Chapter 65
Team Characteristics Moderating Effect on Software Project Completion Time

Niharika Dayyala
https://orcid.org/0000-0003-3128-9954
Illinois State University, USA

Kent A. Walstrom
Illinois State University, USA

Kallol K. Bagchi
https://orcid.org/0000-0002-5821-4349
The University of Texas at El Paso, USA

ABSTRACT

This study highlights the importance of human factors in software projects developed in capability maturity model (CMM) level software development environments. While software process initiatives help streamline the development process, people factors can influence project outcomes. Using data procured from the International Software Benchmarking Standard Group, the effects of team turnover, team heterogeneity, and team member work experience were examined as they moderate project elapsed time for software projects developed in CMM level software development environments. Team member work experience and team functional heterogeneity were found to have significant moderating effects on project elapsed time to completion. The turnover of members on the team did not have a significant moderating effect on project elapsed time to completion. Previous studies have examined the benefits of raising the level of maturity as identified by the capability maturity model. This study identifies the importance of human factors as they moderate project success.

DOI: 10.4018/978-1-6684-3702-5.ch065

1. INTRODUCTION

The Capability Maturity Model (CMM) is a framework developed by the Software Engineering Institute (SEI) for assessing the maturity of the software development process of organizations. The Capability Maturity Model Integration (CMMI) evolved from the CMM by addressing the integration issues with multiple development models in an organization. CMMI was widely adopted after its release in 2002 (Latif et al., 2019). The CMM and CMMI frameworks describe the key elements to make the software development process manageable, measurable, predictable and repeatable (Örgün et al., 2018). The frameworks facilitate improvement and optimization in the information systems development process in an organization. This staged five level model was built on the proposition that the quality of the software product depends on the quality of the software development and maintenance processes (Söylemez & Tarhan, 2018). The five staged model for CMM and CMMI recommend practices in the process areas to enhance software development and maintenance capabilities (Cuenca et al., 2013). According to Curtis (2019), higher level maturity ratings in an organization leads to better software development than organizations with a lower level of maturity rating.

Despite the existence of various quality centric methods and process improvement techniques many software projects result in systems that do not function as intended, are not used, or are not delivered on time (Khan & Keung, 2016; Lu et al., 2011). Process improvement may not be the complete answer to improving project performance.

AlQaisi et al., (2017) propose that people and teams can shape the sociotechnical environment that exists in software development. The authors state that human related factors on software engineering have first order effect on software development outcomes. According to Yilmaz et al., (2017) team personnel factors are key elements that impact the effectiveness and productivity of software teams. Luna-Reyes et al., (2005) note that a substantial percentage of Information System (IS) failures are due to social and organizational factors, not just technical factors. According to Lu et al., (2011), team composition, dynamics, and interaction of team members are the most important aspects influencing IS development project success. Some of the important characteristics of teams include: work experience of team members; qualification of team members; and a sustainable mix of internal and external team members (Bloch et al., 2012).

Despite the importance of human factors and teams in software development, there is lack of progress in understanding these (Capretz et al., 2017; Almomani et al., 2018). Capretz et al., (2017) and Hoegl & Parboteeah (2007) highlight the presence of only a few qualitative and quantitative investigations about the role of team members and team characteristics. Muñoz et al., (2016) note that software development processes have major influences on the software team's performance. Therefore, the purpose of this study is to examine the moderating effects of team characteristics on project elapsed time of software development in the context of CMM/CMMI level software development environments.

Acquiring the right talent, retaining talent, workforce allocation and planning for critical work positions is a priority for software development managers. To fully utilize the capabilities of the workforce and for successful project completion. Several project factors may influence the success of a software development project. In this study, the focus is how team related factors impact software project outcomes when developers use CMM/CMMI level software development practices. Results from this study can benefit software development practitioners in making the right decisions about staffing teams and assisting team management. This study fits topics covered in the International Journal of Information