

**UNIVERSITI TEKNOLOGI MARA**

**ENHANCEMENT OF  
REQUIREMENTS REVIEW  
PROCESS AND  
CREATION OF SPECIFIC  
VALIDATION CRITERIA  
USING DESIGN SCIENCE  
RESEARCH METHODOLOGY**

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## ABSTRACT

Requirements review has been widely acknowledged as one of the validation techniques used in many software development projects which aims to ensure the feasibility of the software requirements specification. A reliable software system relies heavily on the quality of its software requirements. Poor quality of requirements causes unnecessary additional effort to fix the errors which eventually increases the project budget and delays the project implementation. Even though, requirements review has been recognized as a widely practiced validation technique in many organizations, practitioners are still encountering multiple obstacles related to unclear review scope, lack of preparation and difficulty in finding defects in lengthy specifications. These obstacles have hindered the project team from achieving the requirements review goal. Based on the reviewed literatures, several deficiencies have been observed, mainly on the lack of a standard review process, insufficient review guidelines and generic validation criteria. The aim of this study is to provide a standard guidance, in the form of a process-oriented framework, to facilitate defect identification activity of software requirements specification for business application. The study adopted the six-stage of Design Science Research Methodology (DSRM) : (1) identify problem and motivate, (2) define objectives of a solution, (3) design and development, (4) demonstration, (5) evaluation and (6) communication. This research work placed great emphasis on the applicability of the research outcome within the business organizational context. Due to the nature of the research topic, several methods were employed such as literature review, case study and expert judgement. The research activities were undertaken based on the 'problem-centered initiation' and later segregated into two phases : requirements review process and validation criteria. The research findings revealed the establishment of a requirements review process-oriented framework and formation of a specific validation criteria to guide the reviewer team in conducting defect identification of software requirements for business applications. The framework which comprises of guidelines and a standard review process, is an extension of previous research works related to requirements review process. While the validation criteria is a new contribution to the requirements engineering body of knowledge. The utilization of the framework and validation criteria during the case studies had shown positive outcomes when the practitioners were able to apply both artifacts in their software projects. The involvement of the panel of experts from seven organizations had also given better insights to the utilization of the framework within several industries. The expert judgement sessions were fruitful when a total of 16 recommendations were suggested by the practitioners to further improve the framework and another 23 recommendations for the validation criteria. Future research project may consider evaluating each of these recommendations in their scope of study. The uniqueness of this study exists in the fact that, positive collaboration efforts were obtained with the industry practitioners using real-world software projects. These experts have vast software development experience in various industries, which complements their constructive feedback in providing better insights to the outcomes of this research study. Following this research study, the validation criteria were adopted by two organizations to be used in their future requirements review activities. This positive outcome has further supported the applicability and the importance of the research study for industry practice.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

Requirements engineering is a crucial phase to determine the feasibility of the requirements for a software development project. It has been widely acknowledged as a systematic process of understanding and defining the requirements of software applications, which provide the solution for some real-world problems faced by practitioners. This sub discipline focuses on how a reliable software development process can help develop a good quality software system for organizations, which will ensure that their projects are delivered within the budget and time constraints (Bourque & Fairley, 2014).

A reliable software system relies heavily on the quality of its software requirements (Krasner, 2018; Wiegers & Beatty, 2013). Hence, requirements validation is one of the significant phases under requirements engineering which aims to ensure the feasibility of the software requirements specification (Bourque & Fairley, 2014; Pandey, 2013).

The importance of requirements validation has been widely acknowledged by practitioners and researchers to ensure requirements are correctly documented in the requirements specification (Atoum et al., 2021; Moketar et al., 2018). This activity is important since requirements specification plays a key role in project fulfilment and included as part of the contract documentation between the customer and the project team. The specification outlines the target requirements set by the customer and it reflects the expectations for the overall system in terms of its design, application logic and source codes construction. Poor quality of requirements causes unnecessary additional effort to fix the errors which eventually increases the project budget and delays the project implementation (Krasner, 2018; Pohl, 2010).

The Standish Group, an independent international Information Technology (IT) research organization which focuses on software project performance, has reported in its CHAOS 2020 report that 65% of software projects either end in partial or total failure. Only 35% of the projects meet the success factors of on time and within budget