



Continual Service Improvement: A Systematic Literature Review

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Abstract. Continual Service Improvement (CSI) is an ongoing activity to identify and improve organization practices and services to align them with changing needs. CSI is one of the core elements of IT Service Management (ITSM) frameworks. However, as a research topic it is still an emerging research area of service science. This study explores implementation of CSI and its seven-step improvement process in the context of ITSM. The goal of this paper is to present results of systematic literature review increasing understanding about the CSI and seven-step improvement process, and provide topics for future research. A Systematic Literature Review (SLR) was carried out to analyse CSI-related academic articles. Our main finding is that CSI-related terminology needs clarification and consistency both in academia and in practice to guide the future CSI research for example clarify roles and internal practices of CSI; provide a staged approach for continual improvement; and identify models that support improving and automating the seven-step improvement process.

Keywords: IT service management · ITSM · ITIL · CSI · seven-step improvement process · Systematic Literature Review

1 Introduction

Continual improvement of services plays a crucial role from the point of view of competitive advantage [1]. It is important for the IT service providers to continually evaluate and improve their IT services and IT service management processes [2]. IT services are transitioned to the service operation phase after design, and finally to the CSI phase [3]. The CSI phase includes a seven-step improvement process with following activities [1]: Identify the strategy for improvement; Define what you will measure; Gather the data; Process the data; Analyze the information and data; Present and use the information; Implement improvements. ISO/IEC 20000-1:2018 standard for service management [4] requires service providers to have activities for managing improvement. ISO 20000-1:2018 requirements for the improvement process can be characterized following 6

practices defined as performance indicators for Improvement [5]: 1) Establish commitment to continual improvement, 2) Determine evaluation criteria for opportunities for improvement, 3) Identify and record opportunities for improvement, 4) Prioritise and approve opportunities for improvement, 5) Implement improvements, and 6) Evaluate and report the effectiveness of implemented improvements.

According to ISO/IEC 20000-1:2018 standard for service management [4], improvements can include reactive and pro-active actions. Crain and Yetton [6] present improvement attributes such as; improvements are made to existing processes, improvements are identified continuously, improvement's level of change is incremental, improvements require little of time, and risk for improvements is moderate.

Customers' dependency on IT has been growing, forcing IT service providers to have more effective management [7]. According to Cater-Steel [8] "If IT service providers fail to provide a reliable customer-centric focus, it will impact on their organizations by limiting the potential for IT to add value". This has shifted the IT service providers' focus from a technology-oriented IT department to deliver IT services in a more service-oriented way [9, 7]. However, modern technology is becoming more diverse and complex. This drives IT service providers to spend a significant part of their time just maintaining the IT service and leaving little time for improvements and innovations that drive the IT service forward.

In order to make IT operations effective IT service providers are turning to the best practices and standards in the field of IT service management [10]. IT Service management (ITSM) is a set of objectives and processes used to direct and control the service provider's activities and resources for the design, transition, delivery, and improvement of services in conducting and fulfilling the service requirements [11]. The goal of ITSM is to manage the IT service infrastructure that delivers and ensures continuous operation of IT services to a customer [12]. To direct and control service management activities, it is essential to put a service management system (SMS) in a place to help organizations efficiently to deliver and support services to their customers [13]. Several frameworks are available to manage IT services and software development, such as COBIT [14], IT Infrastructure library (ITIL) [12], DevOps [15], and Scrum [16]. ITIL provides the practical service management knowledge to build IT service operation from lifecycle phases (service strategy, service design, service transition, service operation, and continual service improvement) [17].

In this systematic literature review, the goal is to find research papers related to ITIL Continual Service Improvement (service lifecycle phase) and particularly its seven-step improvement process. The rest of the paper is organized as follows. Section 2 describes the research method. Section 3 presents the findings of the literature review. Section 4 provides a discussion, and conclusions are given in Sect. 5.

2 Research Method

In this study, we used a Systematic Literature Review (SLR) to answer the research problem: How could IT service providers manage continual improvement in a systematic way? The goal of this study is to increase understanding about the CSI and provide topics for future research. The SLR presented in this study has carried out a structured

research process of Kitchenham et al., [18, 19] including three phases: 1) Planning the Review, 2) Conducting the Review, and 3) Reporting the Review. Following research questions are formulated: 1) What is the current state of a seven-step improvement process in literature?; 2) What kind of ITSM process improvement have been identified from literature?; 3) How to identify and manage improvements related to IT services and ITSM processes?; and 4) What opportunities could an automation bring to a seven-step improvement process?

2.1 The Search Process

The search process was organized according to guidelines of Petticrew and Roberts [20]. They suggest using the PICOC as criteria to frame research problem to construct search string for use with electronic databases. The identified synonyms for words are linked using the Boolean operators (OR, AND) to scope the question elements as following:

- Population (P): process (seven-step), practice or framework in which IT service providers are implemented to identify and manage improvement ideas in practice. Boolean attributes: *process OR practice OR model OR framework OR procedure OR method OR continual service improvement OR continual improvement OR CSI process OR 7-step OR seven-step improvement process OR improvement process OR continual service improvement process OR continuous improvement process*
- Intervention (I): clarify the continual improvement activities to perform specific tasks such as requirements specification of ISO/IEC 20000-1:2018 standard to continual improvement. Boolean attributes: *continuous OR continual*
- Comparison (C): describe how service provider performs ideas, initiatives or improvements in practice. Boolean attributes: *idea OR initiative OR change OR improvement*
- Outcomes (O): impact on service operation for example customer satisfaction, effectiveness or value. Boolean attributes: *satisfaction OR effectiveness OR quality OR prediction OR value*
- Context (C): context in IT service management and IT service providers in IT-business (industry). Boolean attributes: *IT service management OR ITIL OR ISO/IEC 20000 OR IT service provider*

2.2 Inclusion and Exclusion Criteria

The selected research problem on CSI guided us to identify and specify which articles are included and excluded. A predefined protocol is necessary to reduce the possibility of researcher's bias [19]. In this study research protocol includes following selection for including and excluding studies:

- Inclusion criteria: 1) Source type: Journal, book series, conference proceeding, 2) Published between 2010–2021, 3) Language: English, and 4) Articles related to discipline of service science, engineering and management.
- Exclusion criteria: 1) Papers are not peer-reviewed, 2) Papers are not available from University of Eastern Finland library, 3) Author's own articles, 4) Articles presenting research in progress, 5) Articles that did not match the inclusion criteria, 6) Posters and tutorials, 7) IEEE Xplore, ACM, Scopus, ScienceDirect, and Google Scholar first 30 results were reviewed, and 8) duplicates studies.

2.3 Data Collection

The systematic literature review was conducted on 11.11.-20.12.2021. Data collection was conducted in two phases and multiple databases were used to find relevant research articles (see Table 1). The first phase included six databases and word “IT service management” was a mandatory word in an abstract field which limited the results. After the first phase, authors decided to add a new database (SpringerLink) and keywords were merged together with the AND operation to increase results. Additionally, “IT service management” as a mandatory word in the abstract was deleted. The second phase expanded the search results (see Table 1).

Table 1. Databases and search results

No.	Database name	Phase 1	Phase 2
1	IEEEExplore	8	265
2	Association for Computing Machinery (ACM)	12	77
3	Scopus	33	192
4	Web of Science	6	1
5	ScienceDirect (Elsevier)	0	88
6	Google scholar	17573	2550
7	SpringerLink	-	10

By reading a title, an abstract, and keywords of an article the researcher evaluates whether the research was related to the research scope. Data search was documented into Microsoft Excel (database, year, topic area, research question/issue, summary of paper, whether the study referenced a research problem, reported quality bias, and cite) and analyzed whether the study supported or was closely related to the research problem. Overall, we identified 29 relevant studies: 8 journals and 21 conference articles. Findings are presented in Chapter 3 and on the tables in Chapter 4.

3 Findings

3.1 What is the Current State of a Seven-Step Improvement Process in Literature?

According to literature review, the concept of continual service improvement (CSI) was just mentioned to be part of the ITIL v3 life cycle. There is a lot of research on how ITIL processes and IT service management can be improved using other methodology such as Six Sigma. Donko [21] presents the improvement of the service quality using Six Sigma methodology. According to Donko [21], CSI interacts with the Plan-Do-Check-Act (PDCA) cycle, and the same idea can be recognized in Six Sigma methodology’s steps in DMAIC (Define, Measure, Analyse, Improve, Control) cycle. Additionally, Herrera and van Hillegersberg [22] present Lean, Six Sigma, and Lean Six Sigma approaches which have gained popularity to improve manufacturing and processes.

In this paper, the focus is to study how CSI and the seven-step improvement process have been studied in IT service management literature. As a result, a few studies have examined CSI in more detail. According to Lamichhane [23]: “Most of us have heard and read about continual service improvement but still don’t know from where to start its implementation process”. Lima et al., [24] present that in an IT Service Management setting, current approaches to support CSI suffer from many deficiencies and CSI activities typically rely on unstructured procedures based on weak data. Trinkenreich et al., [25] investigate how IT service managers define, measure, and monitor IT service goals and strategies, and the difficulties they have faced in this context such as: a) Lack of available time to work on measurement results, b) Lack of discipline to provide measurement data, c) Lack of process to deal with people’s behavioral issues, d) Lack of understanding on what to do with measurement results.

Yamamoto [17] checks the seven-step process activity items and identifies following maturity level problem: service management operations are not assessed to achieve business objectives. Kummamuru [26] proposes a CSI framework including phases: 1) capturing service improvement objectives in a holistic point of view, 2) prioritizing improvement objectives, 3) executing ideas through an appropriate implementation strategy, and measuring the managing improvement process. According to Kummamuru’s [26] study, using six sigma methods to implement improvements in production only helped to solve the identified problem, rather than identifying problems and improvements systematically.

3.2 What Kind of ITSM Process Improvement Have Been Identified from Literature?

During the literature review, several studies on ITSM process improvements were found. Articles focused on specific process challenges where data is analyzed to better identify the root cause of the problem and discover how the ITIL processes can be improved. Arisenta et al., [27] identify change management process maturity and improvements related to it. Lamichhane [23] focused on identifying potential of the improvements in the course business planning and realization processes of decisions. Lineberry [28] identifies that by implementing knowledge management (KM) practices IT organizations can have an opportunity to leverage understanding of their environment and tools to improve performance metrics, customer service, and collaboration.

Macías et al., [29] identify that most institutions in the public sector do not have their IT services catalog implemented. Indra and Hendra [30] present that a project team was ready to implement CSI on the project perspective, but challenges related to software support the CSI activities.

Ilvrianto and Legowo [31] study provide solution to a ticket reporting record system: 1) a ticket system need to be implemented in all business units, not only certain areas, 2) utilization of staff available to the number of incidents handled should be further analyzed and reviewed periodically so that the balance of resources can be met, and 3) maturity level measurement should be done periodically in every organization to trigger innovation and continual development.

Yuan et al., [32] identify that a lot of companies want customers to provide feedback, but companies do not pay the customers for their time as customers did in user studies.

Therefore, customers are getting smarter and ignoring such surveys. In the study, they integrate gamification into the IT service desks to create a loop of knowledge collaboration. In the process flow (users' journey), the customers will be rewarded, and they can earn points, and get gifts by providing useful feedback to IT service teams.

Dos Santos et al., [33] present that ITSM processes can contain segments where the human becomes a bottleneck and slows down the entire process. Karkošková [34] identify lack of comprehensive and efficient methodology for management of cloud computing services from a consumer' point of view. Related to CSI, they propose a new concept to CSI which is a "continual cloud service improvement management process" which focuses on improving long-term performance of cloud service by collecting data.

According to Kajbaf et al., [35] measurement and reporting are the key requirements of service improvement, which in turn are required for value creation and success in a competitive market. They propose an IT service reporting framework to help organizations implementing IT service improvement process in relation to ISO/IEC 20000 PDCA-cycle and identified the following report types which could be used to identify service improvements: 1) Reporting routine task, 2) reporting assigned task, 3) reporting on events 4) reporting on service, 5) reports on review meeting, and 6) management reports.

3.3 How to Identify and Manage Improvements Related to IT Services and ITSM Processes?

Kirilov and Mitev [36] propose a pattern of ITIL integration activities consisting of 4 stages: assessment of ITSM processes, creating a roadmap for ITIL implementation, managing the transition and evaluation, and continual service improvement. Additionally, Abdelkebir et al., [13] propose three tasks to support ITIL usage: defining goals through a Process Maturity Framework (PMF), auditing Quality Management System (QMS), Project Management and a Continuous Service Improvement Program (CSIP). According to Kirilov and Mitev [36], after successful IT management framework implementation, the continual improvement starts. Kirilov and Mitev present that improvement can be based on the experienced results such as ideas noticed during the transition (implies that some best practices are applied appropriately) or during regular audits (conducted yearly to optimize the IT management process).

Jaadla and Johansson [37] state that the assessment of process maturity is commonly used as the starting point of identifying improvements that would be the most beneficial to perform. According to them, the continual improvement of service management processes can be measured by performing a process maturity assessment and comparing the organization's process performance against a best-practice reference set of processes.

Several assessment frameworks exist; however, the most existing assessments are qualitative in nature, which makes them expensive to apply, especially repeated regularly. Shrestha et al., [38] developed a Software-mediated Process Assessment (SMPA) approach that enables the assessment of ITSM processes. The SMPA approach includes process selection; an online survey to collect assessment data; a measurement of process capability; and a report of process improvement recommendations. The SMPA approach supports decision-making on process improvements.

Cortina et al., [39] present the Tudor IT Process Assessment (TIPA) framework to improve ITSM process assessment which can be used to increase the business value of IT services. According to Silva et al., [40] TIPA-framework does not have any relationship between Enterprise Architecture (EA) principles that are useful in understanding organizations and the business. Silva et al., [40] create graphical notation which closes the gap between Enterprise Architecture (EA) and TIPA making it easier for organizations to improve (visualize) their processes and achieve desired process maturity levels.

The research of Abdelkebir et al., [13] aims to identify the important aspects that propose a practical agile framework for ITSM. Their study enables decision-makers to improve and measure agility enhancements and hence, compare the agility of Information Systems before and after Agile Process Maturity Framework (APMF) deploying. Cater-Steel and Lepmets [41] present IT service quality measurement framework in industry to propose feasibility of measuring of interlinked IT service quality aspects. Findings of Cater-Steel and Lepmets support systemic approach to IT service measurement because various service areas are interlinked and stability of IT service impacts on process performance and customer satisfaction.

Jäntti [42] describes the KISMET (Keys to IT Service Management Excellence Technique) model for process improvement. Phases are: 1) Create a process improvement infrastructure, 2) Perform a process assessment, 3) Plan process improvement actions 4) Improve/Implement the process based on ITSM practices, 5) Deploy and introduce the process, 6) Evaluate process improvement, and 7) Continuous process/service improvement. From the CSI point of view, KISMET model's phases could be used to form a structure to the seven-step improvement process's Implement improvement phase.

3.4 What Opportunities Could an Automation Bring to a Seven-Step Improvement Process?

Shiono et al., [43] propose a graphic visualization of the relationship between processes and documents. Their approach helps to improve work efficiency and management processes. Related to documentation, Ahmad et al., [44] present proper documentation and effective process design can give directions to organizations to implement ISO/IEC 20000 in an effective way. According to Krishnan and Ravindran [45] digital transformation forces the organization to implement automation solutions to meet demands of the digital services. Krishnan and Ravindran reviewed the automation scope of ITIL process perspective and identified that in service operation processes have the highest scope for automation opportunities (75% to 85%) and CSI 20% to 25%. Guzman et al., [46] present in their study that Twitter messages (tweets) contain important information for software improvement and requirements evolution (e.g., feature requests, bug reports and feature shortcoming descriptions). The study of Rouhani [47] focused on ITSM software selection to achieve successful ITSM implementation. She/he proposed ITIL-based framework present ITSM software selection criteria such as functional and non-functional requirements.

4 Discussion

4.1 Aspect of Continual Service Improvement in Literature

In the academic literature, studies on the systematic implementation of the CSI or seven-step improvement process in the ITSM context is a rarely studied topic. There is a lot of research on how ITIL processes and service management can be improved using other industry methodology such as Six Sigma and Lean. Six Sigma refers to a statistical measure to indicate the defect within a process [22] and Lean can be applied in situations where the process is already in use but need for improvements [48]. From this point of view, Six sigma and Lean would have brought a slightly different perspective focusing more on fixing problems than creating a process to improve service continually [48]. The way, how the improvement to the IT service is produced, contains a weak visibility of impacts, modeling, and metrics [24, 23]. According to the literature, CSI is an important phase, but articles mainly focus on describing the CSI as a part of ITIL framework. Terminologically, CSI is discussed in academia confusingly: various concepts are used without a clear definition such as CSI process, CSI activities, CSI program, 7-step process activity items, and Continuous Service Improvement Program (CSIP). In this case, forming a perception is challenging due to missing and vague definitions. Summary of literature contribution is presented on Table 2.

Table 2. Aspect of CSI in literature

No.	Researcher	Contribution
1	Donko (2014)	Present results of using Six Sigma methodology
2	Herrera & van Hillegersberg (2019)	Propose an integrated approach of Lean Six Sigma for Continuous Improvement (CI) to IT Services
3	Lamichhane (2019)	Present that it is unclear how to start to implement the ITIL CSI process
4	Lima et al., (2012)	Present that CSI improvement suffer of weak visibility of impacts, modeling, and metrics
5	Trinkenreich et al., (2018)	Identify that IT service managers faced difficulties related to define and monitor IT service goals and strategy
6	Yamamoto (2017)	Identify maturity level problem related to 7-step process activity items
7	Kummamuru (2011)	Propose a CSI framework to ensuring systematic service improvement

4.2 Identify and Manage Improvements Related to IT Service and ITSM Processes

According to the literature, improvements could be identified to have two focuses: 1) the service that is provided and 2) the way (process) that the service is provided. A large number of studies focus on making a resolution of an IT service provider's specific ITSM process problem. In those studies, case organization's challenges were analyzed to identify the root cause of the problem and then discover how the ITIL processes can be improved. These studies support the search for solutions to identify similar problems, for example in the development of an incident management process. However, through these studies, it is challenging to clarify a systematic and repeatable seven-step improvement management process which could be implemented to the IT service provider organization. Abdelkebir et al., [13] study presents that ITSM maturity is low (Level 1–2) which could indicate why only few CSI related papers are found in literature review. A process is an agreed way to accomplish something including steps, inputs, outputs and process monitoring which can be used to verify the outcome of the process. For example, ISO/IEC 20000-1:2018 [4] defines requirements to continual improvement where the process consists of the following steps: improvements are documented, improvement's goal have been set (e.g., quality, value, cost, productivity, and risk reduction), improvements are prioritized, improvements are planned, improvements are implemented, improvements are measured, and improvements are reported. To support the implementation of improvements related to IT services and ITSM processes, future research could explore the possibility of adding a new step to the seven-step improvement process (e.g., evaluate the effectiveness of implemented improvements). Summary of literature contribution is presented on Table 3.

Table 3. Identify and manage improvements related to IT service and ITSM processes

No.	Researcher	Contribution
8	Arisenta et al., 2020	Change management process
9	Lineberry (2019)	Knowledge management
10	Macías et al., (2018)	Service catalogue management
11	Indra & Hendra (2018)	Project management
12	Ilvarianto & Legowo (2017)	Incident management process
13	Yuan et al., (2017)	Feedback management and knowledge management
14	Karkošková (2018)	Continual cloud service improvement management process
15	Dos Santos et al., (2011)	ITSM processes and people perspective
16	Kajbaf (2011)	Report types (reporting process)
17	Kirilov & Mitev (2021)	Improvements can be identify from experienced results or during regular audits

(continued)

Table 3. (continued)

No.	Researcher	Contribution
18	Jaadla & Johansson (2019)	Design a quotative measuring tool to a recurring maturity self assessment
19	Shrestha et al., (2016)	Develop a Software-mediated Process Assessment (SMPA) approach that enables assessment of ITSM processes
20	Cortina et al., (2013)	Present Tudor IT Process Assessment (TIPA) framework to improve ITSM process assessment
21	Silva et al., (2015)	Create graphical notation between Enterprise Architecture (EA) and TIPA
22	Abdelkebir et al., (2017)	Propose Agile Process Maturity Framework (APMF)
23	Cater-Steel & Lepmets (2014)	Systemic approach to IT service measurement
24	Jäntti (2012)	Keys to IT Service Management Excellence Technique (KISMET) model for process improvement

4.3 Improving and Automating the Seven-Step Improvement Process

Related to literature, the scope of the seven-step improvement process automation is 20–25% [45]. These results could be increased if the maturity of the seven-step improvement process increases. The maturity of the seven-step improvement process shall be more to support other ITSM process capability and overall organizational maturity. The assessment of process maturity is commonly used as the starting point to identify improvements that would be the most beneficial to perform [37]. From the continual improvement point of view, the seven-step improvement process should be applicable at any ITSM processes and organizational levels. Otherwise, it would not support improvements and increasing maturity in immature IT service provider organizations where it is needed most. Summary of literature contribution is presented on Table 4.

Table 4. Improving and automating the seven-step improvement process

No	Researcher	Contribution
25	Shiono et al., (2021)	Propose graphic visualization of the relationship between processes and documents to understand ITSM structure
26	Ahmad et al., (2020)	Identify challenges related to the ISO/IEC 20000 implementation (e.g., senior management support, justification of investment, cooperation among IT support teams, documentation and effective process design)

(continued)

Table 4. (continued)

No	Researcher	Contribution
27	Krishnan & Ravindran (2017)	Identify that CSI automation opportunities are 20% to 25%
28	Guzman et al., 2017)	Propose analysis techniques to summarizing, classifying, and prioritizing tweets
29	Rouhani (2017)	Present ITSM software criteria to achieve successful ITSM implementation

5 Conclusion

This study aimed at answering the research problem: How could IT service providers manage continual improvement in a systematic way? The goal of this paper was to present results of systematic literature review increasing understanding about the CSI and seven-step improvement process, and provide topics for future research. The research is related to ITIL-based CSI and its seven-step improvement process because ITIL is a widely used framework for managing IT services and its vocabulary and practices are familiar to IT service providers. Our main finding is that CSI-related terminology needs clarification and consistency both in academia and in practice to guide the future CSI research for example clarify roles and internal practices of CSI; provide a staged approach for continual improvement; and identify models that support improving and automating the seven-step improvement process.

The study consisted of four research questions. Regarding the first research question “What is the current state of a seven-step improvement process in literature” we focused on present CSI related studies in the context of IT service management. Our findings indicate that, in the literature, there was not much research on the CSI phase and its seven-step improvement process which could be used to improve IT services and ITSM processes systematically.

Our findings from the second research question “What kind of ITSM process improvement have been identified from literature?” revealed that process improvement has been studied, especially from the point of view of Lean and Six Sigma methods. From this point of view, Six sigma and Lean would have brought a slightly different perspective focusing more on fixing problems than creating a process to improve service continually [48].

The third research question “How to identify and manage improvements related to IT services and ITSM processes?” focused on study models which support to improve and implement ITSM process and IT services. Maturity and quality aspects in IT services and ICT systems could not be improved without systematic management of improvements. We observed that identifying and managing improvements may need for example: 1) frameworks for process assessment, quality auditing and Enterprise Architecture to defining planned goals for improvement, 2) prioritization and roadmap for improvement implementation, 3) managing the transition such as Project Management, and 4) the evaluation of improvement.

The fourth research question “What opportunities could an automation bring to a seven-step improvement process?” focused on aspects of how to use automation and process visualization to implement the seven-step improvement process. Automation can be used, for example, to increase visualization of the relationships between processes and documents [43], and to analyze service management records and tweets [46].

The following limitations are related to this study: First, the literature review was conducted by one researcher, the first author. Several researchers would have helped in the analysis of the literature review results. Second, the study was conducted within a limited time. A longer research period would have resulted in more studies and deepened analysis. We aimed at improving the validity of the study by using Kitchenham [19] guidelines for performing Systematic Literature Reviews. Reliability was improved by utilizing datastore and maintaining the chain of evidence. Future studies could focus on examining the seven-step improvement process in more detail and identifying the interfaces to other ITSM processes and ISO/IEC 20000-1:2018 standard requirements for continual improvement as part of the whole process.

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