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Failure of AI projects: understanding the critical factors

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Abstract

Adoption of artificial intelligence (AI) has risen sharply in recent years but many firms are not successful in realising the expected benefits or even terminate projects before completion. While there are a number of previous studies that highlight challenges in AI projects, critical factors that lead to project failure are mostly unknown. The aim of this study is therefore to identify distinct factors that are critical for failure of AI projects. To address this, interviews with experts in the field of AI from different industries are conducted and the results are analyzed using qualitative analysis methods. The results show that both, organizational and technological issues can cause project failure. Our study contributes to knowledge by reviewing previously identified challenges in terms of their criticality for project failure based on new empirical data, as well as, by identifying previously unknown factors.

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1. Introduction

The past decade has seen rapid advances in the development of artificial intelligence (AI). The entry of AI into everyday life, combined with significantly better availability of these systems in a commercial context, is fueling high expectations from companies for the introduction of AI [1]. It is therefore not surprising that the adoption of AI systems has risen sharply in recent years. The downside is that many AI initiatives fail and therefore, according to surveys, 70% see no or minimal impact from the introduction of AI systems [2]. Hence, it is crucial to understand the factors that lead to success or failure of AI projects in order to fully exploit the potential of the technology.

A considerable amount of literature has been published on factors influencing the success and failure of Information Systems (IS) projects in general [3–8] or specific application types such as ERP systems [9–11] in the course of the last decades. However, due to the specific characteristics of AI, such as its algorithmic complexity and the broad and holistic changes that accompany the introduction of AI systems in organizations, these factors need to be revisited and extended to fit the context of AI.

A few recent studies have dealt with challenges, success factors and organizational readiness for AI [12–15]. For example, Bauer et al. [13] focused on the relevance of factors depending on the size of a company, while Baier et al. [12] narrowed their research down to the challenges related to the deployment of machine learning applications. While these previous studies provide interesting results about prerequisites and general aspects to consider in AI projects, their focus is not primarily on the question of success and failure of AI projects, i.e., some of the factors presented in these studies might represent challenges that have to be considered but are not critical to project success. Additionally, some of the studies are limited to a specific focus or context, such as SMEs. Therefore, factors that are critical to success and failure of AI projects in a general, holistic context of organizations are still largely unknown. In order to provide guidance for organizations which is applicable independent from firm characteristics, there is the need to analyze the topic from a more general perspective.

The aim of this study has therefore been to uncover factors that lead to success or failure of AI projects in a general context. Subsequently to a literature review, new primary data for this research were collected using qualitative, semi-structured interviews that were analyzed using an inductive coding approach [16–18].

This study makes an original contribution by providing new empirical data on critical factors leading to success and failure of AI projects. The identified factors provide important insights and guidance for organizations to proactively increase the rate of success of their projects in order to exploit the potential of the AI technology and avoid costly project failure.

The paper is organized as follows. The next section provides a brief overview of the theoretical background. In section 3, we describe related work and depict a research gap. This is followed by a description of the research design in section 4, followed by the results in section 5. Finally, we conclude with the main findings and limitations of the study as well as providing possibilities for future research.

2. Background

2.1. Artificial intelligence

Even though AI has become increasingly relevant, no unified definition of the term has emerged. This is mainly due to the fact, that the term intelligence in itself is hard to define [19]. Today, AI is seen as a disruptive technology [20] and includes different fields of sciences, such as statistics or neurosciences [21]. Generally speaking, researchers agree that AI belongs to the field of computer sciences and is about developing independent applications that can solve problems on their own [19]. AI technologies are additionally divided into the subcategories of strong and weak AI. Applications of weak AI, such as speech recognition or fraud detection, are already available today and are constantly being further developed. The main characteristic of such applications is that they are developed for a special task and are not able to execute other tasks [22]. Distinct from this is strong AI, which attempts to replicate the human brain in order to develop an AI that is not limited to specific tasks [19, 22]. As strong AI is not available today and it is discussed when or if it will be achieved [23], the following paper focuses on weak AI and its applications.

2.2. Success and failure of Information Systems (IS) projects

Before discussing typical causes of IS success and failure, these terms need to be defined. In general, success can be defined as "achieving the goals that have been established for an undertaking" [24]. On the flipside, IS failure can be defined as the perceived inability of the project to meet the requirements or expectations of various stakeholders [25]. The mentioned requirements and expectations can be manifold in this context, for example there are not only functional but also financial or time requirements.

The causes of success and failure of IS is a thoroughly studied subject. As the goals of IS were not always perfectly clear, the definition of IS success was a challenge. In an attempt to identify dimensions of IS success, DeLone and McLean [26] undertook a literature review from papers published between 1981 and 1987. They identified six interdependent dimensions of IS success (system quality, information quality, use, user satisfaction, individual impact, and organizational impact) and used these in a model to explain IS success [26]. In the following years, this model was expanded and modified numerous times [4, 24, 27, 28]. Furthermore, both the original and the revised models have been validated to be good predictors of IS success [29–31]. In another stream of research, several studies attempted to identify determinants that have an effect on one or more of the stated dimensions [24, 32]. In total, over 50 determinants were identified to correlate with dimensions of IS success.

On the other hand, the failure of IS projects was also widely studied focusing on the discrepancy between actual and expected requirements. Similar to IS success, studies tried to investigate dimensions and determinants of IS failure [33, 34]. For example, Nelson [35] analyzed over 90 IS projects and concluded that there are 36 common mistakes in four categories: process, people, product and technology.

In summary, IS success and failure are thoroughly studied and existing models are proven to be good predictors of IS success. However, due to the specific nature of AI projects, it is still largely unclear whether these results can be transferred to the context of AI projects.

3. Related work and research gaps

In our literature review, we have identified several prior studies that have investigated research questions related to failure of AI projects, as well as, success factors, challenges and organizational readiness [12–15, 36, 37]. Two papers were identified that discuss success or failure of AI projects in general [36, 37]. They summarize "experiences with the development and deployment of AI systems" [37] in a specific company in a practice-oriented format. As these papers have the character of a practice report and lack scientific methodology, as well as, robust research design, they were excluded from a detailed discussion in this paper. Another paper that was excluded is the one by Pumplun et al. [15] due to its focus on adoption which is different from our aim. Hence, we have selected the remaining papers for a detailed analysis as they were most relevant for our aim [12–14].

Baier et al. [12] used interviews to analyse challenges particular to the deployment and operation of machine learning models. Another study focuses on general challenges in AI projects in the context of SMEs. To do so, Bauer et al. [13] correlate the identified success factors and challenges to the size and maturity of the companies. The data is collected using a survey approach with mainly CXOs or managing directors of SMEs. Jöhnk et al. [14] focus on AI readiness of companies. The authors collected data with semi-structured interviews focusing on factors that determine the readiness of companies in regard to AI. For a better overview, the factors are summarized in Table 1. It is important to understand that the listed factors are abstracted to categories and may contain more than one individual factor presented in the studies.

The table shows that not all categories are mentioned in every study. The main reason for this might be the different focus of the studies. For example, Bauer et al. [13] focus on different company sizes while Jöhnk et al. [14] analyze readiness factors. Interestingly, some categories are mentioned by all studies. One of the most prominent categories that was mentioned numerous times is data management. As data is seen as the fuel for AI [15], it is not surprising that data quality, availability and governance are mentioned as important factors within the category [12–14].

While the mentioned studies show the importance of understanding success factors regarding AI projects, their focus differs from this study's aim. The variance of the factors identified in different contexts, as summarized in Table 1, emphasizes the necessity of collecting new data for the specific question of project failure.

Table 1. Factors identified in previous studies.

Factor / Source	Baier et al. [12]	Bauer et al. [13]	Jöhnk et al. [14]
Know how	X	X	X
Commitment		X	X
Project Management		X	X
Communication	X	X	X
Data Management	X	X	X
Infrastructure	X	X	X
Result validation	X	X	
Deployment	X		
Ethics & Legal Restrictions	X		X
Business Impact	X		X
User friendliness	X		
Customer relation	X	X	X
Acceptance	X		

4. Research design

For this study, a qualitative research design based on semi-structured expert interviews was chosen [16, 17]. This methodology was deemed suitable as the purpose of our study was to identify factors, as opposed to quantitatively testing them. In order to ensure the rigour of the qualitative research process, several measures were implemented [38]. These include critical discussion and reflection of methods and results throughout the different phases of the research process, as well as, redundant data analysis by different members of the team of authors, in order to minimize subjectivity and bias.

To select the interview candidates, we have applied purposeful sampling in order to collect information-rich data that will help to illuminate the research questions [39]. The sample includes AI experts that have heterogeneous professional backgrounds in terms of industry, as well as, company sizes. Following the concept of data saturation [40], we have not pre-determined a sample size. Instead, conducting new interviews was discontinued at a point when no new concepts had emerged from the data anymore. Table 2 gives an overview of the interview candidates.

Table 2. Interview candidates.

#	Industry	Position	Focus/ expertise
1	Plant engineering	Team leader	Robotics and visual recognition
2	Software development	Founder and CEO	Visual recognition
3	Consulting	Senior consultant	AI in general
4	Software development	Developer	Natural Language Processing
5	Automotive	Development engineer	AI in sensor fusion
6	Automotive	Middle management	Driver assistance systems

To collect the data, an interview guide was used consisting of seven questions, including general questions about AI project experience to stimulate an open discussion and generate rich data, as well as, questions explicitly focused on challenges, risks, success and failure of projects. However, for the results as presented in the subsequent section, only the statements that explicitly referred to failure reasons were considered in the analysis, in order to clearly distinguish between general challenges and reasons for project failure. All of the interviews were conducted as audio or video calls between January and February 2021, except one interview that was delivered in written form. With the consent of the participants, the interviews were recorded and subsequently transcribed using AI-based speech recognition. The transcripts were inductively coded in an open coding approach. Finally, the codes were aggregated to higher-level categories [17, 18] based on their similarity in order to derive the factors presented in the results section of this paper.

5. Results

Using the data from the interviews, a total of 12 factors that can lead to failure of AI projects were identified. These factors were further aggregated into the following five categories: Unrealistic expectations, use case related issues, organizational constraints, lack of key resources and technological issues (see Table 3).

Table 3. Categories and factors identified in the interviews.

Category	Factor
Unrealistic expectations	Misunderstanding of AI capabilities
	Thinking too big
Use case related issues	Missing value or cost-benefit ratio
	Complexity
	Low error tolerance
Organizational constraints	Budget too low
	Regulations
Lack of key resources	Lack of employees with expertise
	Data availability
Technological issues	Model instability
	Lack of transparency (black box problem)
	Possible result manipulation

Factors regarding the expectations of AI projects are summarized in the category **unrealistic expectations**. As stated by an interviewee, stakeholders and members are often not fully aware of AI capabilities. This can lead to misunderstandings about technologies to be used. AI projects are sometimes only entitled as AI but are, in fact, not using any AI-related technologies. These projects can be considered as failure since they did not really lead to AI adoption. If expectations rise and managers think too big, projects scopes are getting wider and wider, until it is mostly impossible to make the projects work due to the lack of focus. These big expectations are often linked to "too large promises" (Interviewee 3) that have been made by third parties.

In general, **use case related issues** can also lead to project failure. The adoption of AI is sometimes done without value-based use cases. As there is no return on investments, only expenses, these projects fail in the sense of not delivering any benefits. One interviewee stated, that "most use cases do not provide any value" (Interviewee 2). If the complexity of a use case surpasses the capabilities of the internal development teams, project can be "impossible to accomplish" (Interviewee 1). This means that project expectations and capabilities need to be aligned to prevent failure. In special use cases, like autonomous driving, *low error tolerance* can lead to project failure. These use cases rely on precise and correct predictions and results, as error can have fatal outcomes. In AI projects, since the fidelity of results is only achieved after the models have been created, projects must be started first to verify accuracy. If the targeted and required accuracy is not achieved, projects are often discontinued.

Factors in the category **organizational constraints** represent external impacts on projects from within the company or the environment. Projects involving AI often represent a risk due to the uncertainty of the outcome. Therefore, often insufficient resources are allocated, leading to premature termination as they are running out of budget. The budgets and resources are not only used to hire experts but also to pay for training data and the training itself. Additionally, regulations, internal or external, can cause issues for AI projects. One interviewee said, that there were "bureaucratic hurdles to even only attach a Raspberry Pi to an industrial machine" (Interviewee 2). However, the extent of this factor presumably depends on the country and company.

Key resources, or the lack of those, were often described as a major influence on AI project failure. Three of the interviewees said that the lack of expertise was a key reason for the failure of AI projects. This can be related to other issues, like low budgets, as one interviewee mentioned: "If you put the wrong person, a person without enough knowledge, on an AI project it is possible that the budget gets blown without any outcomes" (Interviewee 1). As AI models strongly depend on the quantity and quality of training data, *data availability* is a factor that influences the project outcome. As an interviewee from the automotive sector mentioned, AI projects fail because correctly labeled training data is often not available or too expensive.

The **technology** itself is also a factor that can lead to project failure. One mentioned aspect is *model instability.* Companies rely on consistent results when it comes to AI algorithms. As the algorithms and systems are updated, there is “no guarantee that the systems work exactly like the last one and gives the same results” (Interviewee 4). This unpredictable behaviour can lead to the termination of projects. Furthermore, AI algorithms lack transparency as of how the algorithms ended up getting the result. This is named the black box problem. Furthermore, models can be manipulated to produce different results, e.g. if street signs are manipulated with stickers, there might be a wrong result interpreting it. The possible error introduced by manipulation can be too high to safely use the AI, depending on the context.

6. Discussion

Our results show that there are a variety of factors that can lead to failure of AI projects. A closer look at the factors reveals some interesting insights. First, it can be seen that technological issues can be one reason for failure. However, the statements of the candidates have shown that failure often seems to occur because of non-technical factors such as false expectations or lack of resources. Especially the lack of expertise or competent employees was emphasized by several interview candidates. Second, many factors or their detailed characteristics can hardly be anticipated before the start of an AI project and therefore cannot be appropriately considered in the planning of such a project. This can be observed, for example, in the factor *possible result manipulation.* At the beginning of a project, it is impossible to predict all possible ways how a result can be manipulated. Other factors, like the actual *complexity* of a use case or *model instability* can be equally difficult to estimate or anticipate. Therefore, it seems difficult to completely avoid possible project failure due to such reasons or to manage these risks as they often only emerge in the course of the project. On the other hand, some of the factors can be anticipated and managed in advance. For example, the needed know how for an AI project can be evaluated and actions can be taken. Furthermore, it can be checked if sufficient data is available to start an AI project.

An important objective of our research was to distinguish general challenges of AI projects as presented in prior studies from critical factors leading to failure of AI projects. In view of the related work reviewed in section 3 of this paper, the factors *know how* [12–14], *business impact* [12, 14] and *result validation* [12, 13] can be confirmed as being not only important, but indeed critical for AI projects. It can thus be seen that some of the already known challenges can also be concrete reasons for failure. On the other hand, some of the most prominent factors from previous studies, e.g. data management and infrastructure, seem to be not as important for failure. This also includes the factors communication, deployment, user friendliness and customer relation. A possible explanation for the lower relevance with regard to failure is that these factors might indeed be relevant challenges in AI projects, but problems can be resolved if they occur and thus do not lead to project failure. Furthermore, our research has uncovered additional factors that have not been previously identified as general challenges or readiness factors but can lead to project failure. These include *unrealistic expectations* and some specific factors in the category *technological issues*.

7. Conclusions

The evidence from this study suggests that there are several technological and non-technological factors that can lead to success or failure of AI projects. Our research has underlined the importance of distinguishing between general challenges and critical success and failure factors of AI projects. Based on new empirical data, our study contributes to knowledge by making this distinction for previously known factors, as well as, by identifying new factors.

The findings of our research have important managerial implications for organizations that are planning to adopt AI. While some of the failure factors are hard to anticipate and manage, the relevance of other typical factors for a particular organization can easily be clarified in advance. Managers are advised to have clear and honest look at their organizations’ capabilities and resources, as well as, their own expectations and understanding of AI, before starting an AI project. After an evaluation of potential critical risks, appropriate measures should be taken to mitigate these risks. If the risk of failure is estimated as too high, an honest acknowledgement of the organization’s lack of AI readiness, combined with a mid-term roadmap to improve the capabilities, might be a better advise than rushing into disaster with one's eyes open.

Our work may have some limitations. Given the qualitative approach and small sample size of our study, caution must be used in generalizing the findings or transferring them to other contexts. Nevertheless, we believe our work lays the ground for further research in this area. We propose that further quantitative studies should be conducted to corroborate our findings and generate representative results based on the categories and factors identified in this study.

References

[1] Ransbotham S, Kiron D, Gerbert P, Reeves M; (2017) "Reshaping business with artificial intelligence [cited 2021 May 2] Available from: URL: http://image-src.bcg.com/Images/Reshaping Business with Artificial Intelligence_tcm9-177882.pdf.

[2] Weiner J. (2020) "Why AI/Data Science Projects Fail". Morgan & Claypool Publishers.

[3] Dwivedi Yogesh K, Kapoor Kawaljeet K, Williams Michael D, Williams Janet (2013) "RFID systems in libraries: An empirical examination of factors affecting system use and user satisfaction" *International Journal of Information Management;* **33** (**2**): 367–77.

[4] Larsen K. RT (2003) "A Taxonomy of Antecedents of Information Systems Success: Variable Analysis Studies" *Journal of Management Information Systems;* **20** (**2**): 169–246.

[5] Avison David, Wilson David (2002) "It Failure and the Collapse of One.Tel". In: Traunmüller R, editor. Information Systems: The e-Business Challenge. Boston, MA: Springer US; 31–46.

[6] Beynon-Davies P. (1995) "Information systems 'failure': the case of the London Ambulance Service's Computer Aided Despatch project" *European Journal of Information Systems;* **4** (**3**): 171–84.

[7] Bussen Wendy, Myers Michael D (1997) "Executive information system failure: a New Zealand case study" *Journal of Information Technology;* **12** (**2**): 145–53.

[8] Gable Guy, Sedera Darshana, Chan Taizan (2008) "Re-Conceptualizing Information System Success: The IS-Impact Measurement Model" *Journal of the Association of Information Systems;* **9** (**7**): 1–18.

[9] Barth Christian, Koch Stefan (2019) "Critical success factors in ERP upgrade projects" *Industrial Management & Data Systems;* **119** (**3**): 656–75.

[10] Finney Sherry, Corbett Martin (2007) "ERP implementation: a compilation and analysis of critical success factors" *Business Process Management Journal;* **13** (**3**): 329–47.

[11] Holland Christopher, Light Ben (1999) "A Critical Success Factors Model for ERP Implementation" *IEEE Software;* **16** (**3**): 30–6.

[12] Baier Lucas, Jöhren Fabian, Seebacher Stefan (2019) "Challenges in the Deployment and Operation of Machine Learning in Practice. In: 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden.

[13] Bauer Markus, van Dinther Clemens, Kiefer Daniel (2020) "Machine Learning in SME: An Empirical Study on Enablers and Success Factors". In: AMCIS 2020 Proceedings; 1–10.

[14] Jöhnk Jan, Weißert Malte, Wyrtki Katrin (2021) "Ready or Not, AI Comes— An Interview Study of Organizational AI Readiness Factors" *Business & Information Systems Engineering;* **63** (**1**): 5–20.

[15] Pumplun Luisa, Tauchert Christoph, Heidt Margareta (2019) "A New Organizational Chassis for Artificial Intelligence-Exploring Organizational Readiness Factors". In: 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden; 1–15.

[16] Oates Briony J (2006) "Researching information systems and computing". Los Angeles, London New Delhi, Singapore, Washington, DC: Sage.

[17] Mayring Philipp (2015) "Qualitative Inhaltsanalyse: Grundlagen und Techniken". Weinheim, Basel: Beltz. 12., überarb. Aufl.

[18] Saldaña Johnny (2009) "The coding manual for qualitative researchers". Los Angeles: Sage.

[19] Buxmann Peter, Schmidt Holger (2019) "Künstliche Intelligenz: Mit Algorithmen zum wirtschaftlichen Erfolg". Berlin: Springer Gabler.

[20] Girasa Rosario (2020) "Artificial Intelligence as a Disruptive Technology". Springer International Publishing.

[21] Russell Stuart, Norvig Peter (2009) "Artificial Intelligence: A Modern Approach (3rd Edition)". Pearson.

[22] Pennachin Cassio, Goertzel Ben (2007) "Contemporary Approaches to Artificial General Intelligence". In: Goertzel B, Pennachin C, editors. Springer; 1–30.

[23] Müller Vincent C, Bostrom Nick (2016) "Future Progress in Artificial Intelligence: A Survey of Expert Opinion". In: Müller VC, editor. Fundamental Issues of Artificial Intelligence. Cham: Springer International Publishing; 555–72.

[24] Petter Stacie, DeLone William, McLean Ephraim R (2013) "Information Systems Success: The Quest for the Independent Variables" *Journal of Management Information Systems;* **29** (**4**): 7–62.

[25] Ewusi-Mensah K. (2003) "Software Development Failures". MIT Press.

[26] DeLone William, McLean Ephraim (1992) "Information Systems Success: The Quest for the Dependent Variable" *Information Systems Research;* **3** (**4**): 60–95.

[27] Seddon Peter B, Staples D., Patnayakuni Ravi, Bowtell Matthew J (1999) "Dimensions of Information Systems Success" *Commun. Assoc. Inf. Syst.;* **2** (**20**): 1–61.

[28] Urbach Nils, Smolnik Stefan, Riempp Gerold (2009) "The State of Research on Information Systems Success" *Business & Information Systems Engineering;* **1** (**4**): 315–25.

[29] McKinney Vicki, Yoon Kanghyun, Zahedi Fatemeh (2002) "The Measurement of Web-Customer Satisfaction: An Expectation and Disconfirmation Approach" *Information Systems Research;* **13** (**3**): 296–315.

[30] Kulkarni Uday, Ravindran Sury, Freeze Ronald (2007) "A Knowledge Management Success Model: Theoretical Development and Empirical Validation" *J. of Management Information Systems;* **23** (**3**): 309–47.

[31] Iivari Juhani (2005) "An Empirical Test of the DeLone-McLean Model of Information System Success" *ACM SIGMIS Database;* **36** (**2**): 8–27.

[32] Iriarte Carmen, Bayona S. (2020) "IT projects success factors: a literature review" *International Journal of Information Systems and Project Management;* **8** (**2**): 49–78.

[33] Lucas Henry C (1975) "Why Information Systems Fail". Columbia University Press.

[34] Sauer C. (1993) "Why Information Systems Fail: A Case Study Approach". Alfred Waller.

[35] Nelson R. (2007) "IT Project Management: Infamous Failures, Classic Mistakes, and Best Practices" *MIS Q. Executive;* **6** (**2**): 67–78.

[36] Hou Fang (2020) "Analyzing the Performance of the Unmanned Bank to Explore the Failure Reasons for AI Projects". In: AIAM2020 - 2nd International Conference on Artificial Intelligence and Advanced Manufacture.

[37] Rychtyckyj Nestor, Turski Alan (2008) "Reasons for success (and failure) in the development and deployment of AI systems". In: AAAI 2008 workshop on What Went Wrong and Why.

[38] Saumure Kristie, Given Lisa M (2008) "Rigor in Qualitative Research". In: Given LM, editor. The Sage encyclopedia of qualitative research methods. Los Angeles Calif.: Sage Publications.

[39] Patton Michael Q (2015) "Qualitative research & evaluation methods: Integrating theory and practice". Thousand Oaks California: SAGE Publications Inc. Fourth edition.

[40] Corbin Juliet M, Strauss Anselm L (2008) "Basics of qualitative research: Techniques and procedures for developing grounded theory". Los Angeles, Calif.: Sage Publ. 3. ed.