Lahtinen, A. & Saaranen, P. (2024) Entrepreneurial Spirit Paving the Way for Successful AI Deployment in Knowledge Work and Organizations. *Proceedings of the 19th European Conference on Innovation and Entrepreneurship, pp. 398–405.* https://doi.org/10.34190/ecie.19.1.2575

Entrepreneurial Spirit Paving the way for Successful AI Deployment in Knowledge Work and Organizations

Anna Lahtinen and Pirjo Saaranen
Haaga-Helia University of Applied Sciences, Helsinki, Finland

anna.lahtinen@haaga-helia.fi
pirjo.saaranen@haaga-helia.fi

Abstract: The rapid advancements in Artificial Intelligence (AI) have significantly shifted the landscape of work, altering the roles of experts and knowledge workers across various domains (Humala et al. 2023). This paper explores the pivotal role of key competencies – self-efficacy, job crafting, and proactivity – in navigating the technological transformation brought about by AI in work settings. The three key competencies were previously identified as the main building blocks of the entrepreneurial spirit that is necessary for the successful use of AI in knowledge work and organizations (Humala & Lahtinen 2023, Ruohonen & Humala 2022). The research paper draws insights from a quantitative nation-wide survey that was carried out among knowledge workers in Finland. The survey was conducted during February-March 2024, with the insights gained from 474 informants. The research was funded by The Finnish Work Environment Fund and conducted by Haaga-Helia University of Applied Sciences based in Helsinki. Results show that while the integration of AI in knowledge work environments generally supports self-efficacy, job crafting, and proactivity, the effects are varied, showing both enhancement and, in some cases, diminishment. The findings indicate that AI's positive influence is most pronounced among those engaged in high levels of knowledge-based tasks and who maintain a positive outlook toward new technologies. This research also highlights some disparity in experiences between different groups, particularly between younger and older knowledge workers with early- and late-careers as well as those in different work positions, pointing to the need for tailored organizational support to ensure equitable benefits from AI technologies. The research reveals that AI can significantly foster proactivity in the workplace, particularly when employees are equipped with sufficient information and resources. Ultimately, this exploration aims to provide insights into developing AI-supported business models that not only leverage the human entrepreneurial spirit but also foster an inclusive environment that enhances organizational competitiveness and innovation.

Keywords: Artificial intelligence, Knowledge work, Self-efficacy, Job crafting, Proactivity,Eentrepreneurial spirit

1. Introduction

Rapid advancements in Artificial Intelligence (AI) have transformed the work landscape, offering substantial opportunities to enhance efficiency and productivity, and altering the roles of knowledge workers. These workers are crucial to core and support functions within organizations and externally, linking and managing tasks, stakeholders, and interest groups, and their roles often require multidisciplinary collaboration across functions such as HR, communications, IT, and administration. Yet, research on factors influencing AI adoption in knowledge work remains limited (Aunimo et al 2023), and the effective digital transformation depends on adept change management (Alasoini et al 2022). The perceptions and communications of knowledge workers about AI critically influence its organizational integration (Kärnä et al 2020).

Central to this are self-efficacy, job crafting, and proactivity, which have been identified as essential for successfully integrating AI in work settings (Humala & Lahtinen 2023; Ruohonen & Humala 2022), and that affect the roles of self-directed change agents of knowledge workers (Kärnä et al. 2021; Ruohonen & Humala 2022). These competencies foster entrepreneurial spirit and enhance AI use.

This research investigated how these competencies manifest among Finnish knowledge workers in relation to AI use, analyzing survey data from 474 employees across multiple sectors. The research question was as follows: To what extent does the use of AI a) impact knowledge workers' experiences of self-efficacy in the workplace, b) enable or restrict job crafting within organizations, and c) affect employees' proactivity in the work community?

The research was part of the "AIE – Artificial Intelligence as a Promoter of Equality" project by Haaga-Helia University of Applied Sciences. The paper discusses related work (Section 2), methodology (Section 3), research results (Section 4), the implications of findings for research and management practice (Section 5).

2. Related Work

AI refers to a machine's ability to mimic and utilize skills traditionally associated with human intelligence, such as reasoning, learning, planning, or creating (European Parliament 2023). Practically, AI involves advanced analytics based on machine learning combined with automation. Its applications are widely relevant for

knowledge work and include, for example, AI-enhanced predictive analytics, sales forecasting, customer segmentation, legal document analysis, automated financial advising, personalized educational platforms, project management optimization, and data-driven research analysis.

The discourse has primarily centered on the transformation brought about by automation in manufacturing contexts (Leesakul at al 2022). However, the landscape is now expanding as AI technologies facilitate the automation of tasks traditionally performed by knowledge workers (Coombs 2020; von Richthofen, Ogolla & Send 2022). AI impacts the daily tools that are in use of knowledge workers, such as in Microsoft Office applications, email, and the human-like text production in ChatGTP or similar interaction software. Moreover, AI implicates wider changes in knowledge work, as it already skillfully mimics skills traditionally associated with human intelligence, such as reasoning, learning, planning, and even creating.

The term "knowledge work" lacks a uniform definition. It is frequently used to contrast with manual labor, emphasizing roles that rely on specialized expertise and knowledge (Nonaka, I., Toyama, R. & Konno 2000; Pyöriä 2005). Knowledge workers process, analyze, and apply information to produce and develop services (Drucker 1999). Various definitions of knowledge work compiled by Pyöriä (2005) emphasize the multifaceted skills required, the complexity of the tasks, the handling of abstract information, extensive education, and continuous on-the-job learning. For the purposes of the present research, knowledge work was interpreted to involve activities related to the creation, modification, processing, and dissemination of information and knowledge (von Richthofen, Ogolla & Send 2022).

Recognizing and enhancing the competencies, agency, and collaboration of knowledge workers is essential for leveraging AI to create value and support operational effectiveness in organizations (Kärnä et al. 2023). Knowledge workers have a cross-disciplinary business, technological, and social expertise (Jalonen et al. 2019), which is especially important in technology adoption. Understanding, helping, and empathetic capabilities are key – besides technological skills (Frey & Osborne 2017; Kilpi 2016).

The entrepreneurial spirit is linked to the concept of intrapreneurship, which refers to an entrepreneurial approach within an existing organization (Heinonen 2001). An entrepreneurial approach enables individuals and groups to initiate, develop, and successfully manage changes and innovations involving uncertainty and complex situations, thereby achieving personal satisfaction (Heinonen 2001). The entrepreneurial spirit, deeply rooted in internal entrepreneurship, naturally extends to embrace three key competencies: self-efficacy, job crafting, and proactivity. Previously, Humala & Lahtinen (2023) identified these skills as fundamental components of the entrepreneurial spirit required for successful AI implementation in knowledge work and organizational settings. Moreover, these competencies enable knowledge workers to act as self-directed change agents within their organizations, as discussed by Kärnä et al. (2021) and further elaborated by Ruohonen & Humala (2022). As a result, these competencies are vital for knowledge workers as they integrate AI into their roles and navigate the technological shifts in their work environments.

Research by Humala & Lahtinen (2023) demonstrates that the self-efficacy of knowledge workers is enhanced under certain conditions. These include access to training and receiving positive, constructive feedback, which bolsters confidence. Clarity in job roles, adequate resources, and reliable support from the community also play crucial roles in fostering this empowerment. This increased self-efficacy manifests as a boldness towards adopting new technologies such as AI. Utilizing AI allows these workers to customize their tasks, minimize redundancy, and engage in projects that are both personally rewarding and advantageous to their teams.

Moreover, fostering proactive behavior in knowledge workers proves more effective when their abilities are acknowledged, they are encouraged to think independently, and their contributions are actively sought and valued. The cultivation of three critical "super competencies" can inspire individuals and introduce new aspects to their roles, shaping how their employment evolves with the integration of AI (Humala & Lahtinen 2023).

The present research built on these previous discoveries and advanced the understanding of the role of the entrepreneurial spirit – investigated via self-efficacy, job crafting and proactivity – in AI deployment.

3. Methods

3.1 Research Design

A quantitative survey was designed to gain insight into the research question via three hypotheses. First, it was hypothesized that the use of AI in organizations improves the sense of self-efficacy among knowledge workers as they learn to adapt and utilize new technology in their work (hypothesis 1). Second, it was proposed that

the use of AI increases the possibilities for job crafting as routine tasks are automated, freeing up time for more creative and personally inspiring tasks (hypothesis 2). The third hypothesis was that the use of AI promotes proactivity among employees, and the information and resources provided by the organization support anticipatory and independent work (hypothesis 3).

The five dependent variables were Likert-scale variables that measure the hypotheses 1 - 3. Independent variables were person-related variables, such as work position, education, gender, and age. Organizational size was an additional organization-related variable.

3.2 Data Collection

The data was collected through an online survey during the period between 14 February 2024 and 22 April 2024. The Webropol survey tool was used, and the survey was available in both Finnish and English languages. The survey link was distributed among the members of several trade unions employing knowledge workers in Finland and among employers known to employ knowledge workers in office settings.

Furthermore, the contact details of private and public organizations were compiled from Selector's company database, employing a wide selection criterion to include micro-, small-, medium- ja large-size organizations across different sectors. In this manner, the survey was distributed to 28,724 employees within the database.

As a result, 484 responses were gathered. The public link to the survey form and data can be obtained by contacting the authors. Out of 484 responses, 10 subjects were excluded from the analysis, as they were retired, full-time students, on parental or caregiving leave or unemployed. The remaining 474 were included in the analysis as they were at present active in work life.

3.2.1 Demographics of respondents and their involvement with knowledge work

Out of 474, 92.0% reported having a full-time job, 4.9% were entrepreneurs or self-employed, and 3.2% were working part-time. The demographics of the informants is described in Table 1. As can be observed, 64.6% of respondents were female, and the biggest age group is that between 51 and 64 (40.7%), followed by the age group of 41 - 50 (35.4%). The most common levels of education were a higher university degree (master) and university of applied sciences (bachelor) – both represented by 32.7% respectively.

Table 1: Descriptive statistics of the demographics of the respondents.

Variable	Frequency	Percentage
Gender		
Male	150	31.6 %
Female	**306**	**64.6 %**
Other	4	0.8 %
Prefer not to say	14	3.0 %
		Age
30 and younger	21	4.4 %
31-40	87	18.4 %
41-50	168	35.4 %
51-64	**193**	**40.7 %**
65 and older	5	1.1 %
Education		
No vocational education	1	0.2 %
Vocational course or similar (6 months - 2 years)	3	0.6 %
Lower secondary vocational qualification (e.g., vocational school or trade school)	40	8.5 %
Upper secondary vocational qualification (e.g., nursing school, business school, technical institute)	43	9.1 %
University of applied sciences (e.g., Bachelor of Business Administration, Bachelor of Engineering)	**155**	**32.7 %**

Variable	Frequency	Percentage
Higher university of applied sciences	58	12.2 %
Lower university degree (e.g., Bachelor of Arts)	11	2.3 %
Higher university degree (e.g., Master's degree, MBA, Master of Engineering)	**155**	**32.7 %**
Postgraduate education (Licentiate, Doctorate)	8	1.7 %
Position		
Manager (supervisor)	145	30.6 %
Specialist (senior expert)	75	15.8 %
Professional (expert)	**197**	**41.6 %**
Clerical support worker	42	8.8 %
Service and sales worker	7	1.5 %
Other category of worker	8	1.7 %

The respondents were categorized according to their reported involvement with knowledge work. Most informants identified as knowledge workers (51.7%), whose work involves processing, analyzing, and managing information. 19.6% were specialized knowledge workers, whose work is deeply concentrated on the expertise of a specific field of knowledge and its application. Knowledge work pioneers (12.9%) perceived themselves as experts, who promote the use of information in innovative ways and serve as an example to others in knowledge work. 14.8% were partial knowledge workers, with knowledge work being a small part of their job, but not the main task. The remaining five respondents (1.0%) did not see their job essentially being related to processing, analyzing, or managing information.

3.2.2 Respondents' personal innovativeness in IT

The scale for personal innovativeness in IT (Tran et al 2021) was employed to establish behavioral attitudes towards and acceptance of new technologies, as this has been shown to impact behavioral intentions to adopt AI. The results were observed across four variables.

Variable 1 measured the general awareness and interest in emerging technology products. Most respondents (48.5%) agreed that they keep an eye on emerging technology, with an additional 18.8% strongly agreeing, suggesting a high level of interest in new technologies. Variable 2 focused on the proactive adoption of new technologies. Here, responses were more evenly distributed across the spectrum, with 30.6% agreeing and another 31.0% somewhat agreeing that they try out new technology products earlier than others. However, a notable 5.7% strongly disagreed, indicating some reluctance.

Variable 3 assessed the willingness to accept new technological innovations. This item showed a strong positive response, with 55.5% agreeing and 34.8% strongly agreeing that they are generally willing to accept new technologies, reflecting a very favourable attitude towards technology adoption. Variable 4 explored proactive behaviours toward learning new technologies. Nearly half of the respondents (46.4%) agreed that they would look for ways to operate a new technology product upon hearing about it, and 10.8% strongly agree, indicating a proactive approach towards understanding and utilizing new technologies.

Overall, the results suggest that the informants displayed a relatively high level of personal innovativeness in IT, with a strong inclination towards adopting and engaging with new technologies.

3.2.3 Respondents' use of AI at work

Language, text, and speech recognition tools were the most widely used AI applications, with 75.5% of respondents indicating their usage. These tools, which include technologies like ChatGPT, Google BARD/Gemini, and Grammarly, help in understanding, translating, and creating text from inputs or speech. Visual content design tools were used by 40.1% of the respondents, including applications like Canva, Adobe Firefly, and Dall-E, which assist in designing and producing images, patterns, and videos. Predictive data analytics tools were utilized by 35.7% of participants, with tools such as Google Analytics and IBM Watson Analytics offering support in data analysis, providing insights and forecasts that enhance decision-making processes.

AI-based applications developed internally within organizations or tailored for specific organizational needs were used by 24.9% of respondents. Customer service and experience tools were employed by 23.6% of respondents. Recruitment and HR management tools were used the least (5.1%). Other AI Applications were mentioned by 4.2% of respondents, which might include niche or less common AI tools not listed in mainstream categories.

No experience with AI-based applications was reported by 12.4% of respondents, highlighting that despite the widespread adoption of AI, a notable fraction of the workforce remains unexposed to or unaware of the use of these technologies.

3.2.4 Organizations represented by informants

The typical informant was employed by a large private company (51.5%). The second-largest body of informants worked for medium-sized companies (23.4%). Small companies were represented by 11.8% of informants and micro companies by 13.3%.

The respondents represented approximately 247 different organizations. This was inferred from the number of different domains of the emails voluntarily given by 262 respondents. Among the 262 responses, there were 137 different corporate domains (not including Gmail, Hotmail and similar services). Thus, it can be inferred that among the total sample of 474, there were approximately 247 different organizations. The exact figure is not available due to the anonymity of the respondents.

The informants represented over 16 different industries, with a large proportion of the service sector, both in miscellaneous category (13%) as well as specialized services, such as education (12%), information and communication (11%), financial and insurance activities (10%), administrative and support services (9%) and others. Manufacturing companies (12%) were also well-represented.

3.3 Data Analysis Methods

In comparative data analysis, the researchers applied subgroup means, crosstabulations and Spearman's rank correlations (r) because the dependent variables were measured on ordinal scale (Likert). The significances of the relations were tested with non-parametric tests and Spearman's rank correlation test. Significance level (p) was set to 5.0% in statistical tests. The significance level of the correlation coefficient was indicated with the upper indexes ** for the $p \leq 0{,}01$ or * for $0{,}01 < p \leq 0{,}05$.

The relations were analyzed and tested as follows. For independent variables measured at a nominal level (such as work position, gender, and education), and dependent variables measured on an ordinal scale (Likert scale), the analysis was conducted using subgroup means and/or cross-tabulations. The statistical tests employed were non-parametric tests, including the Mann-Whitney U test for pairwise comparisons and the Kruskal-Wallis test for comparisons involving more than two subgroups.

For independent variables measured as scale variables (such as age, organizational size, and the averaging variable of personal innovativeness in IT), and dependent variables measured on an ordinal scale (Likert scale), the analysis was conducted using Spearman's rank correlations coefficient, tested with Spearman's rank correlation test.

Additionally, an averaging variable was created from the four variables measuring the personal innovativeness in IT (see Section 3.2.2) by calculating the mean value of the responses for each informant. The internal consistency was high, with Cronbach's Alpha being .834. The reliability of the research was supported by the ability to duplicate the results should the research be repeated in comparable conditions.

3.4 Impact of AI on Self-Efficacy Among Knowledge Workers

The AI impact on self-efficacy is distributed across a spectrum ranging from negative to positive. Overall, these results indicate that while a small percentage of individuals felt a decrease in self-efficacy due to AI (4.4%), a notable proportion reported positive effects (46.2%), and the largest group perceived no change (49.4%). This suggests a generally neutral to positive reception of AI in terms of its impact on individual self-efficacy in the workplace.

Further analysis showed that the more one's work involved knowledge-based tasks, the more one perceived that AI use had a positive impact on one's self-efficacy ($r=0.204^{**}$). Also, the more positive the attitude towards the use of new technologies, the greater the perceived improvement in self-efficacy, which was enhanced by the use of AI ($r=0.302^{**}$).

Based on this dataset, there was no impact of age and gender on self-efficacy. In both cases the results were not statistically significant and without allowing for a generalized correlation across age groups (r=-0.044; p=0.342) and gender (p=0.905). Similarly, the length of career and the organizational size did not have an impact in this sample, with r=-0.047, p=0,340 and r=0.025, p=0,592 respectively.

Informant's work position had an impact, with notable differences in several categories. Managers and senior experts experienced more positive work effect from the use of AI compared to clerical support workers (p=0.009 and p=0.005 respectively). Managers found more positive effect in comparison to experts (p=0.013).

Compared to experts, their more senior and specialized colleagues – senior experts – perceived stronger positive effects (p=0.010). Similar pattern was identified in the analysis of the second question related to self-efficacy that asked to evaluate the impact of the use of AI on ability to cope with challenging tasks in one's work (p=0.050).

Moreover, while a small fraction saw a decline in their self-efficacy in coping with challenging tasks (1.1%), the overall impact of AI was largely neutral (56.1%) to positive (42.8%). A significant portion of respondents felt that AI had improved their capability to manage difficult tasks at work, reinforcing the notion that AI can be a beneficial tool in enhancing individual work capabilities, especially among those who are already inclined towards embracing new technologies.

Further analysis reinforced the notion that the more the person identified with knowledge work, the more positive impact AI had on one's ability to cope with challenging task (r=0.175**) and, therefore, somewhat increased self-efficacy. The analysis slightly reinforced the conclusion that informant's age (r=-0.122**) and career length (r=-0.102*) correlated inversely with the self-efficacy: with the increase of informant's age and career length, there was a decrease in self-efficacy. Respectively, younger informants' self-efficacy increased with the AI use. The organization size (r=0.025, p=0.583) and gender (p=0.831) did not impact self-efficacy. The results in terms of informant's age and career length offered statistically significant correlation, indicating that the result was generalizable, while the conclusion for organization size was relevant for the sample in question.

3.5 The Role of AI in Enabling and Restricting Job Crafting Within Organizations

A fraction of respondents perceived a negative impact of AI on job crafting (2.3%). This suggests that for a minority, AI may impose limitations on their ability to personalize work tasks. Most respondents, 61.4%, reported "No change" in their ability to tailor their work, indicating that for most, AI did not interfere with or enhance their job crafting capabilities. A significant proportion of respondents observed positive effects of AI on job crafting (36.3%).

The more one's work involved knowledge-based tasks, the more one perceived that the use of AI had a positive impact on opportunities for job crafting (r=0.174**). Attitude towards the use of new technologies correlated with the experience of AI increasing job crafting (r=0.268**). Similarly to the results observed in respect to self-efficacy, informant's age (r=-0.134**) and career length (r=-0.099*) impacted job crafting inversely, with statistically significant negative correlation. In this sample, organizational size (r=-0.005, p=0.911) and gender (p=0.196) did not impact job crafting opportunities. In comparison to clerical support workers and experts, senior experts experienced higher increase for the opportunities to tailor their own work due to the use of AI (p=0.005; p=0.033).

3.6 Influence of AI on Employee Proactivity in the Work Community

A minor portion of the respondents noted a detrimental effect of AI on their proactive behaviors (1.7%). This indicates that AI may limit initiative-taking in a small subset of the workforce. The predominant response, from 64.6% of the participants, was "No change" in their level of proactivity due to AI use. For most employees, AI has neither hindered nor facilitated their propensity to engage proactively at work. On a positive note, a significant number of participants reported improvements in their proactivity due to AI (33.7%). These responses underscored the potential of AI to enhance proactive behaviors in the workplace.

Similarly to self-efficacy and job crafting, employees with higher involvement in knowledge work (r=0.162**) and stronger positive personal attitudes towards new technologies (r=0.252**) experienced increased positive change in proactive and initiative-taking approach in work with the use of AI. In this research sample, informant's age (r=-0.013, p=0.777), length of career (r=-0.006, p=0.891) and organizational size (r=0.033, p=0.476) did not have a notable impact, and nor did gender (p=0.301). With AI use, proactivity increased more

in managers and senior experts in comparison to clerical support workers (p=0.015 and p=0.004 respectively), in managers in comparison to experts (p=0.034) and in senior experts in comparison to experts (p=0.008).

The results indicated the connection between proactive behavior and sufficiency of information and resources provided by the employer, enabling employees to be proactive and take initiative in using AI in their work (r=0.242**), with the slight increase in proactivity with the positive perception of the organizational support.

4. Discussion and Conclusion

This research explored the implications of AI on entrepreneurial spirit manifested through three key competencies – self-efficacy, job crafting, and proactivity – within knowledge work environments. The findings supported the proposed hypotheses and suggested a nuanced spectrum of effects, with a predominantly neutral to positive impact on self-efficacy and more considerable variance in the influence on job crafting and proactivity. Aligning with previous literature, the results showed that AI facilitates an enhancement of these competencies under specific conditions, particularly when employees are provided with adequate information and resources, as was the case with proactive behavior.

The research corroborated prior studies on the role of self-efficacy, job crafting and proactivity as competencies reflective of entrepreneurial spirit and their positive connection to AI use (e.g., Humala et al 2023; Humala & Lahtinen 2023; Ruohonen & Humala 2022; Kärnä, Nikina-Ruohonen & Humala 2021). However, it also uncovered the multifaceted effects of AI in the workplace, including instances where these competencies are diminished.

A significant relationship between AI usage and increased self-efficacy, job crafting, and proactivity was particularly evident among those engaged in high levels of knowledge-based tasks and who held positive attitudes towards new technologies. Nonetheless, the data also indicated a degree of polarization among employees, especially between those at varying levels of involvement in knowledge-based work and personal innovativeness with IT.

Significantly, the results revealed that younger knowledge workers and those with shorter career lengths reported more pronounced experiences related to self-efficacy and job crafting. This underscored the need for enhanced support for older workers and those with longer careers in positively engaging with and developing AI capabilities. The support could include organizational measures, such as targeted training and the provision of suitable tools.

Moreover, the research found that proactivity in the workplace was moderately influenced by AI, with many employees experiencing increased initiative due to AI integration. This aligned with the hypothesis that AI can augment proactive behaviors, especially when supported by positive technological attitudes and sufficient organizational backing.

Interestingly, gender did not significantly influence the impact of AI on these competencies, suggesting that the effects of AI integration transcend gender boundaries and the opportunities for self-efficacy, job crafting and proactivity in the context of AI use are gender-equal among knowledge workers.

Previous research arrived at an uncertain outcome as to the relation between organizational size and the adoption of AI (e.g., Pumplun, Tauchert & Heidt 2020). This research found no significant correlation, suggesting organizational size was not a factor in how knowledge workers experienced the implications of AI use on their self-efficacy, job crafting and proactivity.

As a limitation, the research's reliance on self-reported data could introduce bias, and the diversity of organizational contexts suggests that AI's impacts are not uniformly experienced across different knowledge work roles.

Future research should aim to further delineate the conditions under which AI most effectively contributes to enhancing these competencies and to explore the longitudinal effects of AI integration across different sectors, organizational contexts, and knowledge work roles. There is also a need to monitor potential increases in employee polarization concerning AI impacts on entrepreneurial spirit.

The research results may be employed in organizational contexts to consider implementing supportive AI strategies that are inclusive and account for diverse employee experiences with technology, ensuring all workers are equipped to leverage AI benefits.

References

Coombs, C., Hislop, D., Taneva, S.K., and Barnard, S. (2020) "The strategic impacts of Intelligent Automation for knowledge and service work: an interdisciplinary review", *Journal of Strategic Information Systems*, 29(4), 1-30. Available at: https://doi.org/10.1016/j.jsis.2020.101600

European Parliament (2023) "What is artificial intelligence and how is it used?", *News: Society*. Published 04-09-2020, updated 20-06-2023. Available at: https://www.europarl.europa.eu/topics/en/article/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used

Frey, C.B. and Osborne, M.A. (2017) "The future of employment: How susceptible are jobs to computerisation?", *Technological Forecasting and Social Change*, 114, 254-280. Available at: https://doi.org/10.1016/j.techfore.2016.08.019

Heinonen, J. (2001) "Internal entrepreneurship as a tool for organizational development", *Aikuiskasvatus* [Adult Education], 2/01, 122–132.

Humala, I. and Lahtinen, A. (2023) "Knowledge Workers' Supercompetencies in the Adoption of Artificial Intelligence", in *Entrepreneurship Education Days Conference Proceedings, YKTS Entrepreneurship Education Days 2023, Critical and Reflective Perspectives on Entrepreneurship Education* [In the book of Entrepreneurship Education Days Conference Proceedings, YKTS Entrepreneurship Education Days 2023, Critical and Reflective Perspectives on Entrepreneurship Education], pp. 97-111. Available at: https://www.utupub.fi/bitstream/handle/10024/175988/YKTS%20Yritt%c3%a4jyyskasvatusp%c3%a4iv%c3%a4t%202023%20Konferenssijulkaisu.pdf?sequence=5&isAllowed=y

Humala, I., Kärnä, E., Lahtinen, A., and Asikainen, M. (2023) "Artificial Intelligence and New Technologies: Challenges and Opportunities in Knowledge Work", in Unkari-Virtanen, L., Kuusisto-Ek, H., and Brandt, T. (Eds.) *Future-Proof Business — Solutions to Complexity Challenges* [Future-Proof Business — Solutions to Complexity Challenges], pp. 176-180. Helsinki: Metropolia University of Applied Sciences. Available at: https://urn.fi/URN:ISBN:978-952-328-396-1

Jalonen, V., Kärnä, E. and Tuomainen, T. (Eds.) (2019) "From multi-skilled to continuously self-developing hybrid experts", *Haaga-Helia Publications* [Haaga-Helia Publications], 11/2019. Available at: https://julkaisut.haaga-helia.fi/moniosaajasta-jatkuvasti-itseaan-kehittavaksi-hybridiosaajaksi/

Kärnä, E., Humala, I. and Lahtinen, A. (2023) "Knowledge work transforms in the technological upheaval – challenging traditional views of professions and work development", *eSignals Research*, 4(1). Available at: http://urn.fi/URN:NBN:fi-fe2023061656140

Kärnä, E., Nikina-Ruohonen, A., and Humala, I. (2021) "Entrepreneurial spirit of knowledge workers as a key asset in strategic change", *HHbic conference proceedings*.

Leesakul, N., Oostveen, A.M., Eimontaite, I., Wilson, M.L., and Hyde, R. (2022) "Workplace 4.0: exploring the implications of technology adoption in digital manufacturing on a sustainable workforce", *Sustainability*, 14(6), 3311.

Pumplun, L., Tauchert, C., and Heidt, M. (2020) "A new organizational chassis for artificial intelligence - exploring organizational readiness factors", in *27th European Conference on Information Systems - Information Systems for a Sharing Society, ECIS 2019*, pp. 1-15.

Ruohonen, A. and Humala, I. (2022) "Artificial intelligence and human three supercompetencies", *eSignals Pro*. Published 03-06-2022. Available at: https://esignals.fi/kategoria/tekoaly/tekoaly-ja-ihmisen-kolme-superkompetenssia/#3b3c8934

Tran, A.Q., Nguyen, L.H., Nguyen, H.S.A., Nguyen, C.T., Vu, L.G., Zhang, M., Vu, T.M.T., Nguyen, S.H., Tran, B.X., Latkin, C.A., Ho, R.C.M., and Ho, C.S.H. (2021) "Determinants of Intention to Use Artificial Intelligence-Based Diagnosis Support System Among Prospective Physicians", *Frontiers in Public Health*, vol. 9. Available at: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2021.755644 [Accessed: Date].

von Richthofen, G., Ogolla, S., and Send, H. (2022) "Adopting AI in the context of knowledge work: empirical insights from German organizations", *Information*, 13(4), 199. Available at: https://doi.org/10.3390/info13040199