Chapter 10
Project Management and Efficiency of the Projects in the Industry 4.0 Era

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ABSTRACT

Using resources without wasting is not only important for traditional operations but also important for projects. At this point, the concept of efficiency which is directly related with the usage of resources comes to the forefront. Efficiency has been important at all times and its importance also continues today, in the Industry 4.0 era. This chapter deals with project management and efficiency of projects in the Industry 4.0 era. In the first section of the chapter the Industry 4.0 concept is explained. In Section 2 the project and project management topics are discussed. In Section 3, efficiency, efficiency measurement and the data envelopment analysis (DEA) are dealt with. In Section 4 project management and the efficiency of the projects in the era of Industry 4.0 are mentioned. Finally, in Section 5 a numerical example is presented.

INTRODUCTION

Due to the globalization experienced in the world, international trade has increased and the effects of crises such as the 2001 banking and the 2007 mortgage have been significant in accordance with this global expansion. These negativities have forced firms to adopt more modern, more flexible and more scientific management approaches and leave the classical management philosophies.

According to these new approaches adopted, manufacturing enterprises should build flexible production systems, considering the level of expertise and the need and the priority of the customers. When doing these, each product or service should continue its activities by considering the production process as a project. In this respect, the concept of project management and the efficiency of the projects gain importance.

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In the work initiated by Kagermann et al. (2011), which started with the effect of the digital transformation process experienced in industrial production in Germany in 2011, the industry was expressed as 4.0. Afterwards; the German National Academy of Sciences and Engineering (Acatech) published a manifesto in 2013 and shared a new generation of production methods. This revolution, which has also made a tremendous impact outside Europe, is called the industrial internet consortium in America. These approaches, which have basically similar contents, are the cyber physical systems that enable simultaneous information exchange in production processes and create value through the Internet of things.

It is being argued that Industry 4.0 is actually beginning to emerge with the axis shift experienced in global production. The realization of the vast majority of industrial production by the eastern countries has become a threat to the western countries. Countries that want to provide competitive advantage have focused on innovation efforts to decrease the time-to-market of products and services (Hecklau et al., 2016). In the modern sense first project, the Manhattan Engineering Project, was developed in the US during the World War II. With this project, the first atomic bomb was developed and project management concept emerged. Projects are unique, one-time operations designed to put through a specific set of objectives in limited time horizon. Project management is concerned with planning, scheduling and controlling project activities to achieve timely project completion within budget and meeting performance expectations (Fitzsimmons et al., 2008).

In an increasingly complex business world, it is obvious that decisions and projects need to be realized in the light of more professional and scientific data. In this regard, it would be more appropriate to apply Data Envelopment Analysis (DEA), one of the most widely used methods in the literature in project management and project efficiency in the age of industry 4.0. DEA is a linear programming-based method used to evaluate the relative efficiency of decision-making units that are responsible for producing similar outputs by using similar inputs (Kasap et al., 2007). The length of time and accordance of the plan in which projects that are carried out on a long-term basis are important. In this respect, DEA, when implemented with expertise at every stage of the projects being carried out, will be in conformity with the risks and plans carried especially by the long-term projects.

On the other hand, one of the key concepts among the main building blocks of Industry 4.0 is the efficiency of all processes with big data and their analysis. Especially these developments enable industrial growth by increasing productivity in production and therefore faster a production structure having low error rate and high quality with minimum costs has been started (Roda et al., 2018). In addition, with the digitalization, it is seen that the products and services are more customized thanks to these technologies, which allow the changing needs and expectations of the customers to be met faster and more efficiently by the enterprises. In this respect, with industry 4.0, firms that will each become a digital organization should take a holistic approach in the workflows of all processes of the value chain in order to obtain the long-term advantage of digitalization which is started in production. (Buhr, 2017). It can again be said in this point that efficiency measurement and DEA methodology become important in the Industry 4.0 era.

Furthermore, businesses will be faced with massive data as they begin to use the new generation of Internet-based technologies. Those who are successful in analyzing the data will be able to reflect on the competition strategies. Employees with creative and coordinating abilities who are thinking more strategically have begun to be needed (Hecklau et al., 2016). After the availability of the necessary expert staff, businesses will search ways to deal with big data obtained by the Internet of the Things and try to use the data efficiently. Naturally; it will make a sense when the collected data are efficiently categorized and used. In this respect, the concept of efficiency gained importance in the age of Industry 4.0. If we