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Improving ITIL practices using GenAI for agility and decision- making

A Systematic Review and Research Gaps in ITSM Applications

Vinícius Santos

Master Thesis

presented as partial requirement for obtaining a Master's Degree in Information Management

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

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Improving ITIL practices using GenAI for agility and decision-making
A Systematic Review and Research Gaps in ITSM Applications

by

Vinícius Santos

Master Thesis presented as partial requirement for obtaining the Master's degree in Information Management, with a specialization in Digital Transformation

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February, 2025

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism, any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

[Lisbon, 28/02/2025]

Vinícius Santos

DEDICATION

I would like to dedicate this work firstly to my parents who always emphasized the great need for studies in my life, and also to my wife, all my uncles and friends, work colleagues who supported me throughout this journey.

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I would like to say, first, thanks to my advisor, Professor PhD. Manuela Aparício Costa, and expressing my sincere gratitude during all this period, with your patience and your guidance that always was attentive and helpful helping me in this job.

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ABSTRACT

The ITIL framework is a widely adopted standard for IT service management (ITSM), ensuring structured processes and operational efficiency. However, its reliance on manual workflows limits agility and responsiveness in dynamic digital environments. While Artificial Intelligence (AI) has demonstrated potential in ITSM, the specific role of Generative AI (GenAI) within ITIL remains underexplored. Given its capabilities in automation, decision-making, and process optimization, integrating GenAI could transform traditional ITIL practices.

This research explores how GenAI can enhance ITIL processes, particularly in incident management and decision-making, by increasing automation and operational agility. Using the PRISMA methodology, a systematic literature review (SLR) is conducted to analyze existing studies on AI applications in ITIL and ITSM, identifying key gaps and opportunities for GenAI-driven automation. The study aims to provide a comprehensive overview of current research while outlining critical areas where GenAI can optimize workflows and improve predictive capabilities.

Based on these insights, a theoretical framework is proposed to illustrate how GenAI can enhance ITIL workflows, supporting adaptive decision-making and fostering greater efficiency in IT service management. The expected outcomes include a structured model for AI-driven ITSM and alignment with key Sustainable Development Goals (SDGs), particularly in promoting innovation, improving service efficiency, and ensuring responsible technology adoption.

KEYWORDS

Artificial Intelligence; GenAI; ITIL; ITSM; Decision Making; Predictive Analysis

Sustainable Development Goals (SDG):



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LIST OF ABBREVIATIONS AND ACRONYMS

AI	Artificial Intelligence - Discussion on process automation and impact on digital transformation
AIOps	Artificial Intelligence for IT Operations - Application of artificial intelligence in incident management and optimization of ITIL processes
BI	Business Intelligence - Using analytical data for strategic decision making
CI/CD	Control Integration / Continuous Deployment - Agile methods for automating software development and operations
CMMI	Capability Maturity Model Integration - Maturity model for improving IT processes and evaluating organizational performance
COBIT	Control Objectives for Information and Related Technologies - IT governance and risk management model
GenAI	Generative Artificial Intelligence - Using generative AI for automation, predictive analytics and decision support
IT	Information Technology - Technology infrastructure and IT operations, including governance, automation, information security and support for digital transformation
IoT	Internet of Things - Integration of connected devices into IT infrastructure management
ITIL	Information Technology Infrastructure Library - Main study framework for IT service management
ITSM	IT Service Management - IT service management, operations support and process automation
KPIs	Key Performance Indicators - Indicators used to measure IT service performance and operational efficiency
ML	Machine Learning - Machine learning applied to failure prediction, decision automation and service optimization
MLOps	Machine Learning Operations - Practices, maturity models, roles, tools and challenges in integrating Machine Learning into IT operations
NLP	Natural Language Processing - Natural language processing for chatbots, technical support and data analysis

PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Method used to conduct the Systematic Literature Review (SLR)
QOC	Questions, Options and Criteria - Decision support framework that uses artificial intelligence to improve transparency, efficiency and traceability in complex analyses within ITIL
SDG	Sustainable Development Goals - Set of 17 global goals established by the UN (United Nations) to promote a more sustainable future, balancing economic growth, social inclusion and environmental protection by 2030
SLA	Service Level Agreement - Service Level Agreements that define standards and expectations in IT
SLO	Service Level Objective - Objectives that guide the quality and reliability of IT services
SLR	Systematic Literature Review - Methodology used to analyze academic publications in the study
SMEs	Small and Medium Enterprises - Small and medium-sized businesses, often analyzed in the context of ITIL adoption, digital transformation, and implementation of IT service management practices
SVS	Service Value System - ITIL value system that structures service delivery
SVC	Service Value Chain - ITIL Service Value Chain, Modeling the Service Lifecycle
XAI	eXplainable AI - Artificial intelligence approach that seeks to make AI models more interpretable and transparent, allowing users and experts to understand how decisions are made

1. INTRODUCTION

The Information Technology Infrastructure Library (ITIL) framework (Poi Wong, 2019) is widely recognized for managing IT services efficiently. However, its reliance on manual operations poses challenges in achieving agility and responsiveness, especially in today's fast-paced digital environment. The rapid evolution of Artificial Intelligence (AI) has demonstrated its potential to optimize IT Service Management (ITSM) processes, yet the specific integration of Generative AI (GenAI) within ITIL remains largely unexplored (Brusakova, 2020; Meng et al., 2018). Given GenAI's ability to automate complex tasks, enhance decision-making, and improve efficiency, its application within ITIL could redefine traditional ITSM practices.

Despite increasing interest in AI-driven ITSM solutions, research has primarily focused on Machine Learning (ML) and AIOps for predictive analysis, anomaly detection, and incident management (Ahmed et al., 2022b, 2023a, 2023b; Brusakova, 2020). However, there is a significant research gap in understanding how GenAI can transform ITIL processes beyond these capabilities. Current studies fail to provide a comprehensive framework that explores how GenAI can enhance ITIL's agility, decision-making, and operational efficiency (Orta et al., 2014; Zuev et al., 2018a). This thesis addresses this gap by systematically reviewing existing literature and proposing a theoretical framework for GenAI-driven ITIL practices.

This study explores how GenAI can enhance key ITIL processes, particularly in incident management and decision-making, by increasing automation and improving operational agility. By examining the potential of GenAI to streamline workflows, optimize resource allocation, and reduce manual interventions, this research aims to develop a theoretical framework that demonstrates its effective integration into ITSM. The proposed framework will illustrate how AI-driven automation can enhance ITIL's adaptability, predictive capabilities, and overall efficiency, ultimately redefining traditional service management practices.

The research follows a rigorous Systematic Literature Review (SLR) methodology, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Moher et al., 2009). The data extraction will be conducted across reputable databases such as Scopus, IEEE Xplore, Science Direct, Web of Science (WoS), ACM DL (Digital Library), AISel (Association for Information Systems) and Google Scholar, utilizing key terms including "GenAI," "ITIL," "ITSM", "Decision Making", "Artificial Intelligence" and "Predictive Analysis". The selected studies will undergo a structured analysis to extract insights on GenAI's potential role in ITIL, forming the basis for the proposed framework (Sarnovsky & Furdik, 2011; Zuev et al., 2018a).

The main results of this research include a structured theoretical framework that outlines how GenAI can optimize ITIL processes, particularly in incident management, predictive analytics,

and decision support systems. By synthesizing existing research and identifying current gaps, this study will establish an important theoretical framework foundation for future advancements in AI-driven ITSM (Meng et al., 2018; Poi Wong, 2019).

This thesis contributes to academic theoretical domains by introducing an AI-enhanced ITIL framework, suggesting organizations to improve efficiency, automation, and decision-making in ITSM. Additionally, it aligns with the Sustainable Development Goals (SDGs) by promoting technological innovation (SDG 9), economic growth through IT service optimization (SDG 8), and responsible resource utilization (SDG 12).

Finally, this thesis is structured as follows: Chapter 2 presents the literature review covering ITIL, AI, and ITSM advancements. Chapter 3 details the research methodology, focusing on the PRISMA framework and the systematic approach used for data collection and analysis. Chapter 4 discusses the systematic analysis of AI in ITIL and introduces the proposed framework. Chapter 5 presents the results and discussion, including the evaluation of findings and the introduction of the proposed GenAI-AIOps framework. Chapter 6 concludes the thesis by summarizing the key findings, discussing theoretical and practical contributions, identifying implications and limitations, and outlining future research directions.

2. LITERATURE REVIEW

2.1. THEORETICAL CONTEXT BACKGROUND

The integration of emerging technologies, such as Generative AI (GenAI), into IT Service Management (ITSM) practices is a growing field of study (Ahmed et al., 2023b; Reinhard, Li, Dickhaut, & Leimeister, 2023, 2023), focusing on improving the efficiency and agility of ITIL processes (Ahmed et al., 2022b; Tanović & Hasibović, 2024). This literature review aims to compile and synthesize the current knowledge on the impact of GenAI on ITIL, particularly in practices like incident management and decision-making (Ahmed et al., 2023b; Dzemydienė et al., 2024), identifying gaps and proposing a direction for future research (Reinhard, Li, Dickhaut, & Leimeister, 2023; Reinhard, Li, Dickhaut, Reh, et al., 2023).

2.1.1. GENAI AND THE CONTEXT OF ITIL AND ITSM: FUNDAMENTALS AND EVOLUTION

The Information Technology Infrastructure Library (ITIL) is widely recognized as a framework of best practices for IT service management. Its objective is to standardize processes, improve service quality, and align IT with business needs. Since its creation, ITIL has evolved, with recent versions (such as ITIL v4) focusing on agility and adapting to disruptive technologies (Peliarachchi & Wijayanayake, 2023). With the emergence of GenAI, there is a new opportunity to integrate this technology to enhance ITIL practices (Tanović & Hasibović, 2024).

Generative AI represents a significant advancement in artificial intelligence, enabling the creation of customized content, predictions, and automation. In the context of ITSM, GenAI offers unique potentials to improve decision-making and agility, particularly in incident management, where predictive analytics can minimize response time and improve resource allocation (P. Sharma & Kulkarni, 2024, Roy et al., 2024). Studies suggest that GenAI can automate repetitive processes, reduce human errors, and provide predictive insights, making it a strategic component for the digital transformation of ITSM (Mora et al., 2024, Santillan et al., 2024). These advancements align with ITSM goals, especially in incident risk prediction (Ahmed et al., 2022b, Lyu et al., 2024).

2.1.2. KEY AREAS IN THE CONTEXT OF ITSM, GEN AI AND INTEGRATION WITH ITIL

Information Technology Service Management (ITSM) focuses on enhancing the efficiency and reliability of IT services while aligning them with business objectives. By integrating advanced technologies such as Generative AI (GenAI), organizations can optimize key areas in ITSM, including automation, knowledge management, predictive analytics, and service optimization.

- Automation
- Agility and Flexibility
- Predictive Analysis and Decision Making

Automation is a cornerstone of ITSM, transforming routine processes and minimizing manual intervention. Studies highlight that automating repetitive tasks such as incident classification and resolution significantly reduces operational overheads and enhances service quality. According to Ahmed et al. (2023b) emphasize the importance of AI-driven tools in automating incident triage and resource allocation, leading to improved operational efficiency.

Agility has become increasingly critical in ITSM, enabling organizations to respond effectively to rapidly evolving business and technological landscapes. By integrating agile principles into ITIL practices, ITSM frameworks can better address dynamic requirements. According to Sahid et al. (2017), note that agility enhances the responsiveness of IT operations, improving service delivery and organizational adaptability. GenAI further enhances flexibility by providing real-time insights and adaptive solutions, facilitating faster decision-making during disruptions (Mora et al., 2024).

Predictive analytics is a transformative tool in ITSM, enabling proactive management of incidents and resources. AI-powered models, such as machine learning and pattern recognition systems, analyze historical data to identify potential failures and optimize resolution strategies. According to Li et al. (2024) highlight how predictive models improve decision-making by reducing service downtime and enhancing resource allocation efficiency. Additionally, Ahmed et al. (2023b) demonstrate that predictive analytics significantly improves change and incident management by minimizing risks and streamlining operations.

The GenAI and Integration with ITIL section explores the main ITIL practices that can benefit from the integration of GenAI, highlighting how the technology can optimize critical processes:

- Incident Management
- Change Management and Predictive Decision-Making
- Knowledge Management and Process Automation

The studies indicate that GenAI can accelerate response time by predicting incidents based on historical patterns (Aparicio-Lecca et al., 2024). By automating the classification and initial resolution of incidents, GenAI reduces the workload of teams and improves operational efficiency (Cusick & Ma, 2010).

GenAI's capacity for predictive analysis enables more agile change management, minimizing risks by anticipating potential impacts (Bazzan et al., 2024). The integration of GenAI in decision-making frameworks enhances the ability to manage transitions.

GenAI facilitates the creation and continuous update of knowledge bases, providing automated responses to frequent queries and optimizing information distribution (Santillan et al., 2024). It also introduces advanced automation tools that transform information processing workflows (Jabour et al., 2023).

2.1.3. GAPS IN LITERATURE AND RESEARCH OPPORTUNITIES

Although there are studies on AIOps and machine learning in ITSM, the application of GenAI specifically to ITIL is limited (Schmidt et al., 2024). Few studies address the practical integration of GenAI into ITIL processes and the direct implications for efficiency and agility (Ahmed et al., 2022c, 2022b). This highlights a gap that this research aims to fill, proposing a theoretical framework that guides the use of GenAI in ITIL practices to enhance agility and decision-making (Brusakova, 2020).

2.2. LITERATURE REVIEW METHODOLOGY

This study follows a Systematic Literature Review (SLR) based on the PRISMA guidelines. The criteria at beginning started selecting concrete and solid databases to obtain research documentation. The database selected was composed by the references below following this order:

1. Scopus
2. IEEE Xplore
3. Science Direct
4. Web of Science (WoS)
5. ACM DL (Digital Library)
6. AISel (Association for Information Systems)
7. Google Scholar

The adoption of Zotero as bibliographic reference management, to import, review, filter, and using plugin features to analyze data. Within great useability to export data to VOSviewer and Bibliometrix tools.

2.2.1. RESEARCH QUESTIONS

Starting the research on Scopus, since available the opportunity and possibility to use the Scopus AI tool and the explore deeper feature, in the keyword search was possible to found and obtain some questions based on the criteria as follow:

1. Keyword search query: ("ITIL" OR "information technology infrastructure library" OR "IT service management" OR "ITIL framework")

Q1: What are the potential benefits of integrating GenAI into ITIL processes?

Q2: How can GenAI be leveraged to enhance the efficiency of ITIL processes?

Q3: What are the unexplored opportunities for integrating GenAI into ITIL processes?

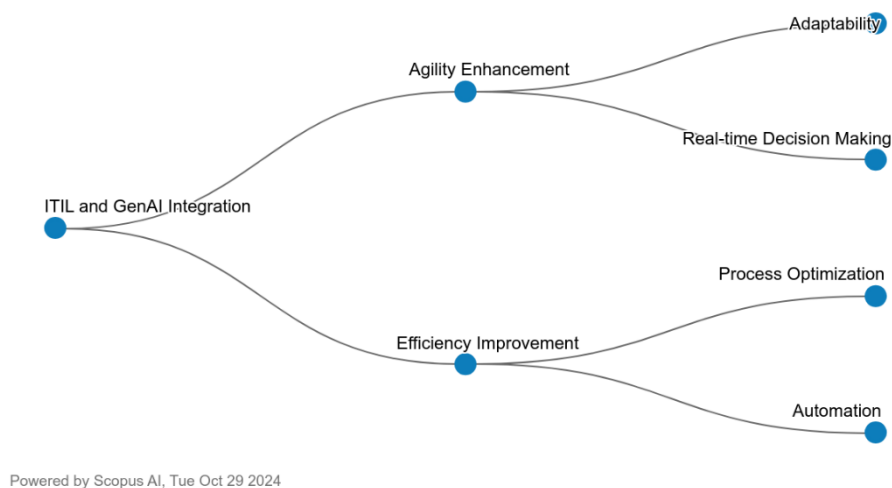


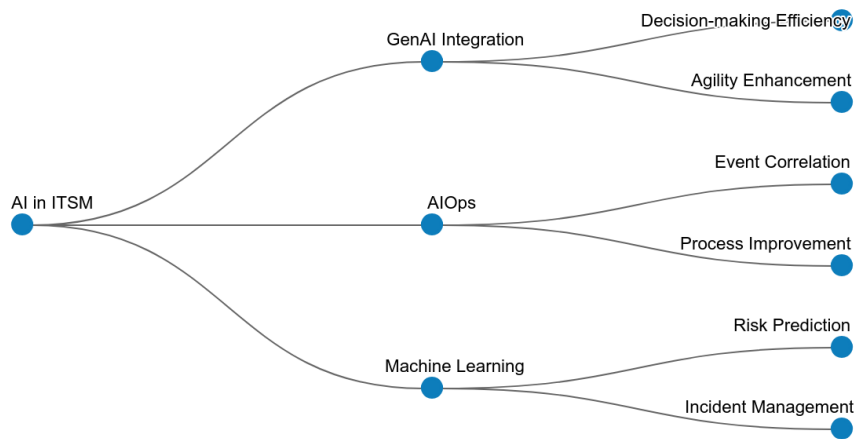
Figure 1 – Integration Map ITIL and GenAI

2. Keyword search query: ("GenAI" OR "genetic algorithms" OR "evolutionary algorithms" OR "genetic programming") AND "ITIL" AND ("information technology infrastructure library" OR "IT service management" OR "ITIL framework" OR "ITIL processes")

Q1: What are the potential applications of GenAI in incident management with ITIL?

Q2: How can GenAI enhance decision-making processes in ITIL implementations?

Q3: What framework can be proposed for integrating GenAI into future ITSM implementations based on ITIL principles?



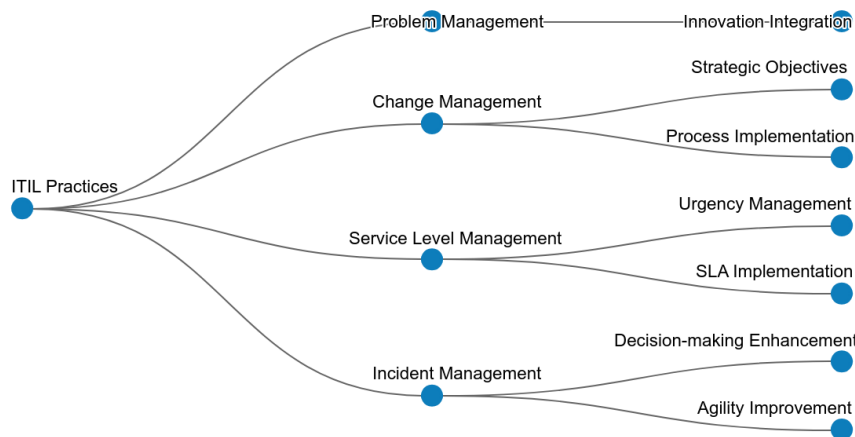
Powered by Scopus AI, Wed Oct 30 2024

Figure 2 – Integration Map AI and ITSM

3. Keyword search query: ("**GenAI**" OR "**genetic algorithms**" OR "**evolutionary computing**" OR "**genetic programming**") AND "**ITIL**" AND "**ITSM**" AND ("**information technology infrastructure library**" OR "**IT service management**" OR "**service desk**" OR "**incident management**")

Q1: How can GenAI be integrated into ITIL practices to improve agility in incident management and decision-making?

Q2: What are the potential challenges in integrating GenAI into ITIL practices and how can they be addressed in a theoretical framework?



Powered by Scopus AI, Thu Oct 31 2024

Figure 3 – Integration Map ITIL Practices

Refining the material provided within the conceptual model and the concept path summary, was defined 5 main research questions:

1. **RQ1:** *What are the potential benefits of integrating GenAI into ITIL processes to increase efficiency and agility?*
2. **RQ2:** *What unexplored opportunities exist for applying GenAI in incident management within ITIL?*
3. **RQ3:** *How can GenAI be applied to improve decision-making processes in the context of ITIL?*
4. **RQ4:** *What theoretical framework can be proposed for integrating GenAI into future ITSM implementations based on ITIL principles?*
5. **RQ5:** *What potential challenges arise in integrating GenAI with ITIL practices, and how can they be addressed in developing a framework?*

2.2.2. RESEARCH PROCESS

These databases were chosen based on factors such as the scope of the topic, the frequency of updates, the availability of the full content of the studies, the quality of the automatic search engine, the functionality of exporting results, or integration with extensions that allowed such export, and the possibility of repeating automatic searches. No initial date was set for the search. Considering the documentation found composed between 1962 and 2025. The research process involved 2 (two) methods to create the complex table for the systematic literature review:

- Manual research process
- Scopus AI tool

The manual research is used in the databases, defining specific strings with the following keywords: *ITIL, AI, ITSM, Artificial Intelligence, ITIL, Decision Making, Information Technology, IT Service Management, and Predictive Analysis*. When available, each result was exported to files using format extensions .ris, .bib, .csv, or .txt. The results from the strings and values using the manual process are visible in Table 1.

To broaden the range of articles considered, the search encompassed all sections, including the title, abstract, keywords, and full text of the articles. The files were imported into Zotero to record references and validate content integrity.

Two databases were excluded from the research: AISeL (Association for Information Systems) and Google Scholar. During the research in AISeL, 447 documents were identified, of which 236 were duplicates, and the remaining 211 were deemed irrelevant to the research context.

Google Scholar was excluded because its export formats and search fields were incompatible with the tools used in the research process.

Table 1 – Strings results on manual process

Search strings (\wedge = AND)	Scopus	IEEE Xplore	Science Direct	WoS	ACM DL	Total
"itil"	129	31	170	113	28	471
"ai " \wedge "artificial intelligence"	13	5	33	3	22	76
"artificial intelligence" \wedge "itil" \wedge "itsm"	11	5	6	6	9	37
"artificial intelligence" \wedge "itil"	43	22	96	27	68	256
"artificial intelligence" \wedge "itsm"	28	13	27	17	22	107
"artificial intelligence" \wedge "decision making" \wedge "itil"	5	2	59	5	35	106
"artificial intelligence" \wedge "information technology" \wedge "it service management"	21	21	112	8	30	192
"itsm" \wedge "decision making"	29	7	63	14	35	148
"itil" \wedge "decision making"	80	23	90	39	127	359
"artificial intelligence" \wedge "predictive analysis" \wedge "decision making"	92	34	252	42	309	729
Total.....	451	163	908	274	685	2481

Using the Scopus AI tool, the research strings were automatically generated based on the thesis introduction, aligning with the Context, Research Gap, Objectives, and Methodological Approach. This process exclusively utilized the Scopus database, with results spanning the period from 2004 to 2024. The strings were provided automatically according to the context and were validated to avoid non parametrization. The results for the strings are visible in Table 2 as shown below.

Table 2 – Strings results on Scopus AI

Search strings (\wedge = AND, \vee = OR)	Total
("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "ITIL framework")	43
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "IT service delivery") \wedge ("integration" \vee "incorporation" \vee "assimilation" \vee "implementation") \wedge ("processes" \vee "procedures" \vee "operations" \vee "methods")	12
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge "ITIL" \wedge ("processes" \vee "service management" \vee "IT service management" \vee "incident management" \vee "problem management" \vee "change management")	11
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "IT service delivery") \wedge ("integration" \vee "incorporation" \vee "assimilation" \vee "implementation") \wedge ("processes" \vee "procedures" \vee "operations" \vee "workflow")	12
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge "ITIL" \wedge ("information technology infrastructure library" \vee "IT service management" \vee "ITIL framework" \vee "ITIL processes")	66
("GenAI" \vee "genetic algorithms" \vee "genetic programming" \vee "evolutionary algorithms") \wedge ("incident management" \vee "problem management" \vee "issue resolution") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "IT service delivery")	8
("GenAI" \vee "genetic algorithms" \vee "evolutionary computing" \vee "genetic programming") \wedge ("decision making" \vee "decision support" \vee "choice" \vee "selection") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "IT operations") \wedge ("implementations" \vee "deployment" \vee "execution" \vee "application")	14
("GenAI" \vee "AI integration" \vee "artificial intelligence integration" \vee "machine learning integration") \wedge ("ITSM" \vee "IT service management") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT infrastructure library")	6
("GenAI" \vee "genetic algorithms" \vee "evolutionary computing" \vee "genetic programming") \wedge "ITIL" \wedge "ITSM" \wedge ("information technology infrastructure library" \vee "IT service management" \vee "service desk" \vee "incident management")	11
("PRISMA" \vee "preferred reporting items for systematic reviews \wedge metaanalyses") \wedge ("methodology" \vee "procedure" \vee "approach" \vee "technique") \wedge ("systematic literature review" \vee "SLR" \vee "literature synthesis" \vee "bibliographic survey")	17
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge ("ITIL" \vee "information technology infrastructure library") \wedge ("agility" \vee "flexibility" \vee "adaptability" \vee "responsiveness") \wedge ("incident management" \vee "issue resolution" \vee "problem handling" \vee "trouble management") \wedge ("decision-making" \vee "decision making" \vee "choice selection" \vee "judgment")	15
("GenAI" \vee "genetic algorithms" \vee "evolutionary algorithms" \vee "genetic programming") \wedge ("ITIL" \vee "information technology infrastructure library" \vee "IT service management" \vee "IT service delivery") \wedge ("integration" \vee "incorporation" \vee "assimilation" \vee "implementation")	12
Total	227

2.2.3. FILTERING CRITERIA

To avoid duplication between the documents for each database and at the databases sharing the same results, was used Zotero to apply the process to remove the duplicate files and filter dirty information.

The exclusion and inclusion criteria involve recent studies from the last ten years that address the integration of GenAI and ITIL, focusing on efficiency and agility into ITSM scope. High-quality sources, including Scopus, Web of Science (WoS), IEEE, ScienceDirect and ACM DL, were prioritized. The filtering process followed strict criteria to select articles discussing the impact of GenAI on ITIL and ITSM.

Considerations for:

- **Exclusion Criteria:** Defined as phase 1, where studies outside the scope (no direct link to the keywords defined), duplicates, books, journals and conference articles without complete data and no publication information.
- **Inclusion Criteria:** Defined as phases 2 and 3, the Journals and Conference articles with studies on GenAI and ITIL with a focus on efficiency and agility on ITSM, publications from the last ten years (2015 ~ 2024), only available papers to download.
- **Quality Criteria:** Defined as phase 4, the evaluation was guided by defined quality criteria, assessing the degree of similarity between the articles and conference documentation in relation to the pre-defined research questions (RQs). Each RQ was evaluated on a binary scale, where "High" similarity was assigned a value of "1" and "Low" similarity a value of "0." This classification captured the extent to which each article offered relevant insights, frameworks, case studies, or results aligned with the respective RQs. The analysis focused exclusively on high-quality academic sources to ensure rigor and relevance.

3. METHODOLOGY

This study will employ the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), a globally recognized guideline designed to enhance the transparency, clarity, and rigor of systematic reviews and meta-analyses (Moher et al., 2009). PRISMA addresses key limitations in reporting practices by incorporating significant methodological advancements. It provides a comprehensive 27-item checklist and a structured four-phase flow diagram to guide researchers in the systematic identification, selection, and analysis of relevant studies. By promoting meticulous documentation of methodologies and findings, PRISMA ensures the reliability and reproducibility of systematic reviews, establishing them as indispensable tools for evidence-based decision-making across diverse disciplines.

Since was defined 2 (two) process to advance with the research, were applied the criteria according to them:

3.1. FOR THE MANUAL PROCESS – PHASES 1, 2 AND 3

First phase, consult and search each database and collect articles according to the string criteria, total documents found in all the **5** databases on this phase **2481**. At this stage was applied **3** steps, one to filter each database to remove duplicated items and dirty information, the second to merge all database information and the third to review duplicated and dirty information after the merge. Total documents found on this phase after the first and second steps are **1434**, removed to trash **1047** documents. After the third step, the remains of **1129** documents. Were removed to trash **305** documents duplicated and with dirty information.

Second phase, composed of the Exclusion Criteria. In the exclusion criteria were removed **1040** items, composed of **5** documents from 2025, **266** documents from 1962~2014, **63** documents with no publication information and **706** documents without Title relation to the thesis. The final number at this second phase turns to **89** documents.

Third phase, at the Inclusion Criteria, composed by keep only the documents available to download, where was identified **29** documents as not available or not found condition. From the amount removed with not available status, **17** from Scopus, **8** from WoS and with not found status, **1** from Scopus and **3** from WoS. Only **60** documents are left at this stage. The result for each phase is visible in Table 3.

Table 3 – Phases results (Manual process)

Phase	Description	Scopus	IEEE Xplore	Science Direct	WoS	ACM DL	Total
		451	163	908	274	685	2481
1	Removed duplicated items	148	48	382	68	236	882
1	Removed dirty information	0	0	0	0	165	165
	Total remains on phase 1.....	303	115	526	206	284	1434
1	Removed duplicated merged						284
1	Removed dirty information						21
	Total removed on phase 1.....	305					1129
	Total remains on phase 1.....						1129
2	Removed year 2025						5
2	Removed year 1962~2014						266
2	Removed no publication field information						63
2	Removed articles with no relation to thesis						706
	Total removed on phase 2.....	1040					89
	Total remains on phase 2.....						89
3	Removed Not Available or Not Found						29
	Total.....						60

3.2. FOR THE SCOPUS AI PROCESS – PHASES 1, 2 AND 3

First phase, collect information from the Scopus AI tool using the introduction of the thesis was identified a total of **227** documents. Applied only one step to remove duplicated and dirty information where was identified only valid **126** documents and were moved to trash **101** items.

Second phase, the Exclusion Criteria, remains **88** documents since were removed **30** documents from 2004~2014 in the exclusion criteria. Also, since was used the introduction from the thesis at the Scopus AI, partial relevant documentation was provided from the PRISMA Method, so, at this stage also were removed **8** documents from this stage.

Third phase was composed by the Inclusion Criteria, where were removed **28** items as not available or not found condition to download the document. At this state also **60** documents remain to advance to the next stage. The result for each phase applied is visible in Table 4.

Table 4 – Phases results (Scopus AI)

Phase	Description	Scopus AI	Total
		227	227
1	Removed duplicated items		86
1	Removed dirty information		15
	Total removed on phase 1.....	101	Total remain on phase 1... 126
2	Removed year 2004~2014		30
2	Removed Complementary Material PRISMA (Out Scope)		8
	Total removed on phase 2.....	38	Total remain on phase 2... 88
3	Removed Not Available or Not Found		28
	Total.....		60

After applying the filters and quality criteria, a total of **120** documents were identified. At this stage, a further consolidation of results from the two processes was conducted. During this consolidation, only one duplicated document was detected; however, it appeared under two different classifications in Zotero: one as a Journal Article and the other as a Conference Paper. The corresponding author is listed in Table 5, marked with reference character “*”.

3.3. CONSOLIDATED QUALITY CRITERIA – PHASE 4

In the fourth phase, the Quality Criteria were applied using a High/Low binary scale. Each document was evaluated for its alignment with the research questions (RQs). A score of 1 (one) was assigned to documents that provided relevant insights, frameworks, case studies, or results that aligned with the thesis's scope. Conversely, documents that did not meet the minimum requirements were assigned a score of 0 (zero). The score board is visible in Table 5. Regarding this structure we have:

- 6 documents had 0 score
- 3 documents had 1 score
- 9 documents had 2 score
- 14 documents had 3 score
- 31 documents had 4 score
- 57 documents had 5 score

Considering that only documents that had **5** score classification are the valid ones to help in all the context for the research questions, **63** documents were removed from the selection, including the duplicated document. The result is composed of **24** Conference Papers and **33** Journal Articles, total of **57** documents that match **5** score points visible in the Table 5.

Table 5 – Result of evaluation of the quality criteria

Study Reference Author, Year (Manual)	Quality Criteria					Total
	RQ1	RQ2	RQ3	RQ4	RQ5	
(Calvo-Manzano et al., 2015)	0	0	0	0	0	0
(Nageldinger, 2015)	1	0	1	1	1	4
(Anagnostopoulos, 2016)	1	0	1	0	0	2
(Cruz-Hinojosa & Gutiérrez-De-Mesa, 2016)	0	0	0	1	1	2
(Franke & Buschle, 2016)	0	0	1	1	0	2
(Aguiar et al., 2018)	1	1	1	1	1	5
(Cardoso et al., 2018)	1	0	1	1	1	4
(Kubiak & Rass, 2018)	1	1	1	1	1	5
(Ranggadara, 2019)	1	1	0	1	1	4
(Rubio & Arcilla, 2020)	1	0	0	1	1	3
(Cook et al., 2021)	1	0	0	1	1	3
(Moudoubah et al., 2021)	1	1	1	1	1	5
(Betru & Getahun, 2023)	1	1	1	1	1	5
(Hennig, 2023)	1	1	1	1	1	5
(Mesquida & Mas, 2015)	1	0	1	1	1	4
(H. Yang, 2016)	1	0	0	0	1	2
(Astuti et al., 2017)	1	1	1	1	1	5
(Yamamoto, 2017)	1	0	1	1	1	4
(Zuev et al., 2018b)*	1	1	1	0	1	4
(Haryanti & Pribadi, 2019)	1	0	1	1	1	4
(Zimmermann et al., 2020)	1	1	1	1	1	5
(Galaz et al., 2021)	1	0	1	0	1	3
(Wach & Chomiak-Orsa, 2021)	1	0	1	0	1	3
(Bhupathi et al., 2023)	1	0	1	1	1	4
(Gołęb-Andrzejak, 2023)	1	0	1	0	1	3
(Gunawan et al., 2024)	1	0	1	1	1	4
(Holmström & Carroll, 2024)	1	1	1	1	1	5
(Toumi et al., 2024)	1	1	1	1	1	5
(da Silva et al., 2015)	1	0	1	1	1	4
(Jantti & Hotti, 2016)	1	1	1	1	1	5
(Tavaves et al., 2016)	1	1	1	1	1	5
(Lofaro, 2017)	1	1	1	1	1	5
(Obwegeser et al., 2019)	1	1	1	1	1	5
(Ranzatti et al., 2019)	1	0	1	1	1	4
(Galup et al., 2020)	1	1	1	1	1	5
(Mao et al., 2021)	1	1	1	1	1	5
(Rizun et al., 2021)	1	1	1	1	1	5
(Mora et al., 2022)	1	1	1	1	1	5
(Baradari et al., 2023)	1	1	1	1	1	5
(Mora et al., 2023)	1	1	1	1	1	5
(Reinhard, Li, Dickhaut, & Leimeister, 2023)	1	1	1	1	1	5
(Reinhard, Li, Dickhaut, Reh, et al., 2023)	1	1	1	1	1	5
(Reyes-Delgado et al., 2023)	1	1	1	1	1	5
(Engemann & Miller, 2024)	1	1	1	1	1	5
(Zong & Guan, 2024)	1	1	1	1	1	5
(Ellul et al., 2015)	1	1	1	1	1	5
(Arbaiza, 2018)	1	0	1	1	1	4
(Arezki & Elhissi, 2018)	1	0	1	1	1	4
(Goman, 2018)	0	0	0	0	0	0
(Niedermaier et al., 2019)	1	0	1	1	0	3
(Puspitasari, 2019)	1	0	0	1	0	2
(Wiedemann et al., 2019)	1	0	1	1	1	4
(Schmitz et al., 2020)	1	0	1	1	1	4
(Ferreira et al., 2021)	1	0	1	1	1	4
(Islam & Mahmud, 2021)	1	0	1	0	0	2
(Tamtam et al., 2023)	1	0	1	1	1	4
(Winkler & Westner, 2023)	1	0	1	1	1	4
(Yeman & Malaiya, 2023)	1	0	1	1	0	3
(Zhao, 2023)	1	1	1	1	1	5
(Jacob, 2024)	1	1	1	1	1	5

Study Reference Author, Year (Scopus AI)	Quality Criteria					Total
	RQ1	RQ2	RQ3	RQ4	RQ5	
(Ghrab et al., 2016)	0	1	0	0	0	1
(Hermanto & Kusnanto, 2017)	1	0	0	1	1	3
(Sahid et al., 2017)	1	1	1	1	1	5
(Kumar Potdar & Routroy, 2018)	1	0	0	1	0	2
(Kasenberg, 2018)	0	0	0	0	0	0
(Prasad et al., 2018)	1	1	1	0	1	4
(Ruiz et al., 2018)	1	1	1	1	1	5
(Zuev et al., 2018b)*	1	1	1	0	1	4
(Conde-Zhingre et al., 2019)	1	0	0	1	1	3
(De Silva et al., 2020)	1	1	1	1	1	5
(Goh et al., 2020)	1	0	1	1	0	3
(Gulenko et al., 2020)	1	1	1	1	1	5
(Prihandono et al., 2020)	1	1	1	0	1	4
(S. Sharma & Soni, 2020)	0	0	0	0	0	0
(Shen et al., 2020)	1	1	1	1	1	5
(Marhraoui et al., 2021)	1	1	1	1	1	5
(Ahmed et al., 2022a)	1	1	1	0	1	4
(Ahmed et al., 2022a)	1	1	1	0	1	4
(Khalid et al., 2022)	0	0	0	0	0	0
(Lima et al., 2022)	1	0	1	1	1	4
(Rijal et al., 2022)	1	1	1	1	1	5
(X. Zhang et al., 2022)	1	0	1	1	1	4
(Ahmed et al., 2023c)	1	1	1	1	1	5
(Jabour et al., 2023)	0	0	1	0	0	1
(Khan, 2023)	1	0	1	1	1	4
(Levshun & Kotenko, 2023)	1	1	1	1	1	5
(Peliarachchi & Wijayanayake, 2023)	1	1	1	1	1	5
(Shetty et al., 2023)	1	0	1	0	1	3
(Valli et al., 2023)	1	1	1	1	1	5
(Wang & Zhang, 2023)	0	0	0	0	0	0
(Alshaigy & Grande, 2024)	0	0	0	0	1	1
(Aparicio-Lecca et al., 2024)	1	0	0	1	1	3
(Arunthavanathan et al., 2024)	1	1	1	1	1	5
(Atienza-Barba et al., 2024)	1	1	1	1	1	5
(Baabdullah, 2024)	1	0	1	1	1	4
(Bazzan et al., 2024)	1	1	1	1	1	5
(Duan et al., 2024)	1	1	1	1	1	5
(Dzemydienė et al., 2024)	1	0	0	1	1	3
(Eskandani & Salvaneschi, 2024)	1	1	1	1	1	5
(France, 2024)	1	0	1	1	1	4
(Héjja et al., 2024)	1	1	1	1	1	5
(Li et al., 2024)	1	1	1	1	1	5
(Lyu et al., 2024)	1	1	1	1	1	5
(Manresa et al., 2024)	1	0	1	1	1	4
(Mora et al., 2024)	1	0	1	1	1	4
(Najafabadi, 2024)	1	1	1	1	1	5
(Narang, 2024)	1	1	1	1	1	5
(Ning et al., 2024)	0	0	1	0	1	2
(Piller et al., 2024)	1	1	1	1	1	5
(Rajaram & Tinguely, 2024)	1	1	1	1	1	5
(Roy et al., 2024)	1	1	1	1	1	5
(Santillan et al., 2024)	1	1	1	1	1	5
(Schmidt et al., 2024)	1	1	1	1	1	5
(Shafiabady et al., 2024)	1	1	1	1	1	5
(P. Sharma & Kulkarni, 2024)	1	1	1	1	1	5
(Singh et al., 2024)	1	1	1	1	1	5
(Takafofi et al., 2024)	1	0	1	1	1	4
(Tanović & Hasibović, 2024)	1	0	0	1	1	3
(Y. Yang et al., 2024)	0	0	1	0	1	2
(H. Zhang & Yang, 2024)	1	1	1	1	1	5

In summary, a total of **2,708** papers were identified during the initial stage. In the first phase, **1,453** papers were excluded based on the exclusion criteria, leaving **1,255** papers. During the second phase, **1,078** papers were further removed, reducing the number to **177**. In the third phase, **57** papers were excluded based on the inclusion criteria, resulting in **120** papers. Finally, in the fourth phase, **63** papers were removed after applying the quality criteria, leaving **57** papers deemed valid to proceed with the evaluation for addressing the research questions.

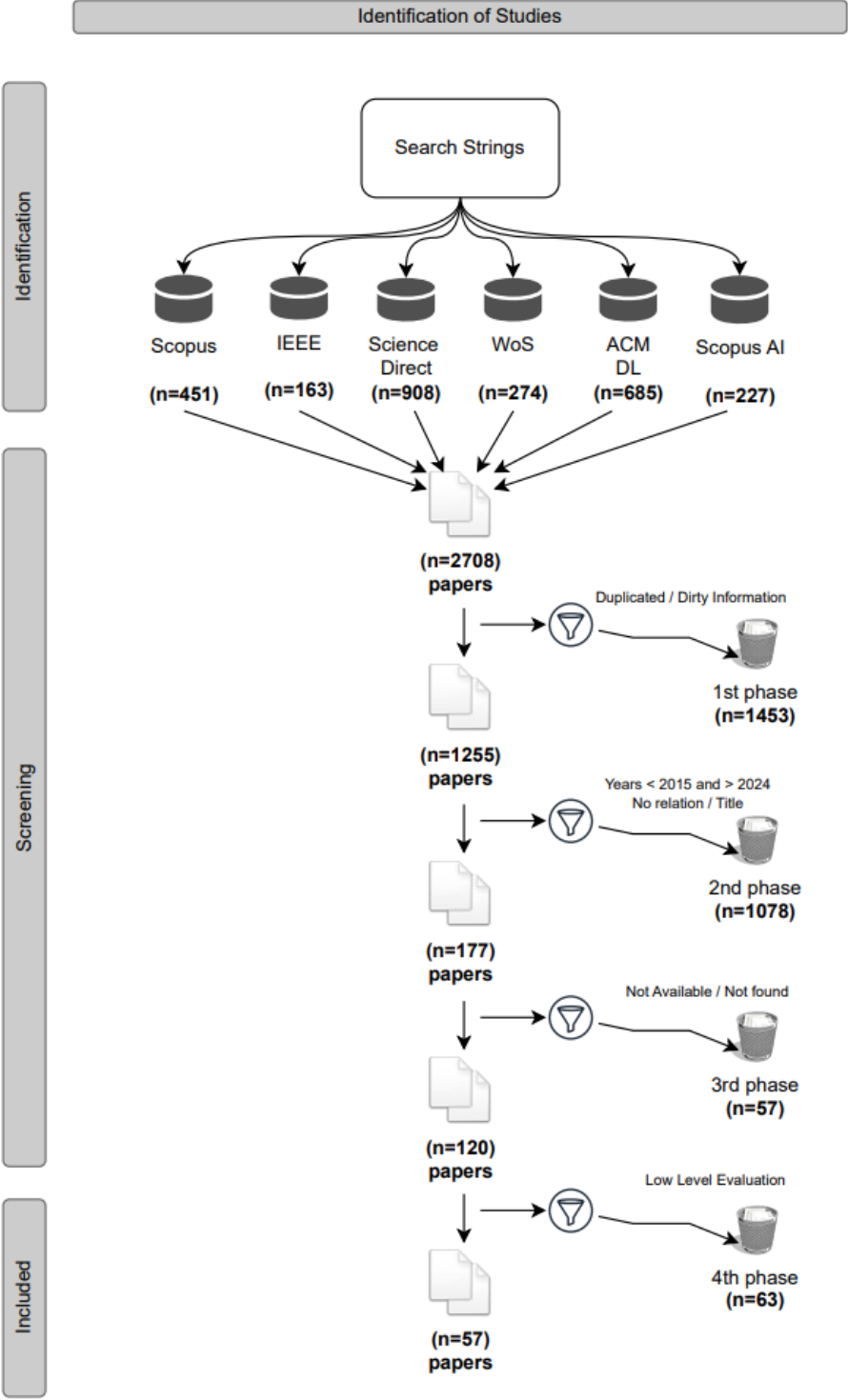


Figure 4 – PRISMA flowchart process

Upon reviewing the articles retrieved using the search string, it became evident that the majority did not directly or indirectly address the research questions, and as such, they were deemed irrelevant to the scope of this study. However, the remaining **120** articles were highly relevant and provided significant insights. By applying a high/low evaluation criterion focused on their alignment with the research questions, the most impactful contributions were identified, allowing the study to focus on the articles that truly advanced the research objectives. In appendix A is possible to verify in detail the separated process for PRISMA flowchart process applied to the manual process and Scopus AI process.

4. BIBLIOMETIC ANALYSIS

The protocol implemented in this systematic literature review (SLR) resulted in the selection of **57** studies, which served as the foundation for addressing the research questions outlined in this study. These selected studies underwent thorough analysis, including content synthesis and data extraction, to ensure comprehensive insights were obtained to support the research objectives.

4.1 CONTENT SYNTHESIS

The final set of **57** selected articles spans publications from **2015 to 2024**, reflecting the most recent advancements in the field. The overall accuracy of the Systematic Literature Review was calculated at **2.10%**, derived from an initial pool of **2,708** articles. Additionally, **120** documents (**4.43%**) demonstrated direct relevance to the research questions, illustrating the systematic filtering process employed. Figure 5 presents a detailed graph illustrating the number of articles published per year across the research library bases, highlighting publication trends and the concentration of studies over time.

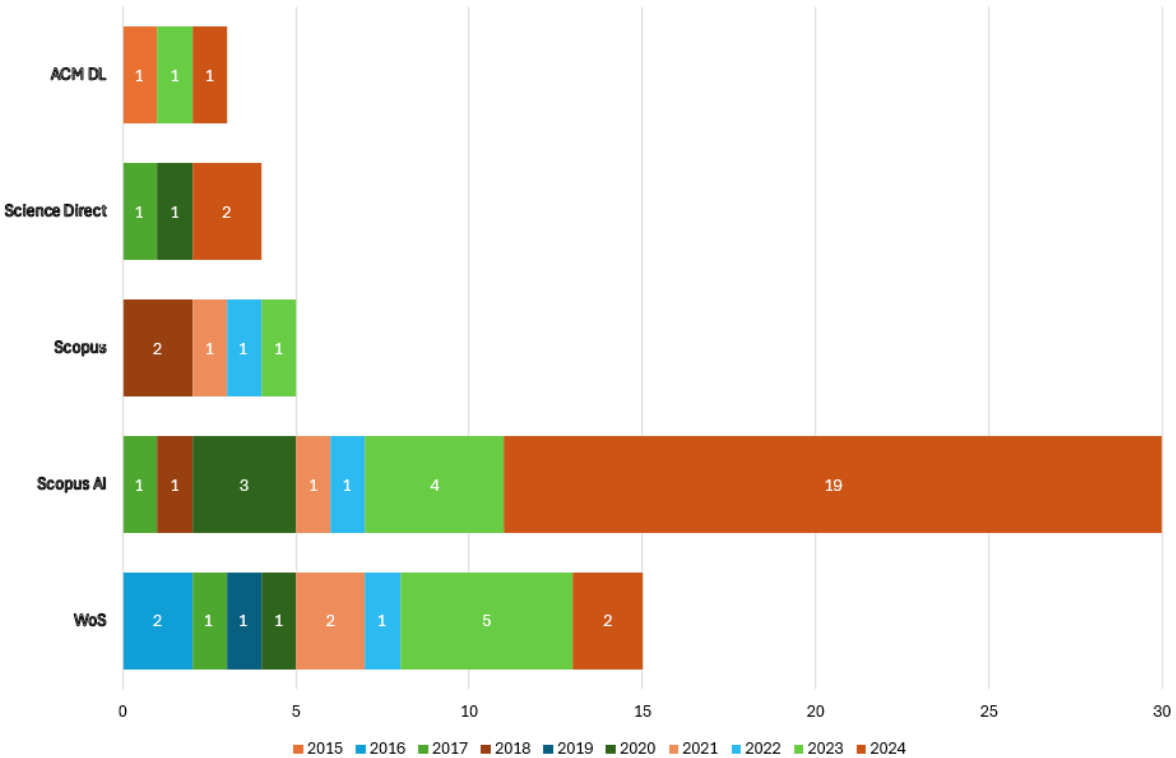


Figure 5 – Papers by year according to libraries

Using Bibliometrix tool, in Figure 6 the data indicates that since 2015, there has been a growing interest in research related to keywords, with the number of publications reaching its peak in 2024, when **24** articles were published. Additionally, a detailed analysis of journal specifications was conducted using the Scimago Journal and Country Rank platform. Data such as journal title, publisher, h-index, and publication quartile were extracted and is detailed in Appendix B.

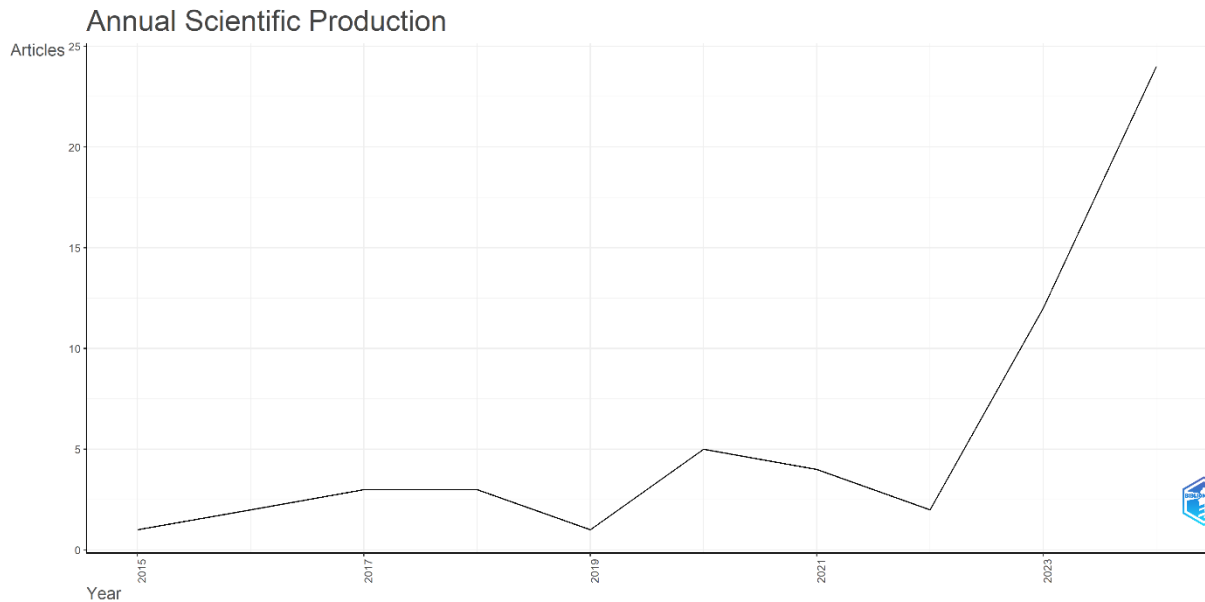


Figure 6 – Trends occurrence from 2015 ~ 2024

4.2 KEYWORD ANALYSIS

To analysis the keywords in details was used VOSviewer tool to map the scientific landscape from the co-occurrence data from the keywords collected in the results of the research. In this section it shows the bibliometric network highlighting the occurrence of keywords. The keywords were selected based on author co-occurrence, employing the software and the complete count method.

From the amount of **396** keywords, with a minimum limit of 2 (two) occurrences, using the methods association strength and linlong/modulatory, **53** keywords meet the threshold within **6** clusters.

The Association Strength method, visible in the Figure 7, helps to identify important links for relationships between topics such as GenAI, ITIL, decision making and incident management, even if certain topics or authors are less frequent, in a very important way of initial exploration to understand the general relationships.

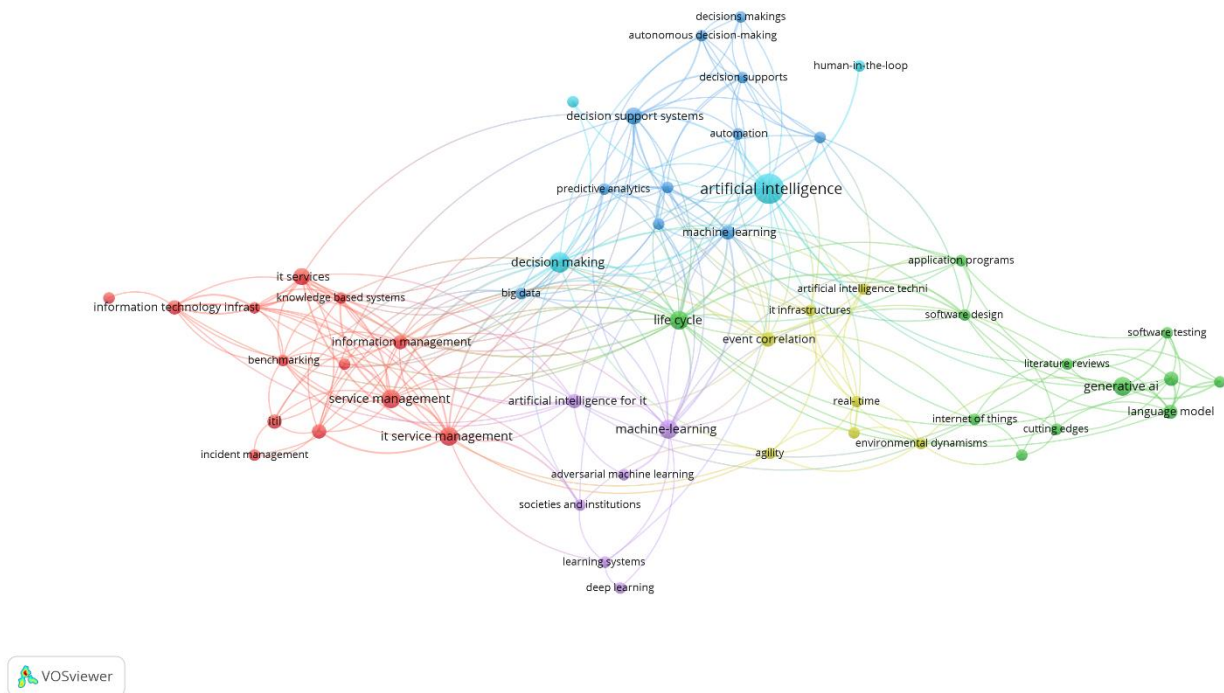


Figure 7 – Keywords occurrence using network association strength

The analysis of the keyword network reveals significant insights into the central concepts and thematic structure of the data. Core nodes such as Artificial Intelligence, Decision Making, Service Management, Generative AI, and Machine Learning stand out as the most recurring and widely connected themes, highlighting their relevance in the field. Within the domain of Service Management, important subgroups like IT Service Management (ITSM) and Incident Management show a strong connection to ITIL-related practices. The network structure is well-distributed, with thematic clusters differentiated by colors:

- Red Cluster: addressing practices such as Service Management and Incident Management
- Green Cluster: focused on Generative AI, Language Models, and technological advances in AI
- Blue Cluster: exploring the intersection of Artificial Intelligence and Decision Support Systems, with an emphasis on decision-making processes

Furthermore, Artificial Intelligence acts as a central node connecting nearly all clusters, while the relationship between Machine Learning, Life Cycle, and Service Management reflects critical thematic interdependencies for GenAI-based ITSM. The size of the nodes and the density of the connections suggest that areas like Decision Making and Generative AI are gaining increasing attention, reinforcing a growing integration between traditional IT management practices and emerging AI technologies.

For a more in-depth analysis, using the LinLog/Modularity method to identify clusters and groups. This method provides a more interesting and useful way to illustrate the systematic literature review, as possible to see in Figure 8 as shown.

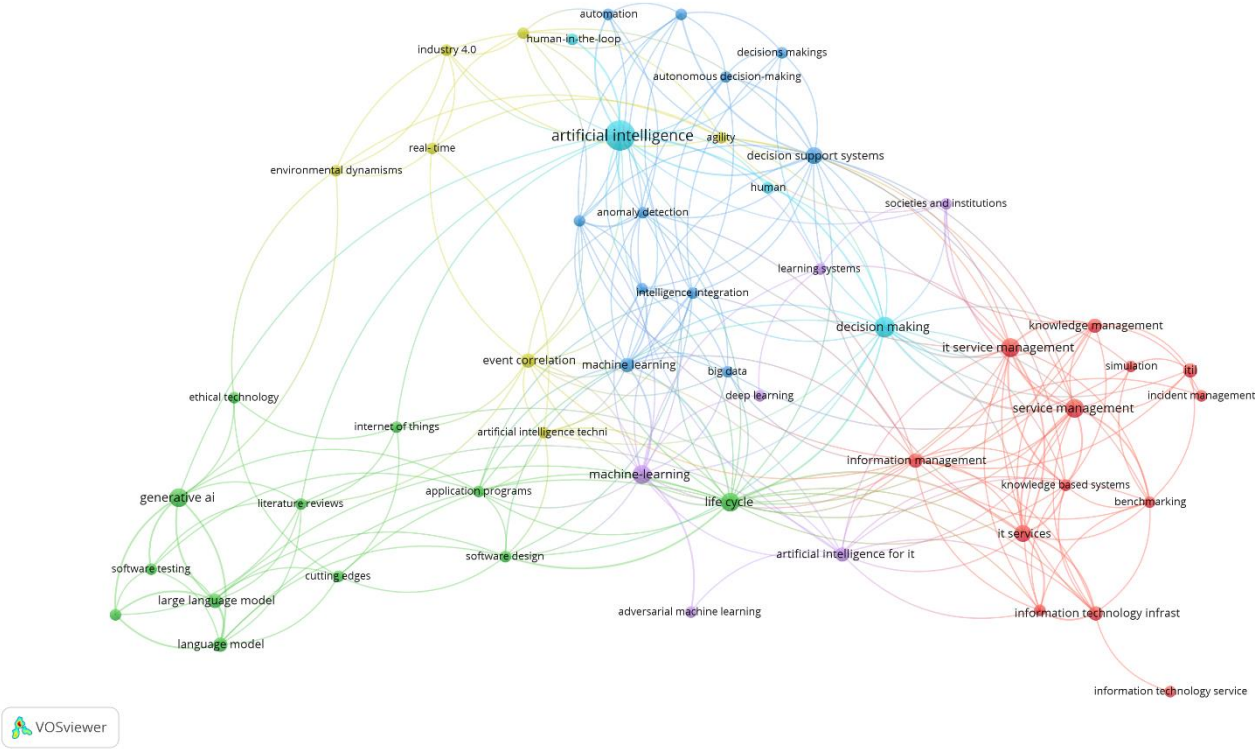


Figure 8 – Keywords occurrence using network linglong/modularity

The analyzed model presents a layout like the first one, with notable differences in the spatial organization of clusters and thematic connections. Artificial Intelligence remains the central core of the network, reinforcing its importance for the analyzed studies. The Green Cluster, related to Generative AI, shows greater integration with Machine Learning and Life Cycle, indicating a focus on practical applications and broad theoretical approaches. The Red Cluster, encompassing Service Management and ITIL, maintains close connections with Incident Management and IT Services, reflecting the traditional foundations of ITSM practices. Meanwhile, the Yellow Cluster addresses emerging topics such as Industry 4.0, Real-Time, and Environmental Dynamisms, highlighting recent and disruptive trends. Decision Making and Machine Learning exhibit a higher number of connections, suggesting a growing focus on decision support and automated learning. Connections between the Green Cluster and Software Testing and Large Language Models point to practical integration in application development. This model also highlights emerging concepts, such as Ethical Technology and Internet of Things, emphasizing ethical challenges and practical uses in the context of GenAI. The increased density in the central core among Artificial Intelligence, Decision Making, and Machine Learning reflects clearer thematic interdependencies and significant contributions to advancing the field. Of the **53** keywords, in Table 6 are visible the **20** selected with the high link strength.

Table 6 – Keywords by link strength

Nr.	Keyword	Link Strength	Occurrences
1	Life Cycle	29	5
2	Artificial Intelligence	26	13
3	Decision Making	26	6
4	IT Service Management	23	5
5	Service Management	23	5
6	Decision Support Systems	21	4
7	Machine-Learning	20	5
8	Information Management	19	3
9	Machine Learning	19	3
10	IT Services	18	4
11	Knowledge Base Systems	15	2
12	Anomaly Detection	14	2
13	Artificial Intelligence for IT Operation	14	3
14	Event Correlation	14	3
15	Root Cause Analysis	14	2
16	Generative AI	13	5
17	Benchmarking	12	2
18	Information Technology Infrastructure Library	12	3
19	Language Model	12	3
20	Large Language Model	12	3

The table highlights the key themes explored in the analysis, showing that "Life Cycle," "Artificial Intelligence," and "Decision Making" are central concepts due to their high link strength and frequency. The presence of keywords such as "IT Service Management" and "Machine-Learning" suggests a strong intersection between service management practices and emerging technologies. Furthermore, innovative topics like "Generative AI" and "Large Language Model" emphasize recent trends and the growing adoption of artificial intelligence in the context of organizational services and processes. In appendix C is visible the entire table showing the links, link strength and occurrences according to each cluster.

Also using the Bibliometrix tool, it was possible to generate a thematic map based on the keywords. The thematic map quadrants provide a clear categorization of the analyzed topics, visible in Figure 9. In the upper-left quadrant, the **Niche Themes**, such as "Internet of Things" and "Cutting Edges," exhibit high development density, indicating they are well-studied in specific contexts. However, their low centrality suggests limited connection to the core discussions in the field. Conversely, the **Motor Themes**, located in the upper-right quadrant, include topics such as "Life Cycle," "Machine-Learning," and "Decision Making." These themes demonstrate both high density and centrality, making them the most developed and critical for the field, serving as essential pillars that drive advancements in the area.

In contrast, the **Emerging or Declining Themes**, positioned in the lower-left quadrant, feature topics like "Deep Learning" and "Information Technology Service Management." These themes show low density and centrality, which may indicate they are either nascent areas of development or topics losing relevance over time. Finally, the **Basic Themes**, found in the lower-right quadrant, encompass "Artificial Intelligence for IT Operation" and "Adversarial Machine Learning." These topics are highly central, acting as foundational concepts that connect other areas of study. However, their low density suggests they remain underexplored in depth, highlighting potential opportunities for future research and expansion.

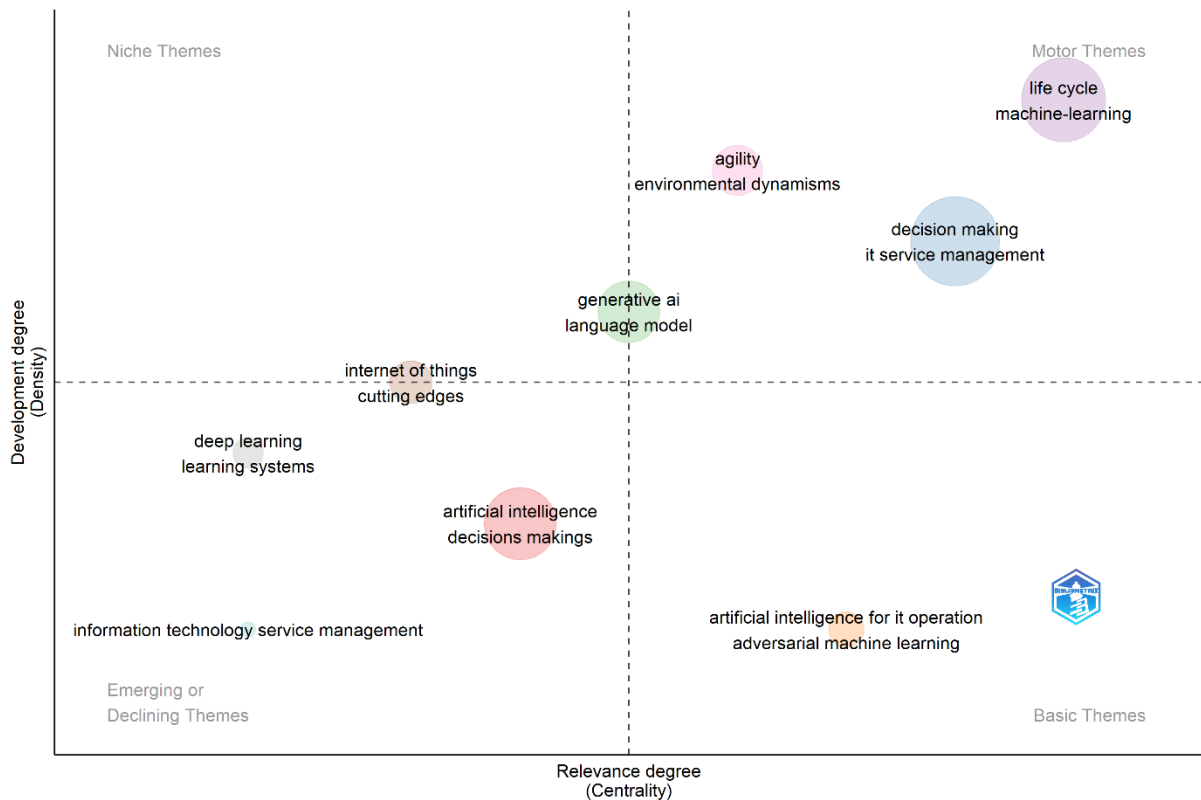


Figure 9 – Thematic Map

As we can observe, the insights and interpretations of the topics "Generative AI" and "Language Model," positioned moderately central and dense on the thematic map, stand out as emerging areas with a growing exploration of practical applications across diverse fields. Simultaneously, the strong centrality and density observed in "Decision Making" and "IT Service Management" reaffirm their importance as fundamental pillars for studies that integrate Artificial Intelligence into organizational practices. The prominence of concepts such as "Agility" and "Environmental Dynamisms" highlights a rising trend of adopting AI in dynamic and sustainable processes, reflecting contemporary demands and envisioning pathways for future innovations.

In summary, the thematic map reveals a rich intersection between emerging technologies and established practices. "Machine-Learning" and "Life Cycle" emerge as central and well-developed themes, while topics like "Generative AI" signal new areas of innovation with significant impact potential. This categorization not only highlights current trends but also enables the identification of research priorities and gaps, offering clear direction for future investigations into the integration of AI in organizational processes.

The Tree Map visualization, showed in the Figure 10, represents the distribution of the most frequently occurring keywords identified in the systematic literature review on the application of Artificial Intelligence (AI) in ITIL and IT Service Management (ITSM). The largest section of the chart is occupied by "Artificial Intelligence" (19%), highlighting its central role in the analyzed studies. The terms "Decision Making" (7%), "Service Management" (6%), "IT Service Management" (6%), and "ITIL" (6%), indicate the strong relation between automation and enhanced decision-making within ITIL practices. Also, "Generative AI" (5%), "Machine Learning" (5%), and "Large Language Models" (3%) demonstrate the emphasis of the growing influence of emerging AI technologies in optimizing IT service management. The keywords "Big Data" (3%), "Event Correlation" (3%), and "Internet of Things" (3%) advise the literature to recognize the importance of integrating these technologies to enhance IT operations. Furthermore, "Information Management" (3%), "Knowledge Management" (3%), and "Decision Support Systems" (4%) reinforce the increasing reliance on AI-driven tools to improve operational efficiency and predictive capabilities. This distribution of keywords underscores the relevance of research on the integration of Generative AI into ITIL, demonstrating its potential to modernize and automate ITSM practices while fostering innovation and adaptive decision-making.



Figure 10 – Tree Map

5. RESULTS AND DISCUSSION

This chapter presents the results of a study conducted to explore the integration of GenAI into ITIL practices. Building on the systematic literature review, this study applies the methodology outlined in Chapter 3, PRISMA Model, using the quality criteria to address the predefined research questions. The Quality criteria serve as a framework to evaluate how effectively the study minimizes bias while ensuring transparency, rigor and reproducibility in the conducted systematic literature reviews and meta-analyses.

5.1 RESEARCH QUESTIONS X RESEARCH OBJECTIVES

RQ1: *What are the potential benefits of integrating GenAI into ITIL processes to increase efficiency and agility?*

The objective of this research question is to explore and analyze the potential benefits of integrating Generative AI (GenAI) into ITIL-based processes. This involves assessing how this technology can enhance IT service management practices, improve efficiency in incident and process management, and foster greater agility in organizational decision-making.

Relevant literature highlights frameworks and ITIL processes that emphasize efficiency improvements and the integration of innovative technologies. For instance, Aguiar et al. (2018) explore incident management within ITIL processes while evaluating frameworks such as COBIT and CMMI-SVC, which emphasize operational efficiency in IT. Similarly, Kubiak & Rass (2018) discuss automation and efficiency in ITSM, directly aligning with the benefits of integrating GenAI. Hennig (2023) introduces predictive monitoring practices for ITSM processes, which strongly relate to agility and efficiency improvements. Furthermore, Toumi et al. (2024) provide a bibliometric analysis of predictive monitoring, highlighting its contribution to process optimization within ITIL.

Other studies focusing on process efficiency, agile frameworks, and ITIL adaptability also underscore the relevance of GenAI in this domain. Sahid et al. (2017) discuss an agile framework for ITSM, focusing on improvements in efficiency and agility. Similarly, Betru & Getahun (2023) present an ontology-driven incident management model that enhances operational efficiency within ITIL practices.

Recent studies reinforce the applicability of GenAI to ITIL-based processes. Gulenko et al. (2020) explore AI governance and levels of automation within AIOps, demonstrating significant efficiency and agility gains in ITIL systems. Valli et al. (2023) discuss the importance of AIOps for performance metrics and log analysis, showcasing direct benefits to operational efficiency. Li et al. (2024) examine how GenAI can be applied to self-adaptive systems, providing insights into improving agility in ITIL frameworks. Rajaram & Tinguely (2024) explore how small and medium enterprises (SMEs) leverage GenAI to streamline processes, enhance scalability, and foster innovation, which can be directly translated into ITIL practices.

Additionally, Schmidt et al. (2024) propose an integrated QOC analysis framework supported by AI, highlighting how AI enhances transparency and efficiency in decision-making by automating complex analyses and providing traceable insights. Shafiabady et al. (2024) explore the use of eXplainable AI (XAI) to improve organizational agility and resilience, demonstrating how AI accelerates decision-making processes and enhances adaptability to changes.

These studies collectively highlight the transformative potential of GenAI in enhancing ITIL processes through increased efficiency, agility, and decision-making precision, paving the way for further theoretical and practical advancements.

The benefits not only highlight the transformative potential of GenAI but also establish a foundation for adaptive ITIL frameworks that prioritize agility and operational excellence.

RQ2: What unexplored opportunities exist for applying GenAI in incident management within ITIL?

This research question has the objective to identify and explore untapped opportunities for applying Generative AI (GenAI) in incident management within ITIL, focusing on innovative ways to enhance predictive capabilities, automate workflows, and address challenges currently unmet by traditional ITIL practices.

Relevant literature emphasizes the integration of automation, ontology-driven approaches, and advanced AI techniques to improve incident management processes. For instance, Betru & Getahun (2023) explore ontology-based models for incident classification and management, showcasing innovative methods to automate and streamline workflows, a critical area where GenAI could add significant value. Similarly, Aguiar et al. (2018) discuss insights from incident management maturity models and the intersection of frameworks like COBIT with automation, highlighting potential applications of GenAI.

Other studies further underscore the role of GenAI in optimizing incident management. Ruiz et al. (2018) analyze simulation and optimization models within ITSM, which provide a basis for predictive incident management. Ahmed et al. (2023b) present a knowledge-based intelligent system for DevOps, focusing on automation and innovative solutions for managing IT incidents. Levshun & Kotenko (2023) delve into AI techniques for security event correlation, offering significant potential for application in incident management scenarios.

Recent advancements in AIOps provide additional opportunities for integrating GenAI into ITIL practices. Duan et al. (2024) explore meta-learning strategies for few-shot adaptation in AIOps scenarios, which offer novel approaches to handling incident management in dynamic environments. Lyu et al. (2024) investigate supervised learning strategies within AIOps, directly enhancing incident prediction and resolution processes. P. Sharma & Kulkarni (2024) analyze the potential of GenAI in optimizing CI/CD pipelines, demonstrating its applicability in automating and predicting anomalies before they impact production environments. H. Zhang

& Yang (2024) introduce a hybrid risk assessment framework combining machine learning and neural networks, providing actionable insights that are highly relevant for incident management in dynamic and complex environments.

These studies collectively highlight the unexplored potential of GenAI to revolutionize incident management within ITIL. By integrating predictive analytics, ontology-based classifications, and advanced AI-driven workflows, GenAI can significantly enhance the efficiency and adaptability of ITIL practices, addressing limitations of traditional approaches and unlocking new capabilities for proactive and automated incident resolution.

The insights provided by these studies underline the unexplored potential of GenAI to revolutionize ITIL incident management by addressing current gaps and enhancing both predictive and operational capabilities.

By emphasizing strategic benefits, such as proactive incident resolution and resource optimization, these studies underscore the critical role of GenAI in transforming ITIL-based incident management.

RQ3: How can GenAI be applied to improve decision-making processes in the context of ITIL?

The objective goal of this research is to explore how Generative AI (GenAI) can be utilized to enhance decision-making processes within ITIL practices. By analyzing its predictive and analytical capabilities, this study aims to identify opportunities for improving decision quality, speed, and accuracy, while proposing a framework for integrating GenAI into ITIL-based workflows.

Relevant literature underscores the importance of decision-making frameworks and IT governance processes in enabling improved outcomes through data-driven and predictive approaches. For instance, Moudoubah et al. (2021) explore IT governance, highlighting how tools such as COBIT and ITIL frameworks facilitate structured decision-making improvements. Similarly, Jantti & Hotti (2016) establish IT governance processes that guide decision-making enhancements, which may be highly relevant for integrating GenAI. Kubiak & Rass (2018) provide insights into data-driven ITSM approaches, aligning with GenAI's capabilities in predictive analytics and decision-making optimization. Additionally, Lofaro (2017) discusses decision support in ITSM using big data, further reinforcing the relevance of GenAI in enhancing ITIL decision-making processes.

Other studies delve deeper into decision-making frameworks and predictive analytics. Ruiz et al. (2018) detail the application of simulation-based optimization for decision support in ITIL workflows, demonstrating how such approaches can enhance decision precision. Marhraoui et al. (2021) propose a collaborative human-AI framework aimed at improving organizational agility and decision-making, providing a foundation for integrating GenAI into ITIL practices. Atienza-Barba et al. (2024) explore the role of AI in driving organizational agility, with direct applicability to modernizing ITIL decision-making processes.

Moreover, advancements in GenAI and its interplay with other technologies are noteworthy. Narang (2024) focuses on the synergy between GenAI and IoT at the edge, emphasizing its role in predictive insights and decision optimization. Najafabadi (2024) provides a reference architecture for MLOps workflows, offering valuable insights into integrating decision-support systems into ITIL contexts. Singh et al. (2024) explore how GenAI facilitates exploratory and incremental innovation, highlighting its potential for real-time data analysis and decision-making personalization. Schmidt et al. (2024) demonstrate three levels of AI integration in the QOC process, ranging from supporting human participants to fully automating decision-making processes, showcasing direct applications for improving ITIL decision-making.

These studies provide a foundation for integrating GenAI-driven decision-making frameworks into ITIL practices, offering new strategies to address complex IT environments.

RQ4: What theoretical framework can be proposed for integrating GenAI into future ITSM implementations based on ITIL principles?

The primary goal of this research is to propose a comprehensive theoretical framework for integrating Generative AI (GenAI) into future ITSM implementations based on ITIL principles. This framework will provide structured guidance for leveraging GenAI capabilities to enhance ITIL processes while addressing scalability, adaptability, and ethical considerations.

Relevant literature highlights integrative models and theoretical frameworks that can serve as foundations for developing a robust GenAI-ITIL integration. For instance, Moudoubah et al. (2021) introduce an integrated ITSG lifecycle ontology, offering an ontological approach to ITSM governance that combines ITIL and COBIT frameworks, providing a strong basis for theoretical framework development. Similarly, Betru & Getahun (2023) propose an ontology-driven intelligent IT incident management model, which serves as inspiration for building theoretical constructs. Astuti et al. (2017) address risks in IT processes, a critical aspect when proposing comprehensive frameworks.

Other studies emphasize integrative approaches and theoretical models that align with ITIL principles. Mora et al. (2022) discuss the design and application of an integrative agile ITSM framework, highlighting its relevance for incorporating GenAI into ITIL-based implementations. Peliarachchi & Wijayanayake (2023) propose a conceptual A-ITIL model that integrates Agile practices with ITIL, paving the way for future GenAI integrations.

Further advancements in GenAI research offer valuable insights for framework development. Arunthavanathan et al. (2024) analyze the interaction between AI and human operators, identifying hybrid models that can be applied to ITIL-based frameworks. Piller et al. (2024) propose a framework for evaluating trust in GenAI outputs within innovation processes, providing critical guidance for ITSM implementations that rely on ITIL principles. (Li et al.

(2024) present a research roadmap for self-adaptive systems, offering a foundation for developing scalable and adaptive theoretical frameworks for ITSM.

Moreover, Shafiabady et al. (2024) discuss the integration of eXplainable AI (XAI) into organizational frameworks to improve predictability and transparency, suggesting pathways to combine ITIL principles with GenAI in a cohesive theoretical model. H. Zhang & Yang (2024) propose a hybrid framework that integrates deep learning and machine learning models, presenting a scalable and adaptable approach that can be tailored to ITIL-based frameworks.

These studies collectively provide a solid foundation for proposing a theoretical framework that integrates GenAI into ITIL practices. By leveraging advancements in ontology-driven models, self-adaptive systems, and trust evaluation frameworks, this research aims to address the challenges and opportunities associated with GenAI-ITIL integration, ensuring scalability, adaptability, and ethical alignment.

By leveraging these theoretical models, the research can propose a scalable and adaptable framework for future ITSM implementations, ensuring alignment with ITIL principles and GenAI innovations.

RQ5: What potential challenges arise in integrating GenAI with ITIL practices, and how can they be addressed in developing a framework?

The primary objective of this research is to identify and analyze the potential challenges associated with integrating Generative AI (GenAI) into ITIL practices. By addressing these challenges, the study aims to develop a robust framework that ensures effective, sustainable, and ethical implementation of GenAI within ITSM processes.

Relevant literature highlights several challenges in ITIL and ITSM processes that are critical to understanding the barriers to GenAI integration. For instance, Aguiar et al. (2018) discuss the complexities of adopting multi-framework ITIL solutions, providing insights into potential integration challenges. Similarly, Jantti & Hotti (2016) explore obstacles in aligning IT governance with service management, which can inform the challenges of integrating GenAI into ITIL. Zimmermann et al. (2020) highlight strategic challenges in implementing intelligent assistants, which are applicable to GenAI in ITIL-based environments.

Studies addressing theoretical and practical challenges within ITSM also offer valuable insights. Mora et al. (2022) discuss the limitations and difficulties associated with implementing ITIL-based frameworks, emphasizing the need for adaptive approaches. Sahid et al. (2017) identify shortcomings in existing ITSM methods and propose solutions that could inform GenAI integration strategies.

Recent advancements in GenAI research further highlight specific challenges and mitigation strategies. Levshun & Kotenko (2023) address technical challenges and opportunities in event

correlation, reflecting risks in integrating AI into ITIL practices. Arunthavanathan et al. (2024) explore risks associated with full automation and propose collaborative AI-human frameworks to mitigate these issues. Rajaram & Tinguely (2024) highlight the challenges faced by small and medium enterprises (SMEs), such as a lack of skills and infrastructure, offering strategies for overcoming these barriers.

Ethical considerations are also a significant aspect of GenAI integration. Narang (2024) discusses data privacy and security risks associated with GenAI, emphasizing their relevance in ITIL contexts. Singh et al. (2024) identify ethical dilemmas and the importance of addressing environmental dynamics, recommending a focus on responsible practices to avoid biases and improve organizational acceptance of GenAI. Similarly, P. Sharma & Kulkarni (2024) underscore the need to integrate responsible AI practices into DevOps pipelines, which also applies to ITIL practices requiring strict adherence to ethical guidelines.

These studies collectively provide a comprehensive understanding of the challenges and potential solutions for integrating GenAI into ITIL. By addressing technical, ethical, and strategic obstacles, this research aims to propose a framework that not only leverages GenAI's capabilities but also ensures its effective and ethical adoption within ITSM environments.

These insights emphasize the importance of addressing technical, ethical, and strategic challenges to ensure the responsible and effective integration of GenAI into ITIL frameworks.

By addressing not only technical and ethical challenges but also organizational and cultural barriers, these insights provide a holistic foundation for integrating GenAI into ITIL frameworks.

5.2 ACTUAL CONCEPTUAL FRAMEWORK ITIL V4

Based on the studies that concerned about SVC and SVS (Mora et al., 2022), we can see the actual ITIL version 4 is made up of five main components:

Service Value System (SVS): The SVS is the core of ITIL 4 and describes how all components and activities of an organization work together to deliver value. It is made up of the following elements:

- **Guiding Principles:** General guidance for the entire organization.
- **Governance:** Decision-making structures and processes.
- **Service Value Chain (SVC):** Core activities to create value.
- **Practices:** Equivalent to the processes in previous versions, but with a broader scope.
- **Continual Improvement:** Continuous focus on improving services.

Service Value Chain (SVC): The SVC is the core operational model of ITIL 4, made up of six activities:

- **Plan:** Planning resources and services.
- **Improve:** Continual improvement of services.
- **Engage:** Communicating with stakeholders to understand needs.

- **Design and Transition:** Developing and implementing services.
- **Build:** Building service components.
- **Deliver and Support:** Delivering and supporting services in operation.

Guiding Principles: The guiding principles provide practical guidelines, applicable in any context:

- Focus on value.
- Start where you are.
- Progress iteratively with feedback.
- Collaboration and visibility.
- Think and work holistically.
- Keep it simple and practical.
- Optimize and automate.

Practices: These replace the ITIL v3 “processes” and cover a wide range of practices, grouped into three categories:

- **General Management Practices** (such as Risk Management, Continual Improvement).
- **Service Management Practices** (such as Incident Management, Problem Management).
- **Technical Management Practices** (such as Deployment Management).

Continual Improvement: A core component of ITIL 4, highlighting the need to continually evaluate and improve all aspects of the SVS.

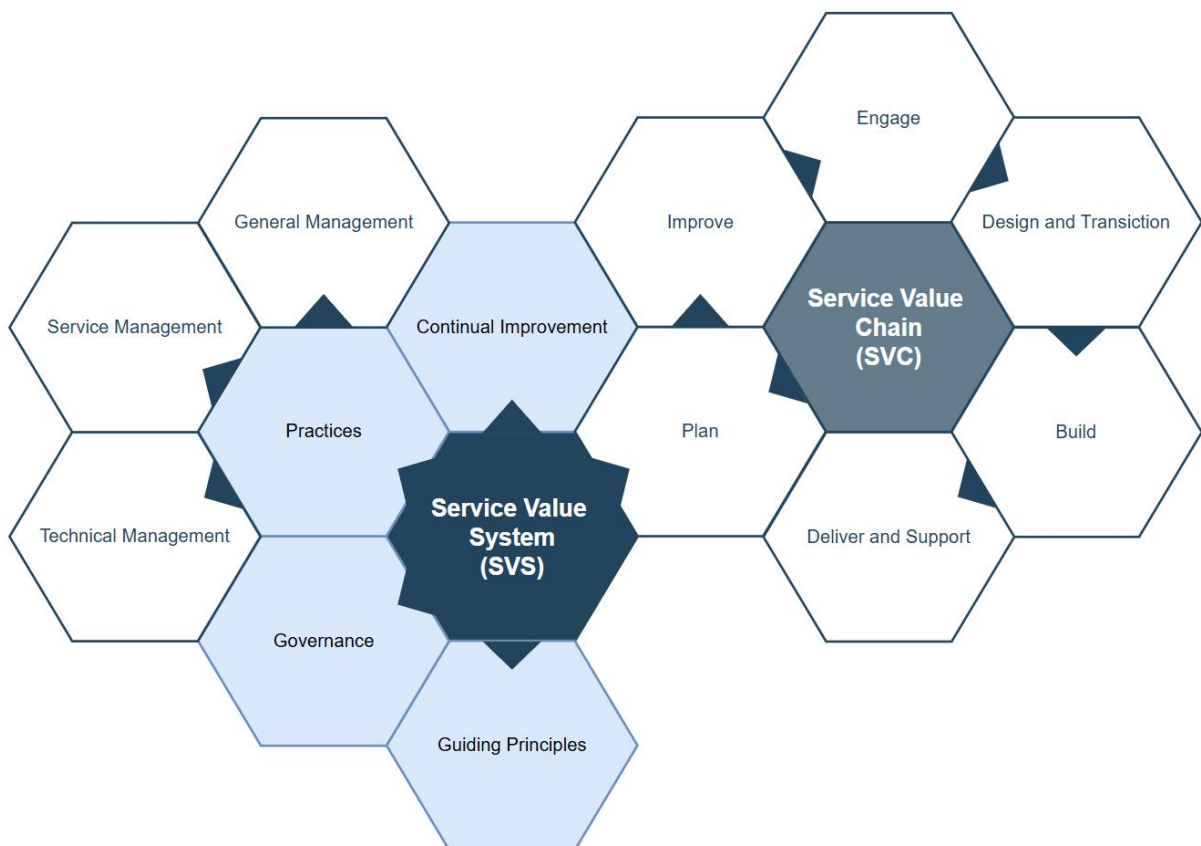


Figure 11 – Actual Conceptual Framework ITIL V4

5.3 PROPOSED FRAMEWORK

The research demonstrates that the increasing complexity of IT services requires intelligent and adaptive approaches to ensure operational efficiency, agility and an improved user experience. The proposed framework combines ITIL principles with Generative Artificial Intelligence (GenAI), promoting intelligent automation, predictive decision-making and continuous process optimization. This proposal directly addresses the central questions of this research, exploring how GenAI can modernize traditional ITIL practices, reduce reliance on manual processes and transform IT service management (ITSM) through advanced automation and continuous learning. The framework structure was developed based on a systematic literature review (SLR) using the PRISMA method to identify gaps and opportunities for innovation in the application of AI to ITIL.

The framework proposed is composed of five interconnected layers, components and processes, each designed to address specific ITSM challenges and ensure strategic alignment between technology and organizational objectives. Visible in the Figure 12, according to:

Layer 1 – Foundation Base establishes the essential infrastructure for the implementation of the framework, incorporating Big Data, IoT, process automation and advanced AI models.

Layer 2 - Operational Intelligence uses machine learning and predictive analytics to improve incident management, detect anomalies and anticipate critical failures in IT services.

These first two layers ensure a robust technological environment prepared for dynamic processes, aligned with ITIL best practices and the needs of modern organizations.

Layer 3 - Service Optimization, expands the impact of AI in IT operations automation by integrating AIOps (Intelligent IT Operations) and GenAI-based decision support, enabling greater scalability and efficiency in service delivery.

Layer 4 - Strategic Alignment ensures that the application of AI is aligned with organizational objectives, promoting governance, regulatory compliance and continuous innovation.

Layer 5 - Customer Experience & Value Delivery places the user at the top of the framework, ensuring personalized interactions, intelligent interfaces and continuous feedback mechanisms, ensuring that AI implementation generates measurable value and continuous improvements in the customer experience.

By connecting automation, continuous learning and strategic optimization, the framework answers key research questions by demonstrating how generative AI can modernize ITIL, improve decision-making and promote operational efficiency. In addition, this model reinforces the importance of structured governance, ensuring that automated decisions are transparent, ethical and aligned with security and compliance guidelines. In this way, the framework not only modernizes IT service management, but also prepares organizations for an increasingly AI-driven future, where intelligent automation and user experience are central pillars of digital transformation.

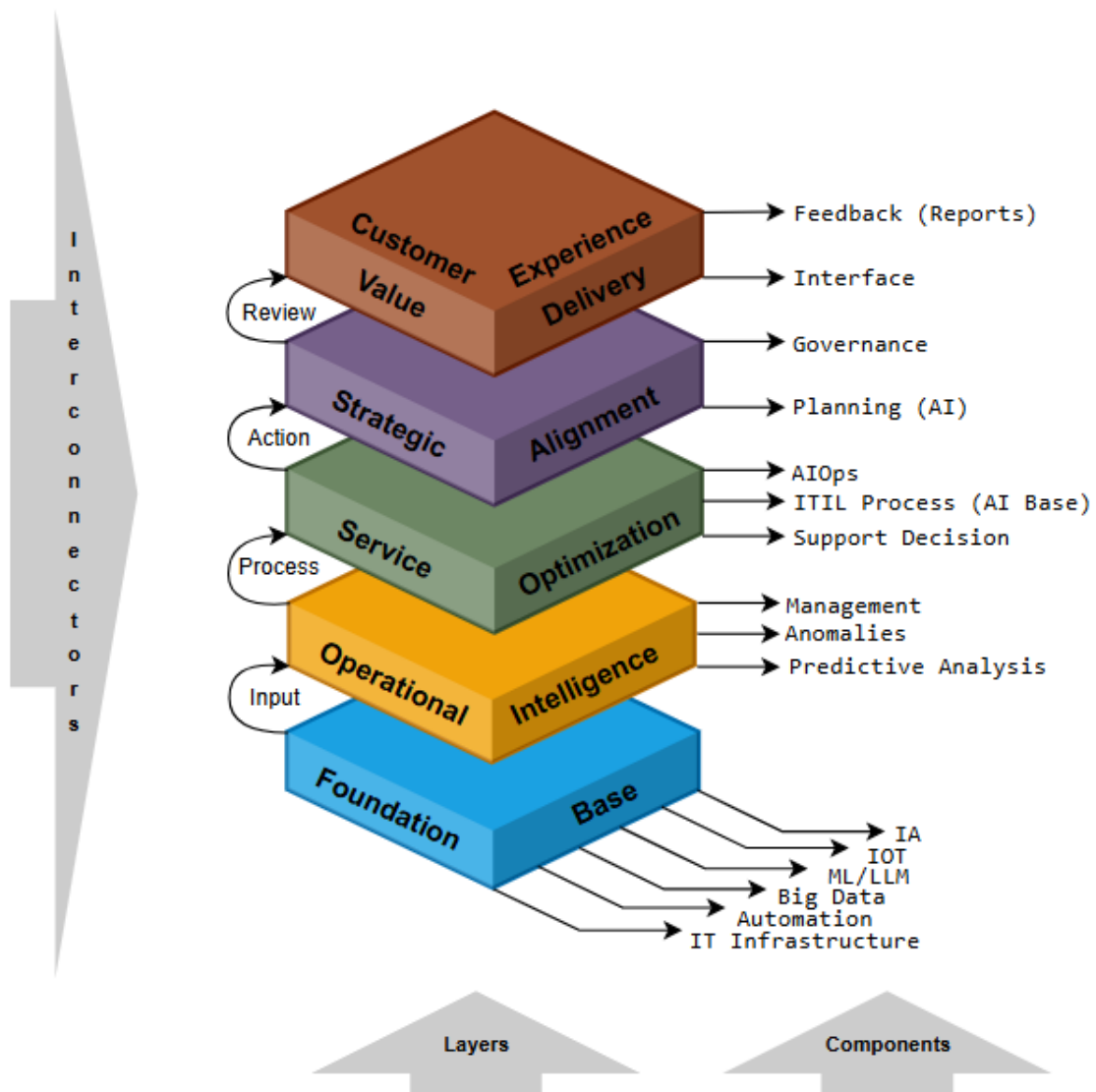


Figure 12 – Proposed Framework

5.4 FRAMEWORK KEY COMPONENTS AND INTERCONNECT FLUX

The framework is designed with a multi-layered approach that ensures continuous automation, predictive intelligence, and strategic alignment with organizational goals. Each layer of the framework plays a critical role in transforming ITIL processes by leveraging cutting-edge technologies, as described in detail below.

The following sections describe the key functions and components of each layer, illustrating how they contribute to the overall transformation of IT services.

Foundation Base Layer

Function: Provides the necessary infrastructure and technological resources to support the framework’s implementation.

Components:

- Artificial Intelligence (AI): AI models, including Generative AI, applied to ITIL automation.
- Internet of Things (IoT): Connected sensors and devices for real-time data collection on IT infrastructure and operations.
- Machine Learning (ML) and Large Language Models (LLM): Continuous learning and optimization of automated responses.
- Big Data: Processing of large-scale datasets for predictive analytics and automated decision-making.
- Automation: Implementation of automated workflows for repetitive tasks, such as incident resolution and report generation.
- IT Infrastructure: Physical and virtual resources supporting IT service operations, including servers, networks, and storage.

Operational Intelligence Layer

Function: Applies AI to enhance operational data analysis, anomaly detection, and predictive actions.

Components:

- Management: Automated monitoring of system health and IT service performance.
- Anomaly Detection: Use of GenAI to identify unusual patterns and anticipate issues before they impact users.
- Predictive Analysis: Application of predictive analytics to prevent failures, improve service resilience, and optimize operational decision-making.

Service Optimization Layer

Function: Enhances IT service delivery through intelligent automation and AI-driven ITIL processes.

Components:

- AIOps (Artificial Intelligence for IT Operations): AI-driven automation for problem detection, resource optimization, and proactive responses.
- ITIL Process (AI Base): Integration of GenAI to enhance incident, change, and problem management processes.
- Support Decision: AI-powered assistants and predictive models for real-time decision support.

Strategic Alignment Layer

Function: Ensures that automation and AI-driven processes align with organizational strategy and governance.

Components:

- Planning (AI): Leveraging GenAI for strategic planning and data-driven recommendations.
- Governance: Frameworks ensuring transparency, regulatory compliance, and ethical AI practices.

Customer Experience & Value Delivery Layer

Function: Ensures that AI-driven solutions enhance user experience and deliver measurable organizational value.

Components:

- **Feedback (Reports):** Collecting and analyzing user feedback for continuous IT service improvement.
- **Interface:** Intelligent and interactive AI-driven chatbots and virtual assistants for automated support to adapt service delivery based on user behavior and feedback.

The flow between the layers of the proposed framework follows a continuous cycle, ensuring the integration of data from technological infrastructure to end-user value delivery. The Foundation Base Layer collects raw data from multiple sources, such as system logs, IoT sensors, and performance metrics. These data points are then processed in the Operational Intelligence Layer, where AI algorithms detect anomalies, monitor service health, and conduct predictive analyses to prevent failures.

With these refined insights, the Service Optimization Layer comes into play, leveraging AIOps and GenAI-driven automation to enhance ITIL processes, escalate incidents, and recommend optimized solutions. In the Strategic Alignment Layer, the processed data is transformed into strategic insights, ensuring that automated decisions align with business objectives, regulatory compliance, and continuous innovation. Finally, the Customer Experience & Value Delivery Layer completes the cycle, allowing user interactions to provide real-time feedback, driving ongoing improvements and ensuring a personalized and efficient service experience.

This dynamic flow creates a cyclic model of learning and optimization, where each layer contributes to continuous improvements, making IT service management increasingly intelligent, agile, and user-centric.

5.5 COMPARISON

Based on verified studies, the actual ITIL V4 framework focuses on service governance through the Service Value System (SVS) and Service Value Chain (SVC), while the new proposed framework incorporates GenAI and AIOps to modernize automation and decision making.

The ITIL V4 Service Value System (SVS) is a comprehensive framework that guides IT service management, ensuring that all activities and components of the organization are aligned to create value. It is supported by Guiding Principles, which establish essential guidelines such as value focus, collaboration, visibility, simplicity and automation, promoting more effective strategic and operational decisions. In addition, Governance plays a central role in defining decision-making processes and ensuring compliance with organizational policies. At the heart of the SVS is the Service Value Chain (SVC), an operational model that structures six fundamental activities: plan, improve, engage, design, build, deliver and support services. Complementing this framework, ITIL Practices are categorized into three main groups — General Management, Service Management and Technical Management — covering everything from strategic management to operational execution of IT services. Finally, Continual Improvement permeates the entire system, ensuring a constant cycle of optimization and evolution of services, aligned with business needs and technological changes.

The proposed framework presents an evolution of ITIL by integrating Generative AI (GenAI) and AIOps, promoting greater automation, predictive intelligence and continuous

optimization of IT services. It replaces repetitive manual processes with Intelligent Automation, reducing the need for human intervention and improving operational efficiency. In addition, Predictive Decision Making is based on Machine Learning and Analytics, enabling the anticipation of failures and the optimized allocation of resources. The framework also prioritizes Continuous Optimization Processes, integrating AIOps for advanced automation and decision support based on GenAI. The model is organized into five interconnected layers: Foundation Base, which establishes the essential technological infrastructure, including Big Data, IoT, Automation and AI; Operational Intelligence, responsible for predictive analysis and anomaly detection; Service Optimization, which applies AIOps to enhance automation and improve service management; Strategic Alignment, ensuring compliance with governance and organizational strategies; and finally, Customer Experience & Value Delivery, which improves interaction with customer through intelligent assistants and continuous feedback, ensuring a more dynamic and responsive service. The framework represents a significant advance in the modernization of ITIL practices, providing greater agility, efficiency and strategic alignment in IT service management.

Table 7 – Aspects comparison

Aspect	Actual ITIL V4	Proposed Framework
Base Structure	Service Value System (SVS) and Service Value Chain (SVC) Base Structure	Five-layer model based on automation and AI
Automation	Limited Automation, dependent on human intervention	High, driven by GenAI and AIOps
Decision Making	Based on manual processes and structured flows	Predictive decision making based on analytics and continuous learning
Incident Management	Emphasizes response and recovery	Emphasizes prediction, proactive mitigation and self-healing
Operational Efficiency	Based on process standardization	Based on continuous optimization and autonomous learning
Data Integration	Manual, with dependence on structured records	Intelligent, with real-time data analysis
Customer Focus	Based on satisfaction metrics	Use of AI for continuous experience analysis and feedback
Continuous Improvement	Iterative process driven by human reviews	Automated feedback, dynamic adaptation

In the proposed framework, traditional SVC is being enhanced with GenAI and AIOps, enabling more automation, predictive decisioning, and adaptive intelligence to optimize ITIL processes.

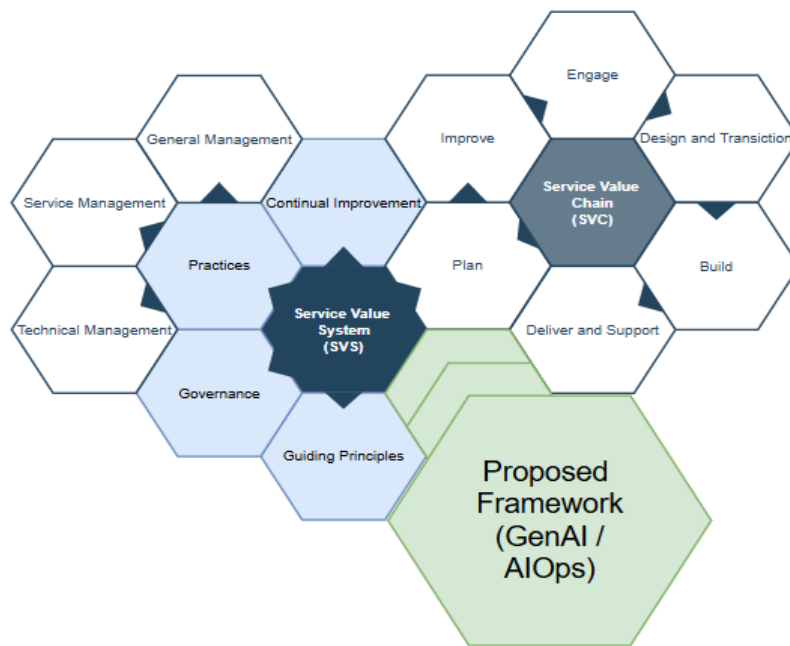


Figure 13 – Extending ITIL V4 with GenAI and AIOps

5.6 KEY DIFFERENTIATORS OF THE PROPOSED FRAMEWORK

The proposed framework represents a significant evolution in IT service management by incorporating GenAI and AIOps, providing greater efficiency, intelligent automation, and continuous adaptation to the needs of the digital environment. Among the main differentiators, Intelligent Automation stands out, which uses GenAI to eliminate repetitive processes and optimize critical flows without the need for human intervention, reducing response times and improving service reliability. In addition, Data-Driven Decision Making strengthens governance and operational efficiency by integrating AIOps, enabling advanced predictive analytics that identify and prevent failures before they impact users, ensuring service continuity with minimal interruption.

Another fundamental aspect is the Continuous Learning Flow, in which Machine Learning is used to dynamically evolve processes and optimize resource allocation, making the system more resilient and adaptable to technological and organizational changes. Unlike traditional ITIL V4, this model incorporates Strategic Alignment, ensuring that all automated decisions comply with regulatory standards and governance standards, promoting security, transparency and accountability in the use of artificial intelligence.

Finally, Focus on Customer Experience is an essential pillar of this framework, as the final layer of the architecture incorporates intelligent assistants and continuous feedback mechanisms, enabling dynamic personalization of services. This approach significantly improves the interaction between users and IT systems, ensuring agile responses, proactive support and an optimized user experience. Together, these differentiators consolidate an innovative model, capable of transforming IT service management through intelligent automation and data-driven decision-making.

5.7 PROPOSITIONS

In the context of the evolution of ITIL V4, the incorporation of GenAI and AIOps represents a significant advancement in process automation, predictive decision-making, and continuous improvement of the user experience.

Based on the literature review and the analyses conducted in this research, four propositions have been formulated to serve as the foundation for the conceptual framework of the proposed model:

- **P1:** The implementation of GenAI in ITIL V4 enhances IT service automation, reducing dependence on human intervention and optimizing operational efficiency.
- **P2:** The adoption of AIOps in ITIL V4 significantly reduces incident response time, enabling a more proactive and efficient IT service management.
- **P3:** The integration of GenAI and AIOps into ITIL V4 improves the user experience, increasing satisfaction and the quality of IT services.
- **P4:** The application of Machine Learning within ITIL V4 facilitates a continuous learning cycle, fostering progressive and sustainable improvements in IT service management.

These propositions are theoretical statements that describe likely relationships between key variables, based on the literature and conceptual foundation. Rather than serving as testable hypotheses, they provide a structured theoretical rationale for how GenAI and AIOps can optimize ITIL V4 practices. By establishing this conceptual direction, these propositions reinforce the role of artificial intelligence in modernizing IT service management, offering a basis for further research and practical implementation.

5.8 DISCUSSIONS

This section discusses the theoretical implications of the proposed framework, analyzing how the integration of GenAI and AIOps can optimize ITIL V4 practices. The discussion is structured around the four formulated *propositions*, examining their alignment with the existing literature and identifying potential contributions and challenges associated with their adoption in IT Service Management (ITSM).

5.8.1 Discussion of Proposition 1: Intelligent Automation with GenAI

P1: *The implementation of GenAI in ITIL V4 enhances IT service automation, reducing dependence on human intervention and optimizing operational efficiency.*

The literature highlights the increasing role of GenAI in ITSM as an enabler of automation and process optimization according to Holmström & Carroll (2024). Studies indicate that AI-driven automation reduces manual effort in IT service operations, leading to improved efficiency and reduced operational costs based on Narang (2024) studies. However, the challenge remains in balancing automation with governance, ensuring that AI-driven decisions align with organizational policies and compliance standards according to Gulenko et al. (2020). The

proposed framework reinforces the importance of automated decision-making, reducing routine workloads while ensuring IT service quality through AI-assisted monitoring and self-healing capabilities.

5.8.2 Discussion of Proposition 2: Incident Management and AIOps

P2: *The adoption of AIOps in ITIL V4 significantly reduces incident response time, enabling a more proactive and efficient IT service management.*

According to Rijal et al. (2022), ITIL traditionally focuses on reactive incident management, whereas AIOps introduces a more proactive approach. Several studies highlight that predictive analytics and machine learning models help in detecting potential failures before they escalate into major incidents, according to Betru & Getahun (2023). The proposed framework integrates AIOps-driven insights with ITIL's Service Value Chain (SVC), enabling faster incident resolution and better allocation of resources. However, Ahmed et al. (2023c), indicate challenges such as data quality, bias in AI models, and resistance to automation must be addressed for successful implementation.

5.8.3 Discussion of Proposition 3: Enhancing User Experience with AI

P3: *The integration of GenAI and AIOps into ITIL V4 improves the user experience, increasing satisfaction and the quality of IT services.*

User experience in ITSM is often measured by service availability, response time, and issue resolution efficiency, second Kubiak & Rass (2018). Also, Kubiak & Rass (2018) and Mora et al. (2022), highlight the studies suggest that AI-driven chatbots and automated support systems improve customer satisfaction by reducing response times and providing personalized. The proposed framework reinforces this perspective, leveraging GenAI-powered service desks and real-time AIOps monitoring to enhance customer interactions. However, according to Levshun & Kotenko (2023), the reliance on AI-based solutions also raises concerns about user trust, transparency, and ethical AI practices in IT service delivery.

5.8.4 Discussion of Proposition 4: Continuous Learning and IT Service Optimization

P4: *The application of Machine Learning within ITIL V4 facilitates a continuous learning cycle, fostering progressive and sustainable improvements in IT service management.*

Machine Learning is increasingly being integrated into ITSM to support continuous learning and process optimization, according to Li et al. (2024) and Ruiz et al (2018). Research from Betru & Getahun (2023), shows that AI-enabled learning systems help IT teams identify trends, predict failures, and refine best practices over time. The proposed framework extends ITIL's Continual Improvement model by integrating self-learning mechanisms, ensuring that IT services evolve dynamically based on real-time data. However, according to Ruiz et al. (2018), the effectiveness of this approach depends on data availability, model accuracy, and organizational readiness to embrace AI-driven decision-making.

6. CONCLUSIONS AND FUTURE RESEARCH

This chapter presents the key findings of the study, summarizing the research objectives, methods, and results, followed by a discussion on theoretical and practical implications. Additionally, it outlines the limitations of the research and suggests directions for future studies. The conclusions highlight how GenAI and AIOps can optimize ITIL V4 practices, improving service automation, incident management, and decision-making processes. The study contributes both conceptually and practically to IT Service Management (ITSM) by proposing a framework that integrates AI-driven automation into ITIL. However, certain limitations, such as the exclusion of 63 articles, the lack of empirical validation, and the need for ethical considerations in AI governance, open avenues for future research. The final section of this chapter discusses possible extensions to this work, aiming to further validate, expand, and refine the proposed AI-enhanced ITIL model.

6.1 CONCLUSIONS

This study aimed to explore how Generative AI (GenAI) and AIOps can be integrated into ITIL V4 to enhance automation, predictive decision-making, and continuous service optimization. The research objectives focused on:

1. Investigating the potential of GenAI to optimize ITIL processes, reducing manual intervention and improving efficiency.
2. Analyzing the role of AIOps in incident management, shifting ITSM from a reactive to a proactive approach.
3. Developing a conceptual framework that integrates AI-driven approaches into ITIL practices.

To address these objectives, a Systematic Literature Review (SLR) was conducted following the PRISMA methodology, resulting in the selection of 57 relevant studies from a total of 2,708 initial papers. The findings indicate that GenAI and AIOps offer substantial improvements in IT service automation, incident management, and decision-making processes. The proposed framework provides a structured approach for leveraging AI in ITIL, ensuring greater agility, scalability, and operational intelligence in IT service management.

6.2 IMPLICATIONS

Theoretical and Practical Implications: This research contributes to both theory and practice in IT service management. Theoretically, it extends the ITIL V4 framework by introducing AI-driven automation and decision support systems, demonstrating how GenAI and AIOps can enhance ITSM practices. From a practical perspective, the findings provide IT professionals and decision-makers with insights into how AI-powered automation can improve incident resolution, service reliability, and resource allocation.

6.3 LIMITATIONS

While this research contributes significantly to the understanding of AI-driven enhancements in ITIL V4, it has certain limitations that must be acknowledged. These limitations do not undermine the findings but highlight opportunities for further exploration.

Exclusion of 63 Articles in the SLR Process: The Systematic Literature Review (SLR) process followed rigorous inclusion and exclusion criteria to ensure that only highly relevant and high-quality sources were considered. As a result, 63 articles were excluded, even though they might contain valuable perspectives on AI-ITIL integration. Some of these sources could provide additional insights into specific applications of GenAI and AIOps that were not covered in this study.

Lack of Empirical Validation of the Conceptual Framework: This study presents a theoretical and conceptual framework for integrating GenAI and AIOps into ITIL V4, but it has not been tested in real-world environments. The effectiveness of AI-driven ITIL practices remains unverified in practical settings, which could limit its applicability in complex IT service management operations.

Focus on Literature-Based Insights Rather Than Quantitative Analysis: The study relies primarily on qualitative findings derived from existing literature, rather than conducting quantitative experiments, statistical models, or performance evaluations. While this approach provides a strong conceptual foundation, it does not offer measurable metrics to validate the actual impact of GenAI and AIOps in ITIL frameworks.

Ethical and Compliance Considerations in AI Adoption: The study focuses on technical and operational aspects of AI-driven ITSM but does not deeply explore the governance, compliance, and ethical concerns associated with AI adoption in ITIL. Questions regarding AI transparency, data privacy, accountability, and regulatory frameworks remain critical challenges that must be addressed to ensure responsible and sustainable AI implementation in IT service management.

6.4 FUTURE RESEARCH

Building upon the limitations identified, this section outlines potential directions for future research to **further** validate, refine, and expand the findings of this study.

Reanalyzing the Excluded 63 Articles: A follow-up study should revisit the excluded articles with a revised set of inclusion criteria, allowing a broader perspective on AI-ITIL integration. This could uncover new insights, alternative approaches, or emerging trends that were not fully explored in this research.

Empirical Validation Through Case Studies and Pilot Implementations: Future research should focus on practical validation of the proposed framework by conducting case studies,

pilot projects, or experimental implementations in real-world IT environments. This would allow organizations to assess the effectiveness of AI-driven automation in ITIL, identifying potential challenges, benefits, and areas for refinement.

Incorporating Quantitative Analysis and AI Performance Metrics: Future studies should employ quantitative methodologies such as surveys, interviews, or AI-driven performance benchmarking to measure the impact of GenAI and AIOps in ITIL more precisely. Establishing key performance indicators (KPIs) for AI-ITIL automation would provide data-driven insights to support decision-making in ITSM implementations.

Addressing Ethical, Regulatory, And Compliance Aspects of AI in ITIL: Future work should explore AI ethics and governance within the IT service management domain. Topics such as bias in AI decision-making, transparency in AI-driven automation, compliance with data protection regulations (e.g., GDPR), and the role of AI governance frameworks should be investigated to ensure responsible AI adoption in ITIL.

Comparative Analysis with Traditional ITIL Approaches: Further research could compare AI-enhanced ITIL implementations with traditional ITIL processes to evaluate the real-world advantages and challenges of AI adoption. This would provide a comparative perspective, allowing organizations to make data-informed decisions when transitioning to AI-driven IT service management models.

FINAL CONSIDERATIONS

By addressing these limitations and pursuing future research opportunities, scholars and practitioners can further strengthen the role of AI in ITIL V4, ensuring more intelligent, adaptive, and automated IT service management frameworks. These next steps will be crucial in validating the theoretical contributions of this study and bridging the gap between research and industry application.

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APPENDIX A

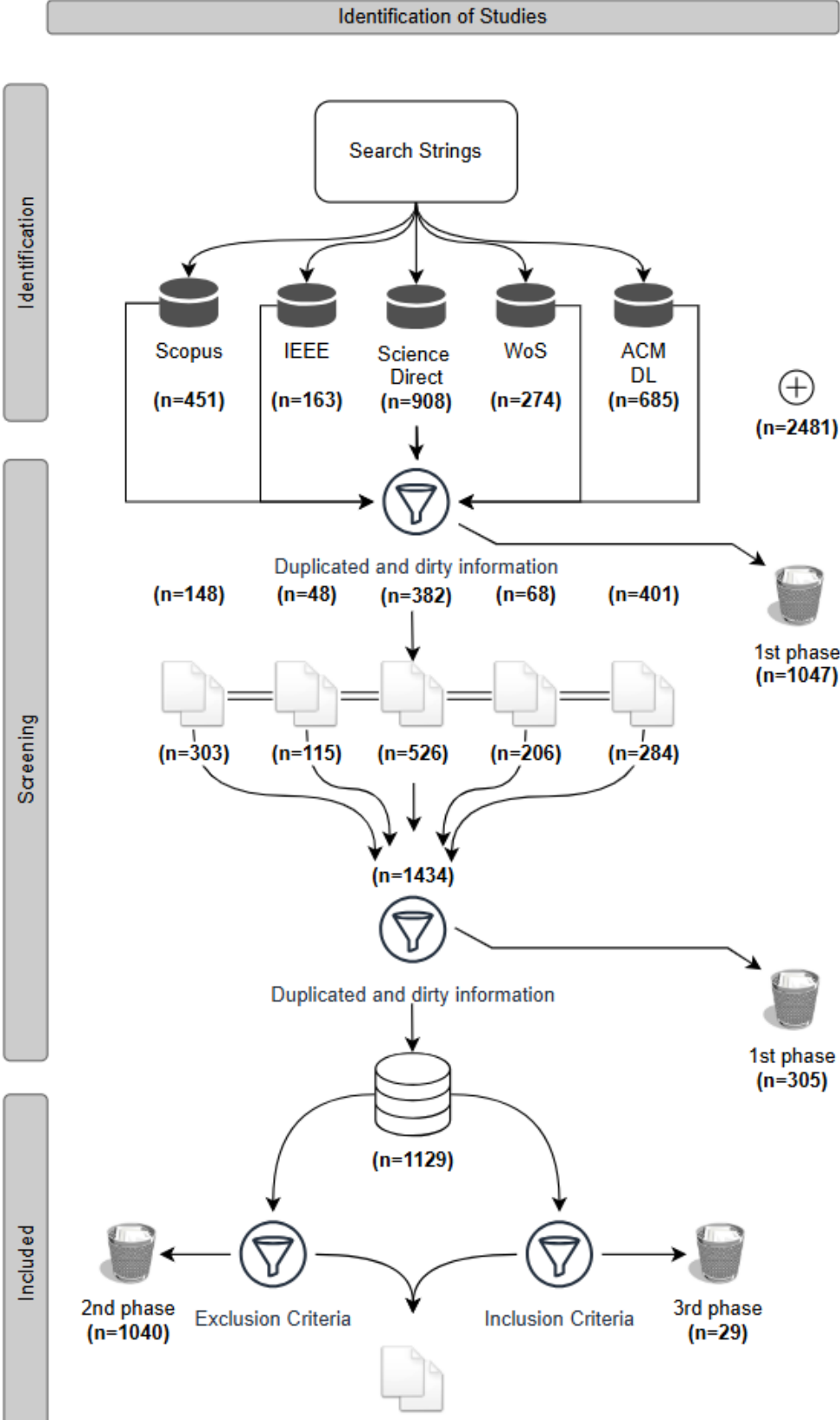


Figure A. 1 – PRISMA flowchart process for manual research

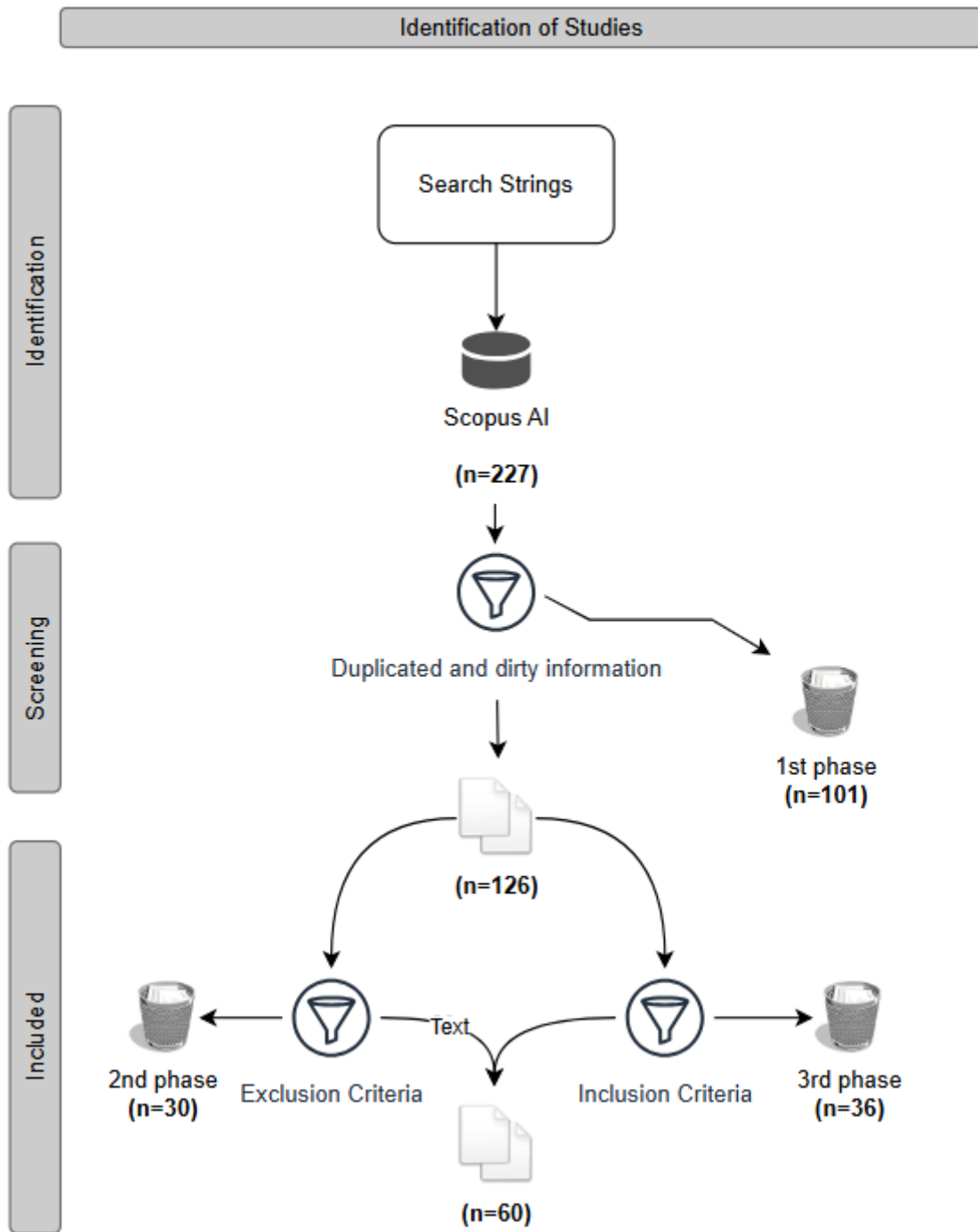


Figure A. 2 – PRISMA flowchart process for the Scopus AI research

APPENDIX B

Table B. 1 – Scimago and ICORE ranks

Year	Author, Year	Publication Type	Topic(s) (of the paper)	Database	Scimago QX	H-Index	SJR	ICORE Title	ICORE Rank
2018	Aguiar et al., 2018	Journal Article	"An overlapless incident management maturity model for multi-framework assessment (ITIL, COBIT, CMMI-SVC)"	Scopus	Q3	30	0.184	-	-
2023	Ahmed et al., 2023	Conference Paper	"Knowledge-based Intelligent System for IT Incident DevOps"	Scopus AI	NO	NA	NA	NA	NA
2024	Arunthavanathan et al., 2024	Journal Article	"Process safety 4.0: Artificial intelligence or intelligence augmentation for safer process operation?"	Scopus AI	NO	188	NA	-	-
2017	Astuti et al., 2017	Conference Paper	"Risks assessment of information technology processes based on COBIT 5 framework: a case study of ITS service desk"	ScienceDirect	NO	132	0.258	NA	NA
2024	Atienza-Barba et al., 2024	Journal Article	"Artificial intelligence and organizational agility: An analysis of scientific production and future trends"	Scopus AI	NO	36	NA	-	-
2023	Baradari et al., 2023	Journal Article	"Defining the relationship between IT Service management and knowledge management: towards improved performance"	WoS	Q1	52	0.728	-	-
2024	Bazzan et al., 2024	Conference Paper	"Analysing the Role of Generative AI in Software Engineering - Results from an MLR"	Scopus AI	NO	69	NA	EUROSPI	B
2022	Betru & Getahun, 2023	Journal Article	"Ontology-driven intelligent IT incident management model"	Scopus	NO	NA	NA	-	-
2020	De Silva et al., 2020	Journal Article	"Toward Intelligent Industrial Informatics: A Review of Current Developments and Future Directions of Artificial Intelligence in Industrial Applications"	Scopus AI	Q1	84	1.298	-	-
2024	Duan et al., 2024	Journal Article	"Learning to Diagnose: Meta-Learning for Efficient Adaptation in Few-Shot AIOps Scenarios"	Scopus AI	NO	83	NA	-	-
2015	Ellul et al., 2015	Conference Paper	"Big data decision making based on predictive data analysis using DEVS simulations"	ACM DL	NO	10	NA	NA	NA
2024	Engeman & Miller, 2024	Journal Article	"Toward revealing concealed risks for agile IT service management practices"	WoS	NO	47	NA	-	-
2024	Eskandani & Salvaneschi, 2024	Conference Paper	"Towards AI for Software Systems"	Scopus AI	NO	NA	NA	AIWARE	NA
2020	Galup et al., 2020	Journal Article	"What do agile, lean, and ITIL mean to DevOps?"	WoS	Q1	241	0.967	-	-
2020	Gulenko et al., 2020	Conference Paper	"AI-Governance and Levels of Automation for AIOps-supported System Administration"	Scopus AI	NO	52	0.275	NA	NA
2024	Héjja et al., 2024	Conference Paper	"Generative AI for Productivity in Industry and Education"	Scopus AI	NO	NA	NA	COMPLEXIS	C
2023	Hennig, 2023	Conference Paper	"Leveraging exogeneous data for the predictive monitoring of IT service management processes"	Scopus	Q3	63	0.339	RCIS	B
2024	Holmström & Carroll, 2024	Journal Article	"How organizations can innovate with generative AI"	ScienceDirect	NO	118	NA	-	-
2024	Jacob, 2024	Journal Article	"Artificial intelligence and the future of evaluation: from augmented to automated evaluation"	ACM DL	NO	15	NA	-	-
2016	Jantti & Hotti, 2016	Journal Article	"Defining the relationships between IT service management and IT service governance"	WoS	Q1	46	0.538	-	-
2018	Kubiak & Rass, 2018	Journal Article	"An overview of data-driven techniques for IT-service-management"	Scopus	Q1	242	0.609	-	-
2023	Levshun & Kotenko, 2023	Journal Article	"A survey on artificial intelligence techniques for security event correlation: models, challenges, and opportunities"	Scopus AI	Q1	115	3.260	-	-

2024	Li et al., 2024	Journal Article	<i>"Generative AI for Self-Adaptive Systems: State of the Art and Research Roadmap"</i>	Scopus AI	NO	46	NA	-	-
2017	Lofaro, 2017	Conference Paper	<i>"Decision support and autonomous decision systems using "big data""</i>	WoS	NO	8	NA	NA	NA
2024	Lyu et al., 2024	Journal Article	<i>"On the Model Update Strategies for Supervised Learning in AIOps Solutions"</i>	Scopus AI	NO	88	NA	-	-
2021	Mao et al., 2021	Journal Article	<i>"Research Framework for Determining How Artificial Intelligence Enables Information Technology Service Management for Business Model Resilience"</i>	WoS	Q2	169	0.664	-	-
2021	Marhraoui et al., 2021	Conference Paper	<i>"An integrated human-AI Framework towards organizational agility and sustainable performance"</i>	Scopus AI	NO	NA	NA	ICDATA	NA
2022	Mora et al., 2022	Journal Article	<i>"An integrative agile itsm framework of tenets and practices - its design and exploratory utilization"</i>	WoS	Q2	48	0.700	-	-
2023	Mora et al., 2023	Journal Article	<i>"AVS_FD_MVITS: an agile IT service design workflow for small data centers"</i>	WoS	Q2	81	0.763	-	-
2021	Moudoubah et al., 2021	Journal Article	<i>"From IT service management to IT service governance: An ontological approach for integrated use of ITIL and COBIT frameworks"</i>	Scopus	Q2	38	0.376	-	-
2024	Najafabadi, 2024	Conference Paper	<i>"Reference Architecture of MLOps Workflows"</i>	Scopus AI	NO	470	NA	ECSA	A
2024	Narang, 2024	Journal Article	<i>"Mentor's Musings on Concerns, Challenges & Opportunities for Generative AI at the Edge in IoT"</i>	Scopus AI	NO	NA	NA	-	-
2019	Obwegeser et al., 2019	Journal Article	<i>"Continual process improvement for ITIL service operations: a lean perspective"</i>	WoS	Q1	67	0.651	-	-
2023	Peliarachchi & Wijayanyake, 2023	Conference Paper	<i>"Evaluating Business As Usual activities between Agile and Information Technology Infrastructure Library (A-ITIL): Industry practitioners' point of view"</i>	Scopus AI	NO	NA	NA	SCSE	NA
2024	Piller et al., 2024	Journal Article	<i>"Generative AI, Innovation, and Trust"</i>	Scopus AI	NO	81	NA	-	-
2024	Rajaram & Tinguely, 2024	Journal Article	<i>"Generative artificial intelligence in small and medium enterprises: Navigating its promises and challenges"</i>	Scopus AI	NO	118	NA	-	-
2023	Reinhard, Li, Dickhaut, & Leimeister, 2023	Conference Paper	<i>"Empowering recommender systems in ITSM: a pipeline reference model for AI-based textual data quality enrichment"</i>	WoS	Q2	470	0.606	DESRIST	A
2023	Reinhard, Li, Dickhaut, Reh, et al., 2023	Conference Paper	<i>"A conceptual model for labeling in reinforcement learning systems: a value co-creation perspective"</i>	WoS	Q2	470	0.606	DESRIST	A
2023	Reyes-Delgado et al., 2023	Journal Article	<i>"AHP evaluation of rigorous and agile IT service design-building phases-workflows in data centers"</i>	WoS	Q2	81	0.763	-	-
2022	Rijal et al., 2022	Journal Article	<i>"AIOps: A Multivocal Literature Review"</i>	Scopus AI	Q4	24	0.131	-	-
2021	Rizun et al., 2021	Journal Article	<i>"Assessing business process complexity based on textual data: Evidence from ITIL IT ticket processing"</i>	WoS	Q1	95	0.844	-	-
2024	Roy et al., 2024	Journal Article	<i>"Digital enabled agility: Industry 4.0 unlocking real-time information processing, traceability, and visibility to unleash the next extent of agility"</i>	Scopus AI	NO	186	NA	-	-
2018	Ruiz et al., 2018	Journal Article	<i>"Using simulation-based optimization in the context of IT service management change process"</i>	Scopus AI	Q1	180	1.536	Decision Support Systems	C
2017	Sahid et al., 2017	Conference Paper	<i>"An agile framework for ITS management in organizations. A case study based on DevOps"</i>	Scopus AI	NO	151	0.159	ICCWCS	NA
2024	Santillan et al., 2024	Journal Article	<i>"Industrial process optimization through advanced HMI systems: exploring the integration of IoT and AI"</i>	Scopus AI	NO	39	NA	-	-
2024	Schmidt et al., 2024	Conference Paper	<i>"AI-Enhanced QOC-Analysis: A Framework for Transparent and Insightful Decision-Making"</i>	Scopus AI	NO	66	NA	IFIP	NA

2024	Shafiabad y et al., 2024	Journal Article	<i>"eXplainable Artificial Intelligence (XAI) for improving organisational regility"</i>	Scopus AI	NO	435	NA	-	-
2024	Sharma & Kulkarni, 2024	Conference Paper	<i>"A study on Unlocking the potential of different AI in Continuous Integration and Continuous Delivery (CI/CD)"</i>	Scopus AI	NO	NA	NA	ICIPTM	NA
2020	Shen et al., 2020	Conference Paper	<i>"Evolving from Traditional Systems to AIOps: Design, Implementation and Measurements"</i> <i>"Applications of generative AI and future organizational performance: The mediating role of explorative and exploitative innovation and the moderating role of ethical dilemmas and environmental dynamism"</i>	Scopus AI	NO	NA	NA	AEECA	NA
2024	Singh et al., 2024	Journal Article	<i>"IT incident management and analysis using non-classical logics"</i>	WoS	Q3	66	0.193	IFIP	C
2024	Toumi et al., 2024	Conference Paper	<i>"Bibliometric analysis of predictive monitoring: Trends and prospects"</i>	ScienceDirect	NO	132	NA	CENTERIS	Unranked
2023	Valli et al., 2023	Conference Paper	<i>"Importance of AIOps for Turn Metrics and Log Data: A Survey"</i>	Scopus AI	NO	NA	NA	ICECAA	NA
2024	Zhang & Yang, 2024	Conference Paper	<i>"Design and Implementation of an AI-Driven Hybrid Framework for Risk Assessment"</i>	Scopus AI	NO	NA	NA	ICAACE	NA
2023	Zhao, 2023	Conference Paper	<i>"Implementation of using AI to manage known and unknown risks in risk management"</i>	ACM DL	NO	151	0.253	ICBAR	NA
2020	Zimmermann et al., 2020	Conference Paper	<i>"Strategic challenges for platform-based intelligent assistants"</i>	ScienceDirect	NO	132	0.334	KES	B
2024	Zong & Guan, 2024	Journal Article	<i>"AI-driven intelligent data analytics and predictive analysis in industry 4.0: Transforming knowledge, innovation, and efficiency"</i>	WoS	NO	45	NA	-	-

APPENDIX C

Table C. 1 – Keywords values by clusters

Cluster Nr	Cluster Name	Keyword	Links	Link Strength	Occurrences	
1	Service Management	benchmarking	11	12	2	
1		incident management	3	3	2	
1		information management	19	19	3	
1		information technology infrastructure	9	11	2	
1		information technology infrastructure library	10	12	3	
1		information technology service management	1	1	2	
1		it service management	16	23	5	
1		it services	12	18	4	
1		itil	7	7	3	
1		knowledge based system	12	15	2	
1		knowledge management	10	11	3	
1		service management	16	23	5	
1		simulation	5	5	2	
2		Life Cycle	application programs	9	9	2
2	cutting edges		6	6	2	
2	ethical technology		4	4	2	
2	generative adversarial network		5	8	2	
2	generative ai		9	13	5	
2	internet of things		6	6	2	
2	language model		8	12	3	
2	large language model		8	12	3	
2	life cycle		24	29	5	
2	literature reviews		9	9	2	
2	software design		10	11	2	
2	software testing		6	7	2	
3	Decision Support Systems		anomaly detection	13	14	2
3			automation	6	7	2
3		autonomous decision-making	7	8	2	
3		big data	9	9	2	
3		decision support systems	18	21	4	
3		decision supports	9	10	2	
3		decision makings	6	6	2	
3		intelligence integrations	11	11	2	
3		machine learning	16	19	3	
3		predictive analysis	11	12	2	
3		root cause analysis	13	14	2	
4	Event Correlation	agility	8	8	2	
4		artificial intelligence techniques	9	9	2	
4		environment dynamisms	6	6	2	
4		event correlation	14	14	2	
4		industry 4.0	5	5	2	
4		it infrastructures	10	10	2	
4		real-time	6	6	2	
5	Machine Learning	adversarial machine learning	2	3	2	
5		artificial intelligence for it operation	14	14	3	
5		deep learning	2	2	2	
5		learning systems	5	5	2	
5		machine-learning	17	20	5	
5	societies and institutions	6	7	2		
6	Artificial Intelligence	artificial intelligence	22	26	13	
6		decision making	21	26	6	
6		human	2	2	2	
6		human-in-the-loop	1	2	2	



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