engineering proceedings

MDPI

Proceeding Paper

Tailoring Managers' Journeys Through the AI Transformation of SMEs †

Vanja Bevanda

Department of Mathematics, Statistics and Information Science, Faculty of Economics and Tourism "Dr. Mijo Mirković", Juraj Dobrila University of Pula, 52100 Pula, Istria, Croatia; vbevanda@unipu.hr

† Presented at the Sustainable Mobility and Transportation Symposium 2024, Győr, Hungary, 14–16 October 2024.

Abstract: Navigation through AI transformative initiatives is challenging for small and medium enterprises (SMEs) in the Mobility–Transport–Automotive (MTA) ecosystem. To move to a higher AI maturity level, they should work on the improvement of indicators in several dimensions. The main role in these processes is assigned to the SME's manager, but contemporary research is the least concerned with their support. This paper aims to shed light on supporting the strategic decisions that facilitate SMEs' implementation of AI services (AIaaS). Applying the principles of design thinking to the design of AI services, the author describes the role of SME managers in AI transformation processes as a base for future AIaaS design.

Keywords: AI transformation; SMEs; managers; customer journey; AIaaS

1. Introduction

SMEs are the backbone of the EU-27 economy and they make up over 99% of businesses in the European Union. Ecosystems encompass all players operating in a value chain: from the smallest start-ups to the largest companies, from academia to research and from service providers to suppliers. The SMEs in the Mobility–Transport–Automotive (MTA) ecosystem play an important role, with 11.2% of the total added value generated in 2022 by 14 EU ecosystems [1] (p. 47).

Nowadays, while the automotive industry has made strides toward more environmentally conscious and sustainable supply chain practices, SMEs are under increased pressure to navigate the AI-enabled digital transformation [1]. "The adoption of digital technologies and artificial intelligence (AI) remains low among SMEs" [2] (p. 17), and a recent study [3] (p. 1) has shown that the SMEs in the Swedish automotive industry, for example, "do not seem to consider the introduction of new technologies in production in their strategic work".

SME managers play crucial roles in the processes of AI transformation [4]. They need to navigate and coordinate the integration of AI into various aspects of business while considering the well-being of employees and the overall organizational impact. Since SMEs have limited resources and are facing competitive pressure, many of them intend to use the services of digital platforms to leverage their business strategy [5]. AIaaS (Artificial Intelligence as a Service) is a cloud-based system that provides on-demand services to organizations and individuals to deploy, develop, train and manage AI models [6]. There is no 'one-model-fits-all' solution and limited research has explored how SMEs use AIaaS to integrate AI [6].

This article aims to deepen our understanding of the SME manager's role in AI transformation processes and foster conceptual clarity to support further service design in the MTA ecosystem. The research question is "What does an SME manager do in AI transformation processes and how to support their tasks? To do so, we briefly explored the AIaaS conceptual model for SME AI integration, the AI maturity model for manufacturing

check for updates

Citation: Bevanda, V. Tailoring Managers' Journeys Through the AI Transformation of SMEs. *Eng. Proc.* **2024**, *79*, 10. https://doi.org/10.3390/engproc2024079010

Academic Editors: András Lajos Nagy, Boglárka Eisinger Balassa, László Lendvai and Szabolcs Kocsis-Szürke

Published: 31 October 2024

Copyright: © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

SMEs and the manager's role in these processes. Based on these, we designed a description of the manager's persona and their AI transformation journey map for AIaaS usage.

2. Methodology

A detailed literature review and selection of articles after an advanced search of the titles and keywords of articles in web-based science databases (Scopus and Web of Science) resulted in a small number of results (less than 20), which confirms the limited research on how SMEs integrate AI into their business. The database selection maintained article consistency by including terms such as "automotive industry", "artificial intelligence", "small and medium-size enterprise" and "manager(s)". The literature on AI-enabled digital transformation was examined to identify the role of SME management in these processes. The principles of design thinking were applied to the design of AI services for SME's managers through research, synthesis and ideation as a baseline for prototyping the new service. In this way, the author has described the roles of SME managers in specific experimental phases of the AI transformation processes as a base for future AIaaS design.

3. Artificial Intelligence as a Service: Conceptual Model for SMEs

To foster AI diffusion, some cloud providers have offered software (relating to the conventional SaaS cloud layer), tools (corresponding cloud service layer: PaaS) and resources (relating to the conventional cloud layer: IaaS) to develop, operate and maintain AI models. In this study, we are considering, in a business-to-business context, a kind of AI provider that can offer an opportunity to SMEs to integrate AI into their business processes, thus gaining the technological capability to adapt to changing needs and context. Digital platforms, with a multi-layer modular structure of components that facilitate the interaction of actors and resources, who are dedicated to a specific purpose (like the automotive industry) and are using (not selling) AI technologies for their central purpose can fulfil that specific purpose [5]. The same authors proposed that they do not consider the layers from a technological perspective but from an interaction perspective, that is, "as a venue where actors interactions and resource combinations take place". In that way, AI providers can offer different forms of resources on different layers such as embedded mechanisms in the coordination layer, modules in the integration layer and building blocks in the capability layer in addiction to SMEs' knowledge, organizational processes and access to external data. Different SMEs interact with the platform at different layers and in different roles as users, designers, ideators, intermediaries and innovators (Figure 1).

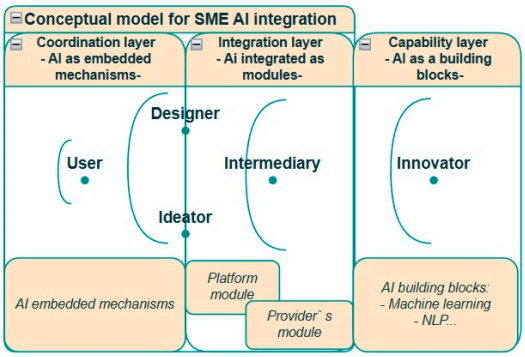


Figure 1. Conceptual model for SME AI integration (based on [5]).

Users are SMEs with limited specific AI knowledge who only use the AI mechanisms essentially embedded on the platform, like using an embedded ERP system to support their daily operations or using generated reports to support their marketing strategies. Designers are SMEs that can select the AI modules they need for further customization of their operations and, in that way, they combine their knowledge with the different modules of the platform's knowledge and external data. Ideators are the SMEs that can access the AI modules on the platform, but because of the complexity and uniqueness

of their processes, some platform functions cannot satisfy their needs. In addition to modifying the modules, ideators co-create them with the platform. Intermediaries expand their activities across different platforms, enabling cross-platform coordination, and they can help by modifying initial platform architecture with the knowledge acquired across multiple platforms. Innovators are SMEs that have advanced AI knowledge, and they operate on the capability layer, producing building blocks that can be shared and combined with external users. This conceptual model of SME AI integration highlights the importance of SME knowledge: "The knowledge a company possesses can influence the approaches adopted in using AI technologies" [5] (p. 479). SMEs often lack the staff, knowledge, hardware and software to develop and integrate their own AI applications, and these providers in specific industries can guide them through the process of adopting and using AI in their context effectively.

4. How to Choose the Appropriate AI Transformational "Bite Size"?

SME managers are invited to assess the types and levels of knowledge their company possesses to determine which platform layer their company can interact with and how deep and tight a connection with the platform (one or more) they want to gain access to AI. When deciding which platforms to use, they should consider the core activity of the AI provider to estimate the possible alignment with SME's business needs.

When a company needs to evaluate its knowledge and capabilities for AI transformation, it should use an assessment system to determine its maturity level and readiness for AI [7] and develop a maturity model (SMMT) for manufacturing companies (like in the automotive industry) that can be applied to individual organizational units as well as the entire company (Table 1).

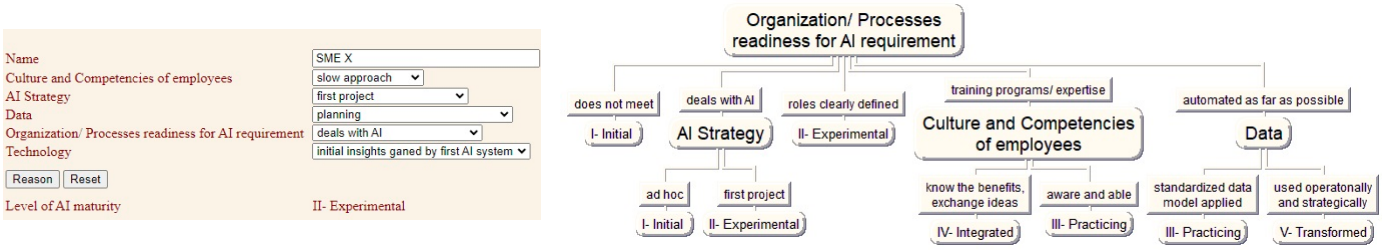
Table 1. An AI maturity model for a manufacturing company (based on [7]).

Maturity Level /Dimensions	Level 1: Initial	Level 2: Experimental	Level 3: Practicing	Level 4: Integrated	Level 5 Transformed
Culture and Competencies of Employees	are not aware of the benefits of AI	inexperienced, slow approach	know the benefits of AI	exchange ideas about AI usability	are aware and can achieve desired AI goals
AI Strategy	all strategic AI ad hoc	first project	first AI strategy pursued	an integral part of the strategy	AI roadmap with a long-term perspective is defined
Data	no standard	planning acquisition	standards	standardized data model	insights from data are used operationally and strategically
Organization and Processes of SME	does not meet the requirements for AI	deals with AI	Initial AI roles	training programs+ AI experts	AI systems are constantly optimized and developed
Technology	does not have the deployment capability of AI systems	initial insight from collected data	first AI technologies are implemented	inclusion of enabling AI technologies	All areas in the company use AI and ML

A maturity model is composed of five dimensions describing a different characteristic and a more detailed level of the dimension that can be described by their indicators. It is possible to evaluate individual dimensions separately, which allows the creation of a basis for further development according to the specific company's interest. The achievement of one level implies that of the previous one.

We recognized the possibility of modelling a rule-based, knowledge-based system for determining and explaining the level of an SME's maturity, as well as a basis for managers'

learning and recommending activities. We believe that we are thereby improving the existing model by designing a tool that can easily be integrated into a digital platform as a starting point for SME guidelines from AIaaS providers. We used a knowledge-based shell (KBS) for creating a rule-based graph (Figure 2) so that if–then rules can be formed in the knowledge base for SME maturity assessment.



(**a**) Knowledge base export (**b**) Inductive tree for AI maturity model

Figure 2. Attributes and dimensions for SME maturity assessment in the form of (**a**) knowledge export and (**b**) inductive tree (screenshots made by author).

From the input of these rules input, a KBS algorithm creates complex rules [8]. In the resulting cases, a machine learning algorithm can be applied to generate an inductive tree that can serve as a basis for a manager's learning. The inductive tree can be seen as a series of rules; for example, if a company has a value of indicator "Deals with AI" for the dimension "Organization/Processes readiness for AI requirement" and has "AI strategy" based on the "finished first project", then the company is in the second, Experimental phase of AI maturity assessment. KBS is capable of exporting knowledge bases in various forms of intelligent agents to be made available to various users, who will be able to use it for evaluation.

5. The Role of Manager in SME's AI Transformation

The Accenture study from 2024 [9] shows that sixty-two percent of companies in the automotive industry lack mature AI strategies and that they are still in the experimental phase of adopting AI in the enterprise. This means that a typical SME in this industry applies a slow approach to AI adoption with sporadic AI training of employees, with a first finished AI project and with applying existing use cases that also have a company objective. Funding and financing processes are established, also with fixed investment capital for AI, but with incomplete AI roadmap. Data sources are integrated in response to a specific event and data analysis tools are used for specific processes. Initial AI roles are defined and an AI transformation strategy is planned. Additionally, in the Technology dimension, SMEs develop experimental models for machine learning, plan to use natural language processing (NLP) systems, consider compatibility and integration into existing infrastructure and experiment with cloud technologies. To move to a higher AI maturity level, they should work on the improvement of indicators in all AI maturity dimensions.

In these processes, the main role is assigned to the manager. The managers who responded to the McKinsey survey from 2022 [10,11] felt frustrated. They were spending an average of nearly 20 percent of their time, or one full workday per week, on administrative work, 28% on individual contributions, 26% on strategy and 27% on activities connected with talent and people management. AI transformational processes are reshaping the conditions for working, learning and interaction and, in turn, also how an organization needs to be managed. Taking into consideration the key manager attributes in the era of AI, Ref. [12] lists the following key activities of manager jobs: data analysis, judgment, learning, critical thinking, augmented work, process reengineering, strategy setting, people development and orchestrating collaboration. One of the ways to free up a manager's time for analysis, the redesign of current processes or the forecast of gains in efficiency through AI tools is to provide support as much as possible for routine managerial jobs.

AI can offload many transactional and routine tasks; for example, spotting irregularities in expenses, generating reports, matching candidates to job requirements or executing transfers without human interventions, etc. Among other things to do while managing business and people, they should decide, task by task, which changes to AI tools make sense for an organization. Arranging this type of change can be complex and to be successful it needs to be accompanied by a lot of attention toward the people who will be affected.

6. Manager's Journey Map Through SME's AI Transformation

From the AIaaS provider's point of view, these SMEs at the experimental maturity level play three roles: as a user of embedded AI mechanisms or as an ideator or designer of some specific platform module. The five steps of the interactions between the manager and the AI service provider can be identified if the previous description of the SME manager's role is used to describe the "persona" and their activities that are modeled through the application of the service design principles (Figure 3).



Figure 3. Manager's journey map through SME AI transformation (made by author using Miro).

At the outset of the journey, the manager seeks an AI services provider in the manufacturing industry who is capable of guiding SME companies in integrating AI processes. In addition, they need the support for their routine and administrative tasks. Offering NLP or analytic modules in enterprise resource planning (ERP) or business intelligence systems specific to the MTA ecosystem can be helpful for these purposes. To self-assess the AI transformation level, the managers may need an AI maturity model in a form that will inspire and guide the creation of an AI strategy. The knowledge-based model we have created can serve this purpose. For AI strategy assessment in the third step, managers search for the source of available real AI use cases in their ecosystem that can be compared and modified for their company objectives. After analyzing and comparing the available AI providers for the specific industry, they will probably need decision-making support for the choice of AI provider and the scope of cooperation/cocreation in the execution of the

AI strategy. Based on these, it was possible to create a manager's journey map as a starting point for the conceptual design of some future AI services.

7. Conclusions

The managers of SMEs are often in a "one-man band" situation, where the orchestration of different roles happens dynamically and daily. The AI transformation of SMEs is a complex and demanding process where technological adoptions are accompanied by innovation in organizational and managerial practices [11] (p. 98). It is "a journey not a destination" [13], and we put on the shoes of the SME manager on behalf of an AIaaS provider to point out their problems and model a sustainable continuation of the AI transformational journey. Depending on "the depth" of the transformation as an acquired knowledge about the ways of AI integration and changes in business processes/organization, managerial journeys will also change, as well as service touch points with the service provider. Therefore, the created design artefacts are only snapshots of possible B2B scenarios. The AIaaS owner is encouraged to consider these different roles that SMEs may play in their mutual interaction with the service. With limited resources for investing in new technologies, open-access platforms can become very attractive for SMEs, and public actors should promote these options to SMEs.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Conflicts of Interest: The author declares no conflicts of interest.

References

1. Di Bella, L.; Katsinis, A.; Lagüera-González, J.; Odenthal, L.; Hell, M.; Lozar, B. *Annual Report on European SMEs 2022/2023*; Publications Office of the European Union: Luxembourg, 2023; ISSN 1831-9424.
2. OECD. *The Digital Transformation of SMEs*; OECD Studies on SMEs and Entrepreneurship; OECD: Paris, France, 2021; ISBN 978-92-64-39245-8.
3. Ericsson, K.; Birkie, S.E.; Bellgran, M. Does Industry 4.0 Matter to Automotive SME Suppliers? The Role of Advanced Digital Technologies in the Strategic Work of Firms in the Swedish Automotive Valley. In *Advances in Production Management Systems. Smart Manufacturing and Logistics Systems: Turning Ideas into Action. APMS 2022. IFIP Advances in Information and Communication Technology*; Kim, D.Y., von Cieminski, G., Romero, D., Eds.; Springer: Cham, Switzerland, 2022.
4. Pfeffer, J. *The Role of the General Manager in the New Economy: Can We Save People from Technology Dysfunctions?* Springer International Publishing: Cham, Switzerland, 2020; pp. 67–92.
5. Wei, R.; Pardo, C. Artificial Intelligence and SMEs: How Can B2B SMEs Leverage AI Platforms to Integrate AI Technologies? *Ind. Mark. Manag.* **2022**, *107*, 466–483. [CrossRef]
6. Lins, S.; Pandl, K.D.; Teigeler, H.; Thiebes, S.; Bayer, C.; Sunyaev, A. Artificial Intelligence as a Service: Classification and Research Directions. *Bus. Inf. Syst. Eng.* **2021**, *63*, 441–456. [CrossRef]
7. Sonntag, M.; Mehmann, S.; Mehmann, J.; Teuteberg, F. Development and Evaluation of a Maturity Model for AI Deployment Capability of Manufacturing Companies. *Inf. Syst. Manag.* **2024**, 1–31. [CrossRef]
8. Velencei, J.; Dörfler, V.; Baracskai, Z.; Szendrey, J. Prelude for Experience Mining: (Re-)Using Relevant Experience for Smart Decision Support. In Proceedings of the 3rd International OFEL Conference on Governance, Management and Entrepreneurship, Dubrovnik, Croatia, 17–18 April 2015; pp. 558–562.
9. Accenture, J.P. The Art of AI Maturity: Advancing from Practice to Performance. Available online: https://www.accenture.com/content/dam/system-files/acom/custom-code/ai-maturity/Accenture-Art-of-AI-Maturity-Report-Global-Revised.pdf (accessed on 20 June 2024).
10. Lamarre, E.; Smaje, K.; Zemmel, R. *Rewired: The McKinsey Guide to Outcompeting in the Age of Digital and AI*; John Wiley & Sons: Hoboken, NJ, USA, 2023.
11. Gratton, L. *Redesigning Work How to Transform Your Organization and Make Hybrid Work for Everyone*; The MIT Press: Cambridge, MA, USA, 2022; ISBN 9780262544986.

12. Canals, J.; Heukamp, F. *The Future of Management in an AI World*; Palgrave Macmillan: London, UK, 2020; ISBN 9783030253746. [CrossRef]
13. Dutta, S. An Overview on the Evolution and Adoption of Deep Learning Applications Used in the Industry. *Wiley Interdiscip. Rev. Data Min. Knowl. Discov.* **2018**, *8*, e1257. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.