A PRELIMINARY SURVEY OF MANUFACTURING WORKERS ABOUT AI IN THEIR WORKPLACE

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EXTENDED ABSTRACT

AI, after more than fifty years of promising "major useful breakthroughs within a decade or two" (Simon, 1960) finally delivered on that promise in the mid-2010s with increasing academic and news coverage. There has been both a wide development of applications, and an increasing level of attention of its impact on society, positive and negative, beyond the existing body of literature on speculative ethics analyses (AI & Society, 1987; Amigoni, Schiaffonati & Somalvico, 1999; Floridi, 2008). In addition to the direct social issues it produces, the economic impact of a wave of additional automation in workforces has also been considered speculatively for decades. Very recently the breakthrough in generative AI (Haleem, Javaid & Singh, 2022), has received considerable attention about the potential impact on employment in areas such as copywriting (Zarifhonarvar, 2023) and journalism (Pavlik, 2023). The potential impact on manufacturing has been the subject of economic discussion since the 1990s (Rifkin, 1996), but limited empirical study, and almost none focussing on workers, although the OECD (Lane, Williams & Broecke, 2023) recently surveryed both employers and workers. In the hope of inspiring more and better research in this area, a survey was undertaken across eight countries, with 1082 non-managerial participants from manufacturing.

The survey was deployed in summer 2022 in three German-speaking countries (Austria, Germany and Switzerland), two other large European countries (Spain and the UK), two smaller European countries (Slovenia and Greece) and in Japan. The choice of countries was largely driven by practical issues. The survey was developed in English then translated into German, Greek, Japanese, Slovenian and Spanish by native-speaking researchers. Survey participants were recruited using professional recruitment firms. All countries were surveyed using Internet surveys except for Slovenia in which the survey was administered by telephone. A reasonable gender balance of participants was sought, only Japan had a 50/50. The most gender unbalanced was in the German-speaking countries with only 28% of respondents being female. (Non-binary gender was offered as an option in the survey but no respondents selected this option.) See Table 1 for breakdowns of gender and participants per country.

In addition to demographic data (including work history and expectations) 19 questions about knowledge of/attitudes towards AI for Manufacturing and its social/economic implications with a seven point Likert answer scale from "very strongly disagree" to "very strongly agree". As an exploratory survey these questions were presented to the respondents without explanation or definition of AI.

Table 1. Participants by Country and Gender.

Country/ies	Number	Male % (N)	Female % (N)
German-speaking (DE, OS, CH)	200	72% (145)	28% (55)
Greece	109	64% (70)	36% (39)
Japan	222	50% (110)	50% (112)
Slovenia	307	60% (183)	40% (124)
Spain	121	64% (77)	36% (44)
UK	123	63% (78)	37% (45)
Total	**1082**	**61% (663)**	**39% (419)**

Summaries of total and per-country analysis of the responses to the attitude questions are presented below.

- AI technology is already important in my workplace.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain and the UK, and moderate disagreement in Slovenia and Japan.

- AI technology will become important, or increase in importance, in my workplace over the next four years.
  Moderate agreement overall with high agreement in Greece, German-speaking countries, Spain and the UK, moderate agreement in Slovenia but neutral in Japan.

- I understand how AI technology can be used in the kind of work I do.
  Moderate agreement overall with high agreement in Greece, German-speaking countries, and the UK, moderate agreement in Spain and Slovenia, and neutral in Japan.

- I have experience with the use of AI related to my job.
  Neutral overall, with high agreement in Greece and German-speaking countries, neutral in Spain and the UK, and moderate disagreement in Slovenia and Japan.

- AI technology can improve the quality of the work I do.
  Moderate agreement overall with high agreement in Greece, German-speaking countries, Spain and the UK, moderate agreement in Slovenia, and neutral in Japan.

- AI technology could help me to become a more productive worker.
  Moderate agreement overall with high agreement in Greece, German-speaking countries, and Spain, moderate agreement in the UK, and neutral in Slovenia and Japan.

- AI technology could help my workplace become more inclusive.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain and the UK, and neutral in Slovenia and Japan.

- AI technology could replace a large part or all of the job I currently do.
  Neutral overall, with high agreement in German-speaking countries and Greece, neutral in Spain and the UK, and moderate disagreement in Japan and Slovenia.

- The introduction of AI technology will help me to keep my job.
  Neutral overall with high agreement in Greece and German-speaking countries, neutral in Spain, the UK and Japan, and moderate disagreement in Slovenia.

- If AI technology replaces part or all of my current job, my employer will retrain me, and anyone else doing similar jobs, into other work with similar pay and conditions.
  Neutral overall with high agreement in Greece and German-speaking countries, neutral in the UK, Japan, and Slovenia, and moderate disagreement in Spain.

- If AI technology replaces part or all of my current job, my employer will make some or all of the people doing these jobs redundant.
  Moderate agreement overall with high agreement in Greece, moderate agreement in German-speaking countries, the UK, Slovenia and Spain, and neutral in Japan.

- I will find it easy to get a replacement job with similar pay and conditions if I am made redundant.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain, neutral in the UK and Slovenia and moderate disagreement in Japan.

- AI will create more jobs than it will eliminate.
  Neutral overall with high agreement in Greece, moderate agreement in German-speaking countries, neutral in Japan and Spain and moderate disagreement in the UK and Slovenia.

- I would move to a new job in order to work with up-to-date manufacturing technology.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain, Slovenia and the UK, and moderate disagreement in Japan.

- My employer has provided me with adequate training to use new manufacturing technology.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain and the UK, neutral in Slovenia, and moderate disagreement in Japan.

- It is important that humans have final control when AI technology is used in manufacturing.
  High agreement overall with high agreement in all countries.

- Companies should pay equivalent taxes for AI/robotic workers if they reduce their human workforce.
  Moderate agreement overall with high agreement in Greece, German-speaking countries, Slovenia and Spain, moderate agreement in the UK and neutral in Japan.

- I understand the idea of a Universal Basic Income system.
  Moderate agreement overall with high agreement in German-speaking countries, Greece and Spain, moderate agreement in Slovenia and the UK and moderate disagreement in Japan.

- I support the introduction of a Universal Basic Income (UBI) or similar system.
  Moderate agreement overall with high agreement in Greece and German-speaking countries, moderate agreement in Spain, Slovenia and the UK, and neutral in Japan.

KEYWORDS: Artificial Intelligence; Manufacturing; Workers; Workforce Impact.

REFERENCES

AI & Society (1987). Editorial. AI & Society, 1 pp. 3-4. https://doi.org/10.1007/BF01905884

Amigoni, F., Schiaffonati, V., & Somalvico, M. (1999). Some ethical aspects of agency machines based on artificial intelligence. In Proceedings of the Fourth ETHICOMP International Conference on Social and Ethical Impacts of Information and Communication Technologies (pp. 6-8). Retrieved from https://schiaffonati.faculty.polimi.it/pubblicazioni/C2.pdf

Floridi, L. (2008). Artificial intelligence's new frontier: Artificial companions and the fourth revolution. Metaphilosophy, 39(4-5), 651-655.

Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. BenchCouncil transactions on benchmarks, standards and evaluations, 2(4), 100089. https://doi.org/10.1016/j.tbench.2023.100089

Lane, M., Williams, M. & Broecke, S. (2023), "The impact of AI on the workplace: Main findings from the OECD AI surveys of employers and workers", OECD Social, Employment and Migration Working Papers, No. 288, OECD Publishing, Paris. https://doi.org/10.1787/ea0a0fe1-en.

Parsable (2021) The State of the Connected Frontline Manufacturing Worker, 2021. Retrieved from https://parsable.com/wp-content/uploads/2021/11/Global-FrontlineWorkerSurveypdf.pdf

Pavlik, J. V. (2023). Collaborating With ChatGPT: Considering the Implications of Generative Artificial Intelligence for Journalism and Media Education. Journalism & Mass Communication Educator, 10776958221149577.

Rifkin, J. (1996). The End of Work. North Hollywood, CA, USA: Pacifica Radio Archives. Retrieved from http://pinguet.free.fr/rifkin1995.pdf

Simon, H. A. (1960). The new science of management decision. Harper & Brothers. https://doi.org/10.1037/13978-000

Zarifhonarvar, A. (2023). Economics of chatgpt: A labor market view on the occupational impact of artificial intelligence. Available at SSRN 4350925.