Implementation of Artificial Intelligence (AI): A Roadmap for Business Model Innovation

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Abstract: Technical advancements within the subject of artificial intelligence (AI) leads towards development of human-like machines, able to operate autonomously and mimic our cognitive behavior. The progress and interest among managers, academics and the public has created a hype among many industries, and many firms are investing heavily to capitalize on the technology through business model innovation. However, managers are left with little support from academia when aiming to implement AI in their firm's operations, which leads to an increased risk of project failure and unwanted results. This paper aims to provide a deeper understanding of AI and how it can be used as a catalyst for business model innovation. Due to the increasing range and variety of the available published material, a literature review has been performed to gather current knowledge within AI business model innovation. The results are presented in a roadmap to guide the implementation of AI to firm's operations. Our presented findings suggest four steps when implementing AI: (1) understand AI and organizational capabilities needed for digital transformation; (2) understand current BM, potential for BMI, and business ecosystem role; (3) develop and refine capabilities needed to implement AI; and (4) reach organizational acceptance and develop internal competencies.

Keywords: business models; business model innovation; artificial intelligence; implementation; road map

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1. Introduction

Disruptive innovations, such as artificial intelligence (AI), are changing the rules of competition within industries all over the globe. Opportunities associated with AI are considered to be the most important technological development, with regards to its enormous potential for adding value and competitive advantage [1].

AI can be described as intelligent systems created to use data, analysis, and observations to perform certain tasks without needing to be programmed to do so [2]. The potential is thus derived from opportunities to automate decision making processes through human-like reasoning—which has created a hype among many industries and firms. AI can be categorized as a capital–labor hybrid with the ability to self-learn, continuously improve and quickly scale-up [3]. As described by O'Leary [4], AI often create the foundation for decision support through valuable insights and results, collected from large and complex data sets and compressed into a manageable scale.

Baden-Fuller and Haefliger [5] highlight that technology and business performance are interlinked through the business model (BM). The authors also explain the importance of user engagement and openness regarding the BM to enable technological development, which highlights the importance to consider BMs when implementing AI. The process of value creation is one of the main segments of business model innovation (BMI) that is clearly connected to AI through its ability to solve complex problems based on large data-sets [6]. BMI unlocks the potential to refine or expand current product

portfolios, and operate more efficient in order to cut costs. However, according to Valter et al. [7], there is a gap between the technological advancements and how organizations operationalize value creation through their BM. This means that BMs must constantly be adapted to the environment it is operating in [7]. In addition to value creation, value capturing and delivery are also vital parts of the BM. Teece [8] describes the essence of a business model as defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit.

Technological progress within the area of AI has led to increased interest among a wide range of businesses. According to the Artificial Intelligence Global Executive Study and Research Report by Ransbotham et al. [9], 90% of the respondents revealed that AI offers opportunities for the company. However, 40% of the respondents reported that significant investments did not result in business gains. Barriers for successful implementation of AI are associated with the technological, cultural, and political domain [10]. However, strategic considerations are considered to be vital as technological improvements do not ensure success when implementing AI applications [11]. This highlights the importance of well-structured BMs to adapt and capitalize on existing technological assets. AI is rather considered to be a catalyst for BMI and thus also an enabler for disruption of industries.

Research within the area of AI in business contexts is growing, however aggregated knowledge within the subject can be considered to be limited and studies that are relevant and rigorous are needed [12,13]. Managers are left with little support from academia when aiming to implement AI in their firm's operations which leads to an increased risk of project failure and unwanted results. The hype of AI and its enormous potential implies heavy investments among a broad range of different industries and firms. However, many firms do not perceive business gains when implementing AI applications and the theoretical understanding of the topic is limited. Research within BMI and digital transformation is relatively generic, meaning that some of its insights are applicable on all technological innovations, including AI [14]. Thus, we will look into the research streams of AI to identify challenges, particularly relevant for implementation of AI. Furthermore, research within BMI and digital transformation will be investigated in order to provide a deeper understanding of how companies can transform their BMs with AI and simultaneously manage the identified risks. The purpose of this paper is therefore to increase insights on business model innovation related to the implementation of AI.

Our insights will be presented in a framework that can be used by practitioners to obtain a better understanding for challenges and opportunities when transforming businesses through AI implementation. The framework represents a roadmap that can be utilized as a guide when implementing AI. Additionally, our results will be used to identify gaps in the literature and provide recommendations for future research areas.

2. Method

This study has been undertaken as a systematic literature study approach. Search engines (e.g., Scopus) have been used to identify current research. To search for articles, we have applied combinations of the following keywords, artificial intelligence, business model innovation, and digital transformation. Our selection process of articles is described through three main steps below in order to thoroughly choose relevant data [15].

Step 1: The Scopus search with our keyword combinations resulted in 411 articles and was combined with the berry-picking method. It implies that we gradually increase the knowledge within the field throughout the process of information seeking [16]. This also leads to a greater understanding on how topics are related to each other, which leads to a more holistic view of the review. By using small insights from a number of different articles this method suits the purpose of the literature review better due to the lack of published articles in high quality journals. Step 2: During the process of information gathering, we used two sorting steps to ensure that the collected articles contained high quality information that suited our purpose and need. This included an analysis of the title and abstract of the articles where keywords and relevant information was analyzed. Additionally, the screening

included an analysis of relevant journals, publish dates, number of citations and expert judgements. This step resulted in a reduction to 79 relevant papers. Step 3: The final screening was based on sorting out articles that were of value for the literature review, the main activity was to ensure that the articles were relevant with regard to the purpose of the research. In order to successfully screen articles, the full article was read.

3. Literature Review Findings

Current research within AI business models highlights challenges, opportunities and prerequisites needed for successful AI implementation. Research within BMI and digital transformation have been investigated to further understand how challenges can be mitigated, opportunities realized and prerequisites fulfilled. Our findings are presented in a four-step roadmap, which should be performed consecutively to achieve a successful implementation of AI. The four steps are framed as: (1) understand AI and organizational capabilities needed for digital transformation; (2) understand current BM, potential for BMI, and business ecosystem role; (3) develop and refine capabilities needed to implement AI; and (4) reach organizational acceptance and develop internal competencies. In this section, these four steps will be further explained with support from the reviewed literature fields.

3.1. Understand AI and Organizational Capabilities Needed for Digital Transformation

The technological development of AI applications are moving fast and its aggregated implications are still unknown [17]. AI systems are likely to perform actions that are unforeseeable for the operator. Thus, we argue that the first step need to incorporate evaluation of potential risks and opportunities of implementing AI. Furthermore, these findings should be transformed into organizational capabilities that will support and mitigate risks associated with the process of implementation.

3.1.1. Challenges When Implementing AI

The ambition of research within AI technologies is to develop a human-like machine that is able to operate autonomously and mimic our cognitive ability. In other words, AI can be described as a feature of intelligence that is more efficient and capable of processing more information than humans. This offers a valuable tool that can identify and solve abstract and complex problems [11]. However, this also entails risks and challenges. With support from the reviewed literature, we have defined the following challenges: transparency, lacking trust for AI among employees, analog processes, and misunderstandings of AI.

Transparency—AI is not an independent technology that can be implemented as an individual function. Rather, AI can be defined as an umbrella term for a combination of numerous different technologies. Areas such as deep learning, machine learning, and neural networks all rely on algorithms to process data but on different levels of complexity and abstraction [18]. The complex assembly of different functions, and its abstraction levels, impairs traceability, which is referred to as the black-box issue [19]. According to Wortham et al. [20], achieving high transparency and interpretability is a great challenge when building intelligent systems. If constructed models are incorrect or inadequate, the system will likely be harmful for corporate operations.

Lacking trust for AI among employees—The transparency issue has a direct impact on organizational behavior, such as trust and the perception of agency [20,21]. In other words, individuals are less prone to trust an AI application if they do not understand how it operates. Trust can be related to the technology itself, but also to the innovative firm and its ability to communicate [21]. Furthermore, trust among organization members is essential in order to mitigate organizational resistance when transforming businesses [22].

Analog processes—Digital processes can be seen as a prerequisite when implementing AI. Data acquisition mechanisms constitute crucial capabilities as AI algorithms requires large amounts of qualitative data [4]. Thus, analog processes must be transformed to enable acquisition of digital content.

Insufficient data sets will have a direct and negative impact on the output, a phenomena referred to as garbage in–garbage out.

Misunderstandings of AI—The complex nature of AI and, particularly, the black-box issue obstructs proper understandings of the AI application and how it operates [20]. Mutual understanding correlates with cooperation, which is a crucial factor when performing digital transformations of businesses [11]. We therefore argue that mutual interpretation of the technology constitutes one of the main challenges during the implementation phase, both regarding the AI's capacity and potential application areas.

3.1.2. Key Organizational Capabilities When Implementing AI

When using AI as a catalyst for digital transformation through innovation of BMs, firms must develop specific capabilities and reach a certain maturity level. In the existing literature, these capabilities are described as strategic, technology, data, and security capabilities [1]. Inadequate development of these capabilities and capabilities that concern the cultural aspect of the transformation [10] will decrease the probability for successful implementations or reduce the potential of AI.

When investigating companies that successfully implemented AI, referred to as DX leaders, Brock and Wangenheim [1] found digital strategies as a common capability. Such strategies are characterized by digital processes, e.g., sourcing, production processes, or performance reviews. Digital business strategies are defined through its scope, meaning that the scope of offerings increases when using digital technologies and thus firms must find a structured approach towards value creation and capture activities [23]. Furthermore, digital business strategies requires rapid scale up and scale down capabilities, as software resources are highly elastic. The organization must therefore be able to rapidly adapt to changes in demand to utilize the potential of digital applications. Thus, scaling opportunities highlight the importance of organizational agility.

Data capabilities concern the importance of building a robust structure of data collection, management of data and analytical skills [1]. To achieve a sustainable data structure, firms usually need to rebuild their current network or replace it with a new network, whereas the aim is to access as much unprocessed data as possible.

Security capabilities are considered to be one of the main organizational capabilities that has a strong impact on digital transformation and its successfulness [1]. Companies access to large data sets and information about customers, employees, or suppliers highlights the challenge regarding data security. Furthermore, implementation of AI will, especially if transparency is low, complicate the handling of sensitive data. Cybersecurity skills are thus a requirement when implementing AI [24].

3.2. Understand Current BM, Potential for BMI, and Business Ecosystem Role

Before BMI is initiated, it is essential to understand business model design [8,25], opportunities for BMI [25] and how it coordinates with external stakeholders and partners [26]. This section will further explain these concepts.

3.2.1. Business Model Innovation

The term business model innovation has been extensively used for a number of years, still some believe that the term is generally misunderstood and inadequately used in its context. Firstly, business models can be described as a mediating construct between technology and economic value [27] and can thus be understood as the mechanism that transforms digital applications into profitable outcomes. Secondly, business models are characterized by three main keystones—value creation, value delivery, and value capture.

DaSilva and Trkman [28], argues that the business model should be looked at as the way of operationalizing a strategy with the help of dynamic capabilities. Therefore, the three layers—strategy;

dynamic capabilities; and business model—represents long, medium, and short term perspectives that connect interlinking processes on the time horizon.

Business model innovation can be described as the development and continues improvement of the business model [26]. Chesbrough [29] also describe the importance of understanding the current business model, its surroundings and the possible paths that are able to be explored before undertaking the process of innovating it. Teece [8], entails that business model innovation enables the opportunity of reaching a competitive advantage if the innovation is sufficiently differentiated and difficult for other competitors to replicate. Imitation regarding the business model is a well-known strategy for new entreats to achieve great success and the possibility to conquer markets [14].

3.2.2. Business Ecosystem Roles

Digitization and disruptive innovations are breaking down industry barriers. This offers opportunities as companies can build strong relationships with customers and increase the scale of their offerings through cross-selling approaches. To improve their offerings, companies seek partnerships in order to tie external capabilities and efficiently access skills needed to exceed customer expectations [30]. This gives rise to networks, or ecosystems, of firms that are collaborating to achieve common goals. Firms can undertake different roles in digital ecosystems. Dedehayir et al. [31] defines four different roles, i.e., ecosystem orchestrator, direct value creation roles, value creation support roles, and entrepreneurial roles.

The leadership role includes orchestration of the entire value chain, platform management or initiation of new partnerships. Ecosystem leaders entails different roles depending on the system where they operate. For instance, system governance entails more focus of development and maintenance of the system, management of resource flow within the system or design and development of key roles. Open platforms, on the other hand, entails that ecosystem leadership rather creates a basis for the market by design of a platform that enables creation of value. This includes creation of a platform infrastructure that facilitates commercialization of innovations that aligns with the platform's purpose [32].

Direct value creation roles define companies that are fulfilling customer specifications through its operations. For instance, firms that are contributing with specific competencies (e.g., software developers), processing information from different contributors (e.g., hospitals in the healthcare ecosystem) or suppliers of materials, are defined as direct value creation companies [31]. Companies with expert knowledge within specific fields are defined as value creation support roles. These companies are not adding tangible input to the ecosystem, but rather supporting elements to the value creation processes. Expert roles are key in innovation ecosystems as they facilitate development of innovations.

The entrepreneurial role can be compared to the ecosystem leader roles, with the difference that they have less impact on the ecosystem. Entrepreneurial companies are likely to tie suppliers, experts, and contributors, and build networks with the aim to commercialize expert ideas. Entrepreneurial roles also include firms that offers sponsorships, and are often a linkage between researchers, i.e., universities, and firms within the ecosystem.

3.3. Develop and Refine Capabilities Needed to Implement AI

The change process can be initiated when the firm's capabilities and preconditions is properly understood. The business should be transformed with support from insights in the previous steps. In this section, technical and organizational aspects during digital transformations are primarily highlighted.

Key Aspects of Digital Transformation

Companies are transforming their BMs to explore digital technologies—e.g., AI—and exploit benefits. This includes transformation of core business operations, organizational structures, and

management concepts [6]. Digital transformation strategies are not equal to IT initiatives, rather they include more of an extensive structural re-design with the aim to align IT strategies with business- and functional-level strategies [23]. Four dimensions should be considered to better understand the nature of digital transformation strategies, regardless of industry or firm—i.e., use of technologies, changes in value creation, structural changes, and financial aspects [6].

Use of technologies addresses a company's approach towards technologies and their ability to capitalize on undeveloped concepts, according to Matt et al. [6]. The authors mention that firms can embrace the role as first developer, meaning that the company develop and exploit immature technologies. This approach is categorized by more uncertainty and risk. The second alternative is to undertake the first follower-role, meaning that the company adopt and implement technologies that are already developed and tested by surrounding firms. Furthermore, implementation of new technologies will require changes in value creation. This implies transformation of the firm's value chain and how value is created. Digital transformations often open up new opportunities regarding expansion of current product portfolios which can lead to new business scopes and customer segments [33,34]. However, defining which services or features add significant value for the customer requires a systematic methodology, including customer engagement, hypothesis-driven commitments, work breakdown, and prioritization [35].

New competencies, offerings and customer segments will further imply need for structural change, meaning that a new basis for operations is formed [6]. Corporate structures are changed and digital activities are integrated in different places of the organization. It is also essential to investigate how certain processes, skills, services, and products are can be integrated in the digital world through the transformation [36]. Depending on the scale of the transformation, companies can choose to integrate digital activities in existing organizational functions, or create new subsidiaries. However, it is necessary to consider the digital strategy throughout the transformation and thus how different organizational functions are interlinked [23].

Lastly, Matt et al. [6] argue that financial aspects must be continuously considered throughout the entire transformation. Financial gains are the driving force behind the rebuild and thus financial pressure will determine whether the digital roll-out will be considered as successful or not. Additionally, it is believed that all stakeholders—i.e., people directly, indirectly, or affected by the changes—should be involved in the transformation [36]. We therefore conclude that financial gains and operational improvements must be continuously reported to stakeholders.

3.4. Reach Organizational Acceptance and Develop Internal Competencies

Social and organizational aspects are crucial when performing radical changes is the business model, particularly when the transformation involves complicated AI solutions [20,21]. Many companies are using AI to reach new industries, develop new offerings, significantly improve operations, or create value. Lee et al. [11] mention that 75% of their 3000 interviewees responded that AI will allow their company to expand their business into new industries. Furthermore, they argue that AI implementations must follow a five-step process, including: executive pilot projects, formation of AI-teams, broad AI-training, development of AI strategy, and development of internal and external communities.

Executive pilot projects offer the benefits of testing the new technology in small-scale and align businesses with today's fat-paced environment [37]. This enables employees to perceive and understand how their position will be affected by the implementation [11]. This will further illustrate both requirements and benefits that follows when implementing AI—e.g., how employees will be affected by the change. Therefore, we argue that employees will be more familiar with the new technology. A deeper understanding of AI and how it will complement and improve current operations, will likely develop positivism towards the change. The purpose of pilot projects should be to translate technological operations into understandable language, in order to prepare the organization and create a common understanding of the new technology and its implications [15]. In other words, high

transparency will mitigate the need for deep understanding concerning the technical aspects of AI among employees, which will lower the barriers for implementation. This highlights the importance of high transparency and interpretability, which constitutes one of the main technical issues [20,21].

Formation of AI-teams, including experts within the AI field, will increase the firm's understanding of technical AI aspects and how it can be applied [11]. If the company is managing confidential data, it can be crucial to form an in-house team and thus also increase the control of how the data is handled. Broad AI training includes education offerings to organizational members. Experts within the AI field will provide the company with an advantage and deepened understanding of the technology. However, AI experts are few and expensive, and the rise of AI will require a broader upgrade of the employee's skills [38]. Therefore, it is believed that broad AI training is necessary in order to fully capitalize on the technology, as new application areas can be found to realize the potential [11].

Development of AI strategy implies that it is crucial to build a strategy that center on AI. Digital strategies are key when transforming to a digital business, where systems and corporate infrastructure is taken into account [6]. Data acquisition and data infrastructure are crucial to ensure a sustainable strategy that promotes AI operations [11]. Large data sets and data analytics, or big data, is often referred to as the fuel that enables the AI-algorithm to produce its result. This implies that the data amount and quality will directly correlate with the output, a phenomenon called garbage in–garbage out [1]. Thus, qualitative data sets constitute a precondition that must be fulfilled in order to succeed with AI initiatives. The principles of lean startup methods can be applied as a potential strategy when building and developing robust data infrastructures [11]. This method is based on the concept of minimum viable products, continuous data collection, testing, and refinement [39]. Hence, this strategy will form a virtuous cycle of AI.

For development of internal and external communities, BMI often generates development of new offerings which leads companies towards new customer segments [6]. AI will increase opportunities to provide additional value to customers, however risks associated with cyber security will also increase. Thus, such risks and opportunities should be communicated to stakeholders. Companies should also consider educating stakeholders within the subject to ensure that stakeholders understand how AI is used, since AI is generally not properly understood by the public.

Communication channels should not be one-sided as stakeholders may have valuable input on how AI is used within the firm [11]. Therefore, well-structured communication channels that enable feedback loops will support further development of the BM and thus foster BMI.

4. Roadmap for Implementation of Artificial Intelligence Business Models

Observations of theoretical concepts regarding AI as a catalyst for BMI has resulted in four key insights. The theoretical concepts are related to research within AI, BMI, digital transformation, and business ecosystems. Consequently, the key takeaways are defined as a need to: (1) understand AI and organizational capabilities needed for digital transformation; (2) understand current BM, potential for BMI, and business ecosystem role; (3) develop and refine capabilities needed to implement AI; and (4) reach organizational acceptance and develop internal competencies. Defined insights must be continuously considered when implementing and developing AI applications, and cannot be approached separately.

These insights will be linked to the identified challenges—i.e., transparency, lacking trust for AI among employees, analog processes, and misunderstandings of AI. Additionally, we will further explain how these challenges and risks can be mitigated through application of our presented roadmap. Relationships between the four-step roadmap and defined challenges are visually presented in Figure 1.
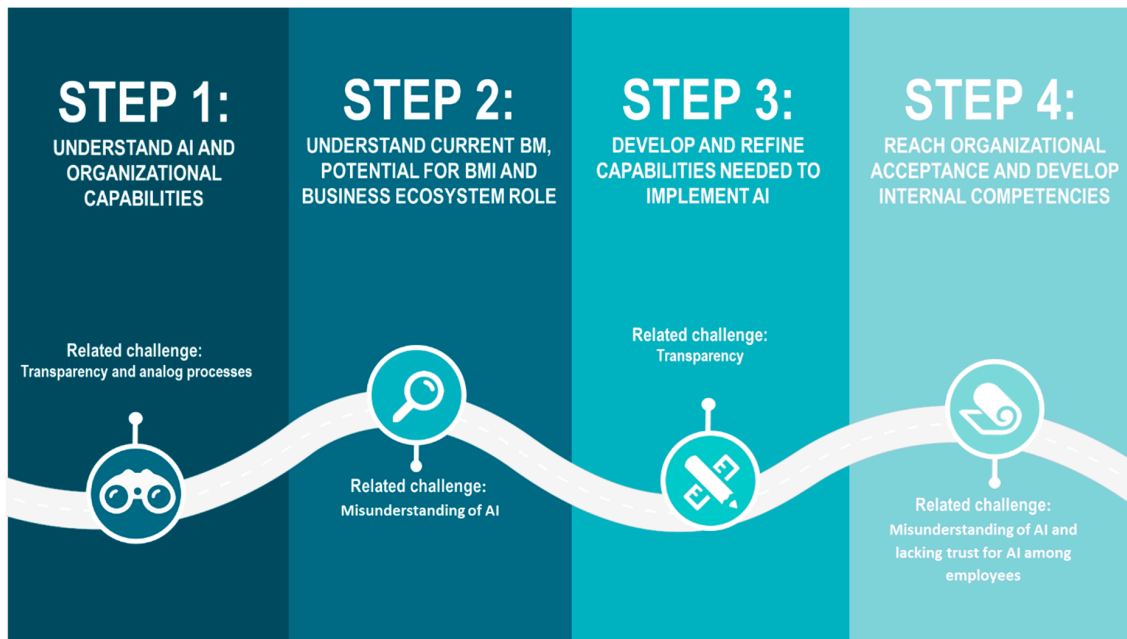
Figure 1. Roadmap for AI business model implementation.

4.1. Understand AI and Organizational Capabilities Needed for Digital Transformation

The understanding of AI characteristics will lay the foundation for the forthcoming implementation plan. This initial step will primarily include upper management as the purpose is to produce a conceptual framework for the usage of AI and to evaluate the firm's capabilities. Questions should be asked: Do we need to develop or refine current capabilities? Do we need to develop new capabilities?

Research highlights data acquisition and infrastructure to be the core aspects for successful AI implementation [4]. Thus, we recommend evaluation of opportunities to digitize analog processes and thus also enable comprehensive data collection. Such actions will subsequently mitigate risks associated with the garbage in–garbage out phenomena.

Furthermore, the transparency issue (i.e., the black-box problem) is mentioned as one of the greatest challenges related to AI [20,21]. Market research and R&D investigation can thus be valuable in order to assess risks associated with AI. Definition of risks and challenges will further lay the foundation for commitments that aims to mitigate defined risks.

4.2. Understand Current BM, Potential for BMI, and Business Ecosystem Role

Before BMI is initiated it is essential to understand how value is currently created, captured and delivered. How is technology utilized to improve offerings and exceed customer expectations? Technical uncertainty is derived from technological maturity and the understanding of the technology, but it is also depending on the external market [27]. Thus, the first step is to interrogate current customer relations and how value is delivered, captured, and created to better understand how technological advancements can improve customer satisfaction.

However, it is not sufficient to merely understand how the focal firm relates to its customers. Digital transformations are rarely dependent on individual firms, but rather networks of companies that are collaborating with a common purpose [31]. Therefore, it is crucial for the firm to understand its position in the ecosystem and how they contribute to the final offering. This also includes how surrounding firms complement the focal firm through particular competencies and capabilities. Findings should subsequently be communicated to organizational members when upper management have achieved an understanding of the current BM, potential for BMI, and ecosystem role. This can thereby clarify how and where AI will be used, and thus also avoid misunderstandings of AI.

4.3. Develop and Refine Capabilities Needed to Implement AI

Further development of key organizational capabilities can be initiated when current BMs, internal and external capabilities, and customer needs are properly understood. The first step is therefore enhancing awareness that will further enable development of tailor-made capabilities with regard to the external market, including surrounding firms within the ecosystem.

Subsequently, a proper understanding of current BM and business ecosystem roles will highlight opportunities and threats followed with implementation of AI. The key organizational capabilities (i.e., strategic, technology, data, and security capabilities) must be attained within the business ecosystem [1], and should therefore constitute the main focus when evaluating AI readiness. Development of capabilities should particularly observed to manage challenges related to the transparency issue. For instance, this may cover technical problem solving through R&D operations.

As discussed by Matt et al. [6], the introduction of AI will often require substantial transformations of core business operations and capabilities, which induces uncertainty and risk. Firms can decide to undertake two different strategies when transforming businesses—the role as first developer or first follower. Bench marking activities and evaluation of surrounding firms can be performed to inspire development of both technical and strategic solutions.

4.4. Reach Organizational Acceptance and Develop Internal Competencies

According to Lee et al. [11], digital transformations often face risks associated with organizational resistance when implementing AI applications. This highlights the importance of reaching organizational acceptance during the implementation phase. Acceptance can be achieved through numerous different commitments, e.g., executive pilot projects, formation of AI-teams, and broad AI training [11]. This will thereby mitigate risks associated with both misunderstandings of AI and lacking trust for AI among employees.

However, benefits derived from educational efforts are not delimited to internal knowledge gains [6]. Firms are rather dependent on the external environment, including cooperating firms or surrounding stakeholders. Thereby, firms should seek for collaborations with partners to strengthen the understanding for AI applications among affected parties within the ecosystem.

Furthermore, feedback loops and continuous evaluation of business performance is paramount both during and after the implementation phase. Feedback loops should be constructed to structure information flow between all affected parties—i.e., customers, partners, suppliers, or internal managers—in order to foster continuous improvements of the business model. Feedback loops will hence lay the foundation for development of internal competences and thus also secure the relevancy of attained knowledge.

Feedback loops and evaluation of customer behavior can be considered to be particularly important when reaching new customer segments, or when new offerings are designed through application of the AI application. Risks should be considered to be higher as the firm lacks experience from the technology, the customer segment, and the solution offered. Hence, continuous communication is essential to minimize uncertainty and gather understanding of the new environment. In the long term, feedback loops will be essential in order to mitigate risks associated with misunderstandings of AI.

5. Conclusions

Technical advancements and progress regarding AI related research has led to increased interest among a wide range of industries and firms. However, insufficient understanding regarding implementation of AI applications induces limited business gains. This report intends to increase the understanding of AI implementation by reviewing research within AI, BMI, and digital transformation.

With support from literature concerning business related AI research, we have increased the understanding of challenges connected to AI implementation. Furthermore, research within the topics of digital transformation and BMI is reviewed in order to provide a deeper understanding of how

defined risks can be mitigated. The four main takeaways are defined as a need to: (1) understand AI and organizational capabilities needed for digital transformation; (2) understand current BM, potential for BMI, and business ecosystem role; (3) develop and refine capabilities needed to implement AI; and (4) reach organizational acceptance and develop internal competencies.

The four main takeaways presented in this literature review can be used as a guide when evaluating opportunities for AI implementation. Organizational character and desirable conditions differ considerably between firms, meaning that implementation phases will be designed quite differently. However, AI will reshape how business is done and business model innovation will be crucial to succeed with businesses built on AI.

The presented framework is relatively generic and applicable on a wide range of businesses, independently of its characteristics—i.e., role in business ecosystem, size, or industry affiliation. Therefore, the validity of current research within the subject of AI can be considered to be insufficient. This affects our presented framework as it may limit its usefulness in specific contexts. To increase the understanding of AI and how successful AI implementations can be formed, we recommend four further research areas.

First, understanding regarding AI readiness and required preconditions is insufficient. Thus, there is a need for measurable guidelines that can be followed to evaluate firm's digital maturity level, manage unexpected challenges, and lower risks associated with AI initiatives. By developing this type of matrix, managers will easier understand how and when AI implementations should be initiated.

Second, research regarding digital transformation partly focus on the resolution of industry barriers and the importance of partnerships when reaching new customer segments with advanced offerings. However, the transformation to AI is highly challenging and complex. Therefore, future research on transformation to AI cases would be valuable.

Third, our paper highlights the importance of understanding the role of the industrial ecosystem. Further research should therefore investigate what competencies each ecosystem actor is associated with and what maturity level each role must achieve to successfully progress with AI initiatives.

Finally, business models for AI applications are usually offered as service contracts rather than traditional sales. Therefore, more research on AI connected to digital servitization would benefit the research on AI business models.

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