Chapter 16

Scrutinizing the Barriers That Impede Industry 4.0 Projects: A Country–Wide Analysis for Turkey

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ABSTRACT

The concept of Industry 4.0 has recently attracted attention from academics, research institutions, and companies. In order for projects to achieve success in Industry 4.0, project specifications must be known and they must be conducted with utmost care. While Industry 4.0 projects ensure lots of advantages, they encounter many risks such as data integration, process flexibility, and security problems. Identification of barriers to Industry 4.0 is important for the success of the projects. The aim of the chapter is to determine the Industry 4.0 barriers in implementation process in Turkey’s conditions investigate the interrelations among them and develop a model that can measure the interacting effects of the barriers on the other barriers in the Industry 4.0 implementation process. To reach that aim, interpretive structural modeling (ISM) and decision-making trail and evaluation laboratory (DEMATEL) are used. According to results, one of the most important findings is the lack of digital vision which found as the only affecting barrier and it affects all the other barriers.

INTRODUCTION

There are many different definitions of project in literature. According to Project Management Institute Global Standard (2008), a project is defined as “a temporary endeavor undertaken to create a unique product, service or result”. Tuman (1983) states that “A project is an organization of people dedicated to a specific purpose or objective. Projects generally involve large, expensive, unique, or high risk undertaking which have to be completed by a certain date, for a certain amount of money, with some expected level of performance”. In its broadest definition, a project is defined as “a specific, finite activity that produces an observable and measurable result under certain preset requirements” (mymanagementguide.com, 2018). Project management is the discipline of planning, organizing, procuring and managing resources to reach and complete the goals and objectives of a specific project (Gencer and Kayacan, 2017).

The relevant literature review reveals that the characteristics of project management are discussed by many academicians. Project management characteristics are essential for project manager to successfully complete a project. Main characteristics of project management could be highlighted as follows “temporariness” (Kirmizi, 2012; Roudias, 2015; Epstein, 2015; mymanagementguide.com, 2018), “progress elaboration” (Kirmizi, 2012; mymanagementguide.com, 2018), “minor changes” (Kirmizi, 2012; Roudias, 2015), “uniqueness” (Roudias, 2015; Epstein, 2015), “single definable purpose” (Kirmizi, 2012; Epstein, 2015), “familiarity” (Epstein, 2015), “uncertainty” in some parts of the project, “cross functionality” (engages people from different seniority and departments) (Roudias, 2015), “appropriate resources” and “available budget” (Kirmizi, 2012). Additionally, Tukel and Rom (1998) have conducted a nationwide survey to identify and categorize the characteristics projects in diverse industries. They conclude that projects in diverse industries have different characteristics, and though many common project characteristics exist, there are remarkable differences in projects across industries.

Project management is used by organizations as a tool to increase productivity (Frame, 1995; Mir and Pinnington, 2013), and the ultimate objectives of industry 4.0 projects, in parallel with project management, are to reduce costs, to increase the efficiency of the field or to reduce the used area, to reduce energy use, to work at high speed and reliability, and to produce more efficient and better quality (Yılmaz, 2016). According to Al-Nasseri and Aulin (2016), along with the stated advantages of project management, there are some obstacles encountered in the process of developing, implementing and controlling the stages of the project. The barriers of development and implementation stages of project management are “lack of effective leadership” (Voth, 2009; Müller and Turner, 2010), “insufficient support from project stakeholders in the development of plans and schedules” (Iyer and Jha, 2006; Davis, 2014), “poor decision-making regarding activity critically” (Hameri and Heikkila, 2002; Gonzalez et al., 2014), “lack of education and training in planning and scheduling” (Nepal et al., 2006; Hameed, 2005; Yang et al., 2011), “incompatibility of planning methods with the nature of the project schedule” (Jurf and Beheiry, 2012; Burke, 2003), “the absence of schedule contingency” (Hoel, 1999; Mulholland and Christian, 1999), and “the absence of resource-constrained scheduling for dealing with uncertainty problems” (Elmaghrab et al., 2003; Abeyasinghe et al., 2001). Barriers of developing and controlling stage of project management are “lack of effective leadership” (Voth, 2009; Müller and Turner, 2010), “lack of education and training in planning and scheduling” (Nepal et al., 2006; Hameed, 2005; Yang et al., 2011) and “the absence of new technology and software for planning and scheduling” (Noronha and Sarma, 1991; Taroun, 2014; Makhtari et al., 2011). Barrier of controlling stage of project management is “trivial control and reporting system between management levels” (Voth, 2009; de Snoo et al,