of the Acquis Communautaire. Millions of agricultural holdings in Europe are encouraged to use biomass, renewable energies, digital innovations, and high tech machinery provided under the label of Industrie 4.0. The discussed strategies aim to achieve sustainable growth and competitiveness in agriculture, to secure self-sufficiency in food and energy production in Europe and to cover the Sustainable Development Goals of the United Nations. Both concepts provide opportunities to overcome the increasing demand for food by an exploding population. To be discussed are risks due to high investment costs, cyber crime, and poor public funds for improving the fragmented digital and energetic infrastructure. The improving of the official database is a precondition to get more information that is accurate on the impact of Agriculture 4.0 and Bioeconomy.

BACKGROUND

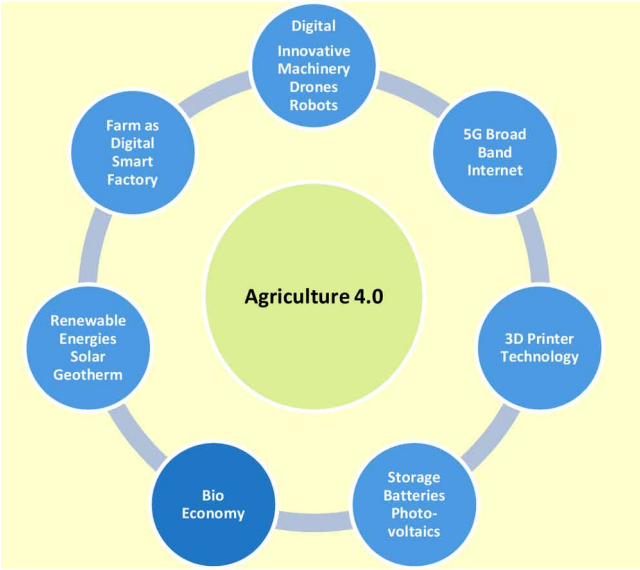
The term **Agriculture 4.0** is used as an official label of the 2020 strategic program of the European Commission (EC) and the German Government for promoting the agricultural sector, rural areas and the nutrition industries to achieve sustainable growth (EU Commission, 2018 a).

The term **Bioeconomy** is defined by the Directorate-General for Research and Innovation of the EC as a new economic system based on the sustainable use of renewable biological resources such as crops, forests, fish, animals and micro-organisms to produce food, materials and energy (European Commission, 2017).

Agriculture 4.0 is an innovative program for the benefit of the agricultural sector that refers to the Industrie 4.0 strategy of the EC and the German Government to foster the digitization of the Manufacturing Industries (Price Waterhouse, 2015). It goes back to the idea of the advisor to German Chancellor Angela Merkel Jeremy Rifkin (2015), who recommends a Digital Revolution in Europe also in the agricultural sector (Rossner, E. 2015). Digital innovations from the Information and Communications Technologies (ICT) sector including Start-ups and high tech machinery from the Manufacturing Industries are to be implemented in the complete supply chain from animal production and the use agricultural land to food

DOI: 10.4018/978-1-7998-3479-3.ch090

Figure 1. Basic Technologies of the Agriculture 4.0 concept



Source: Overview from different reports on Agriculture 4.0 by author

processing and distribution and finally to the selling to the consumers on cellular phone demand. **Figure 1** presents the main technologies of Agriculture 4.0.

The European Commission's Science and Knowledge Service (2016) being founded to evaluate the innovation program of the EC approves "New technologies and their adoption by EU farmers are key drivers in maintaining European agriculture competitive in a global world." Agriculture 4.0 is also connected to the Bioeconomy program that was launched by the EC in 2012 (EU Commission, Directorate-General for Research and Innovation, 2017). The EC Program Biotechnology and Life Sciences precedes the Bioeconomy concept as it was set up in 1982. The EC evaluates its former Biotechnology Strategy as "an important step towards a competitive and sustainable Knowledge Based Bio-Economy (KBBE)." The new strategy includes the traditional concept of Biotechnology, such as genes technology and all biotechnological applications across sectors in primary production, in industry and in the health sector described in detail by Patermann, C. and Aguilar, A. (2018).

As new components of the complex European and German institutional and legal system the Bioeconomy- and Agriculture 4.0-strategies have led to a multifold set of parliamentary decisions, regulations, funding and procurement programs, internet platforms, reviews, reports, staff working papers, working groups, manuals and other publications. The article focuses on the presentation and discussion of a few selected activities.

Generally said, these new strategies in agricultural politics supplement the already existing gigantic legal and institutional framework in Germany and in the EU laid down in the Acquis Communautaire that consists of about 100.000 pages covering the full scope of European legal issues. The new agricultural strategies of the EU and Germany are going well beyond the traditional Common Agricultural Policy (CAP), which is already providing about 50 Billion € as subsidies to the farmers in Europe every year and for decades (EU Commission, 2014 b).

Millions of agricultural holdings and family farms are being encouraged by the new concepts to make use of technical innovations, Bioeconomy, and renewable energies to achieve growth and competitive-