INFORMATION TECHNOLOGY SERVICE MANAGEMENT: DEVELOPMENT OVER THE LAST 25 YEARS, CHALLENGES AND FUTURE OPPORTUNITIES

by

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Dedication

I would like to dedicate my thesis work to my loving late parents, Shri Banshidhar Pattanayak and Smt. Banalata Pattanayak, who are not with me but always in my heart, they were always a source of light in the darkest and toughest days of my life. I am grateful to learn the lessons of determination, honesty, and compassion from them that helps to grow.

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In addition, I want to express my sincere gratitude to my late parents for instilling in me the idea that learning never stops. To my wife and son, who have morally supported me and shown me affection in order for me to finish my study.

God's blessings on you all.

ABSTRACT

INFORMATION TECHNOLOGY SERVICE MANAGEMENT: DEVELOPMENT OVER THE LAST 25 YEARS, CHALLENGES AND FUTURE OPPORTUNITIES

Santosh Kumar Pattanayak, 2023

Dissertation Chair: <Chair's Name>
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Over the years, Information Technology (IT) has been able to establish itself as a vital tool for businesses to thrive in the modern world. Most of the business services are either a fully digital service or enabled by IT services. Over dependence on IT services demands IT service providers to provide a stable service that is in pace with the ever-changing demands of industry. Information technology service management (ITSM) has gained its popularity as it ensures that IT systems deliver a stable and evolving service as dictated by the business environment. Researchers have started taking interest on this field of IT, however, there is not much scholarly paper available for overall ITSM developments. This research project studied the journey of ITSM over the last 25 years, evaluate different frameworks available in the market and present the differences between various frameworks. It also evaluated the frameworks for implementation in various organizations. Further, this study examined future trends (such as Artificial Intelligence (AL)/ Machine Learning (ML) and challenges of ITSM implementation. As AI/ML is catching up very fast, this paper recommends future researchers to develop more and more models using AI/ML for improvements in IT services field.

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CHAPTER I

CHAPTER 1: INTRODUCTION

1.1 Research background

In the last 25 years, technology has improved immensely, and it is accepted that the current decade will see faster improvement in technology than ever before. This study will discuss the Frameworks of IT services management and its improvement through the higher development of the technology. The IT services have four dimensions such as organising and the people, partners and the suppliers, processes and the value streams and the suppliers and partners (Mishra, 2021). In the current digital age, every organization is trying to shift or transform their businesses to the digital which causes the IT services and management role to increase day by day. Moreover, the IT services management consultancies have also been increasing in the last 25 years across the globe. In this data-driven world, everything comes in digital information, and it must be accessed for the further development of any organization. However, the data or the information can be manipulated and that could make one organization at risk in the market (GeeksforGeeks, 2022). There is a greater need to develop and manage IT services. Therefore, this study will discuss the development of IT service management (ITSM), it's opportunities as well as the challenges in the implementation of ITSM. Furthermore, the recommended strategies for the development of the Information technology service and the management roles such as the development of the COBIT framework, ITIL and the ISO20000 will be addressed here. The IT teams are in a pivotal role in the management of the end-to-end delivery for the provision of IT services to customers so far. Some of the IT processes of management and services are designing, delivering and IT support services for an organization (Monrat et al., 2019). The

core concept of the ITSM is denoted as that of the belief that must be delivered with comfortable services for that matter. For example, each organization has its website and regular maintenance of IT services management is required. Thus, the significance of this study is that the role of technological implementations in the delivery of IT services and management could be understood for that matter. The picture below (Figure 1) by Schneider et al. (2019) beautifully depicts ITSM model.
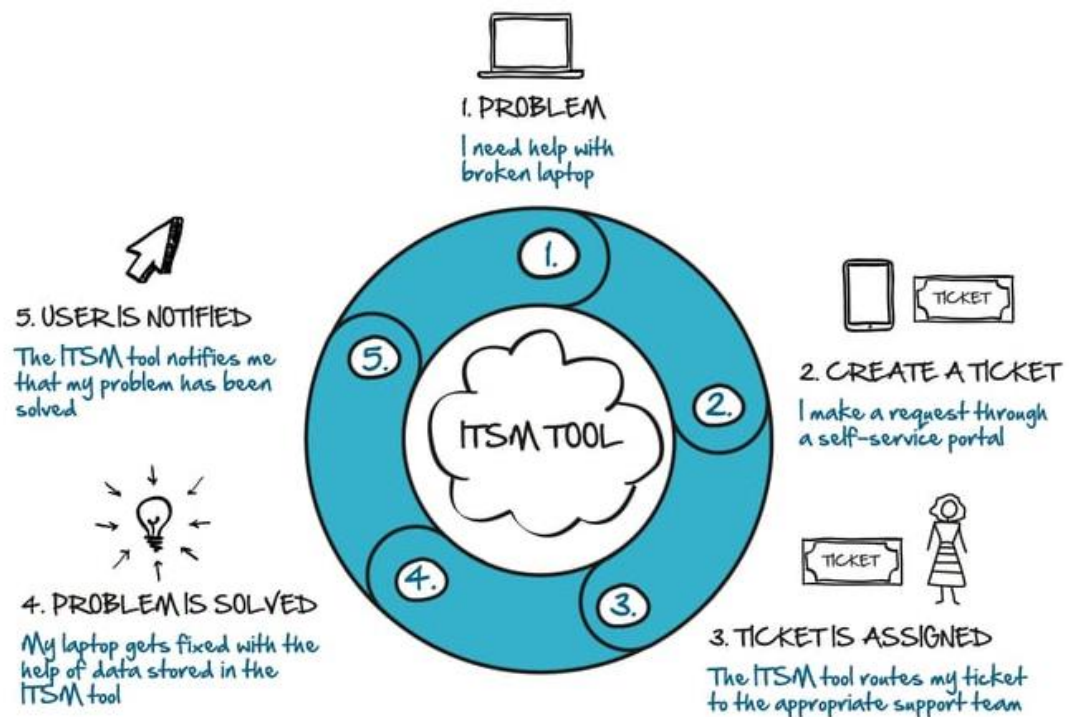
Figure 1. ITSM Tools

(Source: Schneider et al., 2019)

Moreover, this study will also discuss the challenges and the barriers for adaptation of the ITSM frameworks in providing IT services will be highlighted. The most common and significant challenge in managing digital information is that of the third party's involvement in the transactions between the clients and the service holders so far (Navío-Marco et al., 2018). In the front-end management of any website, the back end also needed

to be maintained. Therefore, the database management of the systems should be protected from the manipulation of the third party. The scope and the avoidance of the challenges lie upon the planning of the IT services management for that purpose. Moreover, the businesses have been trying to incorporate the scopes and avoidance of the challenges through newer technologies for the last 25 years. Every organization that delivers IT services to its organizations should have to make the proper frameworks so that the loopholes within its systems can be removed. In the opinion of (Tallon et al., 2019), IT planning has three components, IT leadership and development, IT strategic plan and IT governance by that organization. With all these implications, total security over the delivery of the services and the total management of the IT services can be done. Moreover, the organizations in the IT planning processes for providing the processes, components, and participants for making the decisions regarding the utilisation of the IT for that matter (Soto-Acosta et al., 2018). For example, if one IT service provider manages the website or the transactions processes for any technological company, it needs to combine the people, processes, and technologies to give the ultimate support for appropriate level of uptime/services required by the organization. This study also develops the idea about machine learning (ML) and artificial intelligence (AI) as they have huge potential over the management of the data or information so far. Regarding the importance of AI software, it is observed that the Artificial Intelligence software market size is now up to $126 billion and the start-up funds all over the globe are on the $38 billion for that matter (Lee et al., 2018). AI and ML have a greater role in predicting service requirements and help to automate for delivering better service. Thus, the management of the IT services and making a full proof model for delivering IT services to clients through machine learning and AI would be a desired option for success of any organization.

1.1.1 Applications of IT

The current era is known as the digital era and every contemporary organization is trying to implement Information Technology applications to get a competitive advantage in this competitive market. Some of the sectors where the IT applications can be implemented are in sectors such as healthcare, communications, security, education and governance as per Costin et al. (2018). Awschalom et al. (2021) prepared a diagram as below (Figure 2) showing various usages of IT, this list is not exhaustive, IT can be used anywhere that our imagination can go.
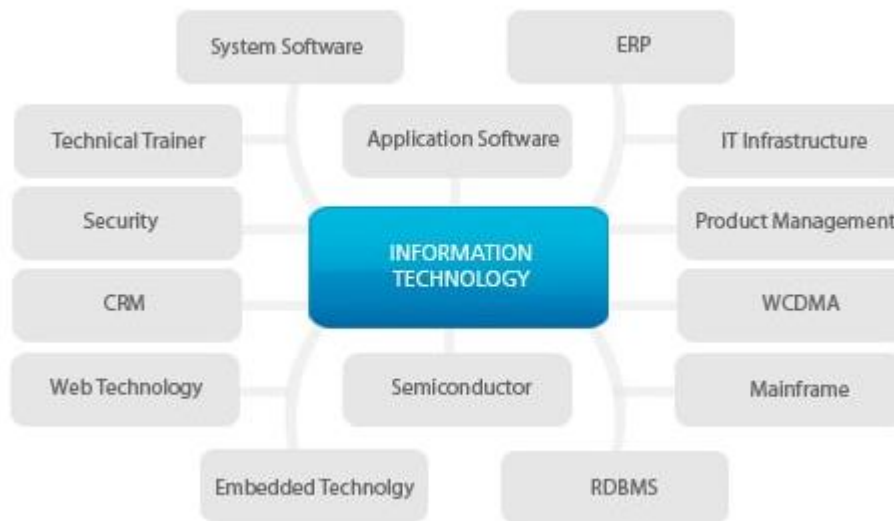
Figure 2. Applications of IT

(Source: Awschalom et al*., 2021)

Healthcare: It is the field that has a huge potential to generate vast amounts of the data, and the researchers can take the data from it. Moreover, one of the applications of IT is live tracking of patients through the help of Skype, Zoom and other real-time communicators as mentioned by Lee et al. (2019). Another application of IT in healthcare is the

implications of data analysis and big data frameworks for further growth in the treatment of any patient. Therefore, the analysis of a patient's data through machine learning algorithms would identify patterns of the diseases and the suitable treatments that the patient can be given based on study by Whitelaw et al. (2020). Moreover, the data from the analysis of the machine learning assessment can help to have a record of the global healthcare formats that can be used by any healthcare person from at any place in the world.

Education: In the education industry, the storage and usage of data can play a major role in the further development of the study of the students. With the help of IT, cutting-edge technology in the classrooms can be implemented through the smart classroom with practical labs from various online resources (Hughes et al.*,* 2019). The most effective application of IT within the education system is that students from a rural area can also get access to the study materials and faculties from world-renowned universities and schools. Moreover, online ranking systems are also there for further development among the students in competing with other students from all over the globe (Castaneda et al.*,* 2018). Besides, digital-based educational resources allows students to learn from the teachers either online or offline at any time suitable to the students.

Communications: With internet and telecommunication technologies, it is possible communicate and share large amount data around the globe on real time basis. This is possible due to advancement of IT. Many organizations are now able to share terabytes of data within seconds and productivity is growing rapidly with the help of the applications of Information Technology such as videotext, Teletext and the common usages of Whatsapp (Siyal et al., 2019). With the entire world connected and sharing data, organizations can assess this information to make the insights for producing the critical decision-making processes

Employment: Information technology is considered one of the major employability scopes for the young generations as each organization and any types of institution uses IT for decision. Some job roles in Information Technology are software engineers, software testers, IT service support, architects of IT systems, cloud data analysts, developers of various technologies and data scientists (Chowdhury et al., 2020). It is also predicted that the positions and the demands of the jobs in the Information Technology field will increase more and more for that matter.

Security: The data transformation and the data transactions from one organization to another corporation must be secured and free from third party's involvement. Furthermore, with the help of digital functions and information technology, monetary transactions from one point to the other can be done with ease and fast. However, these data frameworks and the data packet transmission must be secured to have the security of the data and the monetary transactions. As opined by Pathak (2020), biometric security is considered one of the most significant advantages of using Information Technology applications. For maximum security Therefore, the usage of manual passwords, fingerprint recognition and facial recognition could become the most applicable security method from the applications of Information technology The IT aids can have better secure reading and the making of the data via risk-free networks (Buhalis, 2019).

Governance: The concept of E-governance is spreading all over the globe and it is observed that, with the rising of smart cities, e-governance is also increasing simultaneously. The digital transformation of governance would help to make the administration more accountable and responsible for the issues in society so far. The governments of many developed countries are connected with the people through digital government applications and websites (Pathak, 2020). Thus, the issues and problems

within the societies can also be reached to the higher authorities of the government through digital applications. Through this, people in rural areas can also get the proper services from the government and their necessary resources.

Entertainment: In the entertainment sector, the usage of Information technology is huge, as digital media has improved rapidly in the last 25 years. With the introduction of the internet, the media and the plethora of entertainment have changed the lives of people. Some of the platforms and digital applications of Information technology are Netflix, Amazon Prime and YouTube (Chowdhury et al., 2020). Moreover, with the advancement of technology, it is also observed that people can now watch 3D movies with special audio and digital systems for that matter. It is also observed that with the development of technologies the experience of entertainment for people can be evolved and dynamic.

Science and Engineering: In science and technology, the contribution of Information technology is huge. Existence of standard research data on the internet can also help anyone all over the globe for innovation and to make dynamic changes within the globe. For example, meteorologists can use supercomputers for making rapid updates to the weather forecast in real time. According to Pathak (2020), the most advantageous improvement in science and technology by Information technology is that of the innovations of Artificial Intelligence and machine learning algorithms. The mathematical descriptions and the statistical approaches by the machine learning algorithms would help to predict the patterns of any task and build the data visualisation for any particular organization.

1.1.2 Information technology service management (ITSM)

IT service management can have a significant role how Information Technology applications serve to the clients and the customers. ITSM is simply managing the end-to-end delivery of IT services for the better digital experience of contemporary organizations

(RS, 2022). The core concept of the ITSM is laid upon the belief that Information technology must deliver the service to create value for the organization and customers. With the higher technological improvements, the day-to-day interactions with IT need to be better and user friendly. It has become a misconception about ITSM that it is only for the basic support to the IT but the team of the ITSM can have impact on all types of workplace technology, ranging from servers and business-critical software applications to the configurations of the laptop. Therefore, the proper approach of the ITSM can be divided into three points such as the building of the IT implementations, bringing and enforcing the right process and people learning from the technology and abiding by the processes (Michael et al., 2019). The most important part of the ITSM is that the people who manage ITSM must have to be follow some standards or processes tailored for any particular IT service so that they can be relevant for providing the services. Moreover, logical structure designing and process development could help provide the right solutions to the management of the IT service provided to the clients' organizations (RS, 2022). The skills and knowledge of the technologies by an IT team would help to make support the cross-team performance with another organization for that matter. Finally, the knowledge of IT, software and technology must support the practice of the team and make amplifications the impact that matter.

Karademir (2019) depicted a model as showing in figure 3. He has shown ITSM as combination processes, methods and tools when used effectively, improvements in IT services are realized by the organization.

Figure 3. Information technology service management

(Source: KARADEMİR, 2019)

The development of ITSM, ITIL and DevOps are some of the frameworks developed and matured over the years for overall growth in the IT services management. Some of the common ITSM and DevOps standards for organizations are COBIT, IT4IT, Lean and SIAM (Mora et al., 2022). On the other hand, the practice of the ITIL as an ITSM framework has gained popularity in last decade. It mainly focuses on the processes and practice of aligning of IT services for delivering business requirements. ITIL 4 is the latest framework and with its help, one IT team could be encouraged to adopt holistic and flexible

approaches based on organization requirements. ITIL 4 framework promotes collaboration, feedback and simplicity within the data frameworks (Berihun and Teferi, 2021). The function of DevOps is the collaboration between agile and lean practices. With the development of DevOps, the collaborations between the development and the IT operations team can be performed to build the IT operational teams, organising the buildings and optimising the software release and faster delivery of software changes for client usage. As opined by Moudoubah et al. (2021) the primary advantage of the ITSM is aligning the IT teams with the business priorities and tracking the IT service delivery success using metrics such as budget, results and organizational resources. The cross-departmental improvement of the management of the IT services is another benefit. Hence, as the data or the information can be generated across the departments so binding the teams and the development must be carried on having better results of the IT. Some other processes for the development of the ITSM are the empowering of the IT teams in sharing knowledge and the improvement of the request coordination for further efficient services through the ITSM (Sahid et al., 2018).
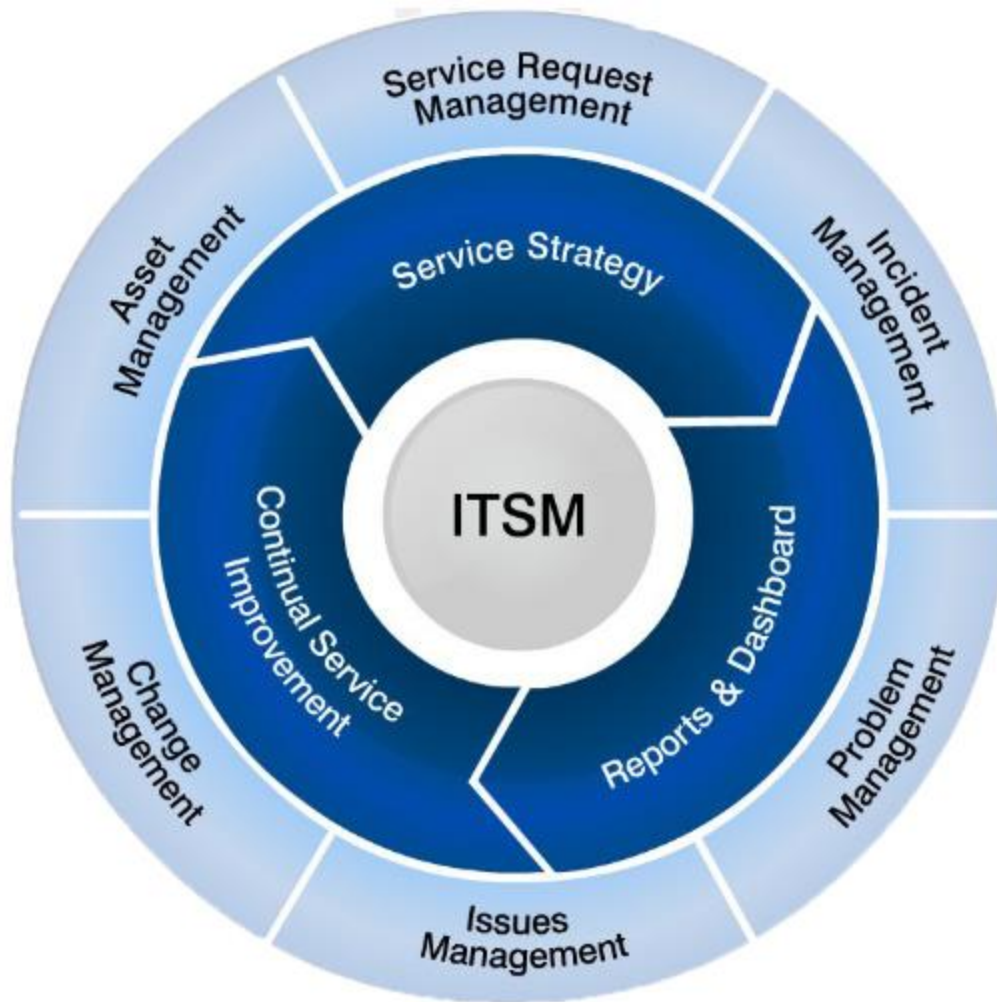
Figure 4. ITSM

(Source: Gunawan, 2019)

ITSM is also combination of several processes and functions as depicted by Gunawan (2019) in the figure above (Figure 4). Therefore, there are various processes for the IT service management, one of the processes is that the service requests management for fulfilling the service (Gunawan, 2019). In this type of management, the IT team must handle the procedure of the wide variety of service requests, access to the applications, software and hardware updates or enhancements. Another process of the ITSM core

process is knowledge management. This process is about creating, sharing and managing the knowledge or information about the IT service. It also denotes the multidisciplinary approaches for achieving the objectives of the organization by making use of the best knowledge (Barreto et al., 2019). Next, the core operation or the process for the ITSM is that of IT asset management. It is considered an essential part of the organization since, with the help of this process, the organization's assets can be accounted for with the deployments, upgradation and disposal at the perfect time so far. In simple form, valuable items, digital assets and tangible objects can be tracked within the organization's operations. Incident management of the organization is another important process for responding to unplanned events and disruption of the IT service operations. With the implications of incident management, the failure chances of the IT team could be reduced, as they are ready for giving quick responses to resolve issues. However, Sipahutar et al. (2020) argued that the problem management by the ITSM could manage the issues that can appear in incident management so that it can be fixed permanently or mitigate/reduce the impact if it happens again.

1.1.3 ITSM - Implementations and Challenges

It is important to have scientific and thorough investigation to detect the challenges during the implementation of the IT services management by any organization so that information decision can be taken regarding successful implementation.

Implementations

- It is important to engage and listen to the users before applying ITSM tools and techniques to organizational management. The aim and development of the understanding by the IT service providers must be to ask for the optimal output from the usages of any ITSM to the specific client (Tijan et al., 2019).

- Building of the service structure based on the business outcome is one of the processes to implement the ITSM processes and deploy appropriate tools. With strong internal services, one organization can have a positive business outcome by implicating ITSM tools. Proper IT support with proven ITSM processes is known as the first line of defense in the battle for broken productivity so the structures must be aligned with the standard of the business (Helo and Hao, 2019).

- Service desk is an important function in ITSM. Investment in the service desk is vital for the successful implementations of the ITSM tools and techniques within an organization to organize various support tasks under one function. It is important to that the service desk analyst has a full understanding of the services that their IT department is providing (Ghasempour, 2019). It is also critical to ensure the necessary tools in the performance of the services on the large scale. With concern for that matter, it is observed that these activities will provide more support and customer satisfaction with increased productivity.

- One of the ITSM tools and core processes is problem management. It should be implemented for the establishment of the full-blown processes and people resource management. For the reduction of recurring problems and to improve the success rates of ITSM implementations, understanding of problem management is of the utmost importance. Furthermore, there is no need for experts regarding the pilot for the problem advisory boards with the identification of the minimal impact upon the problems in the later time (Jia et al., 2019).

- Development of the meaningful metrics and the solving of all IT issues together are significant points for having meaningful IT solutions for any corporation. At the very beginning, it is needed to focus on the data that can be measured and by reporting the measurement with the metrics the extracted data can be used as the baseline for the improvement of the efforts (Zhang et al., 2020). For making successful use of the meaningful metrics in the IT services, it is important that accurate data is collected from all stakeholders. The data and KPI collected should be used to improve service delivered and internal performance. In the team of IT

services, collaborations are needed as the information for the management of any particular digital processes can be obtained from different directions. More importantly, it must be made sure that all the team ,members use the ITSM tools at the different levels of the IT teams.

Challenges

- The challenges of the ITSM are similar to that of the other processes in the technological fields such as the lack of expertise in the management of the ITSM processes. According to Aceto et al. (2019) the lack of effective communication in driving or resolving any major incidents in the organizations could be affected. Major incident management (MIM) is a significant core process by the ITSM and the failures of the MIM could break the productive output of the IT services and impact organization business and image. As digital functions and Information management are always at stake due to the uncertainties, so resolving the issues that as early as possible is needed.

- The process manager has a vital role in the management of ITSM tools and technologies for the betterment of the organizational goals. However, the lack of knowledge of the infrastructure and the lack of understanding of the technologies for the major incidents could become problematic for that certain project as everyone within the IT team is dependent upon the process manager (Almaiah et al., 2020). Thus, reviewing and controlling changes for undertaking the root causes for the overall development of the ITSM tools and the technologies is required.

- Resource management is one of the burning issues in ITSM implementations and lack of skilled resources in ITSM could impact it's implementation or realizing it's potential benefits. Some of the skilled resources in ITSM are service desk specialist, IT security specialist, trained/skilful people who are already providing services, and many other things (Palvia et al., 2018). Therefore, the lack of resources and the lack of resource management could reduce the scope of the overall development of ITSM team.

- It is observed in the implementations of the ITSM services that overall management can be done without having to know the pain points of the customers. Process management or service improvement can be challenging if it is carried out from the perspective of the IT services management providers alone (Ismagilova et al., 2019). Therefore, further customer escalation for any IT services or sudden changes by the customers could cause the failure of overall ITSM services by the service provider. It is required to have further process improvement in the management and the implementation of the ITSM tools and core processes. Thus, in this way the investment in project management with the IT services can be improved.

- The process service is of the utmost importance in the management of successful implementations of the overall management of ITSM tools and technologies. Some customers may not be aware of the overall value delivered by the provider organization, the provider management must have to identify all customer requirements and make sure process is delivering services and providing overall improvement (Sun and Medaglia, 2019).

1.2 Research problems

The problem statement is the statement that focuses on the concern areas, and difficulties to raise the process and highlights the condition to be improved. The findings are based on the analysis of the questions. The research ITSM investigation includes providing deliberate investigations, pointing out a meaningful understanding of the research issues, the challenges, and identifying the key obstacle to raising solutions and improving the effectiveness of. To study development of information technology service management over the last 25 years, challenges and future opportunities researchers have described some significant problems and issues which create obstacles to raising the quality of information technology management based on the adoption of the key features of the advanced

technological system in the IT industry. The major problems and challenges to implementing the technological advancement features in IT management includes of-

- Working within a tight budget and managing the cyber security issues
- Focusing on the right analysis and lack of investment in the Smart technology
- Inadequate software training tools and declining productivity in the workplaces
- Lack of preparedness among the employees and project team
- Misaligned expectations
- Senior management focus
- Lack of proper implementation and incorporation of the new technological features
- Monitoring suitability of data and regulation which could not provide progress in the IT firms

All of the above issues are the major obstacle to implementing new technology in IT firms and ensuring more success based on the development of technological progress.

Lack of budget and cyber security issues- From the data it could be found that the small IT business organizations have faced issues with the tight budget and lack of investment strategies to adopt the new technological features in their business. According to Emre (2019) adopting SQL solutions, processing the innovative software system for making better quality measurements, storing the vast amount of data and specifying the process are the important features, which works as an economic roller coaster and rapid evaluation of the unique technology. Therefore, it could be analysed that the key problems found in the small and medium-term IT industry like 48% of the IT firms, have suffered from making the appropriate budget and inset in new equipment for adopting the virtual reality and machine learning algorithm. Teoh et al. (2018) pointed out that 55% of IT firms could not adopt AI and machine learning features for their inappropriate cost strategy. Managing cyber security and implementing the application for large businesses can stop the potential

cyber-attacks and targets of the cyber criminals, which the typical companies are faced with storing confidential financial data and information on their business networks. The biggest challenge in this digital world is to develop smooth business strategies by avoiding cyber security issues and cyber-attacks on large industrial entities.

Right analysis and lack of investment in Smart technology- Embracing big data analytics based on the adoption of significant analysis of data and then leading the overall business based on the information is another significant challenge for the firms to make use of big data an potential for the organization. Garcia (2020) argues that inspiring investors and key stakeholders for raising investment on actionable data and activities by the business processes by identifying smart technology streamline in business operations. Educating the business community by justifying the benefits of the intelligent technology (AI or ML), operating at greater sustainability and realizing complex cost strategies is the potential challenge or problem for future development by adopting the key technological features and modern technological advancement in the IT industry (Rusakova et al., 2020).

Inadequate software training tools- When the IT Corporation is focused on implementing the new software, the employees need to understand the potential value of the individual software, realise the value of day-to-day usage and develop an effective onboarding plan for the firm. Appointing the IT experts in the related field, the firms can resolve the issues but it is not always possible for the IT industry to hire experts who have a better understanding of the innovative software and is able to operate the activities of the IT companies through digital adoption platforms. *Misaligned expectations*- The project team includes a variety of internal stakeholders such as team leaders, digital adoption experts, project managers, subject matter experts, product managers, designers and architecture. Making transparent, realistic goals and delivering the appropriate process by receiving the

less attentive level of the services and impressive software for desirable capabilities can create issues for the firms. As per the opinion of Ligthart et al. (2017) ensuring the expectation to meet with the process based on the implementation milestones and requiring the planning stages by a smoother process through strong communication between the vendor and project team increase the overall process and expectations. Lack of integration and knowledge of the leaders and managers are some of the issues lead to incapability to meet expectation.

Monitoring suitability of data and regulation- Today new technology lets the company monitor processes and get the overview of designing high-quality efficiency, give insight into the process of the system and make progress based on the achievement of the monitoring process. As per the opinion of Cronmiller and Noble (2018) focusing on open communications and training the employees for the usage of the measurement and analytic tools in the business will raise the capabilities of the companies to generate new results and regulations for the betterment of work.

Lack of proper implementation and incorporation- Taking advantage of new technology could not provide enough integration if the firms were not able to adopt the existing process in the business. Lack of knowledge among the employees about the implementation of the new technology and incorporation of the new features of the technology can raise issues for the older employees about the innovative skills and approaches.
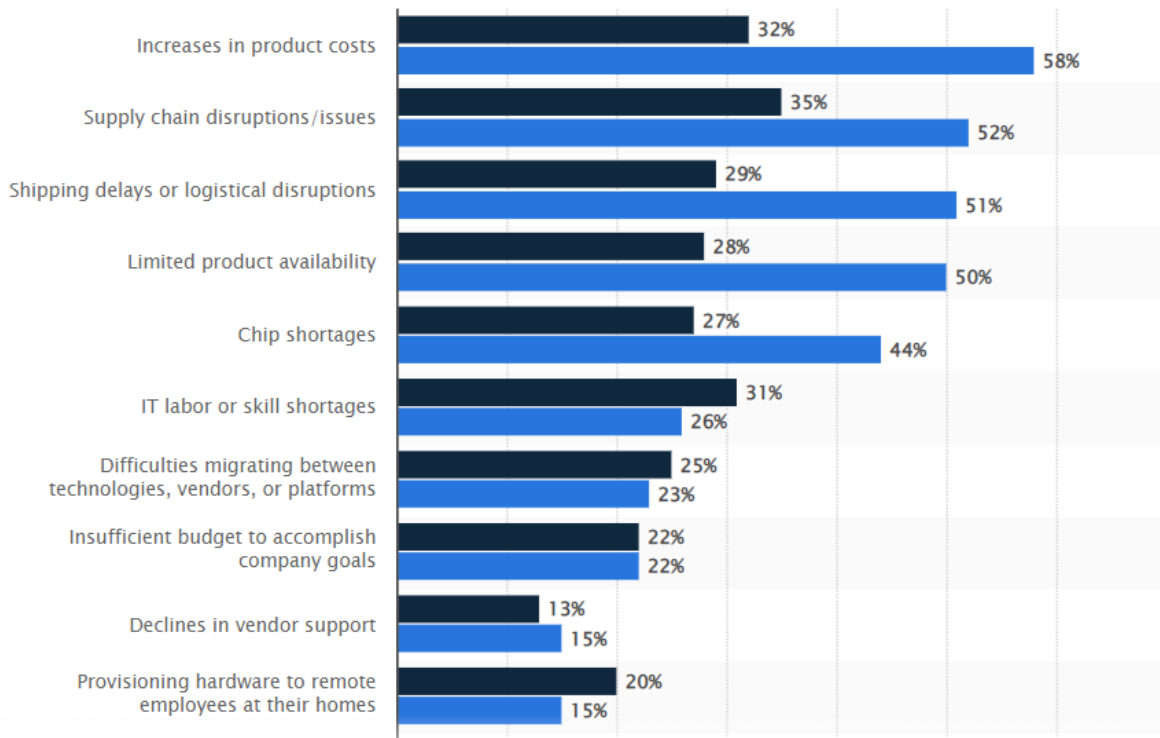
Figure 5. Anticipate IT challenges for the Tech companies in 2023, by region

(Source: Sava, 2022)

According to Sava (2022) with the statistics forecasting (Figure 5), it could be analysed that approximately 93% of the ITSM are accessing the basic pay in the technological account and 7% of the big IT industries are focused on paying more on the technological account. This data also represented the key challenges which the IT companies are facing such as 32% in Europe of companies are facing trouble with increasing production costs to adopt the innovative changes in their corporations. Moreover, 35% of IT companies are facing supply chain disruption issues and 29% of IT companies are facing shipping delaying issues and logistics disruption in their firm. However, 58% of the North American IT industries are facing trouble with enhancing the product cost, 50% issues from the limited product availability and 19% with tracking the license and inventory issues for

remote employees. Investing in the BPM, RPA and other automation method is one of the core challenges for the ITSM as the implementation of those strategies are associated with the execution of particular needs, focus on the financial crisis and priority of the automation matter for exposing the inefficiencies and reliance the manual processing the IT organization. As per the research of Androniceanu (2019) the mainstream for facial recognition to language translators and assisting the disruptive capabilities for decades are indicating the major issues in developing AI features in the business operation of IT firms. The skill gap among employees is a significant issue. From the data sources, it could be found that more than 21% of European firms are suffering from talent gaps, challenges in hiring full-stack developers, and quality employees who can keep the legacy system and work on the new project for getting better success in ITSM. Lack of capabilities to design the project for Outsystem parts, leading the industry analysis based on insights from the OutSystems experts, connecting customer success experts and getting value from the OutSystems is developing the key features of the ITSM that are creating big issues. Create a better communication network for the organizations, helping employees troubleshoot problems, administering the datasets and databases and providing a wide range of security services to ensure the efficiency of the employees who are dependent on the ITSM solutions. Tools perspectives define the collaboration among the different IT networks and enable the common languages for the development of the business such as 'hot topic' categories, cloud computing services and ITIL approaches. Androniceanu (2019) perceived that the ITSM framework and its development have evolved with the improvement of IT management, adopting methodologies like NIST, COBIT, CSF and ISO frameworks in the business model of the IT firms. Data model development based on the physical and logical data interpretation, focusing on source system reverse engineering projects and data governance policies all are the key consuming factors from where the

ITSM is facing key challenges to raise the opportunities in the worldwide market. Data connectivity, data provisioning and disaster recovery all are significant processes and projections that most IT companies could not achieve due to the lack of investment strategies or lack of capable employees in the organization.

1.3 Aims and objectives

The primary objective of this research paper is to analyse the development of Information Technology Service Management (ITSM) over the last 25 years, exploring the challenges faced and identifying future opportunities. The study examines data (past studies) from IT organizations, international IT growth and focus on strategies, the ITSM framework, and the implementation of machine learning in the ITSM process. The research also analyzes the effectiveness of ITSM in the current digital world.

The main aim of the study is to provide comprehensive information on the historic evolution of ITSM frameworks and their attributes, challenges, implications, and management processes over time. The specific objectives of this research include:

- Analysing various ITSM frameworks and their strengths.
- Examining the development of ITSM over the last 25 years, with a focus on ITIL, ISO20000, and COBIT and analyzing their strengths and challenges.
- Assessing the opportunities for implementing machine learning in ITSM processes.
- Evaluating existing machine learning models and identifying their strengths.
- Investigating current initiatives for improving data quality using AI technology.

These objectives are aimed at studying individual elements of the ITSM framework, examining the development over time, and exploring the potential for incorporating machine learning in ITSM processes. The adoption of automation and AI technology in the IT industry leads to more efficient operations management, customizable workflows, and

increased capabilities for firms. The challenges faced by the IT industry include the fast evaluation of software, the implementation of hybrid work environments, cloud migrations, and increasing and unexpected expenditures, as well as various cybersecurity threats.

A study of the development of machine-learning models and the reduction of their gaps highlights the significant growth of IT firms globally. Managing IT is a complex endeavor that encompasses asset management, operations management, and project and program management. Technological advancements and changes brought about by the pandemic have reduced stress on IT firms, and the combination of optimizing processes and advanced technology is a testament to the value of ITSM in the current world.

ITSM today provides technological solutions to businesses and delivers business value through the adoption of AI-powered services, distributed enterprises, and hyper-automated processes in the business field. The development of AI technology and cloud computing services and a focus on the objectives of the 4.0 industrial revolution will help ITSM meet the technological requirements and become more realistic by adapting to key business changes. This will ensure future success by creating a 10-year plan. Over the last 25 years, the consistent growth in the IT industry and innovative technological advancements have positioned IT firms to offer the best solutions through high-security services and improved international business operations.

1.4 Research Questions

The research questions play a crucial role in the research process and aim to provide answers to the questions that arise after analyzing and evaluating the topic of research. This

research paper focuses on the major questions related to the development and evolution of Information Technology Service Management (ITSM) over the past 25 years, its challenges, and future opportunities. The following research questions (RQ) have been identified after conducting a thorough analysis:

RQ1. What are the various ITSM frameworks?

RQ2. How has the field of ITSM evolved over the last 25 years, with a focus on ITIL, ISO20000, and COBIT? What are the strengths and challenges of these frameworks?

RQ3. What are the opportunities for implementing machine learning in ITSM processes?

RQ4. What are the different machine learning models available in the market w.r.t ITSM.

RQ5. What measures are currently in place for maintaining data quality, and how can AI/ML be used to improve these measures?

The study demonstrates the importance of advanced technology in the modern industry by comparing the strengths of each ITSM framework and focusing on the evolution of ITSM over the last 25 years, particularly ITIL, ISO20000, and COBIT. According to Setyowati et al. (2021) AI security can close gaps in potential vulnerabilities and using AI can increase security defense by uncovering attacks, helping firms understand patterns, and identifying attacks in order to defend against them. In the digital era, digital transformations and digital workflows have improved employee experience management and have provided better business outcomes. By utilizing various AI tools, IT firms can engage in activities such as business process optimization, natural language processing, automated problem incident response, machine learning, and knowledge management, which are becoming popular in 2022. Bolton et al. (2018) suggest that technological fusion is the term that provides

differentiating approaches to enhance ability and increase value through the rapid growth of technological changes in IT firms. IT consulting giants such as Accenture, Wipro, HCL Technology, and TCS have experienced significant growth and success in recent years due to their adoption of AI technology, machine learning algorithms, SQL processing, and automation. The study also highlights the challenges, opportunities, and benefits of implementing advanced technology and innovative technological features, which will increase the effectiveness and efficiency of IT operations.

1.5 Contribution of the study

The objective of this research study is to improve understanding of IT service management in organizations. Through the study, the researcher aims to comprehend the resources, management, implementation, and challenges associated with ITSM processes, tools and the organization. In today's digital world, large amounts of data are generated, and the practices of IT service management can be improved to make the data usable by adopting AI & ML. However, there are also challenges and drawbacks related to data management and the ITSM process within organizations. This study also explores the concepts and processes of machine learning (ML) and artificial intelligence (AI) frameworks to enhance effectiveness of ITSM management in IT service organizations. AI and ML can develop models to predict IT demands/requirements, customer behavior, probable challenges and suggest ways to manage services better.

The four most important aspects of ITSM are products, people, collaboration, and process. By combining these ITSM frameworks such as incident management, problem

management, and change management, effective IT service and delivery can be achieved. The IT team should be composed of ITSM experts and the process manager should have knowledge of the technologies and frameworks. On the other hand, stakeholders must align with ITSM projects and resources should be sufficient to guide IT services and management for clients.

This study also extends to analyze the COBIT framework, which provides appropriate control in management of IT services. COBIT can be divided into five principles: meeting stakeholder needs, covering the enterprise end-to-end, enabling holistic approaches, providing a single integrated framework, and separating governance from management. ITIL, ISO 20000 and other frameworks have also been studied for the development of ITSM in IT service management.

Another contribution of this research is to study impact of development of machine learning and AI on ITSM. In a data-driven digital world, evidence-based IT service and security frameworks are crucial for clients or groups of clients. The study aims to give strengths of various frameworks like COBIT, ITIL, ISO20000 and DevOps. AI applications can help analyze data to identify patterns in incidents and prevent future escalations. Utilizing data management and process development can improve the overall effectiveness of ITSM. The stakeholders can make informed decisions through ML models during monitoring and evaluation of IT service systems.

However, there are challenges in using machine learning, such as the risk of client privacy being violated and the potential for fatal manipulation of customer database training data. Thus, ITSM service providers should create proper frameworks and structures to ensure secure technical support for clients. Despite the advancement of technologies over the past few decades, the fundamentals of IT service management will persist for a long time. This

research study aims to raise awareness about how ITSM have been evolved over the years, what are different frameworks and their strengths and how AI & ML will help improving effectiveness of ITSM for value addition to the organization providing IT service and the clients of the services. This will help IT operation people as well as future researcher.

1.6 Thesis Structure:

Chapters	Definitions
Chapter 1: Introduction	The introduction is the first chapter of the research, which defines the ultimate aims, describes the problems and makes questions by analysing the problem of the research. This chapter includes the objectives of the research, the background of the topic, and discusses the rationale and significance of the study. In this research paper, the management flows, and development based on the adoption of technology in the last 25 years in IT management has been described. For this reason, the ITSM frameworks available and the strengths of each framework, the journey of ITSM has been over the last 25 years, emphasizing ITIL, ISO20000, COBIT and what are the strengths, and gaps of various frameworks have been discussed here. After this discussion, this paper also focuses on the machine learning process and AI technological advancement and their features in the development of IT management for the future.
Chapter 2: Literature review	The literature review is the second chapter of the research paper, which can focus on the previously published study, and demonstrate understanding and knowledge of the academic literature on the topic. Using scholarly sources,

	the study of the literature review has been presented in the research, which can be gathered from the different authentic journal sources, and books, that are focusing on the topic of the research. In this research, the literature of the study has focused on the theoretical analysis of information technology service management: development over the last 25 years, challenges and future opportunities. This is written as the often segment of the thesis in order to simulate the work in relation to the existing data and knowledge. Mention the introduction, theoretical concept and learning of the topic and mention the research gap, which highlights the gap between the present research and the previously published research.
Chapter 3: Methodology	The methodology is the third chapter of the research, which is focused on the method that the researcher used to gather information, find the solutions and better outcomes of the research. This is one of the important chapters of the research. This chapter includes of research approaches, philosophy of the paper, types and methods of data collection and data analysis techniques, by mentioning the period methodology showing the plan of the overall thesis also designing the ethical consideration, which can follow the ethical factor to completing the study of the research. In this research, the primary qualitative and sedentary qualitative data collection methods will be followed as the research focused on the last 25 years of development of the IT industry. Prisma model has been prepared for Systematic Literature Review (SLR).
Chapter 4: Data analysis	Data analysis is the fourth chapter of the research, which explains the prices of collecting data, analyses the gathering information, which is collected from direct or indirect sources and is discussed the finding of the research.

	By making analysis researchers will get the solutions to the research topic based on asking significant questions to the interviewees which are coming from the questions of the research. For this study, systematic literature review (SLR) has been conducted and presented w.r.t. research questions.
Chapter 5: Findings and discussion	Finding and discussion is the fifth chapter that is part of the data analysis. The purpose of the discussion and findings is to describe and interpret the data, light on the way to find the solutions to the reading topic and investigate for a better understanding of the solutions of the research. Discussion is the part, which links the findings with the literature of the study.
Chapter 6: Conclusion and recommendation	The conclusion is the last chapter of the research, which represents the ultimate findings, and solution of the research, linking the finding with the objectives and literature of the research. Based on the findings of the research, the researchers have presented recommendations, which can increase the significance of the research and develop the unfolded areas of the topic. This part also describes the limitations of the research study; the limitations of the data collection process also describe the future scope of the research by focusing on the other key areas, which were not discussed in the present research paper.

CHAPTER II

CHAPTER 2: REVIEW OF LITERATURE

2.1 Introduction

Information technology service management (ITSM), is a subfield of information technology that focuses on the administration of various IT-related services and systems. It entails the creation of, the delivery of, and the maintenance of information technology services and systems that are intended to support the business activities of a company. IT service management (ITSM) is an area of information technology that has seen phenomenal expansion and development over the course of the last quarter century. This chapter of the literature review intends to offer an overview of the evolution of ITSM over the last 25 years, including the problems that have been experienced along the way and prospective prospects for the future.

The first step of the evaluation of the relevant literature will be to provide a concise summary of the development of IT service management. This will contain a discussion of the main milestones in the evolution of ITSM, such as the introduction of the ITIL framework in the late 1980s and the advent of service management tools such as ServiceNow and BMC Remedy. This will be covered in the following paragraphs. After this, the literature study will investigate the difficulties that are connected with the adoption and implementation of ITSM. This talk will include an analysis of the possible hazards that relate to ITSM, as well as the actions that businesses can take to ensure that the adoption and implementation of ITSM is effective. In conclusion, the assessment will investigate other avenues that ITSM might pursue in the future. This will entail taking a look at some upcoming technologies such as artificial intelligence and machine learning, as well as future trends in the industry at large.

In general, this chapter will present an in-depth analysis of the evolution of ITSM over the last 25 years, the obstacles and possibilities connected with its acceptance and implementation, and the probable future direction of the discipline via the use of a literature review.

In spite of the fact that the primary objective of the study is to carry out a comprehensive literature review that spans a time period of twenty-five years, the research presented in this section examines some of the most recent work done in the field of IT service management (ITSM) in order to gain a basic comprehension of how it operates before proceeding to examine the procedures that were followed in order to obtain the results.

Baradari et al. (2021) centered their research on gaining an awareness of the link that exists between IT service management and knowledge management for the purpose of assuring an improvement in the performances of organizations. According to the findings of the research, knowledge management is an essential component of the IT service management (ITSM) implementation process. It has been discovered that the efficacy and efficiency of the different processes of ITSM would ultimately enhance when the same is linked with that of the knowledge management techniques.

Lucio-Nieto & Gonzalez-Bañales (2021) discussed the use and execution of IT service management in relation to a food firm that operates in the Latin American area. The research makes use of the unique characteristic of the tool that is provided by the service management office and explores how it may be used to the process. According to the findings of the research, it is essential for the IT service to provide opportunities for the ongoing development of the IT service management (ITSM) process, in addition to ensuring that the desired level of quality and efficiency is reached. The research emphasizes the significance of offering a governance provision that is adaptable to the usage of information technology within the area of its investigation.

In their study, Pereira et al. (2021) focused on one facet of business process management in relation to another, namely incident management (one of the process within ITSM/ITIL). This study's primary objective is to get a knowledge of the time management process that enables the incident management procedure. The research is able to give a number of different insights into the problem, and it claims that there are three best practices that can be emphasized with regard to the process. They comprise the method of automating the operations, the procedure for eliminating the tasks, and the integrated model of technology that is being used in the process. When these ideas are utilised in the field, there is potential for a reduction in the overall amount of time that is spent processing.

Shastri & Thampi (2021) carried out research in order to learn more about the automation process of IT service management. There are a lot of obstacles that arise in the way of the implementation of these ITSM procedures since, in today's environment, organizations are extremely focused on integrating digital technology into their business models. One of the most significant actions that should be taken in this scenario is the automation of the complete IT service management (ITSM) architecture.

Chunpir & Ismailzadeh (2020) study conducted a comparative investigation of the use of ITSM in a variety of industries, including the commercial sector, libraries, the public administration domain, and the advances of e-infrastructure. After doing research into these four domains in relation to ITSM, it was discovered that there are a total of six important facets connected to it. They include the architecture of the digital components, the forms of organization, sources of financing, frameworks produced, and the elements that impact the implementation guidelines of ITSM.

Hermita et al. (2020) concentrated the majority of their attention in their research on the planning stage of the ITSM framework suitable for usage in Indonesia's various areas. A discussion on the application of IT service management (ITSM) to the operation of helpdesks was a part of the research. When it comes to this particular aspect, the design of

ITSM must be in accordance with the standard operating procedures, the service catalogues that are offered, and the service level agreement that one is a part of.

Juliana Sipahutar et al. (2020) investigated the viewpoint of Indonesian start-ups by gaining a grasp of the numerous elements that drive the usage of IT management and those that serve as impediments to its use. The characteristics of the system itself and the level of work that must be exerted in order to make effective use of the system as an element of the overall business process are examples of the kinds of things that are often discovered to be the drivers of the influence they have. The nature of the system's functioning and the creativity that is required to utilise ITSM both contribute to the fact that its implementation is difficult. When it comes to the process of implementing ITSM, the nature of operation in the system acts as both a motivator and a barrier for start-ups and entrepreneurs operating in Indonesia.

Shrestha et al. (2020) carried out their research with the intention of illuminating the procedure of building and assessing the evaluation process by using IT service management. The authors recommend including these four steps into the process in order to make it more efficient. They include the first step, which is the identification of the process; the second stage, which is the evaluation of the process; the third stage, which is the measurement of the capability of the process; and finally, the fourth and final stage, which is the improvement of the process. It has also been claimed that the approach is capable of being altered into a mode that is both self-accessing and transparent.

A case study was carried out by Wijatmoko & Siregar (2020) at the regional office of the Ministry of Law and Human Rights in order to assess the IT Service Management (ITSM) process. The evaluation was based on the e-GovQual measures. Based on the findings that were obtained from conducting an in-depth analysis of the study, it appears that the process of developing ITSM ought to give information and communication systems the priority they deserve in order to ultimately achieve the objective of bettering the quality of the

service. For the purpose of effectively implementing information technology in the realm of public services, the creation of a road map and a blueprint is obligatory.

Davila et al. (2019) investigated the many different options that are now available for the implementation of IT service management with regard to extremely small organizations. As businesses employ information technology services not only for themselves but also for their clients, the usage of IT service management (ITSM) becomes an extremely significant practice. The models that are prevalent in the sector are often developed with regard to huge organizations; hence, it is exceptionally challenging to execute these models at the levels of smaller organizations. The findings of this research indicate that the ISO/IEC 20000 model, which forms the basis of the model that has been presented, works substantially better when compared to extremely small organizations. The implementation process tested across two different companies as part of the research. This ensured that the promises made above have a beneficial outcome.

In their research, Barreto et al. (2019) placed a particular emphasis on ensuring that information technology (IT) service management is used in the most efficient manner possible, with the goal of boosting the availability of information systems in a variety of enterprises. Even if there are many different factors that contribute to the widespread adoption of IT services by organizations, there are also many different challenges that come with the administration of these innovative goods. When put to use in situations like these, ITSM affords organizations the opportunity to improve their management practices via incorporation of IT services.

The topic of knowing the capabilities of ITSM's service effectiveness was investigated by Winkler & Wulf (2019). The procedure has evolved into a hotly debated topic in the field of information technology service provision all around the globe. According to the findings of the research, which was based on information gathered from 256 different companies,

the processes of value co-creation and the facilitation of value internally offered a high strategic plus point as well as stability in the maintenance of ITSM.

In their research, Yandri et al. (2019) discussed an assessment approach for the process of information technology service management (ITSM) that makes use of an information technology infrastructure library (ITIL). For the purpose of this research, a questionnaire was used to explore the primary aspects of the ITIL cycle. The procedure is broken down into a total of four steps, each of which contributes to the smooth operation of the procedure as a whole. This contains the steps of fuzzification of the process, the building of a knowledge base, gaining inference, and finally defuzzification, in the sequence listed above. According to the findings of the research, increasing the amount of time spent on each of the four phases results in increased degrees of maturity across the board.

Eloranta & Turunen (2015) have made an effort to identify any holes in the research pertaining to IT Service Management (more specifically ITIL). They have made an effort to fill an essential void in knowledge about the advantages of adopting a mixed framework by concentrating on the benefits that are appropriate for a variety of organizations and the use of model-dependent technologies. More research is necessary to consolidate the gaps and suggest solutions so that businesses may choose the optimal combination of frameworks that is appropriate to the requirements of the organization.

According to what was written by Rafi et al. (2022), the IT Infrastructure Library (ITIL) was created in the 1980s by the Central Computer and Telecommunications Agency of the United Kingdom government as a response to the fact that other government agencies and private–sector organizations were developing their own IT management practices. The IT Infrastructure Library (ITIL) versions V2, V3, or the most recent version, ITL 4, have been embraced by industries to varying degrees throughout time.

The idea of IT service management was used by Fajar & Andini (2018) in order to measure the effect that was caused on the overall performance as well as the customer satisfaction that was the direct outcome of this. The research was conducted using a case study approach, and the findings indicate that there is a connection between the application of ITSM to improve the operational efficiency of businesses and the overall impact that this has on the degree to which customers are pleased with the products and services they receive. It has been discovered that the way of using a balanced scorecard is one of the most effective methods for getting the most out of the frameworks.

MacLean et al. (2018 & 2023) carried out research with the intention of achieving business alignment for IT by taking into account IT service management as a component of the management control system. The development of a conceptual model in this area was supposed to be the contribution of this piece of writing. According to the findings of the study, in order to achieve high levels of productivity and the satisfaction of consumers, it is important to include the following steps in the model: planning, values, rewards, administrative controls, and cybernetic systems. This is because the study found that these steps are necessary to achieve high levels of both productivity and satisfaction.

In their research, Ravasan et al. (2018) focused on determining the important success elements that already existed with regard to the deployment of IT service management. A significant component of the IT implementation ecosystem is the framework that is currently being built as a component of the IT service management framework. Services. The research project used 122 answers that were obtained from a questionnaire, and the analysis of this set of data indicated that there was a total of five groups that may be classified depending on the need of the ITSM framework. They include managerial, organizational, project management, and process implementations, as well as human resources management and project management.

A research was carried out by Zuev et al. (2018) with the purpose of determining the part that machine learning plays in the process of IT service management, also known as ITSM. The accuracy of predictions made with the use of machine learning datasets was the primary emphasis of this research. The findings shown that even while the accuracy of the forecast is rather high, it is still extremely straightforward to implement for the aim of enhancing the quality of the service. The service process often consists of a number of steps that, when completed in their whole, result in the successful conclusion of a given process. The deployment of IT service management in the field has been significant in assisting with the achievement of precision in the completion of various service activities using an automated way.

The method of simulation was used by Ruiz et al. (2018) in order to optimise the ITSM process. In order to determine the advantages of putting the ITSM process into practice, the research made use of a technique called multi-method simulation. According to the findings of the research, using algorithms that are multi-objective in nature may be of assistance in the process of optimising the application of ITSM throughout a whole company, which is a problem that has to be solved.

Verlaine (2017) performed their research with the intention of constructing an agile information technology service management framework. In the most recent few years, the sector of information technology has been developing a high degree of agility. In the field of information technology, the adoption of service-oriented methods paves the way for providers to exhibit more flexibility and agility throughout the process. When examining the cases of ITSM, however, it is frequently discovered that the processes that are laid out here are quite rigid and include a very high level of control as part of the procedure. The results of this study contribute to the realisation that the IT service management (ITSM) process requires additional agility in order to achieve improved results in the future.

The goal of the research conducted by Krishnan & Ravindran (2017) was to get a knowledge of the procedure of IT service management and the potential effects that this procedure may have had on the IT industry. Businesses are now undergoing a transition away from an operating system centered on commodities and towards one that is centered on services in economies all over the globe. The primary goal of implementing IT service management is to provide these businesses with the assistance necessary to successfully incorporate a variety of IT services into the day-to-day operations of the management. The progress of automating the IT service management (ITSM) domain is helped along by the introduction of a new idea known as the Information Technology Infrastructure Library (ITIL), which was made possible by the government of the United Kingdom.

Eikebrokk & Iden (2017) carried out their research with the purpose of gaining an understanding of the planning that goes into IT service management and the information that is gained via ITIL adoption. In the past, many scholars have analysed and researched ITIL's use in the ITSM field in order to better understand it. The research presented here demonstrated a number of different techniques that may be used to a significant degree via the adoption of ITIL. The primary objective here is to enhance the quality of an ITIL implementation while simultaneously gaining access to the advantages it offers via a methodical procedure.

2.2 ITSM in organizations

ITSM refers to an essential idea for businesses in all sectors. It is an integrated strategy to managing and delivering high-quality information technology services, with the goal of satisfying the requirements posed by the customers and any other relevant stakeholders. IT Service Management (ITSM) is an all-encompassing strategy that includes the design, planning, delivery, operation, and management of information technology services in order to fulfil the needs of customers (Dávila et al., 2020). It is an all-encompassing strategy that

helps businesses to improve their levels of customer service as well as their levels of both efficiency and productivity.

In this day and age, when more and more businesses are dependent on IT services to fulfil their customers' requirements, IT service management (ITSM) has taken on an increasingly significant role. Since companies are becoming increasingly dependent on technology, they have a growing responsibility to guarantee that the services they provide satisfy the expectations of their customers and are provided in a timely way while being cost-effective (Dávila et al., 2019; Sukmana et al., 2017). An efficient IT service management approach may assist businesses in boosting customer happiness, cutting down on unplanned downtime, and improving the effectiveness of their operations.

In the last quarter of a century, IT service management has seen substantial development. At the beginning, IT service management was solely used for technical support and maintenance, and its primary emphasis was on delivering a fundamental level of service delivery. Yet, as a result of developments in both technology and customer requirements, ITSM has expanded to include a far greater variety of services and operations (Gacenga et al., 2012; Marrone & Kolbe, 2011). Nowadays, IT service management (ITSM) encompasses a wide range of domains, including service design and planning, service delivery, service operations, and service improvement; it has also developed into an essential component of the IT strategy of many businesses.

The evolution of IT service management (ITSM) has been a continuous process throughout its entire existence. In its early days, IT service management was primarily concerned with the provision of fundamental technical services like the maintenance of hardware and software. The supply of increasingly complicated services, such as project management and customer support, became the primary emphasis as technology advanced and client requirements changed over time (Mohamed et al., 2020). This shift was also responsible for the creation of service management frameworks, such as ITIL and others, which offered

businesses an organised method for providing excellent services to their customers (Mora et al., 2014).

In recent years, IT service management (ITSM) has become an increasingly vital function for businesses in a variety of fields. IT service management (ITSM) is becoming more popular among businesses in order to guarantee the punctual and economical delivery of their respective IT services. Many companies now consider IT service management (ITSM) to be an essential component of their IT strategy since it helps them to improve the quality of their customer service as well as their efficiency and productivity (Hjalmarsson et al., 2016; Zaydi & Nassereddine, 2020).

There have been significant advancements made in IT service management (ITSM) over the last 25 years; nonetheless, firms who use ITSM still confront a number of obstacles. Lack of resources and knowledge is one of the most major problems that must be overcome in order to successfully adopt ITSM. The resources and the experience necessary to effectively establish and properly manage an efficient ITSM strategy are lacking at many firms (Deutscher & Felden, 2010; Treeratanaporn, 2015). In addition, businesses often have trouble keeping up with the constantly shifting demands of their clients as well as the rapid advancements in technological advancement.

In spite of these obstacles, there are a great deal of chances for businesses to utilize ITSM in order to boost their levels of efficiency and production. With the help of IT Service Management (ITSM), businesses are able to design and put into action efficient IT processes and services that are tailored to the requirements of their clients (Hamranová et al., 2020; Yazici et al., 2015). In addition, firms may use ITSM to better the quality of the services they provide while also cutting expenses.

In conclusion, IT service management has seen substantial development over the last 25 years, and it has become an essential component of the IT strategy of many businesses.

There are several chances for businesses to boost their efficiency and production by using ITSM, despite the fact that there are certain hurdles involved. ITSM will become more crucial as businesses become more dependent on technology. Organizations must ensure that they have the resources and knowledge necessary to properly execute and maintain an effective ITSM strategy in order to prepare themselves for this growing importance.

2.3 ITSM frameworks

During the course of the last quarter century, IT service management (ITSM) has seen substantial expansion, and several frameworks have emerged to support businesses in managing and providing their IT services in an effective and efficient manner (G. B. Berihun & Teferi, 2021). This thesis will investigate the evolution of IT service management (ITSM) during the last quarter of a century, focusing on both the obstacles that the field has faced and the possibilities that lie ahead. In addition to this, it will explore the many different ITSM frameworks, such as ITIL, ISO 20000, COBIT, and other frameworks, as well as their applicability according to the requirements of the company, emphasizing the benefits and drawbacks of each framework.

ITSM Development Over the Last 25 Years:
During the early 1990s, ITSM has seen substantial development, and it has become more vital for enterprises to create and execute efficient IT service management procedures and standards. The evolution of ITSM over the past 25 years may be separated into three different periods: the early-ITIL era (late 80's-1999), the ITIL-driven era (2000-2009), and the advanced-ITIL era (2010-present).

The early-ITIL Era (late 80's-1999):
When ITIL was created in 80's, there was no one unified framework for IT service management, and enterprises depended on a range of different processes, procedures and rules to manage their IT services. At this time period, ITSM primarily concentrated on the

management of IT infrastructure, and the numerous processes and procedures that were deployed were often ad hoc and inconsistent (Kumar et al., 2018).

The ITIL-Driven Era (2000-2009):

The Information Technology Infrastructure Library (ITIL) V2 was first made available to the public in the year 2000, and it rapidly became the framework that is most often used for IT service management. It established a collection of best practices and methods that could be utilized by enterprises to manage and provide their IT services effectively and efficiently. At this time, ITIL was the dominant framework, and the emphasis of ITSM was mostly on service management and service delivery.

The advanced-ITIL Era (2010-Present) :

Since 2010, IT Service Management (ITSM) has continued to develop, and there has been other frameworks in addition to using IT Infrastructure Library (ITIL) as the primary foundation. Although while ITIL (with V3) was still frequently used as a dominant ITSM framework, companies were searching for more complementary as well as supplementary frameworks to provide a higher degree of control and flexibility (Madani et al., 2011). Additional frameworks like as ISO 20000, COBIT, and DevOps have grown increasingly prominent and have become vital components of the ITSM environment. Site reliability engineering (SRE) model by Google is gaining popularity in recent days as per Eveline Oehrlich (2022).

Challenges

While the growth of ITSM over the last 25 years has resulted in a number of advantages for companies, the process of installing and maintaining their IT services continues to provide a number of issues for those organizations. These are the following (Mora et al., 2015):

• Inadequate Resources: The implementation of an efficient IT service management system may be quite resource-intensive and calls for a large commitment of both time and money. It is common for companies to lack either the resources or the skills necessary to adopt and maintain their ITSM procedures and policies in an appropriate manner.

• Lack of Standardization: In the absence of a single framework, it may be challenging for enterprises to guarantee that the ITSM processes and procedures they use are standardised and uniform across the company as a whole and fit for their purpose.

• Complexity: The majority of IT service management frameworks are complicated, making them challenging to both adopt and administer. This may result in confusion as well as a lack of comprehension of the procedures and processes.

• Compliance: Companies have a responsibility to ensure that the IT Service Management (ITSM) processes and procedures they use are in line with all applicable laws, rules, and regulations.

Future Opportunities

In spite of some of the difficulties, there are many prospects for IT service management. As a result of the ongoing development of technology, businesses will need to ensure that the information technology service management (ITSM) processes and procedures they use are current and able to accept emerging technologies. In addition, there is a need for frameworks that are both more comprehensive and versatile, so that businesses may have a larger degree of control and flexibility over their operations (G. Berihun & Lemma, 2021; Marrone & Kolbe, 2011). Last but not least, as businesses work to enhance the efficiency and efficacy of their IT services, there is a chance to take use of artificial intelligence and machine learning. This will allow IT service management to be improved even further.

Some of the Frameworks

Information Technology Infrastructure Library (ITIL):

The Information Technology Infrastructure Library, commonly known as ITIL, is the ITSM framework that sees the most widespread usage. It was established in the early 1990s

by the Office of Government Commerce (OGC) in the United Kingdom. It offers a set of best practices and procedures that may be utilized to successfully manage and provide information technology services. Service Strategy, Service Design, Service Transition, Service Operation, and Continual Service Improvement are the five key books that make up ITIL (Mohammadi et al., 2015).

Advantages

- It offers a systematic approach to ITSM and is readily adaptable to match the demands of a company.
- It is thoroughly documented and backed by a vast community of IT professionals.
- ITIL is the most commonly known and implemented framework for IT service management (ITSM).

Challenges

- It may be challenging to guarantee that processes and procedures continue to comply with applicable rules, regulations, and standards.
- It can be complicated and difficult to execute.
- It can be resource demanding and need a large commitment of time and money.

ISO 20000:

An international standard for the administration of information technology services was produced in the year 2000 and given the designation ISO 20000 by the International Organization for Standardization (ISO). It offers a complete collection of procedures and best practices that can be used for the purpose of managing and providing IT services in an effective and efficient manner (Barcelo-Valenzuela & Leal-Pompa, 2020). Service Delivery, Service Support, Strategic Planning and Control, as well as Measurement and Improvement are the four components that make up this framework, which is based on the IT Infrastructure Library (ITIL).

Advantages

- It is fully documented and backed by a vast community of IT professionals.
- Its processes and procedures are compatible with applicable laws, rules, and standards.
- It offers a complete and unified approach to IT service management.

Challenges

- It may be challenging to guarantee that processes and procedures are kept up to date and are able to handle the most recent technology.
- It can be complicated and difficult to adopt.
- It can be resource heavy and need a large commitment of time and money.

COBIT

An IT service management framework that was established by the Information Systems Audit and Control Association is known as COBIT, which stands for Control Objectives for Information and Associated Technologies (ISACA). It offers a complete collection of procedures and best practices that can be used for the purpose of managing and providing IT services in an effective and efficient manner (Andri et al., 2019). It is broken down into the following five categories: planning and organising, acquiring and implementing, delivering and supporting, monitoring and evaluating, and managing.

Advantages

- It is fully documented and backed by a vast community of IT professionals.
- Its processes and procedures are compatible with applicable laws, rules, and standards.
- It offers a complete and unified approach to IT service management.

Challenges

- It may be challenging to guarantee that processes and procedures are kept up to date and are able to handle the most recent technology.
- It can be complicated and difficult to adopt.
- It can be resource heavy and need a large commitment of time and money.

Alternative Frameworks

ITIL, ISO 20000, and COBIT are not the only IT service management (ITSM) frameworks available; there are a number of alternative ITSM frameworks that companies may use to manage and provide their IT services in an effective and efficient manner. DevOps, Agile, and Lean are all examples of these.

DevOps

Agile software development principles and IT service management concepts are combined into a single framework known as DevOps, which is an IT service management (ITSM) methodology. Its primary objective is to cut down the amount of time and money spent on the process of designing, deploying, and maintaining software applications. Continuous Integration, Continuous Delivery, and Continuous Monitoring are the three primary parts that make up this structure.

Advantages
- It is fully documented and backed by a vast community of professionals.
- Its processes and procedures are compliance with applicable laws, rules, and standards.
- It offers an organised approach to the development, deployment, and management of software applications.
- It removes silos between development and operation teams.
- It improves service delivery life cycle.

Challenges

- It may be challenging to guarantee that processes and procedures are kept up to date and are able to handle the most recent technology.
- It can be complicated and difficult to adopt.
- It may be difficult to combine development and operation resources.
- It can be resource heavy and need a large commitment of time and money.

Agile

Iterative and incremental development are the cornerstones of the Agile IT service management (ITSM) methodology, which is founded on these tenets. It is intended to provide businesses more leeway and control over the creation and distribution of software programs, which is the primary purpose for why it was established. Collecting the Requirements, Planning and Designing It, Implementing It, and Testing It are the four primary parts that make up this structure.

Advantages
- It is fully documented and backed by a vast community of professionals.
- Its processes and procedures are compliance with applicable laws, rules, and standards.
- It offers an organised approach to the development, deployment, and management of software applications.

Challenges
- It may be challenging to guarantee that processes and procedures are kept up to date and are able to handle the most recent technology.
- It can be complicated and difficult to adopt.
- It can be resource heavy and need a large commitment of time and money.

Lean

Lean is an IT service management (ITSM) approach that is predicated on the ideas of minimising waste and maximising effectiveness. It is intended to provide enterprises a higher degree of control over the creation and distribution of software applications, and it is designed to do so. Value Stream Mapping, Kanban, Kaizen, Set-Based Design, and Plan-Do-Check-Act are the five primary components that make up this organizational structure (Mora et al., 2015).

Advantages
- It is fully documented and backed by a vast community of professionals.
- Its processes and procedures are compliance with applicable laws, rules, and standards.
- It offers an organised approach to the development, deployment, and management of software applications.

Challenges
- It may be challenging to guarantee that processes and procedures are kept up to date and are able to handle the most recent technology.
- It can be complicated and difficult to adopt.
- It can be resource heavy and need a large commitment of time and money.

The development of IT service management (ITSM) over the course of the last 25 years has been an important accomplishment that has made it possible for businesses to manage and provide their IT services in an effective and efficient manner. Although there have been a lot of obstacles in the way of IT service management, there are also a lot of opportunities for its future. One of these opportunities is the utilisation of artificial intelligence and machine learning in order to further improve the efficiency and effectiveness of IT service management processes and procedures. In addition, there are a variety of IT service management (ITSM) frameworks available, such as ITIL, ISO 20000, COBIT, DevOps, Agile, and Lean, that businesses may use in order to manage and provide

their IT services in an effective and efficient manner (Andri et al., 2019). Each framework has its own set of advantages and disadvantages, and the one that is selected must be based on the requirements of the company.

2.4 ITSM and Machine learning models

The management of an IT service's whole lifespan, from conception to delivery, is known as ITSM. It is a collection of procedures and tasks that guarantees the efficient provision of IT services to clients. Incident management, issue solving, change management, service level management, service catalogue management, and other processes are all included in ITSM. It is a crucial procedure for businesses as it ensures the effective and efficient delivery of IT services.

It is crucial to highlight that over the last 25 years, the ITSM landscape has undergone tremendous transformation. The importance of ITSM has increased significantly as a result of the development of new technologies like AI and ML. In the ITSM space, AI and ML are gaining popularity and have the ability to completely change how services are provided and maintained. Several service delivery processes and activities have been automated and optimised by organizations using ML models in ITSM.

A survey of the literature has been used to analyse the evolution of ITSM over the last 25 years. The following elements have been specifically looked at : (1) The development of ITSM over the last 25 years; (2) The challenges organizations have in adopting ITSM; (3) The effects of AI and ML on ITSM; and (4) The potential for future expansion.

New technologies like AI and ML have played a major role in the development of ITSM. Many of the procedures and activities involved in providing IT services may now be automated and optimised by organizations thanks to these technologies. Organizations have been able to automate the process of incident and change management, for instance, via the use of AI and ML. Technology has allowed organizations to offer services more

effectively and efficiently while also reducing the amount of physical labour needed for these procedures (Chen et al., 2022). Also, incident and change management processes have been optimised with the use of machine learning models, allowing organizations to react to issues and changes more rapidly and shorten the time it takes to resolve them.

There have been difficulties in adopting ITSM. The inability of organizations to comprehend ITSM procedures and concepts is one of their biggest problems. Due to a lack of awareness, improper or insufficient ITSM practises have been adopted, which has resulted in service delivery that is both inefficient and ineffective. Moreover, a lack of data and an ignorance of the advantages of these technologies have hampered the application of AI and ML models in ITSM. Due to this, there has been little investment in the creation of these technologies, and adoption has been slow.

The way services are provided and managed has significantly changed as a result of the use of AI and ML models in ITSM. Several service delivery procedures and activities have been automated and optimised by organizations using AI and ML models. For instance, ML models have been used to streamline the incident and change management process, enabling organizations to react to problems and changes faster and cutting down on the amount of time needed to address them (Al-Hawari & Barham, 2021). Large amounts of data have also been analysed in order to find patterns and correlations in the data using AI and ML algorithms. This has made it possible for organizations to learn more about their services and pinpoint areas where they may improve.

The use of AI and ML models in ITSM has created a variety of new prospects for development. These opportunities include the creation of intelligent systems to streamline and automate the incident and change management process, the use of AI and ML to analyse vast amounts of data and spot patterns, and the creation of predictive models using AI and ML to ascertain the underlying causes of incidents and changes. Moreover,

organizations may now take use of the capabilities of AI and ML models to increase the efficacy and efficiency of service delivery.

Depending on the process or activity being automated or optimised, several machine learning models are utilised in ITSM. For instance, incident and change management has been automated using supervised learning models like Support Vector Machines, Decision Trees, and Random Forests. Large amounts of data have also been analysed to find patterns and correlations using unsupervised learning techniques like clustering. Moreover, prediction models to ascertain the underlying causes of accidents and changes have been developed using reinforcement learning models like Markov Decision Processes (Isa & Albarda, 2019).

The benefits of using machine learning in ITSM can be summed up as follows: they can optimise and automate many service delivery processes and activities; they can analyse vast amounts of data to find patterns and correlations; and they can create predictive models to identify the underlying causes of incidents and changes.

The shortcomings of the machine learning models employed in ITSM may be summed up as follows: they need a lot of training data, are prone to overfitting, and need careful hyperparameter adjustment. Moreover, there is a lack of comprehension of the models employed in ITSM, which leads to the implementation of inaccurate or insufficient models (Zaydi & Nassereddine, 2021).

The research that is needed to fill in the gaps and improve the machine learning models used in ITSM can be summed up as follows: more research is required to better understand the models and their applications; more data is required to increase model accuracy; better hyperparameter tuning techniques are required; and more reliable evaluation metrics are required to gauge the performance of the models. Moreover, organizations will be able to use the power of AI and ML to further automate and optimise various processes including

incident and change management thanks to the development of more sophisticated models like deep learning and reinforcement learning.

2.5 ITSM processes improvement and quality data

Continuous efforts have been made to strengthen ITSM processes in order to guarantee that customers get high-quality information technology services. The assessment of outcomes, the identification of problem areas, the study of existing processes, the implementation of modifications and improvements, and finally, the evaluation of the overall effectiveness of the ITSM process are the usual steps involved in its improvement (Mesquida et al., 2012).

Several different strategies have been used by companies in an effort to enhance their IT service management (ITSM) procedures. Using automation and AI-driven technologies like Robotic Process Automation (RPA) and Machine Learning is one of the most frequent techniques. Other examples of these types of technology include chatbots (ML) (Abellán Artacho, 2019; Gobel et al., 2012). The use of these technological solutions has made it possible for businesses to lessen their reliance on human labour, automate tedious jobs, and enhance the precision and uniformity of their procedures. In addition, the usage of these technologies may enhance the efficiency with which decisions are made, maximise the efficacy of operations, and simplify the process of providing services (Hjalmarsson et al., 2016).

Implementation of Service Level Agreements is another strategy for process improvement. SLAs, or service level agreements, are contracts negotiated between companies and their clients that outline the minimum standards of service that must be met. SLAs are put into place to guarantee that the services being given are living up to the requirements and requirements of the client (Jäntti et al., 2013). In addition, service level agreements (SLAs)

may be utilised to pinpoint problem areas and make certain that the necessary adjustments are carried out.

When it comes to assuring the correctness and dependability of ITSM operations, having data of a high quality is very necessary. The term "quality data" refers to information that is not only correct but also comprehensive and up to date (Shrestha et al., 2016). It is very necessary for businesses to collect accurate data in order to guarantee the efficacy and effectiveness of their operations.

A wide number of strategies have been used by organizations with the purpose of gathering and managing high-quality data. Use of data quality tools is one way that may be taken. These tools are intended to keep an eye on the quality of the data being collected and detect any possible problems (McNaughton et al., 2010). In addition, these technologies may be used to check the correctness of the data, find any inconsistencies in the data, and guarantee the data's integrity.

The use of data governance is yet another method that may be utilised to manage the quality of data. The administration of an organization's data according to predetermined standards and protocols is what we mean when we talk about "data governance." Governance of data helps to guarantee that data is gathered, stored, and utilised in an efficient and protected way at all stages of its lifecycle (Jaadla & Johansson, 2020). Moreover, data governance helps to guarantee that data is correct and up to date by providing a mechanism to do so (Behari et al., 2018).

In conclusion, there has been a substantial amount of progress made in ITSM throughout the course of the last 25 years. Several different strategies have been used by businesses in recent years in an effort to enhance their ITSM operations and better manage quality data. It is essential to make use of automation and AI-driven technologies, in addition to data quality tools and data governance, in order to guarantee the precision and dependability of

IT Service Management (ITSM) procedures. In addition, service level agreements (SLAs) have been used to guarantee that the offered services are living up to the requirements and requirements of the customers. There is a great deal of prospects for further advancement available to firms as they work to establish and enhance their ITSM procedures.

2.6 Research Gap

The research gap that can be taken from the literature analysis is the absence of a thorough study that explores the influence that Information Technology Service Management (ITSM) has had on a variety of businesses over the course of the last 25 years. Majority of the research studies that have been conducted in this field have concentrated their attention on certain facets of ITSM, such as the creation of service management frameworks, the adoption of ITIL, and the problems and possibilities that are related with ITSM. There has been a paucity of study that has sought to investigate the holistic impact that ITSM has on an organization, including the implications that it has on customer happiness, IT performance, and organizational efficiency.

In addition, there is a dearth of research that investigates the use of IT service management best practices in businesses of varying sizes and operating in a variety of sectors. Most of the studies that has been done up to this point has been on large companies like those found in the banking and finance industry. Yet, it is essential to have a solid understanding of the effects that ITSM has on businesses of varying sizes and operating in a variety of industries, since the use of ITSM techniques may lead to a variety of diverse results.

In conclusion, there has not been enough study conducted that looks at the evolution of IT service management over the last quarter of a century using a longitudinal perspective. There have been some studies that have looked at the development of ITSM practices over the course of a specific time period, but there is a need for a more in-depth analysis of the development of ITSM practices over the course of the last 25 years. This analysis also

looks at how the practices have changed, how they have been adopted, as well as what challenges and opportunities have arisen.

CHAPTER III

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

There are frequently specifics regarding how the researcher did the inquiry and indeed the tactics and techniques they employed in a project, research, academic published paper, or various other formal pieces of research. Planning an exploratory research may benefit from an awareness of the research technique and the variety of methodologies and tools available to one. A study design appears to be a way for an analyst to explain how they intend to carry out their inquiry (Indeed Editorial Team, 2022). It is indeed a deliberate, logical technique to a research problem. A methodology outlines the steps a scholar would take to carry out the investigation and create reliable, precise findings that satisfy their aims and purposes. It covers the data they'll compile, where they'll obtain it from, how they'll compile it, and how they'll analyze it. A research-based methodology lends the inquiry legitimacy and produces valid scientific findings. It also provides a comprehensive framework to help keep scholars on track, enabling a straightforward, effective, and manageable strategy. By comprehending the subject's method, the audience may realize the plan and steps taken to get at the findings. While creating a study strategy, a scholar should consider several decisions. Choosing whether to use qualitative, quantitative, or perhaps a combination of the two data techniques is one of the greatest important considerations. Investigations can focus on acquiring either phrases, statistics, or both as the evidence would constantly be in the shape of graphs or statements (Indeed Editorial Team, 2022).

These points highlight the value of employing a trustworthy research methodology:

- Other researchers who want to carry out a comparable study have access to enough information.

- A scholar can use the approach to support their position when they're criticized.
- It can help by providing scholars with a defined plan to follow throughout their work.
- With the assistance of the technique design process, scholars may select the optimal methods for their objectives.
- It makes it possible for scholars to describe their objectives for the experiment in unambiguous terms right once (Indeed Editorial Team, 2022).

This section is going to include the various aspects of a research methodology including research paradigm, research approach, research design, reasoning approach and the data collection method. The section is going to shed light on each of the aspects by explaining or describing the chosen method and by justifying the reason for making that selection (Indeed Editorial Team, 2022).

3.2 Research Paradigm

A researching paradigm seems to be a data collection method, framework, or pattern. It alludes to a collection of ideas, convictions, or understandings that permit the application of concepts and practices. The two scholarly philosophies that comprise the majority of paradigms typically formed are positivism and interpretivism (Abbadia, 2022). Each study project adheres to any of the aforementioned paradigms as merely a foundation for formulating its research techniques and carrying it out in the best morally and logically sound way feasible. Even though there were just actually two paradigms, these two gave rise to several new paradigms, particularly in social science research (Ryan, 2018). Keep in mind that selecting one of the paradigms for a certain research project requires a thorough understanding of the unique characteristics. Choosing a paradigm is essential for any investigations since it establishes the framework for the technique and subject examination. A paradigm that looks at how data is analyzed and examined, specifically states the article's objective, motivating factor, and expected outcomes (Abbadia, 2022). When researching paradigms are applied properly, analysts have an obvious path to follow while they investigate the topic of interest. As a result, it merely improves the task's quality

and total skill but also offers a logical and intentional foundation for doing it out (Ryan, 2018).

According to the positivism philosophy, knowledge may be found by measuring and objectively observing activities, motions, or responses. Positivism holds that when anything is not assessed in this way, it cannot be decided with any degree of certainty. Irrespective consideration to hypotheses or importance, evidence gathered from experience is how empirical cognition is developed. According to this, anything that cannot be observed and hence measured in a specific way is of little or no importance. Positivism is intimately related with statistical data gathering techniques (Ryan, 2018). In gaining an in-depth picture of society and identifying cultural mores, including the link between academic achievement and socioeconomic status, the positivist method stresses the need of carrying out numerical modeling, such as extensive surveys. This approach to demographics is far more preoccupied with broad developments and structures rather than with single people (Ryan, 2018).

The notion that reality is arbitrary, multifaceted, and socially created is the basis of interpretivism. To summarize, scholars can only understand another person's reality from their own perspective. This impression may be unique from that of a different person and affected either by the latter's prior experiences or current social situation (Abbadia, 2022). In order to find out more about the subject being studied or to produce it, interpretive approaches rely on both inquiry and evaluation. This is closely connected to methods for gathering relevant information. It offers a contextual foundation for prevalent philosophical perspectives and can influence research projects and those just beginning to explore metaphysics. It can serve as a starting point for more investigation into research approaches and serve as a roadmap for selecting the principles that will inform research strategies (Ryan, 2018).

The key justification for using the interpretivism approach is that it is commonly employed in qualitative sociological science studies and is premised on the possibility of several realities instead of a singular fact. According to interpretivists, since human behavior is so

complex, it is unable to be predicted with any degree of confidence. Human behavior cannot be compared to a manipulable quantitative element (Ryan, 2018). Interpretivism refers to methods for acquiring knowledge that rely on figuring out or comprehending the meaning people attach to their activities (Abbadia, 2022).

3.3 Research Approach

There appear to be 2 main appropriate research methodologies: quantitative and qualitative, for collecting and evaluating data. The study strategy will be chosen based on the type of data the analyst needs. Quantitative or qualitative information might be classified. Standard statistical procedures are required to assess quantifiable data since it is quantifiable (Budert-Waltz, 2022). Applications like SPSS or R may be used to calculate the average, percentile, sample variance, covariance, and many other quantitative assessment criteria. The interpretation of primary analysis, which may be textual or visual, involves literature review. During theme evaluation, statements and keywords are classified and organized into subcategories. When the data was being transcribed, linkages between emergent themes could be noticed. Conceptual framework is straightforward to perform when using tools like Atlas.ti or NVivo. Analysts may employ both quantitative and qualitative data while doing descriptive surveys. Observational findings in a naturalistic environment are presented utilizing descriptive research. Experimental research is only possible with statistical methods. In the hopes of arriving at a result, experimental research manipulates factors to investigate an idea (Budert-Waltz, 2022). It is vital to be informed of the sort of study a researcher will do. If the researcher does primary research, they will actively participate in the information gathering process. When conducting secondary research, a researcher only uses sources that have already been published. Both primary and secondary research have advantages and disadvantages. Primary research gives the researcher control over the data even if it can be highly expensive and time-consuming. Despite the prevalence of secondary research, the researcher must ensure the accuracy of the data (Budert-Waltz, 2022).

Qualitative Research Approaches:

To analyze trends in human behavior, researchers employ qualitative research methods. Finding features of business products that might increase profits is useful for product management. For example, a brand manager planning the release of a mobile phone would surely want to comprehend the habits and preferences of a targeted audience in addition to incorporating those into the layout of the phone (Budert-Waltz, 2022). Following all of this, quantitative research is done to see whether the device's design conforms with specifications. One might also consider qualitative research to be the initial stage of quantitative research. These investigators generate a wide range of ideas using this technique, which they may then develop into study theories. These concepts are able to be carefully looked at and studied using a range of quantitative research techniques. For instance, a survey can indeed be conducted prior to the launch of a hand cleanser company. This survey may provide insight into a variety of well-known corporations. Therefore, by completing quantitative research regarding each of these businesses, a significant amount of time, effort, and capital may be avoided (Kirti, 2022).

The strategy used to conduct qualitative research or in-depth study on a subject is often referred to as the qualitative research approach (Budert-Waltz, 2022). It outlines the objectives of the study, the significance of the author(s), the part they will perform, the phases the study will take, and the approach(es) that are going to be taken to evaluate the information gathered. The 4 most crucial methods for qualitative research are discussed below:

1) Ethnographic Approach: Inside the discipline of sociology, the interpretive paradigm to qualitative research involves a detailed examination of cultural groupings. The significance of the term "culture" has evolved significantly throughout time. Before, the term "culture" solely applied to pre-established cultural minorities that related to a particular geographic region. Nowadays, it refers to nearly any institution or grouping (Kirti, 2022).

2) Phenomenological Approach: The goal of the phenomenological approach to qualitative research is to find a phenomenon or concept by scrutinizing the actions and perspectives

of individuals who engage in it. This strategy has developed as a result of research into behavioral theories like existentialism.

3) Field Research: Another systematic method for doing qualitative research, survey work tries to examine a scenario or occurrence over an extended time frame. via means of conversations and experiences. This approach tries to closely examine a social group's everyday activities while they are taking place in the real world. It is frequently referred to as longitudinal research since it takes a long-term, comprehensive approach. This distinctive quality might cause the investigation to last for months, and perhaps even years. The majority of the time, this method is employed to collect qualitative data (Budert-Waltz, 2022).

4) Grounded Theory: Created and refined by Glaser and Strauss in the 1960s, grounded theory is a sophisticated, inverted method of qualitative research. In contrast to other methods, grounded theory seeks to first specify what must be seen or whatever question(s) must be addressed before thoroughly collecting data that summarize said observation. This method seeks to demonstrate a hypothesis that is grounded in evidence and is backed by extensive observations, rather than just proving an abstract notion (Kirti, 2022).

Researchers may employ the following methods to gather qualitative data:

1) Depth interview: Depth interviews are lengthy discussions with a small group of participants to learn their thoughts and perspectives regarding a particular issue or situation. For example, the researcher could conduct in-depth interviews with a small number of members of the societal subgroup to get their perspectives on the new business standard and the financial repercussions they anticipate or feel have indeed occurred because of it. They will be able to evaluate the way it will impact the members of that societal community as a consequence (Kirti, 2022).

2) Focus Group: A focus group is a gathering of individuals for debate and conversation on a particular subject, led by a trained facilitator. Qualitative methods are a concept that came from sociological studies and are currently utilized often in market surveys. The main

goal of these conversations is often to assess a figure's brand value. The first step in the process is selecting the subject that has to be covered (Budert-Waltz, 2022).

3. Projective Techniques: People are pushed to offer their opinions regarding the way other humans behave in situations that have been purposefully made vague and fuzzy as part of this plan.

The study uses the **qualitative approach** due to the following reasons:

Whenever the study purpose is complicated and the response is not a simple yes or no, the qualitative technique is simply used. The qualitative study approaches are fairly simple to implement, especially when an organization is working with little resources (Kirti, 2022). A qualitative investigation will always produce some information that the business can employ because of how broad its reach is. But if the idea is incorrect, a lot of wasted time and money could be spent. A qualitative research does not have to adhere to sample size restrictions, in contrast to a quantitative study. For instance, even with a small sample size of respondents, a research report evaluation is possible.

3.4 Research Design

Choosing the methods and methodologies for the study's investigation is frequently done from the outset. A work design appears to be a paper that outlines a project's methodology, technique, and certain other important details. Experts claim that the study design acts as the panel's unifying factor. This (the investigation design) helps to provide the subject emphasis and organization, leading to successful results (Jaiswal, 2022).

The following are some guidelines for a good study design:

- Determines the issues
- Examines the literature relevant to the issue statement
- Identifies the theory
- Specifies the way information will be processed and describes the sources of the data

The features of the research design:

Validity: Many methods may be used to assess the results of research. A sound research design aids in choosing the appropriate measuring instruments to evaluate outcomes in line with the study purpose.

Generalised: Strong research designs produce data that can be beneficial to a wide variety of people and are not limited by the quantity of interviewees or the examination subgroup (Jaiswal, 2022).

Neutrality: Each research project must begin with some preconceptions which will be examined in detail as the study progresses. The hypotheses are guaranteed to be neutral as well as without prejudice by a good study design. Moreover, it claims that the knowledge obtained during the investigation was built upon the theories that were created at the beginning (Jaiswal, 2022).

Key components of a research design:

Reliability: When implemented straight, every time a study is undertaken, its design might yield reliable results. Nevertheless, it is only possible to achieve comparable results if the research methodology is reliable.

Following are some components of an effective study design:

- Goal statement
- Data gathering techniques
- Techniques for data analysis
- different research methods
- Having trouble with the investigation
- requirements for research
- The duration of the experimental study
- measurement of examination (Jaiswal, 2022)

Reasons why the research design is necessary:

- Decreases accuracy
- Increases dependability and efficiency
- Removes prejudice and mistakes
- Reduces time wasted and is beneficial for testing the concept
- Orients study in the right direction.

Key research design concepts:

Variable: A notion known as a factor can have a variety of quantitative values. For example, size, height, etcetera.

Dependent variable: A factor under examination in any investigation is referred to as a dependent variable. This is somewhat reliant on how an independent variable varies (Jaiswal, 2022).

Independent variable: An investigation's independent variables are those that can stand alone. If, for instance, a team's exam performance is the outcome of their endeavors, then their endeavors constitute an underlying factor and overall mark constitute a regression coefficient.

Hypothesis: It is described as the idea that must be tested by getting involved in a particular investigation (Jaiswal, 2022).

The Several Research Design Categories:

A scholar needs to be familiar with various research designs. Also, having a thorough understanding of the numerous methodological approaches facilitates selecting the appropriate research methodology.

Quantitative and qualitative research designs are the two primary categories. Below, we'll examine each in further detail (Jaiswal, 2022).

Creating a quantitative research plan

The quantitative inquiry design aims to answer the who, what, where, how, and when queries over the timeframe of the research. Also, utilizing statistics, graphs, spreadsheets, and ratios, the outcomes of the quantitative evaluation are easily represented.

Designing a qualitative study

Finding both how and why constitutes the aim of a qualitative investigative approach. It employs open-ended questions and helps the participants communicate their ideas effectively. Companies should employ qualitative research to understand client behaviors and wants (Jaiswal, 2022).

The various study design models may be further divided into five groups:

Experimental design: This style of research methodology establishes a distinct cause and consequence for each occurrence in order to approach a topic scientifically. Furthermore, it makes an effort to comprehend how the dependable factor is affected by the independent component. Social sciences frequently utilize it to monitor people's behavior and better comprehend human social dynamics (Jaiswal, 2022).

Correlational design: A link between two relevant variables is established through correlation study design. These parameters are tracked over a period of time by the investigator, who then makes inferences from them. Two distinct groups are necessary for this kind of study design.

The link between two factors is determined by the coefficient of correlation. This correlation coefficient has a value that is between -1 and +1. A favorable relationship among the two factors is shown by a correlation coefficient of 1, while an unfavorable connection is indicated by a correlation coefficient of -1 (Jaiswal, 2022).

Descriptive design: The major subject of the study is described through descriptive design, a theory-based investigative approach. This type of research strategy uses checklists,

spontaneous sightings, case studies, and other questioning techniques to produce conclusions (Jaiswal, 2022).

Diagnostic design: The purpose of diagnostic investigations is to identify the root reasons of issues and offer solutions. The issue's development, assessment, and treatment are the three steps that this type of research technique breaks down into.

Explanatory design: The researcher investigates ideas and preconceptions regarding a theme inside of this research design. The article's main objectives are to explore the subjects' little-known aspects and respond to whether, when, and also why questions (Jaiswal, 2022).

The research adopted the ***Explanatory research design*** because Explanatory research helps academics better understand a certain topic and improves their capacity to fully appreciate a particular circumstance. By doing an explanatory research, one might speculate on the cause of an occurrence, establish a hypothesis, and anticipate what will happen in the future (Jaiswal, 2022). Furthermore, the particular research design also helps in completing the research process by elaborating on a phenomenon, determining the consequences of specific modifications to procedures, standards, or methods, increasing the prospects for new subject research and even for improving understanding of a problem. Researchers can investigate businesses that went through the same circumstances as their corporation using case studies inside this research design. This could provide investigators fresh viewpoints to assist them tackle challenges more successfully. The practice of looking for information, either digitally or in archives, to assist establish the hypothesis of particular phenomena is known as literature research. In this study design, observation techniques were employed to observe people in their natural environments. This enables the investigator to record actions rather than verbal communication from subjects. Focus groups, a significant component of this research strategy, acquire information by selecting a small population to participate depending on predetermined criteria, including such demographics (Jaiswal, 2022). To gather information from the individuals in the gathering and further their study, researchers schedule sessions. A technique employed within this research design is an in-

depth survey, whereby the investigator speaks with an authority on the subject at hand. Often, they are individuals who have firsthand knowledge of the topic. These are the main reasons or aspects due to which the Explanatory research design was chosen for this research in the first place.

3.6 Data Collection Method

Collecting data entails finding relevant information about a study topic. That is significant since it confirms the issues related to the investigation imbalance. This constitutes a vital element of an investigation study since it enables the researcher to make judgements on the basis of the information and determine the worth of the material in advancing the subject of study. The assessment of the collected data is essential because it helps the analyst to create a result with a factual basis (DissertationHelp, 2013). Data comes in many forms, including attribute data, variable data, etcetera. Knowing the appropriate resources out of which to get the information is essential after having an awareness of the dynamics around the information that need to be obtained. Depending on the requirements of the research project, information may be gathered from both primary as well as secondary sources. It is advised to first gather a relatively small amount of information and then evaluate it to satisfy the criteria demanded in effort to guarantee that the information acquired will assist the investigator in evaluating the aim of the thesis or investigation activity (DissertationHelp, 2013).

evidence from previous research which is easily obtainable as secondary resources. The expression is opposed to relevant data, that is data collected from the actual author. Third-party data sources can be utilized to increase the population range of research projects and are also chosen since using pre-existing data is simpler and highly efficient. The utilization of reliable information facilitates extensive research projects requiring collaboration between several academic researchers to gather secondary data. The lead author is thus free to focus on independent work or specialized areas of expertise. This division of labor

hastens scientific advancement (Crossman, 2019). Using secondary sources offers the benefit that a majority of the preparatory research has been previously completed. The data could have previously been made public, reviewed, and compiled in an electronic medium, replete with research articles. Secondary information may quickly become more widely recognised by being used in the forefront. Since secondary sources have undergone greater inspection and publicity than the actual study results, it is commonly used to support main data. Before incorporating secondary information in an investigation, there really are a few crucial steps that need to be taken. Given that the data were not gathered by the scholar, it is crucial for them to understand the statistical model, including how it was gathered, the feedback classifications for each inquiry, whether or not loads should be implemented during the assessment, if any groupings or differences should be considered, who the investigation's demographic was, and much more. For sociological study, there are a ton of secondary information sources including data options are also available, majority of which are open and simple to use (Crossman, 2019).

A systematic literature review (SLR) finds, selects, and impartially assesses evidence in the goal of answering to a correctly formulated question. Before beginning the evaluation, the characteristics should always be stated in detail, and also the systematic review needs to follow a carefully defined procedure or approach. Other researchers could replicate this work since it was comprehensive, accessible, and had been conducted using a number of different databases and academic journals. It requires planning a thoroughly thought-out research methodology with a distinct concentration or one that answers a defined inquiry. The assessment lists the data groups which were searched for, examined, and reported throughout the course of specific time frames. The evaluation must contain the search keywords, search tactics (containing databases identities, interfaces, as well as dates of investigation), and restrictions. Secondary research includes systematic reviews. In order to provide a broad remark so that other investigators might develop upon the procedures or actions they advise, systematic review authors are very deliberate concerning their inclusion/exclusion rules, or even which publications they'll incorporate in research evaluation (Metcalf, 2023).

The current study uses the ***Secondary data collection*** technique wherein the data was gathered with the help of ***Systematic Literature review method.*** The reason for choosing this framework or structure is that the aim of the study that only can get information from past research study and also to some extent to save effort using secondary information. The data collection process has been successfully completed; therefore, the analyst is not obligated to expend any time, resources, funds, or labor upon this. The cost of secondary resource collecting may sometimes be necessary, however it's nearly somehow less expensive than the cost of compiling an equivalent datasets from zero, which frequently includes salaries, transportation and accommodation costs, office costs, infrastructure investments, and some other operating expenses. Furthermore, the analyst may concentrate more on research than evidence extraction because the material was previously acquired, often cleaned, and properly preserved (Metcalf, 2023).

a. Inclusion and Exclusion Criteria

Everything a study has to do is to satisfy the criteria for inclusion is described. The features which would prevent an inquiry from being included are, in fact, the exclusion standards.

For the current study, the following criteria were considered:

The different research categories, volunteer categories, administration categories, and outcome assessment categories.

The exclusion category for the current study focuses on the information or data having foul languages or unofficial terms.

b. Search Strategy

The systematic steps followed for developing the strategy for the systematic review study are as follows:

- Deciding on a precise and pertinent question.
- Identifying the sites that might provide a solution.
- Selecting the important ideas that address the many aspects of the question.
- Selecting the ingredients that will produce the greatest outcomes.
- Selecting a suitable database as well as interface as a starting point.
- Creating a textual content to record the search procedure
- Finding the right index phrases within the initial database's vocabulary
- Finding equivalent words in the vocabulary
- Changing up the search keywords
- Enhancing the search and assessing the first set of results
- Inspecting for mistakes
- Adapting to different databases
- Trying and trying again

c. Methods for Study Selection and Appraisal

The methodology followed for the selection of studies in relevance to the review study undertaken along with the study appraisal in consideration of the review question and further objectives of the study are as follows:

Creating research questions, finding pertinent work, Evaluating the caliber of research, Recapitulating the evidence, Understanding the results or outcomes.

3.7 Development of Prisma Model

A systematic literature review (SLR) has been conducted to summarize the existing studies and to identify the research gaps, and problems relevant to information technology service management.

Articles are sourced using Electronic Databases such as IEEE, Research gate
n=5415

Articles are sourced using online search engine such as Google Scholars and online sites
n=1215

Filter articles based on keywords of the study from the total of 6620
n=2815

Exclude articles if the keywords are not present in the Title
n=915

Filtered article based on relevance
n=1900

Exclude articles if the keywords and search strings are not present in the abstract
n=750

Read Full text articles based on the relevance to the topic of research and the objectives
n=1150

Exclude articles if the content of the paper is not relevant to the finalised keyword
n=1075

Studies included in the review
N=75

A SLR is conducted by searching the relevant articles based on the keywords and search strings. This is the first step involved in the literature review process. The keywords and strings are searched on search engines namely ResearchGate, IEEE Xplore, online sites and Google scholar. In addition to this, the keywords are formulated using Google search trends. These sources are considered as the most valuable sources used for obtaining high quality research articles and journals.

The stages of filtration is given in the table below

Table 1. Stages of filtration and assessment criteria

Filtration Stage	Process Involved	Assessment Criteria

First stage of filtration	Search the relevant articles from the search engines and online databases using related keywords	All keywords are considered
Second stage of filtration	Excluded articles and journals based on the keywords, search strings, and titles	If the title contains keywords and search strings. Yes = include articles No = exclude articles
Third stage of filtration	Excluded articles based on year of publication and journal of publication	If the articles published are from IEEE Xplore, google scholar, Research gate and other international publishers including industry standard websites such Axelos (ITIL); Yes = include articles No = exclude articles
Fourth stage of filtration	Excluded articles based on topic of research and the objectives	Is the topic relevant to the study; Yes = include articles No = exclude articles

CHAPTER IV

CHAPTER 4: SYSTEMATIC LITERATURE REVIEW
4.1 Introduction

For conducting research, a specific research method is required to utilize. For the research on this topic, a systematic literature review has been implemented in the paper. With this systematic literature review, the study of information technology service management (ITSM) and its development for over 25 years is ably executed in a systematic manner with optimal research for developing the paper. The challenges and future opportunities are ably analyzed properly with the systematic literature review. The study is carried out by analyzing and investigating the challenges that are faced in information technology service management and future opportunities in this field (Buhalis, 2019). The current challenges that are being facing in the information technology service management are required to be analyzed with in-depth research to find out appropriate solutions. By building a proper ITSM framework, the challenges that are faced in the field of information technology service management are able to be solved in an adequate manner. This study has attempted to find out some of the future opportunities and challenges.

In this way, the research work with a systematic literature review is a very advantageous approach to developing an effective research paper on the challenges and future opportunities in Information Technology Service Management. With this systematic literature review method, the study has been carried out by analyzing development of ITSM over past 25 years, the challenges and future opportunities at different levels. The articles were selected from the IEEE and google scholar websites to address the topic of Information Technology Service Management over the last 25 years. To address the topic with the systematic literature review 280 articles were selected from the websites as the information is authentic to utilize for developing an effective research paper. With in-depth research, the articles were analyzed thoroughly and some of the articles were removed for

developing the paper as the study of the topic is not appropriate. 75 articles relevant to this study were selected and finalized for developing the paper. The selected articles based on developments of ITSM from the time period late 1980s to 2023 were utilized for developing an effective research paper. The entire procedure that is initiated in the research paper is with the Prisma Model, details given in section 3.7.

4.2 Overview

Information technology has been introduced over the past 50 years when digital technologies were not in progress and the companies were not aware of it. With the introduction of technologies and digital modes, the world has evolved into a new generation. This evolution has made many changes in the world and in companies. With the evolution of technologies, every sector and industry has completely changed according to digital platforms. Digital technologies have changed the daily lives of people slowly with more benefits and future opportunities till now. Communication and information technology has been increased thoroughly in tech companies and industries as they were struggling to build communication in their work in the early stages (Bolton et al., 2018). Communication has increased and the information was able to circulate evenly among the tech companies easily within the time. This is an advantage for tech companies to increase their growth and expand their business widely. Information Technologies and their services have gained popularity and demand among tech companies. With the demand for information technology, ITSM (Information Technology Service Management) has gained popularity as it has been in the market since the 80s.

With the introduction of information technology in the 80s the ITSM was a new kind of tool that brought in progress to operate. The current information technology systems work along with the ITSM which helps to manage all the services in different levels of sectors. The current information technology is able to pace with the industries and tech companies that are ever-changing along with the generation. The Information Technology Service Management (ITSM) has various frameworks and applications that work according to the

services in the sectors of the companies and industries (Hughes et al., 2019). These different applications and theoretical frameworks were utilized by different sectors of the organizations as per their requirements to increase their business in this competitive world. The main aim of the study is to analyze the challenges in-depth at different levels to resolve the issues within the time period before affecting the future field of information technology. With this analysis of the challenges that occurred at different levels is an advantage to developing the field of information technology with the proper execution of solutions. It also helps to increase the scope of future opportunities to implement information technology at different levels.

4.2 Data Extraction and Synthesis

The table below lists all the research papers studied as part of SLR to discuss the result of the research questions.

Table 2. SLR and synthesis

Sr. No.:	Authors	Research subject and Year	Relevant to RQ	Aim	Methodology	Results
1	Utsav Mishra	Various applications in the IT sectors based on the ITSM frameworks 2021	RQ1	To study various benefits of applications in the IT field in various sectors.	Qualitative research methodology	The omnipresent impact of the applications in the IT sector is analyzed by implementing advanced technologies which are very dependent on people in their daily lives. All the sectors are able to utilize the information technology which helps to handle any services. The applications

						that were developed were supportive of information technology for all sectors.
2	Ridley, Young, Carroll	COBIT and its utilization 2004	RQ2	To analyze the COBIT framework that is utilized in the IT field for achieving the various business goals.	Interview sessions conducted	Various applications of information technology service management are being utilized in different industries across the globe that benefited the business field. COBIT is one of the frameworks of ITSM that has the ability to control effectively. With the high increase of ITSM frameworks implementation the business goals were easily met.
3	Shamsul Sahibudin, Mohammad Sharifi, Masarat Ayat	The ITSM frameworks were combined to design a comprehensi	RQ2	To analyze the ITSM frameworks by combining it together to form an	Qualitative case study	With the survey, it is identified that the combination of COBIT, ITIL, AND ISO/IEC 27002 is the future scope for various challenges that have been facing over the past 25

				extensive framework to make use in the organizations.		years. By combining the ITSM frameworks it has provided the best approaches to deal with the challenges and future opportunities that were researched. This combination of the frameworks has an intensive approach to utilize by the organizations in a single framework.
4	George Mangalaraj, Anil Singh, Aakash Taneja	COBIT framework analyzation 2014	RQ2	To analyze the COBIT framework through multiple perspectives	Participants are utilized to collect the primary data	COBIT is one of the frameworks of ITSM which has a unique feature to govern information technology effectively. This COBIT framework is very famous for providing governance in any kind of organization. By utilizing multiple perspective, the COBIT framework is analyzed to focus on the development in the overall framework. For future considerations the COBIT framework is an advantage framework to deal with the

						security, and risk management.
5	Steven De Haes, Wim Van Grembergen, Anant Joshi & Tim Huygh	Analyzation of COBIT framework 2019	RQ2	A systematic review of the literature is introduced for enabling the agility of COBIT framework for governance of organizations in the IT field	A questionnaire session is conducted	The gaps in the challenges and future opportunities were able to be resolved with the systematic review of literature in the COBIT framework. A proper relationship has been developed between the organizations by implementing the governance with the COBIT framework to increase their business and goals. Some insights were provided for the development in the organizations with the implementation of COBIT framework.

| 6 | Rafael Almeida Renato Lourinho; Miguel Mira da Silva; Rúben Pereira | Simultaneously the utilization of COBIT framework and ISO 27001 2018 | RQ2 | To analyze the two frameworks COBIT and ISO 27001 simultaneously for defining the scope. | A survey is conducted to gather the primary information | The two frameworks of ITSM are simultaneously analyzed in the paper for better outcome. COBIT framework and ISO 27001 are the two frameworks that are utilized simultaneously to avail best outputs in the organizations. As the IT field requires a proper management system to increase the success rate and this combination of the ITSM frameworks is an added advantage for the organizations with more and more better results. |
| 7 | Sikhulile Ndlovu, Michael Kyobe | Challenges faced by the organizations in the governance and the benefit of COBIT framework analyzation 2016 | RQ2 | The study focused on the challenges that are faced by various organizations in the process of governing. | A structured questionnaire session is implemented | The study revealed that the COBIT framework has the capacity and capability to enhance the sectors with innovation which is an advantage for future development and opportunities. All sizes of industries and companies benefited from the implementation of COBIT framework. In some cases, |

						to handle the challenges that are faced by the organizations are mitigated by implementing the COBIT framework which provides positive outcomes.
8	Schneider, Plate, and Auth	Evaluation von ITSM-Tools für Integration und Managemen t von Cloud-Diensten am Beispiel von ServiceNow, 2019	RQ2	To manage the IT services cloud technologie s were implemente d to analyze the ITSM tools for evolution	A questionnaire is executed in a structured manner	The ITSM tools were evaluated, and the service integration and management are able to assess the information technology services. With the evolution of Information Technology Service Management from the information technology tech companies were experiencing the positive impact and services. The services were easily manageable with the information technology service management theoretical frameworks and tools.

| 9 | Necmettin Ozkan, Ayca Kolukisa Tarhan, Burak Gören, İsmail Filiz, Enis Özer | Challenges and future opportunities of COBIT framework and Scrum 2020 | RQ2 | The study focuses on the challenges and future opportunities of COBIT framework and Scrum | A primary survey is initiated to gather information | COBIT framework and Scrum are two different frameworks that are addressed in the same organization for analyzing the challenges and future opportunities that can be provided from both frameworks. From several frameworks these two frameworks were selected in this paper to study the existence of both frameworks in a single organization. In which the success rate of the organization from each framework is able to be analyzed. |
| 10 | Schmidt Michael Brenner Michael, Schaaf Thomas | Comparison of all the information technology service management frameworks in one platform 2019 | RQ2 | The study focuses on the continuous comparison of all the ITSM frameworks in a single platform to | By analyzing the data that is gathered in a survey | To analyze all the frameworks of ITSM in a single platform by comparing each one with other for checking out the positive results and challenges that are provided. By comparing all the ITSM frameworks the differences are able to |

				maintain the structured process in the management of service.		differentiate which provides a clear output on each framework on their capabilities.
11	Roumiana Ilieva, Nikola Gaydarov	Comparison of all the ITSM frameworks 2021	RQ2	To analyze the ITSM frameworks that were compared with another	By analyzing the information that is gathered through the questionnaire session	Various frameworks are practiced by the organizations to manage the various services by pointing out the goals. The paper focuses on eliminating the confusion that is created in the organization with various services that are required. To maintain all the services in the organizations with a perfect framework all the ITSM frameworks were compared which helps to analyse the needs and fit accordingly to work on it.

12	Francis Gacenga,Aileen Cater-Steel, Mark Toleman	Benefits of implementing the ITSM in the organization 2010	RQ2	To analyze the benefits of ITSM with the implementation in the organization	A primary survey is initiated to gather the information	Information technology service management is the best approach to adopt by the organizations as it has various benefits to elevate the business by analyzing the goals. Mainly the operational efficiency is increased in the organization with the implementation of the ITSM. In the same way it enhances the perspective of the customers and tries to minimise the risks that occur in the organizations.
13	Mathias Sallé	A comparative analysis of ITSM services and the governance of the IT 2004	RQ2	The main aim of the study is to analyze the analysis that has compared between the services of ITSM and the governance of IT	Prior literature has been analyzed for appropriate data	ITSM has been designed to align with the IT structure and services to provide a chain of results. The frameworks of IT governance were analyzed and in the same way the frameworks of ITSM were analyzed. By analyzing both the frameworks a comparative analysis is initiated in the study. With the comparison between the

					two frameworks the impact has explored for the development of the next generation.
14	Mauricio Marrone, Francis Gacenga, Aileen Cater-Steel, Lutz Kolle	The ITSM framework - ITIL adoption in the services 2014	RQ2	To investigate the results, future implications, and challenges ITIL a framework of ITSM	The data from the questionnaires were analyzed properly	ITSM consists of various frameworks and ITIL is one of them which is adopted to analyze its challenges, benefits, and future opportunities that are provided. The study is completely about the adoption of ITSM in the infrastructure of IT. In the strategic level processes, the ITIL is one of the finest frameworks of ITSM that has the ability to manage the functions and services in IT.
15	Jochen Wulf Till J. Winkler Walter Brenner	Analyzing the capability of Information technology service management 2015	RQ1 RQ5	To analyze the capabilities of Information technology service	A mixed survey has been implemented	Information Technology Service Management is the next version of development in the infrastructure of IT. In this study the capabilities of ITSM were analyzed briefly. The process of

				management t		ITSM is in three dimensional form that leads to positive results. The planning, operation, and transition of the services are made by the ITSM. Managing these services in the organization is maintained by the ITSM by minimizing the risks that are encountered.
16	Muhammad Imran Sarwar Qaiser Abbas, Tahir Alyas, Ali Alzahrani, Turki Alghamdi, Yazed Alsaawy	Transformation of public sector governance into digital format with the adoption of ITSM 2023	RQ1	To analyze the ITSM for transforming the public sector governance into digital mode.	The existing literature is analyzed with an in-depth analysis	Information technology service management has gained huge popularity in organizations and industries across the world. It has become a limelight for all the organizations and industries. It helped the tech companies to grow rapidly with innovative thoughts and technologies. With the adoption of ITSM the public sector governance is able to turn into digital mode which is an added advantage to manage the services in an easy way.

17	James Cusick	To increase the business value with the implementation of ITSM 2020	RQ2	To investigate the revolution in ITSM for analyzing the business value improvement	The questionnaire is utilized to analyze the data	With the innovations in ITSM, various organizations have adopted it to increase their business value. As every organization has various business goals and targets to meet the success rate. For achieving these goals and targets of business the adoption of ITSM is a benefit. By utilizing the frameworks of ITSM which is ITIL is utilized to analyze the value of the business. These frameworks were very useful to understand the business needs and values.
18	Vladimir Stantchev, Martin Goernitz	The ITIL based process landscapes were evaluated in a comparative analysis. 2011	RQ2	The study focuses on analyzing the ITIL based process landscapes with a comparativ	A primary survey has been implemented to analyze the data that is gathered	ITIL is the framework of ITSM which is evaluated in a comparative analysis. ITIL framework has a very simple nature that can be used in the process of IT services. These processes were analyzed completely with the adoption of the ITIL framework.

				e evaluation.		Comparison and evaluation of the ITIL framework is done in the study for the process of IT services. The weak spots were able to be identified with the implementation of the ITIL framework.
19	Rahavendran	Analyzing the Information Technology Service Management 2022	RQ2	To investigate the challenges that are faced while managing and delivering the processes in Information Technology Service Management.	With the help of participants, the data that is collected is able to be analyzed.	To manage the challenges in quality of service, value delivery, and the process of Information Technology Service Management various recommendations were initiated with proper service providers and initiating the multi-skilled resources for analyzing the process in the service management.

				To analyze the purpose of Service Portfolio Management (SPM) in the IT infrastructure with the ITSM (Information Technology Service Management) frameworks.		With the implementation of Service Portfolio Management (SPM) along with the frameworks of Information Technology Service Management (ITSM) has helped to increase the future work with proper metrics, standardized model types, and model elements.
20	Michael, Michael, and Thomas	Comparison of SPM and ITSM frameworks 2019	RQ2		Participants are utilized to gather more information	
21	Don MacLean, Ryad Titah	Implementation and Impacts of ITSM in IT function 2023	RQ2	To analyze the impacts of information technology service management with the implementation of IT functions.	Participants are utilized to collect data related to the topics of the research	By implementing the ITSM in the IT function the impacts are analyzed. In recent years, the implementation of ITSM has increased in the IT field as various organizations have benefited with its services. The study focused on enhancing the quality and the delivery of the

						services that are provided by the ITSM frameworks. The performance, customer experience, and focus on the customers is able to analyze with the implementation of ITSM and its frameworks.
22	Berihun, and Teferi	Development of ITSM and its frameworks 2021	RQ2	To analyze Ethio Telecom by utilizing the recently developed Information Technology Service Management frameworks.	Analyzing the existing literature by implementing the survey	As telecom service providers require proper communication service technologies and the Information Technology Service Management frameworks were very helpful to investigate further designs and research to develop more adequate frameworks.
23	Moudoubah, El Yamami, Mansouri, and Qbadou	Evaluation of integrated use of ITIL and COBIT frameworks 2021	RQ2	To analyze the ITIL and COBIT frameworks to manage the Information Technology	A mixed survey is implemented to collect data	Some of the organizations have achieved positive responses by implementing Information Technology services with different frameworks and with the combination of COBIT ITIL frameworks the

				service governance and Information Technology Service Management.		organizations experienced better benefits in the information technology services.
24	Gunawan, August	Implementation of ITIL framework for a strategic management in the services 2019	RQ2	To investigate the ITIL (Information Technology Infrastructure Library) framework in information technology services.	A mixed questionnaire is implemented to analyze the data that is gathered	The ITIL (Information Technology Infrastructure Library) has been adopted by many organizations nowadays that resulted in positive outcomes as it provides several service strategy stages in the Information Technology services to utilize the frameworks by the organizations and industries.
25	Barreto, Battaglin, and Varga,	Implementing the ITSM to increase the information systems availability (2019)	RQ2	To check the efficiency of Information Technology Service Manageme	Analyzation of the information that is gathered through various methods	With in-depth research in information technology, the study identified that there are various frameworks available for solving the issues. But the Information Technology Service Management tools and

				nt for increasing the availability of the information systems.		frameworks are always available to the information systems to manage the issues and to respond immediately to the challenges that are faced by organizations and industries.
26	Sipahutar, Hidayanto, Rahardja, and Phusavat	Adoption of ITSM in the Indonesia start-up company with a innovation theory (2020)	RQ1, RQ2	To check the barriers and adoption of ITSM in start-up companies and industries.	A mixed questionnaire is initiated to analyze the data	The ITSM is a framework that is purely designed for large companies. In this study, the adoption of ITSM in start-up companies is analyzed. The diffusion of Innovation Theory is initiated by the ITSM framework to analyze the barriers that are identified in start-up companies. With this theory implemented in start-up companies, the barriers have fallen down into the innovation of the attributes.

| 27 | Barcelo-Valenzuela, M., & Leal-Pompa, C. M. | An ITSM framework adaptation: Case study in an electoral institution. *Proceedings - 2020* | RQ1,RQ2 | The main aim of the study is to analyze the ITSM adoption in electoral institutions | Analysis of the data taken from primary sources | The paper focuses on the ITSM framework and how it has been adopted in an interesting case . |
| 28 | Abraham Dávila, Rosanna Janampa, Paula Angeleri, Karin Melendez | "Information Technology Service Management Processes for Very Small Organization: A Proposed Model, 2019 | RQ2 | To analyze the models of ITSM to implement in the small organizations. | Secondary analysis by utilizing the green information systems | With the implementation of ITSM models in various small organizations the impacts are evaluated. As the ITSM has been very popular and every organization intends to adopt these frameworks and models. In this process the ITSM models were initiated to help manage the IT services in the small organizations. By analyzing the needs and requirements of the small organizations these models were designed based on the ITSM frameworks. Three kinds of enterprises are analyzed to |

					develop and implement these ITSM models.
29	Iman Baradari Maryam Shoar Navid Nezafati	Evaluation of the differences among ITSM and knowledge management 2021	RQ2	The study focuses on evaluating the differences between knowledge management and ITSM.	Participants are selected to analyze the information that is gathered from them	The study focused on analyzing the differences between the two models that are ITSM and knowledge management. To align with the digital mode the ITSM is required to be enhanced with knowledge management. With this enhancement the ITSM is able to manage the services in the IT infrastructure as it is growing high on a daily basis into a digital arena. Key performance indicators are analyzed for the ITSM as then processes were increased with the responses.

| 30 | Gilmar Barreto, Paulo Battaglin, Sergio Varga | The ITSM enhanced with efficiency for improvement of IT 2019 | RQ2 | To analyze the efficiency of ITSM to improve the IT infrastructure | A mixed survey is implemented to address the information | The study focuses on increasing the efficiency of ITSM for improving the IT infrastructure. The ITSM frameworks were extensively utilized to increase the impacts of IT and its services. The complexity in the IT sectors is able to be handled and managed by the ITSM and its frameworks. In some cases, it is a challenging situation for the ITSM to handle the complexity in the IT but the frameworks are helpful to manage these kinds of difficulties. |
| 31 | Pearl Brereton Barbara, Kitchenham, David Budgen, Mark Turner, Mohamed Khalil | Analyzing the systematic literature review process and learning the implementation in software domains | General | The study focuses on the implementation of literature review process in software domains | A mixed questionnaire is initiated to address the information | The study focuses on the implementation of literature review processes in the software domains. Research outcomes were provided with the implementation of the literature review process in software engineering. The applicability of the methods is analyzed thoroughly by various |

		2007			researchers to extract the software engineering with a proper practice.
32	Chin, Benslimane,Yang	Evaluating the applications of ITSM based on the standards with the practice 2017	RQ2	To analyze the applications of ITSM by evaluating the standards and its practice	An interview session is conducted to gather the data	The paper analyzed the applications of the ITSM standards and the practice of them is evaluated. The ITSM process is identified and ranked according to the standards of the ITSM. Findings provided a large demand on ITIL with the evaluation of the ITSM standards.
33	Hashim Chunpir, Mostafa Ismailzadeh	Analyzing the comparison of ITSM among various sectors 2020	RQ2	Comparison of ITSM among various sectors like libraries, public administration, e-infrastructures, and	With the interview sessions, the data is able to collect related to the	The study investigated the practices of ITSM and compared among various sectors like private, libraries, e-infrastructures, and public administration. Six aspects were drawn out of many for analyzing the properties of these sectors. Based on the aspects it was identified that there are

				private sectors		many similarities among these sectors that are selected. With the similarities among the sectors the practice of ITSM is the most required element that is discovered by the researchers in the study.
34	Tom Eikebrokk, Jon Iden	Implementation of ITIL model and empirical test for strategizing the ITSM 2017	RQ2	To investigate the ITIL model and empirical test which is implemented in the ITSM form strategizing	The data is gathered by conducting interview sessions	The study investigated the ITIL models and empirical test for strategizing the ITSM. Some of the appropriate theories are lacking that are identified while analyzing the ITIL. This has led to the initiation of the practice of ITIL in the study. The intention is to close the gap by initiating an empirical ITIL model which helps to strategize ITSM. By initiating the ITIL model the quality is improved and the benefits are observed.

35	Segundo Moisés Toapanta Toapanta, Emmanuel Alejandro Narváez Picon, Luis Enrique Mafla Gallegos	To improve the quality of services with new prototype for engineering companies 2020	RQ2	To investigate the management of engineering companies for increasing the quality services with prototypes.	With the initiation of interview sessions efficient data is able to be gathered.	With various new prototypes introduced the quality of the services were able to be developed for managing the engineering companies. These new prototypes are helpful to increase the quality of services related to the business management. For analyzing the information some of the methods like deductive and exploratory research has been introduced. With these methods the information is able to analyze accurately for improving the quality of the services.
36	Rini Juliana Sipahutar, Achmad Nizar Hidayanto, Solikin, Untung Rahardja, Kongkiti Phusavat	Adopting ITSM as drivers and barriers for the startup company of Indonesia 2020	RQ1 RQ2	To investigate the ITSM adoption as barriers and drivers in an Indonesian startup company	Primary interview sessions were conducted with the participants	With the innovation theory the startup company of Indonesia has adopted ITSM as barriers and drivers. A digital platform is started by the Indonesian startup companies in which the ITSM is the best approach they have chosen for their IT functions and

					services. By implementing the ITSM in their startup companies it has aligned with the goals and services of the business. In various ways it led to various factors for implementation of the ITSM in their startup companies.
37	Tom Eikebrokk, Jon Iden	Implementation of both ITSM and its framework ITIL 2013	RQ2	To analyze the implementation of ITSM and its framework ITIL together	A primary survey is conducted for data collection	The main goal of this study is to implement both ITSM and its framework ITIL together for a research purpose. With this approach the study is able to identify the future opportunities, benefits, efforts, relevant studies, and research areas for implementation of ITSM and its frameworks. The study carried out and provided various benefits and research areas for other areas to implement the ITIL and ITSM for business improvement.
38	Brian Guilfoos, Jeff Triplett	Implementing ITSM in supercomput	RQ5	The study focuses on implementi	A primary questionnaire is initiated in	With the adoption of artificial intelligence, various benefits were

		ing for improvement of services 2022		ng the ITSM in supercomputing for increasing the services and delivery	the paper for data collection	encountered along with the ITSM. The ITSM is implemented in supercomputing for increasing the experience of users, delivery of the services and the reliability. With the increasing complexity the ITSM practice is the main tool to be initiated in supercomputing. As supercomputing is a kind of centre that provides better management of risks and data recording and increasing stability. To manage all these factors, implementing the practice of ITSM is an advantage.
39	Madani, N., Suzangar, A., Kajbaf, M., Nasher, S., & Kalantarian, M.,	Proposing an Optimized Change Management Process by Analyzing ITSM Frameworks, 2011	RQ1, RQ2	Study ITSM frameworks for a change management model	Analysis of various frameworks	This study proposes a model to implement change management process by studying various frameworks.

40	Teresa Lucio-Nieto, Dora Luz Gonzalez-Bañales	Implementation of ITSM in World food company in Latin America 2021	RQ2	To analyze the implementation of ITSM in World food company in Latin America	The literature analysis is implemented to manage the huge amounts of information that is gathered.	The study aims to analyze the implementation of ITSM in World food companies in Latin America. Research has been initiated on the service management office for analyzing the challenges and outcome. In this study the contribution with the implementation of the service management office is analyzed. In big size companies the implementation of a service management office provides various benefits in management. The three perspectives that are people, technology, and processes

					are managed with the implementation of SMO in the big size companies.
41	Luke Irwin	The framework of ITSM that is ITIL revolution in the ITSM 2019	RQ2	The study focused on reshaping the ITSM with the implementation of the ITIL framework.	A case study has been initiated for gathering information.	The aim of the study is to analyze the reshaping of ITSM with the implementation of the ITIL framework. The implementation of the ITIL framework has changed a lot in the ITSM. With the introduction of the ITIL framework the two main issues were able to be solved easily in the ITSM. ITIL is a new version that has been developed. Previously the third version of ITIL was used to run and when the fourth generation of ITIL was introduced with higher features. It focuses greatly on the customer satisfaction by providing value to it.

42	Marcel Foederer	Change in past 20 years with the implementation of ITIL 2018	RQ2	To analyze the change that occurred in 20 years with the implementation of ITIL framework.	To gather appropriate information the case study is implemented.	The study focuses on analyzing the changes that occurred over the past 20 years with the implementation of ITIL framework. More flexibility is required for the business in their organizations to gain this flexibility the ITIL framework is very useful. Higher quality performance is required for businesses to enhance their business. The main point of implementing the ITIL in the IT organization is to pace the speed of the business with high integrity.
43	MacLean, Ryad Titah	For business alignment ITSM implementation for managing the control system 2018	RQ2	The study aimed at analyzing the implementation ITSM in the business for managing the control system.	A primary questionnaire is implemented	The aim of the paper is to analyze the business alignment with the implementation of ITSM as a management control system. A new concept has been analyzed in the ITSM, which is a management control system. This is designed to analyse the customer experience widely

						and responses in the IT functions. This is a conceptual model that is designed for the ITSM for enlightening the business needs and increasing productivity. The outcomes that are generated in the organization is the part of the conceptual model of ITSM that is implemented.
44	Karin Melendez, Abraham Dávila, Marcelo Pessoa	Implementation of ITSM in small and medium organizations 2016	RQ2	To analyze the impacts of small and medium organizations with the implementation of ITSM	A primary questionnaire is introduced	The aim focuses on dealing with small and medium organizations by implementing ITSM for managing business goals and targets. The ITSM main role is to provide high quality levels performance and services in any organizations. To analyze these qualities of the ITSM, it is implemented in the small and medium organizations to check its abilities in the services and business upgrade. In this competitive field efficiency is the main goal to be

						achieved by the organizations. For this purpose, the ITSM is implemented for management of services.
45	Mauricio Marrone, Mara Hammerle	Analyzing the ITSM in relevant research areas 2017	RQ1 RQ2	The paper focused on analyzing the ITSM in relevant research areas.	A case study is initiated to analyze the information that is collected	ITSM is termed as information technology service management is a kind of activity that is implemented in various organizations. The paper focuses on researching the ITSM with relevant areas in practitioner literature and academics. Both the practitioner literature and academics specifies that ITSM has an impact in the use and it values the practices. In the research that was discovered that it has positive ways with the practicing of management and it has a wide view on social networks. It focused on increasing the views for future opportunities by

					identifying the misalignments that occur.
46	Martin Sarnovsky, Juraj Surma	Development of predictive models for ITSM in the support of incident management processes 2018	RQ4	To investigate on the predictive models for ITSM with a support of incident management processes	Analysis of the existing literature provides a greater impact	Predictive models were developed for the ITSM with the support of incident management processes. This helps to increase the overall support that is provided to the IT infrastructure. The predictive models that are developed are like machine learning techniques which help to database the changes that are made related to the IT infrastructure. The information is able to obtain with the help of incident management processes during the process of incident.

47	Schmidt Michael, Brenner Michael, Schaaf Thomas	Comparison of ITSM frameworks to simplify into service portfolio management 2019	RQ2	To analyze the comparison of ITSM frameworks to simplify into service portfolio management	The existing data is analyzed accurately	In this paper the comparison of ITSM frameworks is carried on to simplify it into service portfolio management. The main role of Service portfolio management is to organise the IT services and functions of the organizations. As the service portfolio management is the part of the ITSM frameworks which deals with the IT infrastructure. But the service portfolio management is less researched when compared to the other methods.
48	Mohammad Augus Prihandono, Ruki Harwahyu, Riri Fitri Sari	Performance in IT incident management with implementation of Machine Learning Algorithms	RQ3	To investigate the machine learning algorithms by implementing in the IT incident	The case study is implemented in the paper for analysis of the data.	The study focuses on analyzing the performance of IT incident management by implementing the machine learning algorithms. Highest accuracy is estimated for identifying the incidents in before with the implementation of machine

					learning algorithms in IT incident management. Multicase problems can be resolved with the various algorithms that are existing in the machine learning techniques. Mainly deep learning technique has the capability to handle the problems in multiple cases with proper solutions.
		2020		management	
49	Chitu Okoli, Kira Schabram	Conducting a systematic literature review for research on information systems. 2011	RQ2	To analyze the perspective of information systems by conducting a systematic literature review.	A mixed questionnaire is initiated for gathering data	The main focus of the systematic literature review is to provide brief research on information systems. A high-quality research has been carried out in this paper on information systems. Detailed research has carried out in the information systems. For proper research, a systematic literature review has been implemented to recover the information highly.

50	Rúben Pereira, José Braga de Vasconcelos, Álvaro Rocha, Isaías Scalabrin Bianchi	Managing the business processes in ITSM with a case study of incident management 2021	RQ2	To investigate the business processes in ITSM with a case study implementation with incident management	A mixed survey is initiated in the paper for data collection	The study's main aim is to analyze the business process management in the ITSM by initiating a case study with incident management. In this study the research is to analyze the management of business processes which helps to improve the processes in ITSM. Through ITSM processes a case study is initiated for increasing the time performance in the incident management. For increasing the time performance in the incident management three main practices were suggested which resulted in positive response.
51	Ari Widianto, Apol Pribadi Subriadi	Evaluation of ITSM methods based on the approach, process, and context 2022	RQ1 RQ2	To investigate the Methods of ITSM based on the context,	A case study has been initiated to gather the data	The aim of the study is to analyze the methods of ITSM based on the content, approach, process, and context. The ITSM is preferred by any organization to maintain high quality performance.

| | | | | approach, and process | | This high quality performance maintenance is possible with the ITSM methods. Evaluation of the ITSM method is a difficult task as it is of a very complex scale. To evaluate the ITSM method a right evaluation method is required to be chosen to fit in it. The right evaluation method is helpful to achieve the goals and strengths with the ITSM. |
| 52 | Shastri, Thampi, | Evaluation of ITSM processes in automation mode 2021 | RQ5 | The paper focuses on the innovation and automation of the ITSM processes | A case study is implemented for analyzing the data | The paper focuses on evaluating the ITSM processes in automation mode. In an industry sector automation has created more interest in developing the methods and techniques for success rate. With the automation implementation in the industries, it improves the potentiality. With the implementation of automation in the ITSM it helps in cutting the costs of the operational |

						performance. High level of accuracy occurred with the implementation of ITSM. Zero errors occurred with the implementation of automation in the ITSM.
53	João Serrano, João Faustino, Daniel Adriano, Rúben Pereira, Miguel Mira da Silva	Literature review of ITSM with evaluation of challenges, benefits, practices, and future opportunities 2021	RQ2	The aim of the paper is to investigate the literature review of ITSM by evaluating the challenges, future opportunities, and benefits	Semi-structured interviews were initiated with a qualitative approach	The study focuses on literature reviewing of ITSM by evaluating the future opportunities, benefits, practices, and challenges. ITSM is a combination of various frameworks that is providing support to the organizations for managing the services. By implementing the various ITSM frameworks helps in increasing the IT infrastructure in the organizations. The main objective is to analyze the life cycle for managing the services and functions in the IT domain.

54	Bertrand Verlaine	Analyzation of agile ITSM frameworks 2017	RQ5	To analyze the perspective of agile ITSM frameworks	A mixed questionnaire is implemented for gathering the information	The study analyzed the perspective of agile ITSM frameworks. For more agility the digital world is evolving with the generation of agile ITSM frameworks. Cloud computing and service-oriented computing are the agile frameworks that helps in managing the services. Companies more and more were preferring to implement these agile frameworks like cloud computing and service-oriented computing. To manage the IT projects in the IT infrastructure these agile frameworks were useful along with the ITSM.
55	Ragil Tri Wahyudi, Gusmelia Testiana	Applying e-GovQual Dimensions Case Study for evaluation of e-Government	General	To investigate the e-government service quality by implementing the e-	A secondary analysis is initiated with the implementation of blockchain technology	The study focuses on analysing the e-government service quality by evaluating the e-GovQual dimensions case study. Evaluation of user satisfaction with the e-GovQual dimensions case

		Service Quality 2020		GovQual dimensions case study		study that helps to analyze the e-government service quality. The results showed a level up satisfaction in the IT level.
56	Till Winkler, Jochen Wolf	Implementation of co-creation and value facilitation mechanisms to analyze the capabilities of ITSM. 2019	RQ2	The paper focused on analyzing the capabilities of ITSM by implementing the value facilitation and co-creation mechanisms.	A mixed survey is initiated in the paper for gathering the information	The aim of the study is to analyze the mechanism of co-creation and value facilitation in the ITSM. ITSM has the best capabilities to manage the services accurately in the IT infrastructure. There is still a lack in understanding the ITSM to which mechanisms that work effectively to the information systems. Various mechanisms were engaged in evaluating the ITSM for best and effective approaches in managing the information systems. The ITSM capabilities are more than the expected as it can align with the IT functions and handle the IT structure.

57	Teresa Lucio-Nieto, Dora Luz Gonzalez-Bañales	Exploring ITIL® Implementation Challenges in Latin American Companies (2019)	RQ2	To investigate the challenges of ITIL implementation.	A mixed questionnaire is initiated for collecting the data.	Though there are numerous benefits of ITSM frameworks, many organizations fail to realise full benefits and face difficulties to implement. This paper has studied challenges of implementing ITIL in Latin American countries.
58	Yvonne Black and Mauricio Marrone	Research gaps in ITSM and ITIL frameworks 2019	RQ2	To investigate the research gaps in ITSM and ITIL frameworks.	A semi structured interviews were conducted for gathering of the information	The paper focuses on analyzing the research gaps in ITSM and ITIL frameworks. In this research work four main gaps were identified practically. The frameworks of the ITSM were combined in some cases for potential outcomes in the practices of some organizations. This is the major gap that is identified as combining the frameworks doesn't work effectively. Implementation of ITSM for improvement of the IT infrastructure is another research gap.

						Implementation of tools for improving the performance of ITSM is another research gap. The Impact of regulation on ITSM is very less evident is another research gap.
59	Dmitry Zuev, Alexey Kalistratov, Andrey Zuev	Evaluating ITSM with a machine learning technique 2018	RQ3 & RQ4	To analyze the ITSM with machine learning techniques	A case study is implemented in the paper for analysis of the data	By analyzing the ITSM with the machine learning techniques helps to improve the experience of the customers and by handling the issues appropriately. ITSM is a foundation for the IT infrastructure as it is able to handle the services, challenges, and provide future opportunities in an easy way. For resolving the issues in limited time a incident prediction model has been introduced which is a part of machine learning technique. With this incident prediction model the issues were able to be solved quickly within the time. With this inscription of ITSM along with the

						machine learning technique the performance is very high in positive outcomes. The service costs were able to be deducted effectively.
60	Alice E. Cook , Andrew S. Gann, , Daniel A. Ray and Xihui Zhang	Advantages, challenges, and success factors in implementing information technology infrastructure library 2021	RQ1	The study focuses on ITIL advantages, CSFs, challenges.	A multi research covering study of scholarly articles and survey.	A roadmap of best practices to facilitate the adoption of ITIL presented in this paper. The benefits of ITIL adoption and implementation are first explored. Then presented a taxonomy of problems that the IT Services Management profession faces when it decides to adopt ITIL as its ITSM framework. It has identified key success factors (CSF) that will mitigate these challenges when they are implemented. During the adoption of ITIL, it has taken a closer look at the psychological components among stakeholders that lead to identified problems

					and give an insight into how they can be overcome.
61	Madhavi Pradhan, Arun Bagbande, Amaan Khan, Abdul Aman Abdul Majid, Unnati Chandekar	Implementation of AI Chat Bot and data visualizers with the ITSM 2022	RQ3 RQ5	To analyze the AI Chatbots and data visualizers with the ITSM	An interview session is conducted with the participants for data collection.	The aim of the paper is to analyze the ITSM with the implementation of the Chatbots and data visualizers. A robust service in dealing and solving the issues in quick bite the introduction of AI in ITSM is the best approach. With the smart generation and automation running successfully, introduction of AI along with the ITSM is the best combination that can deal with the issues with a robust nature. The robust service is based on the ITIL framework that works well for reporting, managing, and resolving the issues quickly within the time.

| 62 | Salman Ahmed, Muskaan Singh, Brendan Doherty, Effirul Ramlan, Kathryn Harkin, Damien Coyle | Implementation of artificial intelligence for review of incident risk prediction 2022 | RQ3 RQ5 | The main aim of the paper is to analyze the artificial intelligence for review of incident risk prediction | A case study has been implemented in the paper for the gathering of information. | The main aim of the paper is to analyze the artificial intelligence for reviewing the incident risk prediction. The incidents that occur are termed as tickets in the field of IT structure as these tickets are handled by the team of the IT domain. With the ITSM the most challenging situation is handling the incidents. The incident risk prediction method is initiated by the companies to resolve the risk that occurred automatically within the minimum time. By utilizing the AI models the risks are able to resolve automatically and within the time. |

63	Berntsen, K. R. (2017) as cited by Cook et al (2021)	The use of ITIL and its effect on organizational culture: Bringing the employee perspective to the scene [Master's Thesis]. Østfold University College, Halden, Norway (2021)	RQ1	Main aim of this paper is to findout ITIL Usage and effect on culture of the organization	Secondary paper, this has been cited.	This paper has studied ITIL usage and the effect on the culture of the organization.
64	Dugmore, J., & Taylor, S.	ITIL V3 and ISO/IEC 20000 alignment white paper. itil-iso20000-alignment.pdf 2008	RQ1	To findout how ITIL and IS=2000 are aligned/different	Data collected from primary source of ITIL and ISO20000 publisher.	the differences between ITIL V3 and ISO/IEC 20000, from the perspective of each clause in the standard where the core 5 ITIL books either do not cover it or cover it differently

64	Dugmore,J.,	BS 15000 to ISO/IEC 20000 What difference does it make. (2006)	RQ1, RQ2	Journey of BS15000 to ISO20000	References taken from framework0s website.	It has studied how and why BS15000 moved to ISO20000.
65	Muhamet Gërvalla, Naim Preniqi, Peter Kopacek,	IT Infrastructure Library (ITIL) framework approach to IT Governance 2018	RQ1	ITIL as IT governance framework	Secondary data, taken from past research papers.	The study is focused on understanding the ITIL framework in relation to IT Governance
66	Pierre Bernard	ITIL Foundation 2011 edition book, Van Haren Publishing,Z altbommel 2012	RQ1/RQ 2	It gives ITIL V3 process/fun ction details	Book taken from original ITIL publishing	This book is outlining all aspects of ITIL at foundation level.

67	Ghayekhloo, S., Ghayekhloo,Sara., Nasri, R. and Shabgahi,G.L	What is the best framework for IT governance? ITIL V3 or COBIT4.1 2022	RQ1	Studies and compares ITIL V3 and Cobit w.r.t IT governance	Secondary data from past research and books	Discussed how both frameworks implemented simultaneously can help in IT governance.
68	Steuperaert, D.	COBIT-2019: A Significant Update 2019	RQ1, RQ2	It outlines COBIT 2019 version details	Secondary source (book and references)	This paper gives details of COBIT 2019 version of the framework.
69	RS, R. (2022)	The common challenges in managing and delivering ITSM Processes	RQ2	List out the challenges	From industry experience	List out common challenges of ITSM process implementation.

70	Nikulin,V.V., Shibaikin,S.D, Vishnyakov,A. N.	Application of machine learning methods for automated classification and routing in ITIL (2021)	RQ3	Analyses ML models to automate classification and routing of requests.	Primary analysis based on various models available for ML	Comparisons are made with the implementation of machine learning techniques, as well as an evaluation of the results achieved by automatically classifying text information based on gradient boosting and convolutional networks.
71	Zaydi,M & Nassereddine,B	A Machine Learning Based Secure Change Management (2020)	RQ3	Aim is to improve change process and reduce change related incidents.	Primary research and tested a model	A new model was proposed in the study. To enable strategic decisions at the time, to reveal weaknesses in which transformation managers should focus their efforts on improving these and thus ensuring appropriate levels of cybersecurity, it is based on Machine Learning algorithms and CRISPDM methodology with a view to identifying

						relevant named changes causing incidents.
72	Christa I.L. Sharon, V. Suma	Predictive Analytics in IT Service Management (ITSM) 2022	RQ3	Application of Predictive analytics and applied machine learning techniques in ITSM	Reference and verification	Provides a comprehensive overview of the IT service industry, including its use of Machine Learning to improve delivery performance and quality using these techniques.
73	Karamitsos, I., Albarhami,S., and Apostolopoulos, C.	Applying DevOps Practices of Continuous Automation for Machine Learning (2020)	RQ3	DevOps and usage of Machine Learning.	Secondary source as well proposed a model	The practice of DevOps, which blends the development and operating environment smoothly, is presented in this paper for a machine learning application.

74	Reinhard,P., Li,M.M., Dickhaut,E., Peters, C. & Leimeister,J.M., (2023),	Empowering Recommender Systems in ITSM: A Pipeline Reference Model for AI-Based Textual Data Quality Enrichment	RQ5	Improve data quality using AI	Both primary and secondary source	Designing a machine learning-driven data quality analytics pipelines for recommender systems.
75	Mora, M., Gomez, J. M., O'Connor, R., Raisinghani, M., & Gelman, O. (2015)	An extensive review of IT service design in international ITSM processes frameworks: Part II. International Journal of Information Technologies and Systems Approach,	RQ2	ITSM frameworks design process and practices	Study of literatures	Analysis focusing on the IT service design processes and practices reported in the seven ITSM processes frameworks.

4.3 Conclusion

ITSM and its framework is the best approach that is adopted by the companies to manage their services and functions to increase the business levels. ITSM and its framework is the right approach to adopt by the organizations as they have the capabilities of managing the services, functions, quality of the data and risks. Initially the ITSM has been adopted by the large organizations and lately the small and medium organizations started adopting the ITSM and its frameworks in their business as it has been well known. For the past 25 years the ITSM has been providing its services in various ways to the IT infrastructure with its benefits and future opportunities. Some of the challenges were also encountered in the past 25 years in the services of ITSM and its frameworks (Baradari et al., 2021). The challenges were identified and developed new versions of frameworks to overcome the issues that the previous version provided. In this way the services of ITSM and its frameworks are providing the best efforts in developing the businesses in the organizations. Along with the development of new version frameworks the ITSM started aligning with the machine learning techniques and artificial intelligence to provide more positive performance in developing the businesses in the organizations. The business goals and targets were analyzed by the ITSM and improve the needs accordingly for business improvement in the organizations. Machine learning techniques are utilized for decreasing the quality of time in delivering the services and in solving the risks automatically. Artificial intelligence is aligned with the ITSM to analyze the large data for maintaining the quality and managing the errors in the data.

As ITSM is still emerging and many organizations are depending on the processes, there are still a lot to be researched. Not many comprehensive studies not available on ITSM implementation. Most of the studies are sector specific either covering a particular or a segment of industry, a geographic location or any process specific study (such as incident management).

As part of this extensive systematic literature review, analyzed various research papers available with respect to the research questions posed and detailed results presented in chapter V.

CHAPTER V

CHAPTER 5: RESULT AND DISCUSSION

5.1 Results

ITSM is a kind of tool that has various benefits, challenges, and gaps to be filled that is discovered in the research. ITSM is introduced to operate in the IT sectors of various organizations to manage the services and functions. It has provided a wide impact in changing the levels of businesses in the organizations since the need of it formally recognized in early 1980s. With the positive impact in the increasing levels of business, large companies prefer to adopt the ITSM for managing their services. The IT service is divided equally among the departments and divisions for managing them in an adequate manner. Various ITSM frameworks such as ITIL, COBIT and ISO 20000 have varied capabilities to handle the issues and in managing the risks that occur in the IT infrastructure (Davila et al., 2019). ITIL framework has a strong foundation in providing accurate and precise processes to maintain the high quality in the content. As it has a structured approach, ITIL is easily able to be managed by the individuals in the organizations. COBIT is one of the frameworks of ITSM that is specially designed to provide control structure to support the teams and managers in the IT companies. It has an ability to manage the technical risks and builds a proper bridge among the control requirements and the risks that occur in the companies. ISO-20000 is one of the frameworks of ITSM which has all kinds of abilities to deal with the businesses in the organizations.

ITSM has the capacity of handling the risks, services, and function in the IT domain but with the intersection of Machine learning and artificial intelligence, ITSM is able to drive the operations in an effective way. As the time is a constraint, the tasks that are done manually, and the streamlined process is able to effectively analyze the changes with the intersection of machine learning. The efficiency has been increased completely in handling the IT service incidents in level 1 with the automation process. With this approach the

problems were solved within the time to provide satisfaction to the user ends with the intersection of various machine learning models like chatbots and custom-built models, etc., aligning with the ITSM (Chin et al., 2017). Artificial Intelligence has capability a special feature to identify the data and analyzing the important information from the large sets of data. AI has the capability in analyzing large volumes of data and helps the organizations to improve the data by implementing automation processes, enhancing and validating the data in the process.

5.2 Discussion

With the fast generation, organizations are relying on software techniques and tools to enlighten their business. In this process organizations are adopting the ITSM frameworks, machine learning techniques and artificial intelligence which are the trends that are helping the growth of business. For the past 25 years the ITSM is aligned with the IT infrastructure to manage the processes, all kinds of activities, delivering the services and designing to the end users. ITSM and its frameworks are adopted by small enterprises to large enterprises as it has an unique feature to handle all the risks, processes and services to serve. As ITSM and its framework are very helpful in dealing with any problems and are able to manage the assets in the companies (Foederer, 2018). A robust IT management system is able to be built with the implementation of ITIL in the organizations. This ITIL framework helps in improving the experience of the customers and the services experienced in the IT domain. COBIT framework is widely utilized by various organizations as it is known for maintaining the quality and ensures the best quality services in the companies to the customers and clients. With the implementation of ISO20000 framework the customers are able to understand the level of quality the companies are maintaining in their services and functions.

The intersection of ITSM with machine learning is the best combination to adopt in the organizations as the services that are provided by the ITSM are able to be managed by the machine learning techniques with automation. Machine learning techniques are able to

manage any risks automatically within the time as they include incident management response mode. With this incident management response mode, the time for solving a risk is decreased and it takes very less time to solve automatically (Davila et al., 2019). Maintaining the quality of the data is a crucial approach for the organizations which are facing difficulties in this approach. To solve this challenge the organizations started adopting ITSM with Artificial Intelligence which strongly focuses on maintaining the quality of the data. Data cleansing is a technique in which artificial intelligence utilizes the techniques of machine learning that is natural language processing technique that helps to detects the errors in the data like spelling mistakes, etc and corrects them accurately in the data.

5.3 Research Question 1

RQ1: What are the various ITSM frameworks available and what are their strengths?

The goal of information technology service management (ITSM) is to manage IT infrastructure, business components, applications, and related activities. ITSM is a well-established set of well-defined services. The services and procedures known as frameworks can be utilised to address a variety of business objectives or requirements, and many industry associations have well-defined guidelines on these topics.

ITSM solutions, when properly implemented, assist IT Operations teams in efficiently managing progressively more complex hybrid environments and speeding up the supply of IT services. Advanced performance management, orchestration, and automation capabilities are offered by these solutions.

IT service management (ITSM) consists of the activities, tools, processes, and policies that businesses and other organizations use to deliver IT services. Although many of the best

practices and models that are used for delivering IT services are now being applied to other areas (such as education, manufacturing and finance), IT remains the most dominant use-case for service management frameworks.

The following are typically included in ITSM:

- Tools, techniques, processes and procedures that IT departments use to enable and maintain their environment to provide business services
- Framework by which efficiency and IT service value are measured
- Assistance for waterfall, agile and DevOps integration
- Assistance both engineering and operations (EngOps) domains
- It is applicable to all stages including pre-production and production environments.

What is an ITSM framework?

ITSM concepts are implemented by frameworks of structures, processes and relational mechanisms, which usually are built on the sets of good practices, verified in the theory and real-life business. Such an approach implies that each organization must carefully identify which components of a given framework are the most appropriate for its needs and select them for the implementation. (Agnieszka Zejac et al., 2012)

As per Zejac et al. (2012), there are numerous frameworks available for effective and efficient ITSM/IT governance implementations. The most recognized are: Business Framework for the Governance and Management of Enterprise IT (COBIT), IT Infrastructure Library (ITIL), Microsoft Operational Framework (MOF), HP IT Service Management, IBM Integrated Service Management, eTOM and Calder-Moir IT Governance Framework. They differ in the scope and extent and in many cases are in overlapping relationships among themselves.

ITSM places a strong emphasis on process-driven methodologies. These procedures are referred to as frameworks and include predetermined best practises. In contrast to other IT disciplines, such as network management, which is more focused on technology, an ITSM framework places more of an emphasis on services than systems.

The aggregate of processes and behaviours required to manage and support information technology services are referred to as the ITSM framework. The ITSM framework provides vendor-independent support for the entire range of IT services, including network, application, and full business services. Numerous ITSM frameworks and standards, including ITIL, IT4IT, eTOM, and COBIT, help to define common operating procedures and auxiliary services within organizations while enhancing value and productivity for the IT operation teams.

Some Popular ITSM Frameworks

ITIL

ITIL is one of very early framework of ITSM that started providing best practices. Enterprises across the world every so often leverage ITIL and other frameworks together to maintain their holistic needs. Each framework has its own range of possibilities and approach that is distinctive, which can help cater to an organization's unique challenges.

Here are some of the popular frameworks implemented alongside ITIL:

ISO 20000

Although there is no sanctioned affiliation between ISO 20000 and ITIL, ISO 20000 basically draws on ITIL principles. Although not noticeably stated in ISO20000 standard, preparing an IT enterprise for ISO 20000 certification normally involves disseminating ITIL principles.

COBIT

The COBIT IT governance framework and supporting toolset is developed by ISACA. ISACA views ITIL as a framework that counterparts COBIT. While COBIT offers governance and assurance, ITIL provides supervision for service management.

The Business Process Framework (eTOM)

As a collective effort, TeleManagment Forum and itSMF built an Application Note to eTOM (GB921) that shows how the two frameworks can be charted with each other. It elucidates how eTom process elements and flows can support the processes identified in ITIL.

FitSM

FitSM is a standard for lightweight service management. This ITIL process framework is relatively similar to that of ISO 20000 of ITIL Version 2 but includes Service Portfolio Management from later ITIL versions.

DevOps

DevOps uses the methodology of cross-functional teams (development, production support and infrastructure teams), stimulated by open communication. The DevOps framework brings together an unattached set of principles that are united, depending on the business needs of an enterprise.

SAFe

Scaled Agile Framework lets the application of the Agile structure used by software development teams by scaling Agile on bigger applications. SAFe empowers a single, all-inclusive view of the complete process.

IT4IT Reference Architecture

IT4IT uses a value chain approach to produce a model of the functions accomplished by IT to help organizations detect and classify the activities contributing to business success. IT4IT also focuses on the technical competencies that are mandatory to support the IT function, as an alternative of the activities and processes defined by ITIL.

Benefits of ITSM frameworks

There is much expenditure supplementary to IT investments. Many leaders express frustration as their teams try to end the disorder with restricted guidance and direction. ITIL is internationally the most widely recognized approach to accomplish and deliver IT services.

IT departments and employees in many establishments are not capable of accomplishing tasks on a well-timed basis, due to impromptu work, at all times, taking precedence over work that is planned. ITIL can help an organization close this unremitting cycle giving a clear emphasis to the Total Cost of Ownership (TCO) and other accompanying activities in their unit.

Successfully adopting ITIL and other IT Service Management (ITSM) frameworks enable to deliver the following:

- An improved and specialized approach to delivering services, leading to improved customer gratification

- Best practice processes for upgraded IT services

- Improved ROI of IT

- Enhanced delivery of third-party services through the specification of ITIL®.

- Increased skill, productivity, and competence of IT staff

- Reduced training costs

- Increased staff retention

- Reduced hidden costs

- A better view of IT spending, costs, and assets

- Greater ability to manage and curtail business risk, service interruption or failure

- Delivering efficient services to customers, thus resulting in enriched and positive relationships with customers

- Reduce redundant work and make the right use of resources

- Maintain performance indicators for benchmarking and direction

5.4 Research Question 2

RQ2 : How has the field of ITSM evolved over the last 25 years, with a focus on ITIL, ISO20000, and COBIT? What are the strengths and challenges of these frameworks?

Development of ITSM over last 25 years

During the early 1990s, ITSM has seen substantial development after it was left of a need in 1980s, and it has become more vital for enterprises to create and execute efficient IT service management procedures and standards. This study about the evolution of ITSM over the past 25 years has been separated into three different periods: the early-ITIL era (late 80's-1999), the ITIL-driven era (2000-2009), and the advanced-ITIL era (2010-present).

The early-ITIL Era (late 80's-1999) :

When ITIL was created in 80's, there was no one unified framework for IT service management, and enterprises depended on a range of different processes, procedures and rules to manage their IT services. At this time period, ITSM primarily concentrated on the management of IT infrastructure, and the numerous processes and procedures that were deployed were often ad hoc and inconsistent (Kumar et al., 2018).

During this period COBIT was shaping up ((De Haes,S et all, 2013), COBIT V1 released in 1996, V2 in 1998. Details of COBIT discussed in next section.

The ITIL-Driven Era (2000-2009) :

The Information Technology Infrastructure Library (ITIL) V2 was first made available to the public in the year 2000/2001, and it rapidly became the framework that is most often used for IT service management. It established a collection of best practises and methods that could be utilised by enterprises to manage and provide their IT services effectively and efficiently. At this time, ITIL was the dominant framework, and the emphasis of ITSM was mostly on service management and service delivery.

The advanced-ITIL Era (2010-Present) :

Since 2010, IT Service Management (ITSM) has continued to develop, and there has been other frameworks in addition to using IT Infrastructure Library (ITIL) as the primary foundation. Although while ITIL (with V3) was still frequently used as a dominant ITSM framework, companies were searching for more complementary as well as supplementary frameworks to provide a higher degree of control and flexibility (Madani et al., 2011). Additional frameworks like as ISO 20000, COBIT, and DevOps have grown increasingly prominent and have become vital components of the ITSM environment. Site reliability engineering (SRE) model by Google is gaining popularity in recent days as per Eveline Oehrlich, 2022.

Detailed study on COBIT, ITIL and ISO20000

COBIT:

COBIT (Control Objectives for Information and Related Technology), as compiled by De Haes, S et al. (2019) is developed by ISACA (Information Systems Audit and Control Association), an international professional membership association for individuals interested or employed in IT audit, IT risk, and IT governance fields. ISACA was created in 1967 and has since evolved to become an internationally known organization with over 150,000 members worldwide. COBIT was first designed to help (financial) audit professionals deal with increasingly automated environments. COBIT was first published by ISACA in 1996 as a framework for carrying out IT audit assignments.

This initial version was shortly followed by the second edition, published in 1998, and centered on a complete set of control objectives for IT processes. ISACA established the ITGI (IT Governance Institute) as a think tank for IT governance in 1998, recognizing the growing importance of IT for organizations and, as a result, the growing necessity for effective management over this IT. The ITGI's insights have considerably aided COBIT's maturation into a mature good-practice framework for IT management and governance (De Haes, Van Grembergen, & Debreceny, 2013). COBIT was expanded into a larger IT management framework by building on the auditing foundation of the first two versions.

The third version of the COBIT framework was launched in 2000, and it included management principles (such as KPIs, important success factors, and IT process maturity models). ISACA released COBIT 4.0 in 2005, which introduced several new management

and governance concepts, including (1) the alignment of business and IT goals and their relationships with supporting IT processes, (2) roles and responsibilities in the context of IT processes, and (3) the interdependence of IT processes. The goal of the fourth edition was to solidify COBIT as a widely acknowledged paradigm for IT governance. As a result of ITGI's (2003) findings that value delivery and risk management are key outcomes of IT governance1, the 'Val IT' (first version in 2006, second version in 2008) and 'Risk IT' (in 2009) frameworks were released as supplements to COBIT 4, and its direct successor COBIT 4.1 (released in 2007).

The Val IT and Risk IT frameworks, respectively, addressed IT-related business processes and roles in value creation and risk management. ISACA then combined COBIT with the Val IT and Risk IT frameworks, releasing COBIT 5 in 2012 as an integrated good-practices framework for IT governance and IT management (De Haes et al., 2013). COBIT 5 also has closer linkages to established frameworks and standards such as ISO/IEC 38500, ITIL, PRINCE2, and TOGAF. COBIT 5, for example, drew on ISO/IEC 38500 to expressly differentiate IT governance from IT management by creating an extra process domain comprising IT governance processes, namely 'Evaluate, direct, and monitor (EDM)'. COBIT 2019, the successor to COBIT 5, was formally published in November 2018. This most recent COBIT update is aimed at facilitating a more flexible, tailored implementation of effective 'enterprise governance of information and technology (EGIT)' and includes the modification of COBIT principles, an updated goals cascade, the introduction of three new processes, the introduction of focus areas (which is aimed at providing a focus on specific problem-solving situations), and the introduction of design factors (which is aimed at better facilitating the implementation of COBIT). As per Steuperaer (2019) in general, the

evolution of the COBIT framework is a healthy response to numerous relevant (IT-related) changes that enterprises face (e.g., a changing role of information and technology, changing sourcing models for IT services, changing business models due to digital transformation, a changing regulatory landscape, and so on). Figure 6 depicts a historical chronology of the evolution of the COBIT framework.
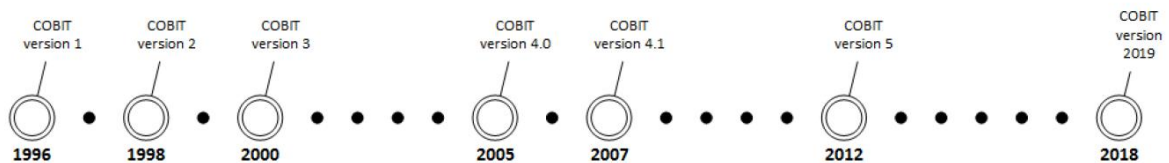
Figure 6. COBIT historical timeline

(De Haes et al., 2019)

COBIT's Underlying Principles - COBIT is based on corporate governance and defines governance as (ISACA 2012, p. 14): Governance ensures that stakeholder needs, conditions, and options are analyzed in order to identify balanced, agreed-upon company objectives; determining direction through prioritization and decision making; and monitoring performance and compliance against agreed-upon direction and objectives. COBIT distinguishes between information technology management and information technology governance. Management is defined as follows (ISACA 2012, p. 14): Management plans, constructs, runs, and monitors activities in accordance with the governance body's guidance in order to fulfill the corporate objectives. Many of the ideas underlying COBIT are similar to the principles underlying IT governance as stated by Weill and Ross, 2004. Some of the similarities include a) separating IT management from IT

governance, b) relying on corporate governance as the foundation, and c) aligning business and IT strategies.

Highlights and Advantages of COBIT

- Business focus – As per Ghayekhloo et al. (2022) COBIT looks for IT not for IT sake but business sake and presents to a multifaceted collection of stakeholders, primary management, users and auditors.
- Process Oriented – To achieve IT objectives, numerous actions and tasks must be completed and in order to assure the appropriate direction and consistency of such activities, these must be structured into sub-processes, which are then classified as processes. COBIT categorizes into four broad domains:
  - Plan and organise
  - Acquire and Implement
  - Deliver and support
  - Monitor and Evaluate
- Control based
- Measurement driven
- Model of IT governance
- One of the leading IT governance and control frameworks (as per ISACA)

As described by Ghaekhloo et al (2022) organizations interested for ITIL should have an effective IT governance and control framework such as COBIT for ITIL to be successful.

Information Technology Infrastructure Library (ITIL)

As described by White and Greiner (2022) ITIL is a framework of best practices for providing and managing IT services. An organization may manage risk, improve customer relationship and create an IT environment that is prepared for growth, scale, and change by using ITIL's systematic approach.

ITIL is an IT service management framework that outlines best practices for delivering IT services. ITIL's systematic approach to IT service management (ITSM) can help businesses manage risk, strengthen customer relations, establish cost-effective practices, and build a stable IT environment that allows for growth, scale, and change.

ITIL was developed around 1988 by UK government's Central Computer and Telecommunications Agency (CCTA) as described by John S Stewart (2013) in response to lack of quality control for delivering IT services to government. It's initial name was GITIM (Government IT Infrastructure Management) and later named as ITIL (termed as ITIL v1 by some authors), It quickly grew 30 volume catalogs covering recommendation and implementation of various aspects of service management. CCTA was later merged to Office of government commerce (OGC) of UK in 2001.

ITIL's management was handed over to AXELOS (sourced from www.axelos.com) in 2014. AXELOS was a joint venture between UK government and outsourcing giant Capita, PeopleCert acquired Axelos in July 2021.

As mentioned by White & Greiner (2022) **ITIL V2** was released in 2001 where 30 volume framework of ITIL V1 condensed to 7 books, each dedicated to a facet of IT management.

A refresh of ITIL project released in 2007 called **ITIL V3**, consolidating the framework to 5 volumes consisting of 26 processes and functions. This is based on service lifecycle as depicted in the figure below (figure 7).
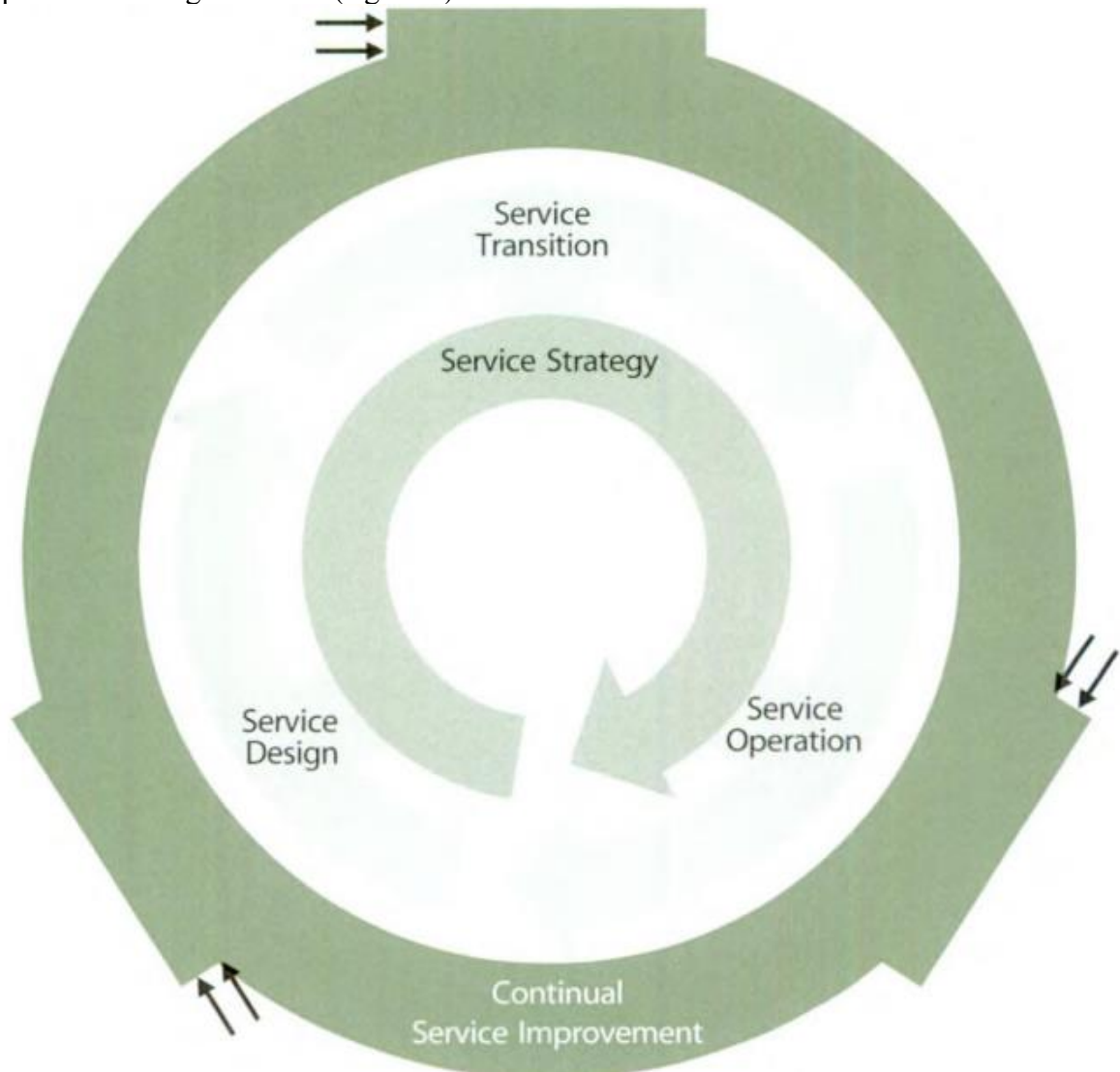
Figure 7. Service life cycle as per ITIL V2, taken from ITIL V3 foundation handbook released by OGC,UK

As mentioned in page 5 of ITIL foundation book 2011, the main difference between ITILV2 and V3 is the service lifecycle approach in V3, V2 was more into individual practices and V3 takes entire service lifecycle as a whole.

In ITIL V3, all services are derived from business needs and requirements. All the stages and processes are given in the figure (figure 8) below (taken from OGC ITIL V3 foundation handbook).
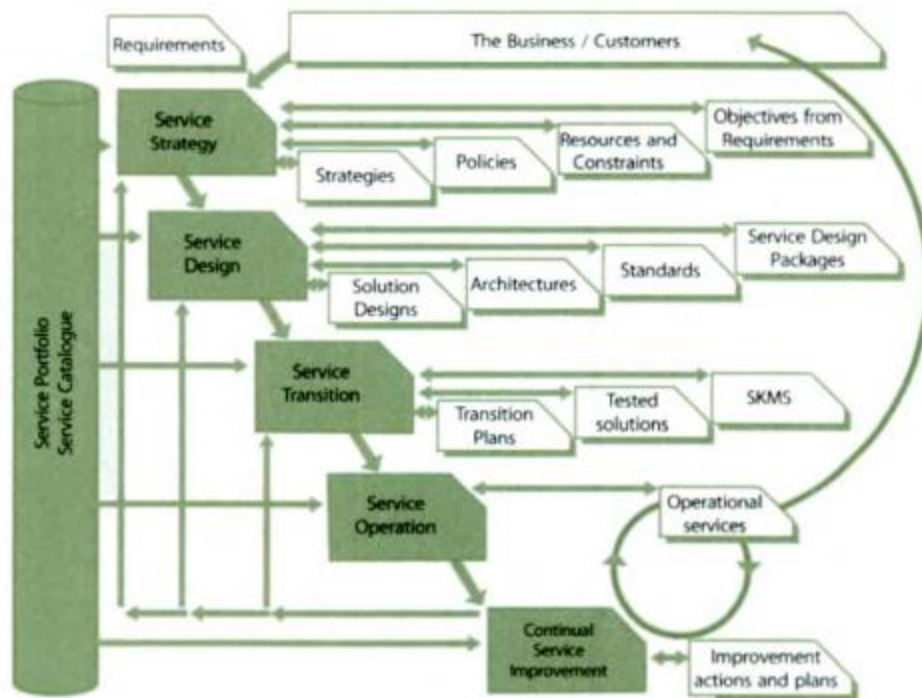
Figure 8. Key links, input, outputs of service lifecycle stages

ITIL 4 (2019) – the current version

The most recent iteration of ITIL which is in its fourth iteration as mentioned by Kaiser,A.K. (2021) contains several intriguing new features. It gives a new framework for managing services as well as a new viewpoint on the services industry. This is particularly intriguing since instead of being razor thin, the line separating the development stage from the operations stage has completely disappeared. The usefulness of ITIL as a framework to manage operations has been questioned due to the lack of a barrier to separate the activities surrounding development stages from operational activities. An updated version of ITIL that is suitable for the digital age is the solution

The current version of ITIL is ITIL 4, it guides how to use ITIL in collaborative approach and align with Agile, Devops, Lean etc.

As defined by Axelos (www.axelos.com, official owner of ITIL), ITIL 4 is an adaptable framework used by service management organizations. It optimises digital technologies to co-create value, drive business strategy and embrace digital transformation. The diagram (Figure 9) below summarises all the guiding principles, value system and practice defined by Axelos (taken https://valueinsights.ch/the-itil-4-big-picture)
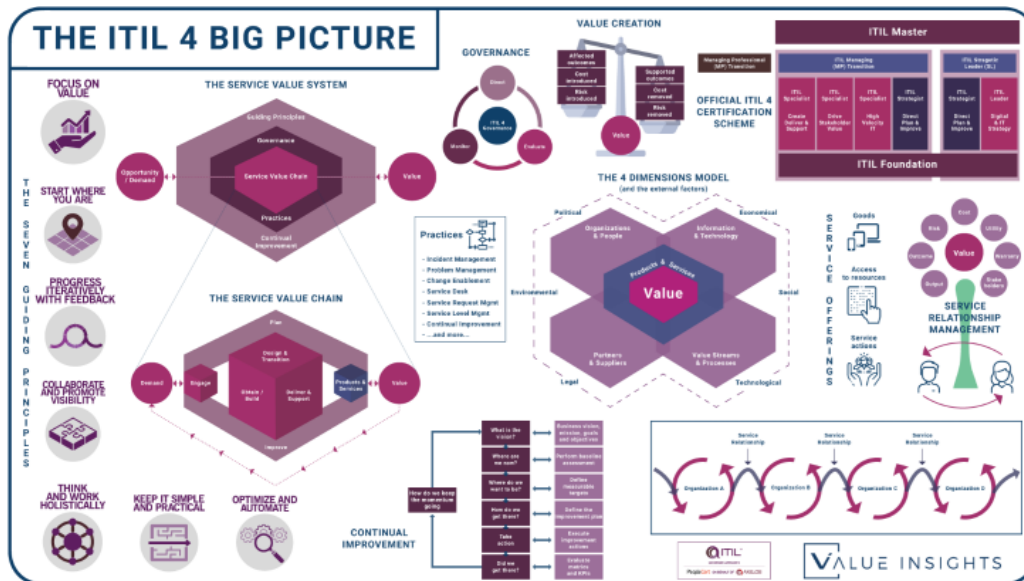
Figure 9. ITIL 4 Big Picture from https://valueinsights.ch/the-itil-4-big-picture/

Highlight and Advantages of ITIL (based on studies taken from Axelos; Moeller, 2013; Cook,et-al., 2021) :

- Best practice framework (as per www.axelos.com)

- Service and process oriented

- Value co-creation approach makes it favourite.

- As it is best practice, it is not rigid to implement.

- Better end-user and customer satisfaction.

- Improved availability of service, directly leading to better business bottom line.

- Cost savings from reduced rework, lost time, improved resource management and IT service usage.

- Improved time to market for the IT aspects of new products and services.

- Improved decision making and optimized risk for all IT-related processes.

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- The study by Kashanchi and Toland (2006) found that another advantage of adopting and implementing ITIL is that it can help align IT processes with business goals.

- These advantages are mostly seen at the corporate level, but there are benefits that have been observed by lower-level employees as well. In Berntsen (2017) study, she revealed that "[all] of the respondents reported that ITIL caused an increase in service quality. In addition, ITIL introduced stability to the workday, increased product quality and predictable services" (p. 32). According to Berntsen's research, the adoption of ITIL granted the participants of her study a more predictable and balanced working environment, and this, in turn, created more motivation and incentive for the employees

Challenges of ITIL implementation:

- As per Muhamet et al. (2018), ITIL implementation offers and requires a culture change, and institution should prepare employees and management of institution how ITIL implementation will help them in the working environment. It is not always easy to change culture of an organization.

- Despite numerous benefits of the ITIL framework, organizations face some common challenges as cited by Cook et al. (2021).
  - Most organizations will encounter resistance to ITIL adoption from employees who oppose change, resist limitations being placed on their processes and procedures, differ with executive expectations, value ad-hoc creative solutions over proven methodologies, and worry about the complexity of the new processes (Chen & Chou, 2010).
  - Additionally, organizations which have not previously employed strict guidelines will undergo a cultural change. Employees accustomed to exercising localized decision making and control over their workflow may

rankle at the dissipation of that control. Such resistance could lead to failure of the project.

o ITIL promotes the need for measurement and report on the service quality, and it makes IT staff felt been watched constantly.

o In addition, adoption of ITIL represents great culture shift, the staff related to ITIL may fear their jobs become redundant, and this resistance will stall the process of implementation (Chen & Chou, 2010)

o Another challenge faced when adopting and implementing ITIL is the successful engagement of users in adopting the updated procedures. Although ITIL enhances the delivery of IT services to customers, encourages the alignment of IT processes to business objectives, and supports effective incident management, ITIL does not provide a clear way to engage people outside IT who are involved (Yao & Wang, 2010). When not all system users are engaged with an adopted system the quality of service is affected and incident handling becomes slow (Raflesia et al., 2017)

o Beyond concerns related to the opposition of the workforce, organizations must also deal with technical issues they will inevitably encounter during the adoption of ITIL, such as integrating the new service delivery application, incorporating the new procedures into the existing procedures, developing accurate measurement tools, and training the workers in an effort to mitigate user error (Chen & Chou, 2010)

o A collection of best practises for the administration of IT services is what ITIL describes itself as. It should not be treated as a standard, as its maxim "adopt and adapt" suggests. Therefore, no organization can assert ITIL compliance, this is what led to BS15000 and later ISO20000 (Cots,Santi & Casadesus,Marti, 2014))

ISO 20000

The first international standard for service management, ISO/IEC 20000, will likely be remembered as one of the most important turning points in the growth of the sector. Being ISO/IEC 20000 took less than 14 months from the 'fast-track' submission of BS 15000 makes it all the more significant. This demonstrates how important it is to have a global standard for service management (Dugmore, 2006).

Dugmore (2006) further elaborated:
- ISO/IEC 20000 has been developed in order to meet the needs of the wider international audience and to provide a common understanding of the management of IT services worldwide. It covers the aspects of IT service management that are linked to 80 per cent of the total spend on IT by most organizations.
- ISO/IEC 20000 is also the basis for certification audits and assessments of how well ITIL (IT infrastructure library) advice has been adopted.
- Achieving the requirements is about efficiency and 'doing, not documenting' and not about building a bureaucratic overhead. Being independent of technology and of organizational size or sector, the requirements are applicable to a very wide range of services. Achieving ISO/IEC 20000 not only benefits service providers and their customers, but also a nation's gross domestic product.
- Based on BS 15000, ISO/IEC 20000 was accepted via a procedure used when an existing national standard may satisfy an international requirement without requiring significant revisions. A code of conduct that was established in 1989 and grew along with the service management sector is where BS 15000 got its start. The BSI and the ITIL owners' agreement that both sets of papers should be in sync served as motivation. Prior to going global, it was decided that testing the standard

under an early adopter programme would be best because it would gather feedback from a wide range of service providers. The advantage of alignment between BS 15000 and the ISO 9000 series was the most important.

- In 2003, with the release of the 2nd edition, itSMF, launched a certification programme that has since been upgraded to ISO/IEC 20000 certification.

- Information Technologies Infrastructure Library (ITIL) is the standard in the ITSM area that stands out for its significance, adoption, and development. Since ITIL refers to a collection of books that have evolved with each revision of the standard, it is known as the "Library." The standard was created at the end of the 1980s using ITIL, which is the property of the Office of Government Commerce (OGC) of the British government. A collection of best practises for the administration of IT services is what ITIL describes itself as. It should not be treated as a standard, as its maxim "adopt and adapt" suggests. Therefore, no organization can assert ITIL compliance.

- Although ITIL and ISO 20000 are fundamentally distinct from one another—the former is a collection of best practises while the latter is a management-system standard—due to their many similarities, as noted by Dugmore and Taylor (2008) many authors have studied them together or have viewed ISO 20000 as a way for businesses to "certify themselves in ITIL.

Future Opportunity and challenges

- As presented by Schneider, et al. (2019) "in the context of digital transformation, the use of IT services from the cloud in companies is increasing rapidly. This development leads to new challenges in IT Service Management (ITSM). The ITSM, which is geared towards the management of internal IT services, must be extended in order to integrate and manage external IT services from the cloud".

- Rahavendran (2022) elaborated the following challenges in his article:
    - Effective communication
    - Lack of knowledge on technology and infrastructure by process managers

o Proper understanding of ITSM processes

o Service level not matching with customer expectation.

o Managing frequent customer escalation

Many ITSM tools are helping to overcome communication and process barriers, still ITSM frameworks need to manage the challenges posed through appropriate process improvements.

5.5 Discussion on Research Question 3 and 4

RQ3: What are the opportunities for implementing machine learning (ML or AI/ML) in ITSM processes? **RQ4**: What are the different machine learning models available in the market w.r.t. ITSM.

- Prediction of future IT service incidents using various Machine Learning (ML) techniques such as such as Random Forest, SVM (support vector machine), Multilayer perceptron, and the latest machine learning techniques such as RNN (Recurrent Neural Network), LSTM (Long short-term memory), GRU (Gated Rucurrent Units) (Prihandono et al.,2020).

- Zuev, et al. (2018) mentioned in their study that the most significant performance indicator for ITSM is the time it takes to resolve an incident. A model of infrastructure incidents prediction is proposed by the authors in order to shorten resolution times. Machine learning techniques are used in this model. The use of machine learning models in ITSM is allowing considerable improvements to customer experience and the resolution of issues more effectively, resulting in less effort for front desk agents as well as reduced service costs.

- Ahmad, et al. (2022) studied that Recent advances have been made to automate the prediction of IT incidents and resolve them in a minimal time, utilizing AI models.

- Nikulin, et al. (2021) proposed a solution in their article that automation of incident management, which reduces response times and eliminates inaccuracy linked to the human factor, is an essential component of this solution. In addition, since the role of a team specialist is being carried out by machine learning algorithms, it will optimise work environments within departments that manage continuous operation of information technology services.

- Zaydi, et al. (2020) proposed a new model based on Machine Learning algorithms and CRISP-DM methodology to predict the relevant named changes causing incidents, in order to allow strategic decisions at the time and to expose the shortcomings on which change managers should focus to improve them and thus ensure the right level of cybersecurity.

- Crista, et al. (2022) published that "predictive analytics and applied machine learning techniques have taken a significant role in the state of the art in technology that make use of data mining techniques for knowledge extraction. It is observed that machine learning techniques perform and produce better results than what is achieved in hard computing techniques. Further, the IT service sector is a dominating component in the global market while machine learning techniques are most suitable to be applied in the areas of high uncertainty. Since client management and incident management aspects of IT service management are highly uncertain, integrating machine learning in IT service is a better choice as they can produce near accurate, robust results from uncertainty and partial truth."

- Karamitsos, et al. (2020) presented a ML automation pipeline based on CI and CD principles in their paper. The method was based on DevOps methodologies, which

were responsible to integrate and distribute ML models that have been trained and tested. Various modelling methods were presented, and the TSDP methodology was better suited for this study. They have learned that, in business organizations, manual methods of ML lead to a lot of operating costs and delays. The proposed automated ML method improves many areas such as time to market, integration across business units, and breakdown departmental silos; it also increases code and deployment quality, productivity, and visibility. However, it is not straightforward; many companies struggle and stuck at the start of the journey while others abort the implementation halfway through the process due to challenges like resistance to change, isolated teams (silos), lack of skillsets, etc. It is critical to understand that DevOps does not stand alone, but it relies on the adoption and integration of multiple frameworks and methodologies like ITSM, Agile, and Lean.

5.6 Discussion on Research Question 5

RQ5 : What measures are currently in place for maintaining data quality, and how can AI be used to improve these measures?

- For ITSM to be successful in an organization, it is important the data captured/available are to be accurate so that such data be analysed for future usage. As discussed in 5.5, AI/ML can be used in various ITSM processes/functions. For AI/ML to be successful, data accuracy is very important to build the models.

- Reinhard, et al. (2023), mentioned in their paper - AI-based recommendation systems to augment working conditions in the field of IT service management (ITSM) have attracted new attention. However, many IT support organizations possess high volumes of tickets but are confronted with low quality, to which they train the underlying models of their AI systems. Due to pressure on time and lack of motivation, the documentation of support tickets is insufficient. In order to

address data quality, they developed and evaluated an Analytics Pipeline as a result of design science research. The pipeline is capable of assessing and extracting high quality support tickets for subsequent model training and operations. Based on a data set of 60.000 real-life support tickets from a manufacturing company, they develop the artifact, instantiate a recommender system and achieve a higher prediction performance in comparison to naïve enrichment methods. In terms of data management literature, they contribute to the understanding of assessing textual ticket data quality. By deriving a pipeline reference model, they move towards a general approach to designing machine learning-driven data quality analytics pipelines for attached recommender systems.

- Use of artificial intelligence should be made available in order to prevent, detect and deal with security issues that affect the company. Industry 4.0 is aiming at significantly improving information security by bringing together the Internet of things (IoT), ML, AI and big data analysis with a view to comprehensive control over security breaches. AI will help organizations to detect and predict potential vulnerabilities and to simplify the process of dealing with them when it is integrated with information security management (ISM). As a result, the chance of staff not being qualified is reduced. AI should be the first priority of improvement in security procedures at any time when a new service is introduced. In terms of the management of IT infrastructure, ITIL sets out best practices that can help businesses generate value. The fact that it can be adapted to embrace emerging technologies such as AI/ML, DevOps, agile methodology etc. challenges the widely held notion of ITIL as a bureaucracy and an inflexible framework. ISM is a core element of each company in the current environment and managing the risk is utmost important for the organizations. The means of mitigating the impact of these threats will be addressed through introduction of AI in IT service management and, to a reduce threat to security.

CHAPTER 6: CONTRIBUTION, IMPLICATIONS AND RECOMMENDATION

6.1 Summary and contribution of the study

The main idea or motive of this research study was to that of better understanding of IT services and management for any organization. From the study, the resources, management, implementations, and challenges by the ITSM tools and the organization have been understood. In the digital world, data is being produced immensely and to make them usable the practices of the IT services and the management for the improvement in the services can be obtained so far (Rajasekharaiah et al., 2020). However, there are also challenges and backlashes associated with data management and the process of ITSM within the organization. This research study also studied the concepts of the ML and the AI frameworks and it's implementation for better ITSM benefits. One of the top resources or tools of the ITSM are technical support or desktop service management (Ergunova et al., 2019). The role of the service of technical support is that of providing technical support to the client's side from the maintenance of the Website processes to the server management for that matter. It is also observed that the training of the IT teams for technical support is also one of the further developed strategies for the contributions to the management of the overall ITSM. Thus, here the study discussed some examples and the processes to have better management in the IT service and delivery. The most important four aspects of the ITSM are the products, people, collaborate and process (Li et al., 2020). Thus, with the combinations of all these frameworks of the ITSM such as incident management, problem and change management could be done. Therefore, the forming of the IT team with the experts of the ITSM, the process manager must know the technologies and the frameworks.

On the other hand, the stakeholders must have to align with the projects of the ITSM and the resource management have to be sufficient enough to give the right directions of the IT services and management to the clients so far (Qu et al., 2019). Therefore, the study contributes more to the framework development of IT management and resource, people management or the conductions so far. It is required to have a better role in IT management and the service provided by the over management of the organizations so far. Furthermore, the concepts of various ITSM frameworks such as COBIT, ITIL and ISO 20000 have been studied and presented here, in which the IT service provider and academic researcher can get better understanding of the frameworks. As opined by Rahimian et al. (2020), the COBIT framework is known as the control objectives for the information and the related technologies. It can be divided into the five principles such as meeting the stakeholders' needs, covering the enterprise from end to end, enabling the holistic approaches, applying for the single integrated framework and separating the governance from the management. Moreover, the frameworks of the ITIL and DevOps for the development of the ITSM into the management of the IT services have been discussed for benefit of readers.

Furthermore, the significant contribution of this research study is its study on Machine Learning and Artificial Intelligence (AI/ML) and how ITSM is getting benefitted. It is very common that in the age of digital and data-driven approaches it is quite necessary to have better evidence-based IT service and security frameworks for any particular client or groups of clients (Belanche et al., 2020). Along with the frameworks in IT development such as the COBIT, ITIL and DevOps the development of the big data frameworks and machine learning helping them in making great associations of the overall growth of the management in providing better IT services and the management to the client and the customers. It is common in ITSM management that sudden client escalation and incident

management can be managed successfully from the process of machine learning and the suitable models of the AI for that matter. The applications of AI are dependent upon data-driven facts and by analysing those data further patterns of any incident within the systems could be understood (Tuzovic, S. and Kabadayi, 2020). In the analysing of those data, the possibilities of further escalations and the development of suitable strategies for the prevention of the incident can be managed so far. The infrastructure or the database management of the organization can help to determine whether there could be any escalation of IT services or the management or not. It is recommended that with the further utilisations of the data management and the process development an overall development of the organization can be done. Moreover, in the ITSM frameworks such as the COBIT and the machine learning algorithms the stakeholders can make the suitable organising factors for the overall development and during the monitoring and evaluation of the IT service systems the correct decision-making approaches through the ML models could be done (Khanal et al., 2020). Therefore, the contribution of the study is that it can make the overall improvement through the fundamental development of ITSM with the help of the IT frameworks and the machine learning developmental frameworks. Some of the challenging parts for the usages in machine learning is that the privacy of any client organization would be at stake through the machine learning algorithms and the manipulation of the training data of the database management systems of the customers could be fatal (Ravipati and Abualkibash, 2019).

In the past 25 years, many new technologies have been incorporated and many technologies have been obsolete, but the basic IT service and the management would take for the longer period (Mannanuddin et al., 2020). Therefore, the people must have to be more aware and through this research study, the awareness could be done about the Information

technologies and their service and management. Hence, with all these factors, a developed position for an ITSM-providing company could be reached in this contemporary world.

In addition to presenting various ITSM frameworks, their benefits and challenges, this study also presented developments of ITSM over last 25 years. Contribution of this research study includes the thoughts and research about information technology service management: development over the last 25 years. The ITSM and its development in the last 25 years have shown the operations of ITSM lie in 4-dimensional areas such as value stream and process, information and technology, organizations and people and suppliers and partners.

As per the research of Navío-Marco et al. (2018), top ITSM features contribute to the configuration of the management database to manage the real-time changes by up-to-date accurate information and track the IT asset by raising the dependencies on the multi-cloud environments. Metrics, BI, analytics and reporting are the contributions of the ITSM technological advancement and implementation of the key templates for improvement. The best solutions of the ITSM empower the users by providing overwhelming metrics, requiring actionable insights and finding the reporting solutions by guiding the improvement of the ongoing services. ITSM practices and innovative technological features boost end-user productivity and the application of machine learning algorithms that assist the performances for providing quality services in front of the consumers. As per the research of Navío-Marco et al. (2018) to extend the control of usages, and visibility, centralised the dashboard's effectiveness for providing critically optimised resources and features by adopting cloud services and applications will ensure the success of the firm. Cloud environment configures the cycle across the complex networks that the firms can be

adopted for their further development in the future ability. DevOps integration and automated workflows are the strategic priority for the ITSM technological attributes and terms of self-service ITSM capability in the organization. Ops, Dev, and QA are the important tracking solutions approaches that the IT services have adopted for collaborating with the cross-functional of DevOps in the firm. The software of ITSM reports advanced capabilities by raising the DevOps environment features in the business and identifying the SDLC process framework, which can reduce the waste process by achieving the optimised services in the firm. Carayannis et al. (2021) perceived that the contribution of the information technology service management: development over the last 25 years has mentioned the value of the market that the IT firms are get was USD 5.25 million in 2021. Moreover, it will be reaching 6.43 million by 2027 that the experts are expected from the growth and forecasting of the technological advancement growth. ITSM mainly focuses on the specific approaches, which help them to offer the advantages based on achieving the long-term and short-term strategic objectives and raising the quality of the service-level agreement (SLA) which is associated with the market growth.

6.2 Limitation of the Study

There are often limitations seen for every research conducted. In this case although the limitations have been minimised to a large extent, there are certain limitations which could not be further reduced. Firstly, the study conducted within a limited time frame and hence the time duration for incorporating of previous literature is 25 years only and not been extended further. However, keep in mind the significant rise in the use and application of technology, it is quite optimum to limit the time frame for the past 25 years as major implementations have only occurred in the last 15 years. The sample size or in this case

the number of articles to be reviewed is limited in nature due to the time constraints being mentioned which otherwise could have been extended. Secondly, the study is thoroughly based on past literature and does not include any empirical evidence on its own. The method of study although is perfectly in line with the objectives and research questions, it is however, important to mention that with the help of empirical data there could have been several further highlights be added into the study.

6.3 Recommendations for Future Research

This study has presented most of the studies which are available in various literature. There are not many comprehensive analysis of ITSM developments. Most studies are sector specific either covering any particular industry, geography or any particular tool. Suggest future researchers to carry forward this research and add additional developments and improvements and help the industry.

Further research also required to highlight latest development in technology space such as advancement of AI and future trend, and on IT services on cloud.

6.4 Conclusion

With vast nature of the subject, the study of hundreds of the literatures were studied and tried to present with respect to the identified problems and research questions. As it is such a vast and fast changing area, there are further studies required to be done regularly so that industry practitioner, researcher can be benefited. This study will give a baseline for next level of studies including high velocity IT (ITIL4). Analysis of machine learning implementation in incident and change management processes were discussed. All the presentations and statements have been based on literature study and the authors have been

cited in reference section. This study has presented as per the fact available and have not attempted to present any gaps of any study, framework, or tools.

As part of this research journey, hundreds of literatures have been studied to understand developments in IT as well as ITSM. Research has also been done to understand various research methodology to decide the suitable one for this study.

After studying the research papers with respect to the research questions, the result was synthesised, discussed and presented as per research questions.

Finally, constraints and limitations of this study have been presented along with recommendation for future research.

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