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ARTIFICIAL INTELLIGENCE IMPLEMENTATION IN BUSINESS

Developing best practices

Bachelor's Thesis
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Abstract

The majority of previous literature on the application of AI systems in business focuses on its impact on particular industries or companies. Thus, AI's effects on businesses, such as increased efficiency, revenue, and offerings, have become widespread. In an effort to obtain these advantages, implementing AI systems within organizations is one of the leading business development trends. This has caused AI to transition from a competitive advantage to a mandatory business application. However, the implementation of AI remains a difficult challenge for businesses, and only a small percentage of businesses have been able to achieve significant results with AI.

To develop best practices for implementing AI, it is necessary to examine the success factors. Due to its significance, scholars have demanded additional research on the crucial success factors impacting AI implementation. In response to this demand, this thesis takes a comprehensive look at recurring success factors in digital transformation and AI research, resulting in a list of 18 actionable Critical Success Factors. These are then analyzed and categorized into five distinct groups: Data, Processes, People, Organization, and Ecosystem. In addition, the insights are assisting managers in aligning AI with business strategies.

Keywords Artificial intelligence, Digital Transformation, Critical Success Factor, Digital Strategy Management, Best practises

Table of Contents

List of Figures

List of Tables

1 Introduction

Artificial intelligence (AI) is rapidly affecting multiple industries, from healthcare, finance, retail, and energy to manufacturing (Gerard Verweij & Anand S. Rao, 2017). As it is being more widely implemented into businesses, it is estimated to add $13 trillion to the global economy during this decade (Fountaine et al., 2019).

With an increasing number of organizations seeing the potential that AI is believed to have, its implementation in organizations has evolved from a competitive advantage to a business need (Makridakis, 2017). This is also a consequence of the world and enterprises becoming increasingly digital (Kane et al., 2017; Ransbotham et al., 2017).

This has caused a frenzy of businesses rushing to implement AI with big hopes for its unprevailed opportunities, but unfortunately, many fall short. A global survey done between 2016 and 2018 by (Brock & von Wangenheim, 2019) with more than 3000 executives totaling 7000 advanced digital technology implementation (including AI) projects under their belt revealed that only 20% had made an impact in their business.

However, the adoption of digital technologies like AI is reportedly infamously difficult and dynamic as it includes numerous, ongoing alterations to an organization (Thomas H. Davenport, 2018). This notorious characteristic of AI has caused firms to struggle to scale AI systems from the pilot to companywide programs and business challenges (Fountaine et al., 2019).

Ultimately, organizations need to develop a special set of resources and capabilities to effectively leverage their investments to generate business value (Mikalef & Gupta, 2021). Generally, it seems to involve more than just a technology change, it requires a holistic organizational transformation that impacts an organization's strategy, operations, structure, culture, and even its core value proposition (Brock & von Wangenheim, 2019; Vial, 2019; Volberda et al., 2021).

This highlights the need to gain a better overview of all the factors organizations can take into action to achieve this transformation and implement AI systems successfully.

1.1 Research Objectives and Research Questions

This paper provides a means to create a clear overview of how the implementation of artificial intelligence is holistically considered across businesses. There have been lots of previous studies on similar topics focusing on AI's impacts on businesses and society, and especially on specific industries such as service (Huang & Rust, 2018; Makridakis, 2017). But the literature on AI has not yet extensively studied critical success factors (CSF) extensively on AI system implementation (Merhi, 2023). AI is also developing rapidly, and implementation characteristics and requirements change along with it.

Thus, answering to (Merhi, 2023) call for further research into critical success factors This thesis looks to provide a fresh, up-to-date view on CSFs impacting AI implementation on businesses holistically. Thus, not focusing on a specific industry or use case but trying to provide general insight into how implementing AI systems should be approached. This should help existing business operations gain a needed grasp on how to align AI and business strategies (Borges et al., 2021).

To further provide value to research and practice, this thesis takes digital transformation into account. DT has been extensively studied in previous literature (Hanelt et al., 2021; Vial, 2019; Warner & Wäger, 2019), and it is believed to augment efforts put towards implementing AI systems (Brock & von Wangenheim, 2019). Insights from this research aspect should also be valuable for research and practice.

From the provided perspective, this thesis seeks to research: (1) What are the critical success factors impacting successful AI system implementation in businesses currently? And as both realms of AI and DT are included, (2) are DT practices connected to successful AI implementation? By answering these questions, this thesis attempts to determine: (3) What are the best practices for AI implementation?

1.2 Methodology

This thesis is a literature review. Most articles are sourced from Scopus, and the remaining articles are from Google Scholar and direct internet search. Searches were done combining key words like: “AI”, “Organization”, “Business”, “Implementation”, “Maturity”, “Success”, and “Transformation”. This provided wide range of results which was refined using BOOLEAN operators such as “OR” “AND”.

The articles were chosen by weighting the Field-Weighted Citation Impact, if provided, author, and citation count. The final assessment of relevancy for this thesis topic was made by reviewing the abstract, conclusion, and introduction of the article.

1.3 Scope

This thesis focuses on articles published during the last decade due to AI's business implications in business being a relatively new research topic. Having up-to-date information, as AI is developing rapidly, is important to reflect on the changes in CSFs.

The examination of AI implementation across various technologies such as IoT, 5G, and cloud computing, as well as the exploration of diverse AI models including machine learning, learning language models, and neural networks, falls beyond the scope of this thesis. Also factors outside of the internal organization boundary, like society, governments, and legislation are not discussed. This provides a clear scope for the holistic and practical implementation of AI systems on businesses.

1.4 Structure of the Research

The rest of the thesis is structured as follows: Chapter 2 reviews previous literature on artificial intelligence and digital transformation. Chapter 3 presents the CSF lens and the analysis process. Chapter 4 discusses the research questions in light of the unveiled CSFs. Lastly, in Chapter 5, conclusions, implications for practice and research, limitations, and future research directions will be discussed.

1.5 Key Terminology

Artificial intelligence (AI)

"Artificial Intelligence is the ability of a system to identify, interpret, make inferences, and learn from data to achieve predetermined organizational and societal goals" (Mikalef & Gupta, 2021).

Critical success factor (CSF)

"Critical Success Factor are for any business the limited number of areas in which results, if they are satisfactory will ensure successful competitive performance for the organization. " (Leidecker & Bylwo, 1984)

Digital strategy

"Digital strategy can be defined as outlines and documents how a firm wants to achieve its strategic objectives with the help of digital technologies—including but not exclusive to AI—channels its activities and provides for a guiding purpose." (Brock & von Wangenheim, 2019)

Digital transformation (DT)

"Digital transformation can be described as a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019).

Digital processes

Digital *processes* are organizational tasks and activities which are augmented with the use of technology to communicate between each other and generate data for further implications.

2 Technological Background

In the stage of rapidly changing and evolving technological advancements, two paradigms stand out as influential factors that are causing disturbance and guidance for organizations: Artificial intelligence (AI) and Digital transformation (DT). The following chapter defines these terms and gives a foundation for the analysis.

2.1 Artificial Intelligence

The Oxford Dictionary defines the term "artificial intelligence" as the "theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages." Furthermore, Mikalef & Gupta, (2021) define it from a business standpoint as "the ability of a system to identify, interpret, make inferences, and learn from data to achieve predetermined organizational and societal goals".

The general definition of artificial intelligence varies in literature, but the idea of "the increasing capability of machines to perform specific roles and tasks currently performed by humans within the workplace and society in general" is often present in some form. (Dwivedi et al., 2021).

The interest among researchers in the strategic use of AI has recently experienced exponential growth, which is evident from the increase in research articles written about the topic (Borges et al., 2021). The major force driving AI initiatives in firm is its impact on business that has been well researched by previous literature (Brock & von Wangenheim, 2019; Huang & Rust, 2018; Wamba-Taguimdje et al., 2020).

The surge is the consequence of three breakthroughs: the introduction of a much more capable class of algorithms, low-cost and high-performance processors capable of performing large amounts of calculations in a few milliseconds, and the availability of very large, correctly annotated databases allowing for more sophisticated learning of intelligent systems (Wamba-Taguimdje et al., 2020).

This has enabled AI systems to be used in business to automate processes, augment human tasks, enhance data capabilities, and enable better decision-making. These impacts include improvements in operational efficiency, an increase in revenue, a strengthening of offerings' competitiveness, and customer experience enhancements (Brock & von Wangenheim, 2019; Huang & Rust, 2018).

2.2 Digital Transformation

The role of the organization has evolved as the global economy goes through its transformation to a more digital form from its analog history (Menz et al., 2021). Moving to the digital age has fundamentally challenged our understanding of the nature and function of firms (Menz et al., 2021). This is caused by the disruptive nature of digital technologies and changes in competitive environments (Vial, 2019).

While information technologies (IT) have been a recent force moving firms into the digital age, these traditional frameworks have evolved. (Vial, 2019) views DT as an evolution of IT-enabled transformation as it better reflects the complexity of the environment within which firms operate and the disruptive effect on individuals, organizations, and society.

Success in digital transformation is attributed to "firms' ability to shift to new mental models of competition, to develop the supporting digital routines, and to implement new organizational structures in such a way that these elements support one another" (Volberda et al., 2021).

2.2.1 Digital transformation and AI

The adoption of digital technologies like AI is reportedly infamously difficult and dynamic as it includes numerous, ongoing alterations to an organization (Thomas H. Davenport, 2018). DT practices are aligning to this as "it is not just about adopting digital technology, but also about framing the way it is to be conceived, adopted, and exploited, and building the supporting routines and organizational forms" (Volberda et al (Volberda et al., 2021).

Previous examples have also shown that using DT as guidance has been successful (Brock & von Wangenheim, 2019). Holmström (2022) adds to this by stating, "AI and DT go hand in hand, but a systematic effort is needed to maximize the potential of this relationship." Thus, using DT as a lens provides valuable insights that can be used in developing best practices for AI implementation. In this research, literature on DT and AI is combined to provide knowledge and tools for executives to enable the successful and beneficial implementation of AI.

3 CSF Analysis

CSF analysis is used in "determining information systems priorities, and utilized by management teams more generally to aid in determining an organization's managerial priorities and the action programs that flow forth from this set of priorities" (Forster & Rockart, 1989).

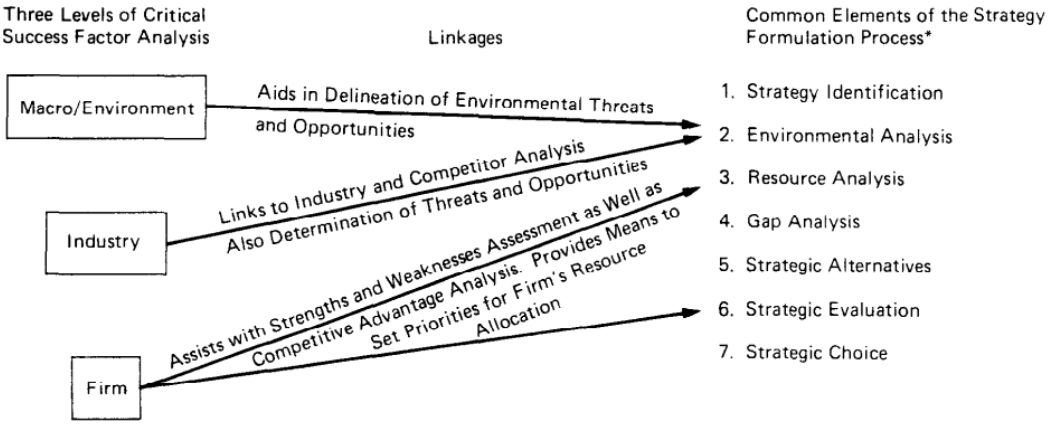

Figure 1, Three levels of Critical Success Factor analysis (Leidecker & Bylwo, 1984)

Usually there are three different levels of CSF analysis: Macro, Industry, and Firm (Leidecker & Bylwo, 1984). As this thesis tries to provide a holistic overview of CSFs impacting AI system implementation on businesses, it goes beyond these levels and focuses on reoccurring factors in studies focusing on AI implementation.

3.1 Sources

Articles were chosen for this CSF analysis with the aim of giving a wide variety of perspectives from previous AI implementation CSF studies, practitioner reports, and journal articles. To research the implications of DT for AI implementation, three studies were chosen from that realm for the analysis.

AI studies used in CSF analysis:
(Merhi, 2023), (Holmström, 2022), (Dwivedi et al., 2021), (Chen et al., 2021), (Mikalef & Gupta, 2021), (Hamm & Klesel, 2021), (Mark Foster, 2020), (Cubric, 2020), (Brock & von Wangenheim, 2019), (Fountaine et al., 2019), (Ransbotham et al., 2018), (Webb, 2018)
DT studies used in CSF analysis:
(Sony & Naik, 2020), (Warner & Wäger, 2019), (Kane et al., 2017)

Table 1, Studies used in CSF analysis

Some of the studies were previous CSF analyses focusing on AI implementation and adoption (Cubric, 2020; Hamm & Klesel, 2021; Merhi, 2023). The studies used in the following CSF analysis differ from those used in the previous CSF studies.

Using these studies in this article should be valuable as they extend the understanding of CSFs in AI implementation through their own unique sources of study. Studies used in these analyses were also published before 2021. 40% of the studies used in this thesis are from 2021–2023, providing an up-to-date view of the CSFs.

3.2 Process

The CSF analysis process started by gathering literature from multiple sources, as mentioned in the method. Studies used in this analysis had to implicate characteristics such as challenges, barriers, CSFs, opportunities, capabilities, and considerations for AI implementation or DT. This assessment totaled 15 fitting studies. A list of possible success factors was then formed by reading the full articles of the chosen studies. These factors were formed from the previously mentioned characteristics. This was done by understanding the context around the indicated factor and other studies.

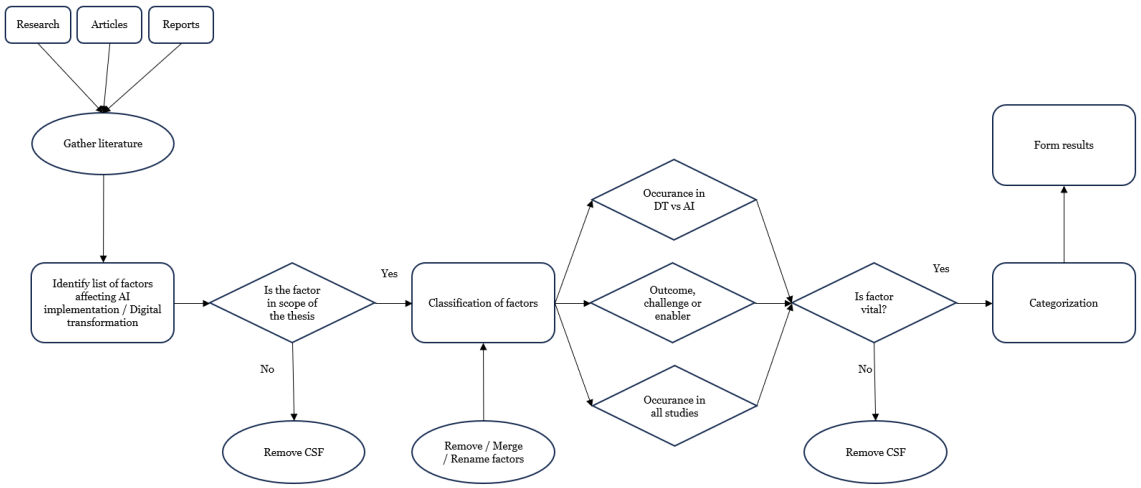

Figure 2, CSF analysis process flow chart.

Sometimes separate factors were merged into one, such as “data quality and quantity,” or went under a broader factor, such as “sufficient investment,” under “top management support,” if that was seen as fit for eliminating excess factors. Renaming factors such as “resistance” into “receptivity” also occurred. This enabled the formation of fitting factors for the assessment of vitality.

Factor vitality was considered by looking at how many times the factor occurred in AI vs. DT literature, whether it was a challenge, outcome, or enabler, and how many times it occurred between all the chosen studies.

In the end, this analysis formed 18 CSF: staff expertise, digital strategy, technological capabilities, top management support, IT infrastructure, organizational culture, receptivity, AI competence, data quality and quantity, digital processes, multi-disciplinary collaboration, organization structure, ecosystem partner, agility, governance, security, goal alignment, and AI-augmented work.

Critical success factors	Studies															Σ
	AI implementation												Digital transformation			
	(Merhi, 2023)	(Holmström, 2022)	(Dwivedi et al., 2021)	(Chen et al., 2021)	(Mikalef & Gupta, 2021)	(Hamm & Klesel, 2021)	(Mark Foster, 2020)	(Cubric, 2020)	(Brock & von Wangenheim, 2019)	(Fountaine et al., 2019)	(Ransbotham et al., 2018)	(Webb, 2018)	(Sony & Naik, 2020)	(Warner & Wäger, 2019)	(Kane et al., 2017)	
Staff expertise	x	x	x	x	x	x	x		x	x	x	x	x	x	x	14
Digital strategy	x	x	x	x		x	x		x	x	x	x	x	x	x	13
Technological capabilities		x	x	x	x		x		x	x	x	x	x	x	x	12
Top management support	x			x	x	x	x		x	x	x	x	x	x	x	12
IT Infrastructure	x			x	x	x	x	x	x	x		x	x	x		11
Organization culture	x	x			x	x	x		x	x	x		x	x	x	11
Receptivity	x		x		x	x		x	x	x	x	x		x	x	11
AI competence				x		x	x	x		x	x	x	x	x	x	10
Data quality & quantity	x		x		x	x	x	x	x		x	x				9
Digital processes		x					x		x		x	x	x	x	x	8
Multi-discplinary collaboration		x	x		x	x				x			x	x	x	8
Organization Structure	x	x				x	x			x			x	x	x	8
Ecosystem partners	x			x		x	x		x			x		x	x	8
Agility					x	x	x		x	x				x	x	7
AI & Data governance	x		x			x	x	x		x	x					7
Security	x		x			x	x		x		x		x			7
Goal alignment					x	x	x				x				x	5
AI augmented work			x				x			x	x		x			5

Table 2, CSFs from analysis in occurrence order from top to down

3.3 CSFs for AI Implementation in Business

In this section, the 18 CSFs for AI implementation are presented by order of occurrence and expanded upon.

3.3.1 Staff expertise

Sufficient staff expertise is the most prevalent factor in the CSF analysis. The successful implementation of artificial intelligence necessitates the acquisition of diverse human, technical, and business skills (Mikalef & Gupta, 2021). Current staff expertise also needs to be trained to the required level, as Kane et al. (2017) highlight employees and executives being more inclined to jump ship if they feel they don't have opportunities to develop digital skills.

3.3.2 Digital strategy

As mentioned in 13 studies, aligning organizational efforts and capabilities is the starting point for successful AI implementation. Holmström's (2022) "AI readiness" framework emphasizes the holistic view of strategic considerations for AI, as it is not just about technology but also lining activities, boundaries, and organizational objectives.

Further affirming the importance of a coherent digital strategy Kane et al (2017) note that digitally mature companies are four times more likely to possess a coherent digital strategy. Ransbotham et al (2018) add that 85% of organizations knowledgeable and proficient in AI implementation consider the development of an AI strategy urgent, with 90% already having a strategy in place.

3.3.3 Technological capabilities

Technological capabilities build a necessary and flexible foundation for the effective implementation of AI applications. Chen et al., (2021) articulate that "robust technical capabilities can simplify the complexities of AI integration as they enable the IT department to deploy AI technologies with both speed and efficiency. "

This is corroborated by Ransbotham et al. (2018), who note that a significant barrier to AI adoption is a lack of general technological capabilities, particularly in analytics, data, and IT. Among organizations with little to no understanding or adoption of AI, as many as 60% of respondents cited this shortcoming.

3.3.4 Top management support

AI implementation requires investment, commitment, and dedicated management on all levels and from top to bottom(Brock & von Wangenheim, 2019; Mikalef & Gupta, 2021; Sony & Naik, 2020). Top executives and managers need to drive the change needed to implement AI. This is done through tasks such as active encouragement, role modeling, being accountable, facilitating adoption, and providing incentives for change (Fountaine et al., 2019).

3.3.5 IT infrastructure

AI systems rely heavily on IT infrastructure for their development and operation, making it crucial for the successful implementation of AI. IT infrastructure facilitates the integration of AI and ensures seamless information flow, which is necessary to enable system cross-communication and AI algorithms.

With the increasing digitalization of organizations, there is also a corresponding increase in the volume and quality of data that needs to be effectively managed. However, the efficacy of these datasets is constrained when they are isolated and lack integrated connections with other relevant data. (Brock & von Wangenheim, 2019)

3.3.6 Organization culture

As other CSFs tell us, AI implementation is not solely a technological endeavor. (Fountaine et al., 2019) emphasized this by stating that while cutting-edge technology and talent are crucial, it is equally important to align the company's culture to support board AI adoption. Organizational culture can also support other factors. A culture that encourages cross-functional collaboration between other business units will facilitate a more effective AI implementation.

3.3.7 Receptivity

Organizations should prioritize strategies aimed at influencing organizational culture and structure to enhance its receptiveness towards AI solutions. Mikalef & Gupta, (2021) emphasizes this by stating that even with all the necessary capabilities and resources, an organization that fails to overcome factors of resistance is unlikely to extract value from investments in artificial intelligence.

3.3.8 AI competence

AI competence is built outside of staff expertise, and it mostly affects management. It is not enough to have the required skills and tangible resources for implementation; one must also have knowledge of how AI is evolving and how it can benefit businesses. Mapping possible AI opportunities requires knowledge of AI. Knowing where and how AI can be implemented is a key success factor.

3.3.9 Data quality & quantity

A data-centric approach is crucial for AI implementation. The availability of large and reliable datasets is a core requirement for AI, given the intrinsic data dependence of AI algorithms. Sufficient training data is a prerequisite for the effective learning process of AI systems, and a scarcity of training data could compromise the performance and

reliability of AI algorithms (Hamm & Klesel, 2021) (Merhi, 2023). Focusing on data quality and quantity helps realize AI expectations and build usable and trustable solutions.

3.3.10 Digital processes

As AI cannot augment analog processes, a degree of digitalization in a firm's core processes serves as a distinguishing factor for successful AI implementation as it enables real-time data gathering from various processes and products (Brock & von Wangenheim, 2019; Sony & Naik, 2020).

AI systems, in the absence of a digital infrastructure, also face a lack of crucial training data required for algorithm training. Consequently, they become unable to effectively implement insights into organizational changes at a larger scale (Webb, 2018).

The role of digital processes is not only foundational but also critical in enabling organizations to leverage AI effectively, reinforcing the need for an integrated approach to digital transformation and AI implementation.

3.3.11 Multi-disciplinary collaboration

As implied before, AI is inherently a cross-functional technology that impacts various aspects of an organization. Thus, multi-disciplinary collaboration is essential to gain a comprehensive perspective, which is essential for successful AI implementation. Bringing together expertise from different business units, processes, and skillsets also helps to align AI with opportunities and challenges on different levels of the organization.

Results by Kane et al., (2017) further highlight this as more than 70% of digitally maturing businesses are using cross-functional teams to organize work and charging them with implementing digital business priorities.

3.3.12 Organization structure

Both AI and DT studies highlight the importance of fitting organizational structure, as seen in the CSF analysis. Organizational structure needs to work as a supportive foundation for other CSFs such as agility, multi-disciplinary collaboration, and digital strategy. Overall, a horizontal and open model is suggested (Mark Foster, 2020).

3.3.13 Ecosystem partners

Brock & von Wangenheim (2019) stress the importance of collaboration within the ecosystem should be emphasized, along with the fact that a successful implementation of artificial intelligence requires not only partners in the technology sector but also an

entire business ecosystem. This includes suppliers, competitors, customers, and alliance partners from different industries.

3.3.14 Agility

Agility is a driving force that affects all levels of organizational structure and operation. The diverse perspectives on agility form agility as a complex but essential factor in AI implementation. Agility helps transition from old processes to new ones and emphasizes the organization's cultural and structural traits to enable the implementation.(Warner & Wäger, 2019) (Mikalef & Gupta, 2021).

Kane et al., (2017) further reinforce the importance of agility in modern organizations through their research, which states that "Approximately 85% of organizations transformed by digital technologies and capabilities that improve processes, engage talent across the organization, and drive new value-generating business models place a premium on initiatives that drive organizational agility."

3.3.15 Governance

AI implementation faces ethical, political, legal, and policy challenges and as well data flow, privacy, and access challenges (Cubric, 2020; Dwivedi et al., 2021). Because of this, strong governance frameworks are needed to make sure that AI technologies and data protocols are in line with rules and ethical concerns. This reduces the range of risks that come with AI.

It can be argued that strong, enterprise-wide governance not only mitigates biases but also engenders trust in the insights generated by AI algorithms (Mark Foster, 2020). Thus, AI and data governance are strategic enablers that significantly influence the success of AI implementation and scaling across the organization.

3.3.16 Security

Organizations are digitally transforming, and core business and AI processes rely on a working IT infrastructure. This increases the risk of cyberattacks affecting the information assets that AI relies on. Dwive al. (2021) also argue that "with time, process maturity and people maturity in organizations become questionable." and that: "As a result, issues surrounding how these information assets are developed, maintained, and exploited becomes debatable." Failure to address these security concerns compromises not only the data but also the integrity of the AI systems, leading to potential adverse impacts such as system failure, data breaches, and loss of consumer trust. Therefore, robust cybersecurity protocols are essential for AI implementations.

3.3.17 Goal alignment

As highlighted in the CSF analysis, when executing AI implementation, it is important to first find a business problem it can align with and analyze how current organizations' capabilities can carry out the task. As previously highlighted, one of the challenges faced by AI is its integration with existing infrastructure, which in turn necessitates organization-wide adjustments. Initiating AI initiatives without a clearly defined objective steers the implementation toward failure.

3.3.18 AI augmented Work

It is believed that most workers will need to adapt to AI-enabled roles rather than face obsolescence and their existing skill sets will be augmented by AI (Fountaine et al., 2019; Ransbotham et al., 2018). Thus, it is important to know the effect AI implementation has on organizations and how to enable this partnership between AI and human intelligence (Dwivedi et al., 2021; Mark Foster, 2020).

The operational necessity of AI augmented work is also underscored by Sony & Naik, (2020) who posit that "organizations need to be capable of monitoring and managing various aspects of the business from the shop floor to the executive level with comprehensive data". Thus, AI augmented work is not only an add-on or outcome but a critical component. It needs thoughtful consideration in both the human and technological realms for successful AI implementation.

	Data	Processes	People	Organization	Ecosystem
	Data Quality & Quantity	Technological Capabilities	Staff Expertise	Digital Strategy	Ecosystem Partners
	AI & Data Governance	IT Infrastructure	Receptivity	Top Management Support	
	Security	Digital Processes	AI Competence	Organization Culture	
		Goal Alignment	Multi-disciplinary Collaboration	Organization structure	
			AI Augmented Work	Agility	
Σ	23	36	48	51	8

Table 3, Categorization of CSFs and occurrence of CSFs within categories

4 Discussion

The purpose of doing this CSF analysis was to gain a deeper understanding of the various aspects that play a role in the successful implementation of AI systems. To emphasize the successful implementation, the CSFs were evaluated by their property of being a challenge, outcome, or enabler, focusing on the enabling factors.

To enhance the comprehension of the discovered findings identified through literature review, the 18 CSF are placed into the following categories: Data, Processes, People, Organization, and Ecosystem (Table 3).

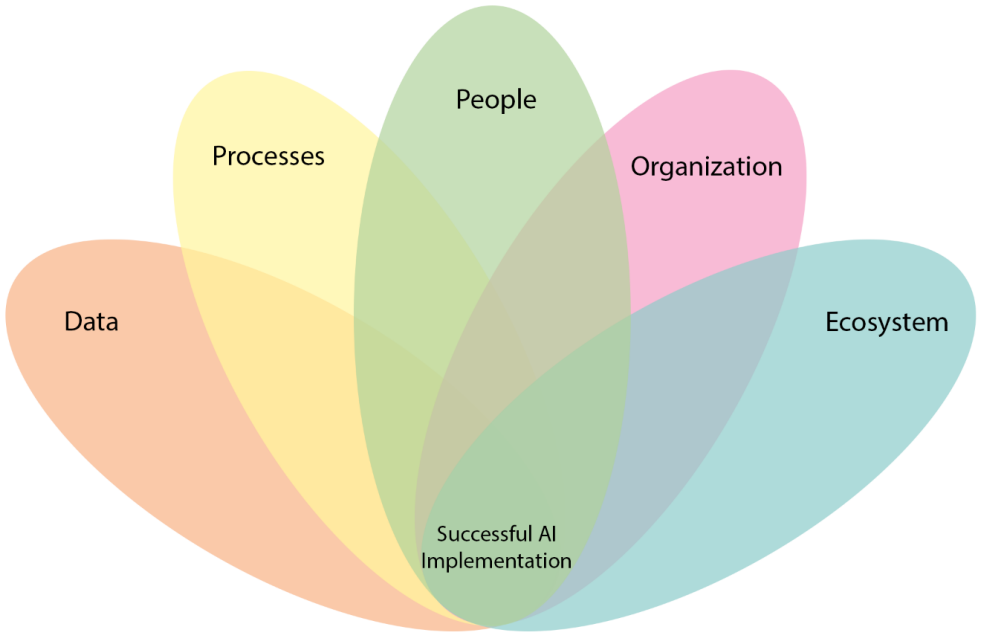

Figure 3, Venn diagram of CSF categories

The literature indicates these CSFs are intertwined, and implementing AI requires a holistic view (Brock & von Wangenheim, 2019; Vial, 2019; Volberda et al., 2021). Thus, focusing on only one category does not provide many benefits. On the other hand, investing efforts in one category will help take actions in other categories. This characteristic of the CSFs is visualized in Figure 3 by a Venn diagram.

Now that the primal research question, "What are the critical success factors impacting successful AI system implementation?" has been answered, a comprehensive framework to understand the insights from the CSF analysis has been set. Next, the remaining research questions will be answered: (2) Are DT practices connected to AI implementation? (3) What are the best practices for AI implementation?

4.1 DT practises & AI Implementation

In Table 2, we can see the cohesiveness of the DT and AI literature. It is prevalent that DT practices and AI implementations are connected to each other. This is especially highlighted in the CSFs: staff expertise, digital strategy, technological capabilities, top management support, organizational culture, technological competence, digital processes, and organizational structure.

Overall, 9 out of 18 CSFs are highly prevalent, included in all DT studies and multiple AI studies, in both DT and AI implementation. This supports insights gained from digital transformation leaders in Brock & von Wangenheim's, (2019) study further emphasizing that successful implementation of AI systems benefits positively from DT. The only CSFs that are not mentioned in the DT literature are data quality and quantity and AI and data governance. This indicates that they are consider as a standard in DT.

4.3 Developing Best Practices for AI Implementation

The CSF analysis did not encompass factors that lie beyond the bounds of the organization and focused on enabling factors. Thus, all the CSFs exhibit general opportunities to take into practice. As the CSFs were previously presented by their occurrence, this part focuses on further analyzing the categories of the CSFs.

The *Data* category offers a distinct emphasis on data as a resource that is used to enable AI implementation but also requires its own functions to sustain its value. CSFs under this category overall ranked in the bottom part of the list. But on the other hand, the importance of Data CSFs is highlighted in them being almost all AI implementation specific.

The Processes category indicates that successful implementation of AI is influenced by CSFs that facilitate seamless integration. The foundation for this comes from digitalizing the organization (Brock & von Wangenheim, 2019; Sony & Naik, 2020). The high occurrence of these CSFs in DT studies implicates that DT helps implement these factors into organizational practices.

The People category shows that successfully implementing AI requires strategizing how the systems will be received and how they can augment current tasks. The CSFs in this category were most scattered in terms of occurrence. Factors such as staff expertise and receptivity are thought to be crucial, while factors like AI-augmented work and multi-disciplinary collaboration are more supportive.

The Organization category calls for the top management to plan and support AI implementation across organizational culture and structure. Achieving this requires a robust digital strategy, which is is further emphasized by the overall picture of CSFs encompassing a wide range of elements.

The Ecosystem is the only category that has one CSF, ecosystem partners. Gaining access to external resources is cited as being beneficial for AI implementation (Brock & von Wangenheim, 2019; Kane et al., 2017). The practical translation of how this is achieved and how organizations should integrate with each other is yet to be fully researched.

Organization, People, and *Processes* were the categories with most CSFs and most occurrences in the literacy review. The five most commonly occurring CSFs also fell under these three categories, further highlighting their importance. These findings suggest that AI systems require the most change in these categories.

5 Conclusions

The demand for AI systems in business is increasing, but many initiatives fall short. As these systems have been proven to be complex to implement, sufficient guidance for executing the implementation is lacking. To save resources and realize the full benefits of AI systems, this research attempts to provide an up-to-date list of general CSFs enabling the successful implementation of AI systems. This holistic overview of the CSFs further helps put digital strategy into practice.

The CSF analysis conducted generated 18 CSFs impacting the successful implementation of AI systems from 15 sources of literature (Table 1; Table 2). The factors included in the list are general and not specific to certain firms or industries. To further assess the importance of proposed CSFs, an occurrence-weighted list was provided (Table 2). The categorization of the CSFs (Table 3) was made to provide a more comprehensive view.

The findings indicate that the factors are intertwined (Figure 3), suggesting a holistic approach to implementing AI successfully. This is further emphasized by the wide range of CSFs. DT and AI alignment in CSFs was also cohesive, suggesting thatorganizations going through DT are more capable of implementing AI systems successfully. The most important CSFs—staff expertise, digital strategy, technological capabilities, top management support, and IT infrastructure—summarize well how successful AI implementation is achieved. It requires a commitment to a robust strategy with skilled staff and supporting infrastructure.

5.1 Implications to research

Primarily, this research answers the call for further research in business wide CSFs for successful AI system implementation by Merhi (2023) and the need to align AI and business strategies called for by Borges et al. (2021). Second, this research demonstrates the alignment between digital transformation practices and AI implementation through cohesive CSFs. Lastly, this research provides frameworks for successful AI implementation that can be used in future research.

5.2 Implications to practice

As presented, the CSFs included in the list are general and not specific to certain firms or industries. Thus, the CSFs and frameworks provide practical insights for managers implementing AI within the domains of organizational change and digital strategy.

Highlighting DT and AI implementation alignment also proposes that managers investigate DT capabilities when introducing new disruptive technologies such as AI systems. Lastly, a holistic approach to AI implementation is suggested.

5.3 Limitations and future research

This research has its limitations, but on the other hand provides many directions for future research:

Using bibliometric analysis for CSFs: The number and selection of studies, human error, and process method can limit the quality of gathered AI implementation CSFs.

Further studying DT & AI: Even though the CTF analysis showed the cohesion between DT and AI implementation, especially the number of DT studies was low. Thus, this should be researched further with a bigger database of studies.

CSFs assessment: Further CSFs generated in the analyses were not assessed by external experts. Future research should assess presented CSFs with empirical data. Overall, more empirical data is needed on successful AI system implementation.

Role of ecosystems: Business and innovation ecosystems are cited as being beneficial for AI implementation (Brock & von Wangenheim, 2019; Kane et al., 2017). The practical translation of how this is achieved and how organizations should integrate with each other is yet to be researched extensively.

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