Exploring AI Applications in Business: Case Studies on Key Competencies for Professionals

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Abstract. Artificial Intelligence (AI) is transforming business operations across various industries, requiring professionals to develop new competencies. This study explores AI applications in business through case studies, identifying key competencies essential for AI project teams. The research highlights the interdisciplinary nature of AI projects, emphasizing the need for both technical and soft skills, including communication, leadership, and adaptability. Using a case study methodology, the study examines real-world AI implementations, revealing competency gaps among business professionals. The findings suggest that structured training programs and interdisciplinary collaboration are crucial for successful AI integration. Additionally, the study underscores the importance of AI governance, ethical considerations, and compliance with regulatory frameworks. The results contribute to the development of competency models for AI project teams.

Keywords: AI skills, Professional Competencies, Business Applications

1 Introduction

AI projects represent a distinct category of IT projects, characterized by several key features:

1. High Level of Uncertainty. AI projects exhibit a significantly higher degree of uncertainty compared to traditional IT projects. This is due to the fact that AI research and development outcomes are difficult to predict, and achieving the desired model accuracy often requires iterative experimentation [1].
2. Required Interdisciplinarity. AI projects necessitate collaboration between specialists from diverse fields. Effective communication and integration of knowledge from various domains are crucial for the success of AI initiatives [2].
3. Experimentation. AI projects closely resemble scientific experiments, where hypotheses are formulated and tested to verify their validity. They require an approach based on experimentation, flexibility, and a readiness to pivot based on observed results [3].

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Research on AI project methodologies is still in its early stages. There is a visible trend of adapting existing IT methodologies to AI projects. However, a key area requiring further exploration is the development of methodologies that reflect the unique characteristics of AI projects. Defining the necessary competencies of AI project team members is a crucial element in developing AI project methodologies. Consequently, researchers focusing on AI project methodologies emphasize the importance of identifying the required competencies within project teams. The primary objective of this study is to identify and analyze competency gaps among AI project team members, enabling the development of recommendations regarding roles and required skills within AI project execution methodologies.

This study employs two scientific methods: literature analysis, based on a review of academic articles, industry reports, and case studies. The results of the literature analysis reveal a knowledge gap concerning the competencies required for AI project team members. Additionally, case studies highlight specific competency gaps among individual project team members, which may ultimately widen the information gap on the client side during IT project implementation [4].

The conclusions drawn from this research will contribute to both the development of recommendations regarding the necessary competencies for AI project teams within AI project methodologies and the formulation of training plans for specialists, as well as curricula for higher education institutions.

2 Literature review

Artificial Intelligence (AI) has become a critical component in transforming business operations across various sectors. In business management, e-commerce, and finance, AI applications are extensively utilized to boost efficiency and enhance consumer interactions. By analyzing transaction data, AI systems can identify fraudulent activities and help in making informed investment decisions, ultimately maximizing profits and enhancing security measures [5]. Marketing is another domain where AI's impact is profoundly felt. As AI technologies continue to develop, they expand the scope for their application, offering competitive advantages to organizations that embrace their potential in revolutionizing traditional marketing methodologies [6].

Arman and Lamiyar [7] delve into the functions of AI within the business realm. The paper emphasizes the importance of considering both the advantages and limitations of AI adoption in business, as well as the ethical and legal implications of its use. Menzies and colleagues [8] explore the applications, benefits, and challenges associated with utilizing AI in business. The authors note that AI prompts changes in workplace configurations and necessitates organizational and staffing adjustments in response to this technology. Hamadaqa and colleagues [9] discuss the role and functionalities of AI in business. The article ultimately offers recommendations for effectively implementing AI solutions to maximize benefits while navigating potential challenges. Chowdhury [10] examines the role of AI in business. The paper discusses how the intersection of artificial intelligence (AI), machine learning (ML), and blockchain technology is reshaping contemporary business operations. The author investigates the

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collective impact of these technologies on enhancing efficiency, transparency, and strategic advantages within organizations. Petrescu and colleagues [11], explore the role of AI and its application in business. This research systematically examines the impacts of AI in customer-centric retail applications based on the ecosystem value creation framework. This study can also assist managers in determining suitable conditions for AI use. Yang and colleagues [12] discuss the uses of AI in business. The findings identify six key factors in AI adoption, including technological affordances and constraints, innovation management approaches, AI readiness, the competitive environment, and regulatory environments. The findings clarify that factors such as the competitive environment and regulatory frameworks play crucial roles in the scale and depth of AI adoption. Company size has significant effects on how challenges of AI adoption are addressed.

2.1 Definition of AI

Various definitions of Artificial Intelligence (AI) have been introduced to help distinguish it from conventional information technologies. To fully understand AI, it is essential to break down its two main components: "artificial" and "intelligence." The term "intelligence" encompasses cognitive functions such as understanding, learning, and reasoning [13], while "artificial" refers to something that is manufactured by humans rather than occurring naturally [14]. AI can be described as the development of machines capable of mimicking human intelligence [15]. At its core, AI involves creating systems that imitate human-like abilities by functioning as intelligent agents, capable of processing and responding to environmental inputs in an informed manner [16]. Some scholars argue that AI should not depend on explicit programming to perform tasks considered intelligent [17]. Instead, AI must have the capacity to independently perceive, interpret, learn, plan, and take appropriate actions ([17], [18], [19]). This implies that AI systems should be capable of processing external data, drawing meaningful insights, and using this knowledge to flexibly adapt in order to achieve specific objectives or complete complex tasks [20]. Crucially, this process should not be confined to rigid rules or pre-programmed sequences of actions [21].

In some contexts, AI is viewed as a type of automation in media consumption and creation [22], and it is sometimes classified as general AI, referring to intelligent systems designed for specific, limited functions, as opposed to systems exhibiting intelligence comparable to or exceeding that of humans [23].

AI is defined as “the process of creating computing machines and systems that perform operations analogous to human learning and decision-making” [24]. “Artificial intelligence (AI) is about emulating the human intelligence process by machines” [25]. AI is “a step-by-step process for performing repetitive actions, designing models, and solving technical problems without pre-existing concrete solutions” [26]. AI “refers broadly to computational systems that involve algorithms, machine learning methods, natural language processing, and other techniques that operate on behalf of an individual to improve communication outcome” [27].

Academics have explored the function of AI in business, along with developing concepts like Human-AI Interaction (HAII) and AI-driven communication, taking into

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account elements such as the source's perspective and social interactions enhanced by machine learning techniques [28, 29].

In this study, we conceptualize AI as the demonstrable, practical ability of non-biological machines or artificial systems to execute tasks, resolve issues, convey information, engage with their environment, and act rationally, emulating processes found in human beings.

2.2 Structure of the AI project team

Successful AI project implementation requires a multidisciplinary team [30]. Data scientists handle data analysis and algorithm selection. Machine learning engineers transform models into practical solutions. Business executives and analysts set goals and facilitate communication between business and tech teams. Data engineers provide clean data infrastructure, while domain experts offer industry-specific insights.

Team skills include leadership, mentoring, decision-making, and conflict resolution. A blend of soft and hard skills is crucial for effective project management [31]. Leaders should focus on skill development through training, ensuring organizational success. The structure of AI project teams should prioritize collaboration between humans and AI systems. Johnson and Vera [32] emphasize the importance of "teaming intelligence" for AI to work effectively with people. Webber et al. [33] propose using AI to improve team diagnostics and effectiveness, highlighting both advantages and challenges. Haller [34] stresses the need for efficient project management in AI teams, focusing on delivering results quickly with limited resources. Torre et al. [35] introduce a goal programming model for team formation that considers human-AI trust and technology acceptance. They propose an index measuring attitudes towards AI tools to ensure teams are receptive to machine-based decisions. Overall, these papers suggest that successful AI project teams should balance technical expertise with collaborative skills, efficient project management, and a positive attitude towards AI integration ([32],[33],[34],[35]) A novel framework proposes using generative AI agents to model diverse team member roles, potentially leading to more dynamic collaborations [36]. Siemon [37] identifies four key roles for AI teammates: coordinator, creator, perfectionist, and doer. Miller [38] emphasizes the importance of considering passive stakeholders in AI projects, proposing six stakeholder roles. Ma et al. [39] investigate three AI roles in decision-making: Recommender, Analyzer, and Devil's Advocate, finding that each role has distinct strengths and limitations depending on AI performance levels.

2.3 Identification of the knowledge gap

While extensive research has been conducted on the operational capabilities of Artificial Intelligence (AI) in various business contexts, several gaps persist in the current theoretical frameworks used to evaluate these applications.

- **Human-AI Collaborative Dynamics:** Research on Human-AI Interaction (HAII) focuses primarily on operational efficiency [40], yet there is limited exploration of

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the collaborative dynamics between AI systems and human decision-makers. Theories on social interactions enhanced by AI lack empirical studies that investigate the cognitive and behavioral impacts on human teams working alongside AI.

- **Ethical and Societal Implications:** While there are definitions of AI as a technological force [41], there is insufficient theoretical grounding on the ethical considerations surrounding its use in business decisions.
- **Role of Soft Skills in AI Implementation:** While competencies such as communication and leadership are asserted as vital for AI project success, theoretical models do not fully explain how these skills interact with AI technologies to enhance team performance and project outcomes [42].

Addressing these theoretical gaps requires multidisciplinary research that merges insights from AI technology, business strategy, human-computer interaction, and ethics. Future studies should aim to build comprehensive frameworks that not only address these gaps but also offer actionable insights for businesses looking to leverage AI for competitive advantage.

3 Research methodology

The main goal of the conducted research was to identify the key competencies of a group of business employees that are necessary for the proper execution of AI projects. The selected group of business employees can be characterized as follows:

- Employees acting as specialists, not managers.
- Employees without IT education.
- Employees working in production, logistics, finance, and marketing departments.
- Employees with basic experience in IT project implementation, i.e., ERP, CRM, DMS, BI, ECM as key users, internal consultants, project leaders in the area of functionality implementation.
- Employees without knowledge and experience in AI project implementation; most of them have not completed any AI projects.

The study posed research question:

Q1: "What key competencies should employees in the selected group of specialists possess to properly and effectively implement AI projects?"

In the research, the authors used the case study method. The research object is three IT system implementation projects that utilize AI. It should be emphasized that the authors of the research try to include the issues contained in the concept of E - environmental, S - social responsibility, G - corporate governance. The ESG concept assumes that an enterprise should not only care about its economic interest, but the business, including the projects implemented, should bring broadly understood benefits to all stakeholders, local communities, and the environment. The authors use the case study method because it allows them to develop existing theory and provide explanations for previously unrecognized issues. The choice of the research method by the authors – case study – mainly results from the early stage of development of

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theoretical and practical knowledge in the field of AI project implementation in business. The consequence is a knowledge gap in the areas of:

- AI project implementation methodologies.
- Understandable taxonomy of concepts used in AI projects.
- Theoretical and practical knowledge in the field of AI project implementation, including the identification of risk factors.
- Requirements resulting from EU AI Act, ISO/IEC 22989, ISO/IEC 23894, ISO/IEC TR 24030, ISO/IEC JTC 1/SC 42, ISO/IEC 25012.
- Required competencies of employees in the implementation of AI projects.

The selection of studied cases is carried out in deliberate mode. According to B. Flyvbjerg [43], there are five main criteria for selecting studied cases. Table 1 presents the criteria along with their characteristics in the context of the conducted research.

Table 1. Characteristic of the criteria for conducted research.

Criterion	**Information regarding the fulfillment of the criterion**
Data availability	Guaranteed
The vividness of the case clearly illustrating the examined regularities	Successfully completed projects utilizing various artificial intelligence models.
Diversity of analyzed cases	The diversity of analyzed cases is expressed in the selection of: • Various artificial intelligence models. • Client profile. • Project implementation results. • Competency diversity of employees
The critical nature of the phenomenon allowing for the formulation of a generalization	The identification and analysis of competencies required for AI project implementation should consider the main challenges in the following areas: 1. Technical knowledge regarding AI models. 2. Methods for executing AI projects, which are characterized by uncertainty. 3. Soft skills in communication and knowledge transfer related to AI project execution. 4. Incorporating the perspective of sustainable growth (ESG) in AI project implementation.

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A metaphor directing the researcher's attention to a specific course of the examined phenomenon	An AI specialist in a company is like an alchemist who combines raw data, statistical models, and business principles to create valuable and unique solutions. Success depends on skillfully balancing technical knowledge, intuition, and experimentation.

4 Research Findings and Interpretation

In Tables 2 and 3, we present the results of case studies conducted in three companies from the IT industry, the training and consulting sector, and a manufacturer of industrial electronics solutions. All analyzed AI projects involved either building a complete solution from scratch or utilizing available AI systems on the market.

Table 2. Results of case study research, including the characteristics of the studied entities. Source: Own study

	Firm X	**Firm Y**	**Firm Z**
Company Profile	IT Company	Training company	Technology company
AI Project Company	An intelligent system for identifying risks and uncertainties in IT projects through financial, technical, logistical, and organizational analysis. It uses agent-based modeling to analyze formal documents and team communication (emails, online meetings), including sentiment and emotion analysis.	An intelligent, integrated platform for creating online AI training programs.	AI project aimed at improving industrial manufacturing through predictive maintenance, supply chain optimization, production automation, and data-driven product development.

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Used tools	NLP, OCR, Machine Learning, Anomaly Detection (AI), Predictive Analytics	Adaptive Learning Systems, NLP, Chatbots, sentimental analysis platforms, automated reporting tools, AI analytical tools	Machine Learning Algorithms, Computer Vision and Machine Vision Systems, Robotics and AI-driven Automation Systems, Big Data Analytics Platforms, IoT-enabled Sensors and Smart Devices
Project Duration	12 months	6 months	over multiple years
Project Methodology	Uses a hybrid AI implementation methodology combining Waterfall (for planning and integration) with Agile (for developing AI features and sentiment analysis). Enables flexibility, ongoing user feedback, and early problem detection.	Focuses on a structured methodology starting with training needs analysis, target group definition, and content planning. Followed by implementation, training delivery, evaluation, and post-training support.	Implements AI in manufacturing through a structured process: data collection from IoT, AI model development, deployment in production and supply chain, and ongoing performance optimization.

Table 3. Results of case study research. Source: Own study

Firm X	Firm Y	Firm Z

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List of project member	Product Owner AI Engineer / Data Scientist Data Analyst Risk Management Expert Construction Expert Software Developer DevOps Specialist UX/UI Designer Sentiment Analysis Expert QA Tester Project Manager / Scrum Master	Project Manager AI Consultant Potential Trainees End User	AI Engineers & Data Scientists Experts Software Developers Supply Chain Analysts Quality Control Specialists Project Managers
Key, prioritized Competencies for Each Role in the Analytical and Implementation Phase of IT Projects	**Product Owner** Understands business and IT, manages and prioritizes requirements, communicates with stakeholders, and bridges business and tech teams. **AI Engineer / Data Scientist** Expert in ML/DL and big data analysis, runs AI experiments, optimizes models, and aligns results with business goals. **Data Analyst** Skilled in SQL, Python, R, and BI tools;	**Project Manager** Understands business needs, prioritizes tasks, oversees training preparation and delivery, and monitors progress **AI Consultant** Provides technical expertise, answers participant questions, refines training based on data, and supports trainers. **Potential trainees**	**AI Engineers & Data Scientists** Experts in machine learning, deep learning, neural networks, and data modeling **Industrial Automation Experts** Skilled in robotics, control systems, and AI-based process optimization. **Software Developers** Proficient in programming (Python, Java, C++), with experience in integrating AI into industrial systems **Supply Chain Analysts** Experienced in demand forecasting, big data analytics, and AI-

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identifies KPIs, visualizes data clearly, and collaborates with IT/business teams.	Participate in training, give feedback, ensure knowledge transfer, and help tailor methods to learner needs	supported decision-making.
Risk Management Expert Manages IT and cybersecurity risks, ensures regulatory compliance, analyzes risk areas, and creates mitigation strategies.		**Quality Control Specialists** Work with computer vision, defect detection, and automated quality assurance.
Software Developer Experienced in Python, Java, C#, JS; develops microservices, solves coding issues, and collaborates with QA and analysts.		**Project Managers** Strong leadership and planning skills, with knowledge of AI implementation in industrial environments.
DevOps Specialist Automates CI/CD (e.g., Jenkins), manages cloud infrastructure, improves system performance, and ensures IT security.		
UX/UI Designer Designs user-friendly		

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	interfaces (Figma, Adobe XD), conducts UX research, builds prototypes, and works with front-end teams.
Cybersecurity Specialist	Secures IT systems, analyzes threats, handles incidents, and ensures compliance with security standards (e.g., ISO 27001).
Sentiment Analysis Expert	Uses NLP for analyzing emails and chats, detects emotional patterns, and works with AI/analytics teams to assess communication risks.
QA Tester	Performs functional and automated testing, validates software compliance, optimizes testing flows, and reports bugs.
Project Manager / Scrum Master	

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Leads projects with Agile/Scrum/Kanban, plans sprints, tracks progress, resolves team issues, and manages priorities and stakeholders.

Analyzing case studies, researchers indicate that competency gaps in AI projects primarily relate to four key areas:

- Project Management Skills in High-Uncertainty and Research-Oriented Environments. AI projects are characterized by a high degree of uncertainty and often exhibit features of research projects, where experimentation is a crucial process. According to researchers, a key competency for AI Project Managers is managing uncertainty and adopting an experimental approach. AI projects often require an iterative approach, where initial results are difficult to predict, and model effectiveness depends on data quality and tested algorithms. Therefore, AI Project Managers must be able to manage experiments, accept unpredictability, and adapt project timelines and scope based on test results.
- Managing Interdisciplinary Teams. Researchers emphasize the importance of teamwork in AI projects under conditions of strong interdisciplinarity. AI projects require collaboration between Data Scientists, AI Engineers, business experts, and data analysts, which is not typical for traditional IT projects. AI Project Managers must be able to coordinate interdisciplinary teams, understand different perspectives, and translate technical results into business language.
- Communication Skills in High-Uncertainty and Interdisciplinary Environments. In AI projects, engineers, Data Scientists, and IT specialists use technical jargon that may be incomprehensible to managers and business stakeholders. A crucial competency is the ability to simplify complex technical concepts and present them in an accessible manner to different audiences. Researchers highlight that the ability to ask the right questions and engage in active listening allows for a better understanding of business and technical needs while preventing misunderstandings. According to research, these communication skills require new competencies that are not as commonly found in traditional IT projects. Scientific studies suggest that the proportion of individuals with Asperger's syndrome may be higher among engineers and programmers compared to the general population, making communication skills particularly crucial in AI project execution [44].
- Skills related to Ethics and Regulatory Compliance. While ethics and regulatory issues are important in IT projects, they become particularly critical in AI, especially

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in the context of algorithmic bias, compliance with regulations (e.g., AI Act), and model interpretability. Researchers emphasize that AI Project Managers must possess the ability to identify and manage ethical risks while implementing responsible AI development principles such as XAI (Explainable AI). Additionally, they should have the competencies to lead projects in accordance with ethical and regulatory frameworks within the project team.

Researchers argue that it is necessary to develop a competency model for AI project team members as an integral part of AI project methodologies. The competency model should include:

1. Definition of Key Roles in AI Projects and Their Responsibilities. Identifying essential roles in AI project teams and specifying the required competencies for each role.
2. Determining Proficiency Levels for Each Competency. Defining the required skill levels across different levels of expertise (e.g., beginner, intermediate, expert).
3. Interdisciplinary Competency Connections. Identifying common competency areas between technical, analytical, and managerial roles that enhance collaboration efficiency in AI projects.
4. Soft and Managerial Skills. Including communication skills, the ability to work in high-uncertainty conditions, adaptability, and decision-making based on experimental outcomes.
5. Recommendations for Competency Development. Developing career paths for AI team members, outlining training methods, certifications, and best practices for improving key skills.
6. Guidelines for Competency Assessment and Validation in Practice. Establishing tools and methods for evaluating team members' competencies, such as certification systems, practical tests, pilot project assessments, and AI problem simulations.

The competency model should be integrated into AI project methodologies, including CRISP-DM, Agile AI, and Lean AI, ensuring a structured approach to AI project execution.

5 Discussion and conclusion

The goal of the conducted research was to identify the key competencies of a group of business employees that are necessary for the proper execution of AI projects. This study identifies key competencies for AI project implementation in business, emphasizing both technical and non-technical skills. AI engineers require expertise in machine learning and programming, while business analysts and managers need analytical and communication skills. Soft skills, including leadership and adaptability, are also crucial for successful AI adoption.

A major challenge is the lack of AI-specific knowledge among business employees, leading to inefficiencies. AI governance complexity, compliance with regulations, and ethical concerns also pose significant barriers, necessitating robust frameworks.

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Businesses should establish cross-functional teams, combining the expertise of data scientists, IT professionals, and business leaders, to ensure a holistic implementation of AI solutions. Policymakers should establish standardized AI competency guidelines through industry-academic collaboration. Furthermore, investing in continuous learning and development programs can empower employees to effectively leverage AI tools, thereby enhancing innovation and productivity.

Interdisciplinary collaboration and governance frameworks are essential for effective AI adoption. Businesses must actively foster an AI-ready workforce by implementing skill development initiatives and fostering cross-functional cooperation. Strategic alignment of AI projects with business goals ensures better integration and maximizes benefits. Additionally, ethical considerations should remain central in AI deployment, requiring transparency, fairness, and accountability in decision-making processes. Ultimately, organizations that proactively invest in AI capabilities will gain a competitive edge, drive efficiency, and position themselves as leaders in an increasingly AI-driven business landscape. By fostering a culture of collaboration and innovation, businesses can effectively use AI to drive growth, improve customer experiences, and maintain a competitive edge in the fast-evolving digital landscape.

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