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International Perspectives on Managing Digitalization and Job Satisfaction

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International Perspectives on Managing Digitalization and Job Satisfaction

1. Introduction

Job Satisfaction has long been considered an important aspect in the productivity of a firm's workforce. Positive effects have been documented across many industries and countries. Böckerman and Ilmakunnas (2012), for instance, in focusing on Finish manufacturing, estimate that a one-point increase in the level of job satisfaction yields up to 20 percent more in terms of productivity. While this estimation might mark the upper edge, other studies also find a positive nexus. Kessler et al. (2020), by exploring Italian firm level data in a variety of industries, find evidence that job satisfaction pushes return on equity and on assets significantly, if effects are estimated over a four-year period. Nicolova and Cnossen (2020), by especially focusing on perceptions of meaningfulness of work in 30 European countries with 2005, 2010 and 2015 data, find lower absenteeism rates and, on average, a higher intended retirement age. Bellet et al. (2023), by examining data of one of the largest employers in Britain, British Telekom, find weekly sales up by 12 percent with a one-point increase in their measure of subjective wellbeing at the workplace. And, for the US, De Neve et al. (2023) present evidence of a positive link between employee wellbeing and stock-market performance of 1,600 companies across various businesses.

While the list could well be continued, the evidence is not confined to quantitative research. There is also plenty of anecdotal evidence. Narratives about work at IT firms suggest that a comfortable work environment that also acknowledges the human factor in labor even gains importance in the digital economy and thus becomes an asset in the competition for scarce human resources. The Comparably job site, an employee review platform, for instance, publishes data on surveys ranking firms according to various criteria, with large players in the tech industry ranking topmost. Articles abound in business magazines praise, for instance, the work environment at Google.¹ An internet search for videos about the work environment at Google delivers 1.9 trillion results in .5 seconds. While much of the work environment might be specific to the tech industry and to software development in particular, the apparent popularity of stories about amenities at the workplace shows that job satisfaction is an issue, both, per se and because people might compare (more easily than ever before) their situation with stories about workplaces on the web – even if not realistic or relevant to them, and although highly selective, age- and skill-specific, and in neglect of other circumstances. They nevertheless frame at least to some extent perceptions about the “ideal” workplace, thereby shaping job satisfaction in one's own workplace.

The speeding up of technological advances in the field of information and communication (including generative artificial intelligence) with their penetration of nearly all activities of firms adds momentum to the managerial issues being associated with this development. While precise numbers might be very much in dispute, the International Labor Organization (2022) considers the number of jobs affected particularly high in advanced economies. Accordingly, digitalization in those economies concern the majority of workers in one way or another, either

¹ See the Comparability (2023) website for their most recent ranking and, for instance, Krapivin (2018) on the work environment at Google.

directly, by changes in tasks, occupations, and shifts in the demand for specific skills, or indirectly, by outsourcing made possible by information and communication technologies. Muro and Liu (2023), for instance, find for the US that, between 2002 and 2020, the share of occupations with a high level of job digitalization almost tripled to more than a quarter of all occupations, and those with medium job digitalization climbed by more than 10 percentage points from 39 to 51 percent (see Muro et al. 2017 on the methodology).

While much of the literature expects major changes for labor, perspectives sometimes seem to differ, by focusing, either implicitly or explicitly, on digitization, digitalization or digital transformation of firms and/or the economy, and by conflating the differences, to the effect that studies are coming up with quite different numbers with regard to the magnitudes associated therewith. While Gartner (2023) clearly distinguishes between the three categories,² with the human resource aspect specifically discussed under the heading of digitalization, others make less sharp a distinction, which may partly explain the large variation when it comes to quantifying the labor impacts.³

However, much of the discussion about the impacts of digitalization concentrates on employment and wages, and less on job satisfaction – despite the apparent relevance of the job-satisfaction-productivity link and thus the challenges it poses for management and the design of the digital transformation. Yet, international research provides ample evidence that what matters for job satisfaction is not just pecuniary characteristics of the workplace but also non-pecuniary factors of the work and the workplace. Whereas there is less of a dispute of challenges abound, the evidence on how information technologies and the digitalization of the economy affect the two dimensions of satisfaction seems to be inconclusive thus far.

Taking a closer look at the issues, some emphasize that work even becomes more stressful with the advanced capabilities of controlling an individual's work, the latent work-life blending associated with the technology, and with the job insecurity increasing as the potential for automating processes broadens. Marsh et al. (2022), in a meta-examination of 194 studies, collect substantial evidence of “dark side effects” and increasing stress levels at the workplace; Giacosa et al. (2023), taking a closer look at 57 studies, find digitalization associated with technostress, exhaustion and burnout, in particular because of the (potential) digital surveillance and the work-life merge that comes therewith. Kieh et al. (2023) identify emotional demands, time pressure, and workload as negatives in working from home enabled by the digitization of the workplace.

Castellacci and Viñas-Bardolet (2019), by contrast, find a positive relationship between digitalization and job satisfaction, although specifically in some IT-affine occupations and in others not. Bolli and Pusterla (2022), attribute positive effects to an increase in productivity and a change in tasks towards more interesting work. However, they approach the issue by means of a case study with part-time students and graduates of professional education and training colleges in Switzerland, which may reflect specificities of a subsegment of employees. Kortmann et al. (2022), as well, report higher average job satisfaction for Germany within

² See also Bloomberg (2018) on the definition and International Monetary Fund (2018) on related issues of measurement.

³ Leaving controversies aside, we follow the classification of issues into three parts by focusing on digitalization, which, however, may also entail questions of reorientation and calibration of businesses in the digital era, that is, issues of digital transformation, such as the linking of businesses and customers and by stressing the management perspective therein.

subgroups of the workforce aged 40 to 65, mostly due to the possibilities digitalization opened up with respect to working hours and earnings, resulting in lower levels of stress as to time management and easier work-life balance. Others point to the option of getting rid of repetitive and monotonous work and thus to the enabling properties of digitalization, effectively augmenting labor and upskilling the labor force thereby.

Brynjolfsson (2022) therefore distinguishes between automation and augmentation with the former substituting for labor and the latter pushing the productivity of those employed. Referring to Turing (1950), he considers it not the least a matter of economic policy to get the incentives right and thus to lower the risk of a “Turing Trap” by influencing the direction of technological change so that it is primarily labor-enhancing and -enabling. On a similar account, Acemoglu and Restrepo (2019) explore factors crucial for countervailing forces outstripping any displacement effects in economy-wide perspective.

The digital economy does not pose challenges to economic policy alone though. Firms also face new challenges. When distinguishing between possible negative (automation) and possible positive effects (augmentation) on job satisfaction, we are at the very center of (change) management. Is there a chance for management to shape the effects of digitalization in such a way as to better job satisfaction, and if so, which strategy is the most promising? If there is a negative impact, how can management reduce adverse effects on perceptions of the job? If there is a positive impact, is it possible for management to promote, guide and possibly amplify the effects? The majority of contributions to the field explore – as previously mentioned -- managerial challenges of the digitalization with respect to human resources either from a purely micro-perspective focusing on the firm (or a specific company) or, once more, from a purely macro-perspective, focusing on the various sectors and labor market segments of the economy. Both have in common though to approach the changes by asking how digitalization affects work and how to “adapt” to the changes -- as if the “disruptions” associated with the transition to a digital firm (or a digital economy for that matter) were exogenous. Notwithstanding the relevance of both approaches, they might underrate the “leadership aspects” in the managerial tasks posed by the digitalization, that is management in the true sense of the word. Rather than being a given, outcomes as well as the direction of technological change itself highly depend on effective management in order to realize any so-called “digital dividend” (World Bank 2016). Work by Minardi et al. (2023), comparing computer use and job satisfaction in Germany and the UK, in fact suggests that management makes for a difference.

We show that merging both, the micro- and the macro-perspective (and exploiting the variance therein), is indeed important for identifying strategic options for management and for the managerial task of augmenting (rather than automating) labor with digitalization. We do so by illuminating the components of job satisfaction by means of an international multi-level approach. In our empirical analysis, we therefore draw on job satisfaction from the International Social Survey Program (ISSP), which provides ordinal information about perceptions at work at the individual level and on data from the World Bank’s Digital Adoption Index (DAI), which measures digital adoption for more than 180 economies at the country level, distinguishing between three dimensions: people, business, and government. In order to assess the relationship between job satisfaction and digitalization, we combine these measures with a range of micro- and macro-control variables from the ISSP and the World Development Indicators (WDI) respectively. The question why firms in some countries are seemingly more successful in delivering on job satisfaction with digitalization than in others is key to identifying

what it takes for leadership at the firm level and for the management of the complexities involved in the digitalization. Bringing in the international dimension of competition in managing the digital transformation is all the more important given the imminent rearrangement of supply chains and the “friendshoring” towards countries which are economically and politically more alike. Both of these developments can be expected to tighten also competition in the field of managing digitalization, with the process of globalization in turn affecting job satisfaction (Dluhosch & Horgos 2019/2022).

Accordingly, management challenges are severe: results show that a higher degree of digital adoption by the people of an economy significantly reduces job satisfaction as perceived at the individual level. While employees become less satisfied, they put a higher weight on the income dimension of their job: digitalization increases the share of employees that see a job just as a way of earning money. This has serious implications for human resource management as the shift affects worker engagement and attachment to the firm. While deepening the discussion on the effects of digitalization on different job characteristics, our results also point towards possible channels, which may be crucial for management when implementing digitalization at the level of the firm and for reaping the digital dividend.

In order to analyze the effects of digitalization on individual perceptions of the workplace, the remainder of our contribution is structured as follows. Section 2 discusses the interaction of different determinants of job satisfaction and thus provides a conceptual framework that can serve as guidance for the empirical analysis. Section 3 describes the data-set which we have put together to properly examine the effects of digitalization on job satisfaction; it presents descriptive statistics of the main variables and it discusses the econometric set-up. The estimation results are then presented and discussed in Section 4, including implications and relevant parameters for management. Section 5 concludes and shows possible lines for further research as to managerial challenges.

2. Conceptual Framework and Estimation Strategy

When investigating the effects of digitalization on individual job satisfaction, several channels and the interaction of different variables and aggregation levels need to be taken into account. Figure 1 sketches out the conceptual framework and the estimation strategy of our approach.

The focus of our analysis is on estimating the effects of digitalization of an economy on individual perceptions of the work place. As Fig. 1 indicates, there exists a direct effect of digitalization on job satisfaction and the motivation why individuals apply for a job. In a more digitalized economy, job satisfaction can be expected to be different than in a less digitalized economy. Also, the motivation for work might differ in economies with a different degree of digitalization: it may either be primarily income driven or also entail personal or social aspects. When estimating the effect of digitalization on job satisfaction in an econometric analysis, it is important to include relevant macroeconomic control variables in order to make sure that the estimated impact can really be assigned to digital adoption and not to other (presumably) important macroeconomic indicators, such as, for instance, GDP per capita or probably (un)employment.

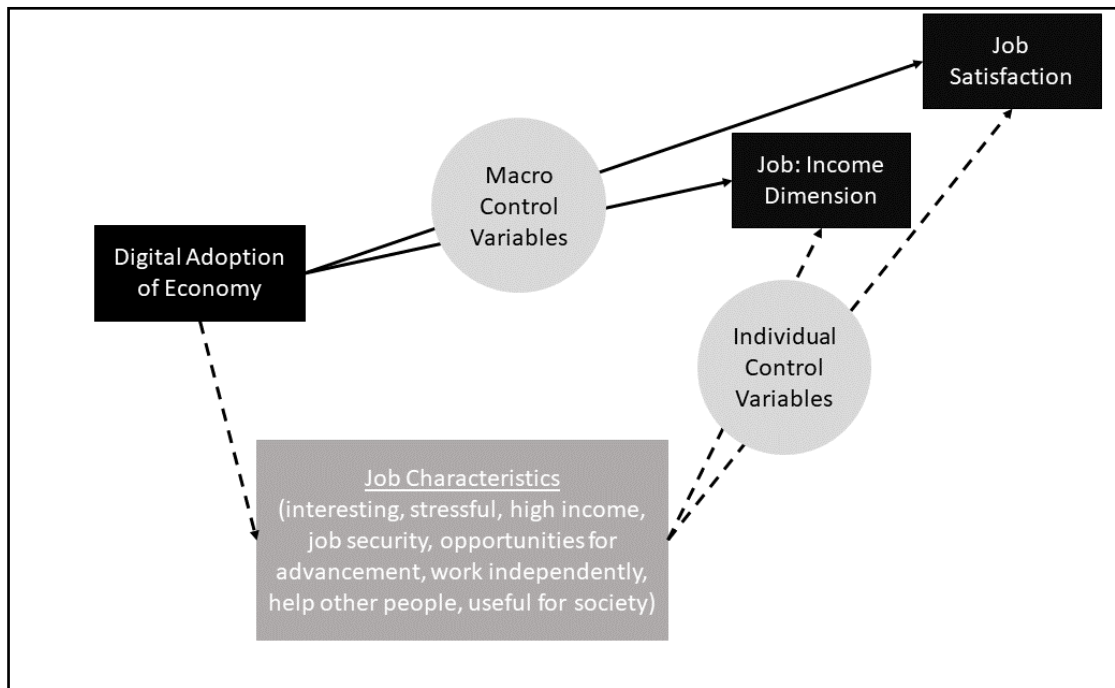


Fig. 1 Conceptual framework and estimation strategy

Besides any direct effects of digitalization on individual job satisfaction and work motivation there are surely also important indirect effects which have to be considered. When investigating whether individuals like their job and how satisfied they are with their tasks, job characteristics are among the most important variables at the individual level: is the job interesting? is it stressful? does the job provide opportunities of advancement? is it a secure job? All of these (partially subjective, partially objective) characteristics have a significant impact on how satisfied individuals are with their job. However, these job characteristics are also affected by the degree of digitalization of an economy. In digitalized economies, jobs may become more or less interesting or more or less stressful. Digitalization may also have an influence on job security or on earnings (perspectives); it may affect how often and intensive people need to interact with other individuals and the society and thus also affects the social component of a job. When estimating the effect of digitalization on job characteristics and on individual job satisfaction it is thus important to additionally include other individual control variables which concern job characteristics. This also entails characteristics of employees and eventual “matching” issues, like, for instance, age, gender, or education (skills) as they can also be expected to impact individual perceptions. In order to clearly identify the impact of digitalization from effects driven by other individual or macroeconomic variables, it is important to take all of these linkages properly into account.

3. Empirical Set-Up: Data and Estimation Methodology

While a number of studies discuss the likely impact of digitalization on employment, surprisingly few do so by exploring international survey data on how people (and workers) actually feel with digitalization. This contribution examines if and how digitalization affects individual perceptions of the workplace. The two core components for the analysis, the level of digitalization of an economy and how employees perceive their working conditions, are taken

from the World Bank and the ISSP. The ISSP (2022) conducts cross-country surveys on work place conditions at the individual level which can be matched with the Digital Adoption Index, presented by the World Bank (2016).

The Digital Adoption Index measures digitalization aggregated at the country level. The extensive index comes in four variants: an aggregated version (DAI) and three subindices for digitalization referring to people (DAI_P), business (DAI_B), and government (DAI_G). While the aggregated DAI uses equal weights to aggregate the subindices, the subindices themselves consist of several normalized indices which measure the digital adoption rate of each relevant group: people, business and governmental institutions. As this contribution focusses on individual perceptions as the endogenous dimension, we refer to the individual category, that is the digital adoption with respect to people (DAI_P), as the main digitalization dimension.

The World Bank calculates the DAI and its subcomponents for 183 economies in 2016. The adoption rate is scaled between 0 and 1. Considering all economies, the actual values of the aggregated DAI range from a minimum observed value of 0.15 (Central African Republic) to a maximum of 0.87 (Singapore), with an arithmetic mean of 0.52 and a standard deviation of 0.19. The people component of the DAI has a broader dispersion, with values ranging from a minimum of 0.01 (Central African Republic) to a maximum of 0.91 (Hong Kong SAR, China), an arithmetic mean of 0.45 and a standard deviation of 0.24. Table 1 displays the digital adoption as measured by the different components of the DAI for selected economies.

Economy	DAI	DAI People (DAI_P)	DAI Business (DAI_B)	DAI Government (DAI_G)
Germany	0.84	0.78	0.87	0.87
Japan	0.83	0.84	0.76	0.91
Denmark	0.79	0.90	0.92	0.56
UK	0.76	0.80	0.90	0.59
US	0.75	0.73	0.78	0.73
Russia	0.74	0.70	0.71	0.82
Poland	0.69	0.68	0.76	0.63
India	0.51	0.23	0.50	0.80
Philippines	0.49	0.44	0.57	0.47
Venezuela	0.49	0.40	0.55	0.52
No Countries (n)	180	183	183	180
Arith. Mean (\bar{x})	0.52	0.45	0.58	0.53
Stand. Dev. (σ)	0.19	0.24	0.19	0.2

Tab. 1 Digital adoption index (DAI) – selected economies in 2016

The DAI for Germany, for example, stands at 0.84. While business and government administration each reach a score of 0.87 on the scale, the people component in the DAI is considerably lower with 0.78. In India, the overall DAI is comparatively low at 0.51 with the government component higher (with a subindex of 0.8) and the digital adoption of the people scoring quite low at 0.23. In Denmark, however, the digitalization of people and of business scores high at 0.9, whereas there is apparently plenty of room with respect to digitalization of government (administration), which reaches a mere 0.56.

We combine the World Bank’s macro information on digital adoption with individual perceptions of the workplace, measured and published by the ISSP. The ISSP conducts a survey on work orientation and collects around 100 different work place characteristics from more than 50,000 employees in 37 economies across the globe. Table 2 provides an overview of the endogenous variables of main interest for this study, namely ‘overall job satisfaction’ and, more specifically, the ‘income dimension of job satisfaction’. With respect to overall job satisfaction, we draw on the variable v44 of the ISSP: in 2016, employees were asked, “how satisfied are you in your (main) job?” with possible answers (1) “completely satisfied”, (2) “very satisfied”, (3) “fairly satisfied”, (4) “neither satisfied nor dissatisfied”, (5) “fairly dissatisfied”, (6) “very dissatisfied”, and (7) “completely dissatisfied” (or (8) “can’t choose”). Next to the overall job satisfaction, we include a variable that captures in particular the income dimension. In variable v1 of the ISSP, employees were asked whether they consider “a job just a way of earning money – not more”. Potential answers were (1) “strongly agree”, (2) “agree”, (3) “neither agree nor disagree”, (4) “disagree”, (5) “strongly disagree” (or, again, (8) “can’t choose”). Table 2 summarizes the information at the country level, including the absolute (and relative) frequencies of the two variables for selected economies with the number of people (absolute frequencies) and percentages (relative frequencies) for individual countries arranged in columns.

In Germany, for instance, a total of 1,072 employees answered the question how satisfied they are in their (main) job. 129 individuals of them (that is, 12%) stated that they are completely satisfied with their job, 385 (or 36%) are very satisfied, 422 (39%), that is the largest number of employees, said that they are fairly satisfied with their job. While 87 people (8%) were neither satisfied nor dissatisfied, 37 (3%) were fairly dissatisfied with their job, 7 people (1%) very dissatisfied, and 5 (0%) were completely dissatisfied. In India, a total of 659 individuals answered the question regarding overall job satisfaction. While 182 employees stated that they were completely satisfied and 183 that they were very satisfied (with both categories around 28%), only 165 (25%) stated that they were fairly satisfied, 85 (13%) that they were neither satisfied nor dissatisfied. The share of individuals that were completely satisfied with their job thus was significantly higher in India (28%) than in Germany (12%). From a macro perspective, we know that people in Germany are generally significantly more digitalized (with a DAI_P of 0.78 in Germany vs. 0.23 in India). However, Germany also scores substantially higher when it comes to GDP per capita (41,682 USD for Germany vs. 1,490 USD for India in 2016). Whether macro indicators like average income levels have a significant effect on individual job satisfaction and its direction will be analyzed in detail in the section below in order to disentangle both channels, digitalization and income.

Q: How satisfied are you in your (main) job? (ISSP, v44): Absolute and relative frequencies

<i>Answers</i>	Germany	United States	India	Venezuela	Total
Completely dissat.	5 (0%)	7 (1%)	4 (1%)	3 (1%)	217 (1%)
Very dissatisfied	7 (1%)	20 (2%)	10 (2%)	1 (0%)	435 (2%)
Fairly dissatisfied	37 (3%)	52 (6%)	30 (5%)	13 (3%)	1,322 (5%)
Neither sat. nor dissat.	87 (8%)	54 (6%)	85 (13%)	3 (1%)	3,183 (11%)
Fairly satisfied	422 (39%)	293 (31%)	165 (25%)	95 (25%)	10,333 (37%)

Very satisfied	385 (36%)	343 (37%)	183 (28%)	140 (37%)	8,248 (29%)
Completely satisfied	129 (12%)	164 (18%)	182 (28%)	126 (33%)	4,304 (15%)
<i>Total No. of Observations</i>	1,072 (100%)	933 (100%)	659 (100%)	381 (100%)	28,042 (100%)

Q: A job is just a way of earning money? (ISSP, v1): Absolute and relative frequencies

<i>Answers</i>	Germany	United States	India	Venezuela	Total
Strongly disagree	297 (19%)	220 (15%)	66 (5%)	209 (21%)	6,766 (14%)
Disagree	605 (38%)	605 (41%)	116 (9%)	60 (6%)	14,827 (30%)
Neither agr. nor disagr.	173 (11%)	242 (16%)	147 (11%)	22 (2%)	7,536 (15%)
Agree	336 (21%)	277 (19%)	499 (38%)	139 (14%)	13,783 (28%)
Strongly agree	187 (12%)	128 (9%)	488 (37%)	568 (57%)	7,105 (14%)
<i>Total No. of Observations</i>	1,598 (100%)	1,472 (100%)	1,316 (100%)	998 (100%)	50,017 (100%)

Tab. 2 Absolute and relative frequencies with respect to job satisfaction and its income dimension – selected countries

Regarding the income dimension of job satisfaction, the bottom part of Table 2 shows that in Venezuela, for instance, 568 employees (57%) strongly agreed with the statement that a job is just a way of earning money, 139 individuals (14%) agreed, whereas 22 (2%) neither agreed nor disagreed. 60 individuals (6%) disagreed and 209 individuals (21%) strongly disagreed that a job is just a way of earning money. In the US, by contrast, 128 individuals (9%) strongly agreed that a job is just a way of earning money, whereas 605 (41%) disagreed. Again, whether indicators like digitalization or GDP per capita are part of the explanation in these differences and their weight as well as their direction requires a thorough econometric analysis.

When estimating the effects of digital adoption on individual job satisfaction, it is thus necessary to consider relevant and important variables in order to control for as much variance as possible, to disentangle the various effects and channels, and to increase the goodness of fit of the model. As we combine in our approach individual variables with aggregated information at the country-level, it is important to include individual as well as macroeconomic control variables. At the level of the individual, we control for the age of the individual, the gender, the years of education and the highest degree of education achieved. All of these variables are known to have an impact on perceptions as to the work and the workplace. In addition, we take individual job characteristics as control variables into account that capture individual variance with regard to the job situation. Specifically, we control for job security, whether the income of the individual is high, whether the job provides opportunities of advancement, whether the job is interesting, whether the individual can work independently, whether the job provides the opportunity to help other people, whether the job is considered useful for society and whether the job requires personal contact with other people. All of these individual control variables are taken from the ISSP data and all of them are of crucial relevance when estimating the determinants of individual job satisfaction. As to macroeconomic control variables, we include the log of GDP per capita of the economy (GDP per capita at constant 2015 USD), the employment to population ratio, the unemployment ratio, government expenditures on tertiary education and final consumption expenditures by the government. All macroeconomic control variables are taken from the World Development Indicators (WDI) as published by the World Bank (2023).

Overall, our final data set thus consists of the main endogenous variable(s), individual job satisfaction and the income dimension of job satisfaction, of our main exogenous variable, the digital adoption of the people in an economy, and additional individual and macroeconomic control variables. Estimations are based on the information of more than 50,000 individuals in 37 countries.

Before presenting the estimation results, we briefly address some peculiarities in the econometric approach. As the endogenous variables job satisfaction and its income dimension both are measured on an ordinal scale with the outcome variables categorical with a definite number of categories, the most suitable model is an ordered logistic regression model for estimating the impact of digital adoption on individual job satisfaction.

A further, specific, challenge of our approach is that the exogenous variable of main interest (that is the digital adoption rate) is measured at the country level. When using this international data along with perceptions at the individual level as endogenous variable, we thus firstly have to account for this multilevel character of the data set. We do so by clustering the error matrix at the country level. Otherwise, the significance of the estimated coefficients would be overestimated, which may yield significant results for the macro variables (including the digitalization) although a correct estimation might not. Secondly, in exploring the data, we must control for other factors which might conflate the answer. These factors may also be related to individual or country specific circumstances. Hence, we have to take account of this fact in a multi-level fashion too. We do so by estimating the impact of the DAI on individual job satisfaction and its income dimension by including (i) individual control variables and specific job characteristics and (ii) cross-country macro data, which might shape answers. This especially holds for information on general living standards as measured by income at purchasing power per capita, employment to population ratios, the percentage of the population with tertiary education, and final consumption expenditures. Controlling for differences in the macro environment, we are thus able to distill information at the micro level with particular relevance to management issues at the level of the firm.

4. Results: Depressing Effects of Digitalization

To discuss the impacts of digital adoption on individual perceptions at the workplace, we mainly focus on a graphical presentation of the results. The margin plots in Figs. 2 and 3 summarize the core results of our multidimensional logit estimation in an intuitive way. They indicate how the probabilities of rating the work environment according to Table 2 (ranging, for instance, with respect to job satisfaction, from “completely dissatisfied” to “completely satisfied”) are affected by marginal changes in the digital adoption scores. Figure 2 has the first set of results. The seven panels of Fig. 2 correspond to the seven categories of the answer to the question in Table 2 about job satisfaction. The leftmost panel in the top row thus tracks the probability of individuals answering as being “completely dissatisfied” in their job, with the percentage depending on the digital adoption rate of the people in the economy; the second panel in the top row shows the probability of answering “fairly dissatisfied”, etc. etc., up until the highest level of job satisfaction in the rightmost panel in the bottom row.

Two results stand out: firstly, the majority of people, namely 45 percent, report in the upper range, saying that they are either “very satisfied” or even “completely satisfied” in their (main) job in the context of digitalization; secondly, going from the top left to bottom right, the probability of answering in one category or another, which is plotted on the vertical axis, shows substantial variation with digitalization as measured by the World Bank’s digitalization index -- and the impact seems to be depressive: the probability of employees answering either that they are “very” or “completely” satisfied goes down with digitalization increasing (as visible in the bottom row, in the rightmost panels), while, correspondingly, those reporting to lower levels of job satisfaction, such as those taking a neutral stance or being just fairly satisfied, goes up – and some even feel negatively affected (displayed in the top row). The probability of answering in the positive thus decreases, while, correspondingly, the probability of answering in the negative with respect to job satisfaction increases.

The seven panels corresponding to levels of job satisfaction in the questionnaire summarize what people might answer -- based on the actual data -- if they were confronted with an increase in digitalization as measured by the index. The gray area around the downward or upward sloping lines in each panel indicates in any case the variation the answers might take (within a confidence of 95 percent). While the percentage of the answers falling in a specific category might be slightly lower or higher as indicated by the gray area around the lines, the variation of the outcome variable is within quite narrow a range around the estimated lines. The depressing effect thus stands up to statistical errors in the measurement.

Notably, the panels in Fig. 2 already reflect the entire set-up of the ordinal logit estimation. The displayed results show the distribution of answers over the categories and how they change with digitalization when controlling for all the other variables at the micro- and the macro-level which might also influence job satisfaction, and it accounts for the clustered structure of the error term. Being stripped from these (other) factors, results thus depict the impact that can exclusively be attributed to digitalization at the country level.

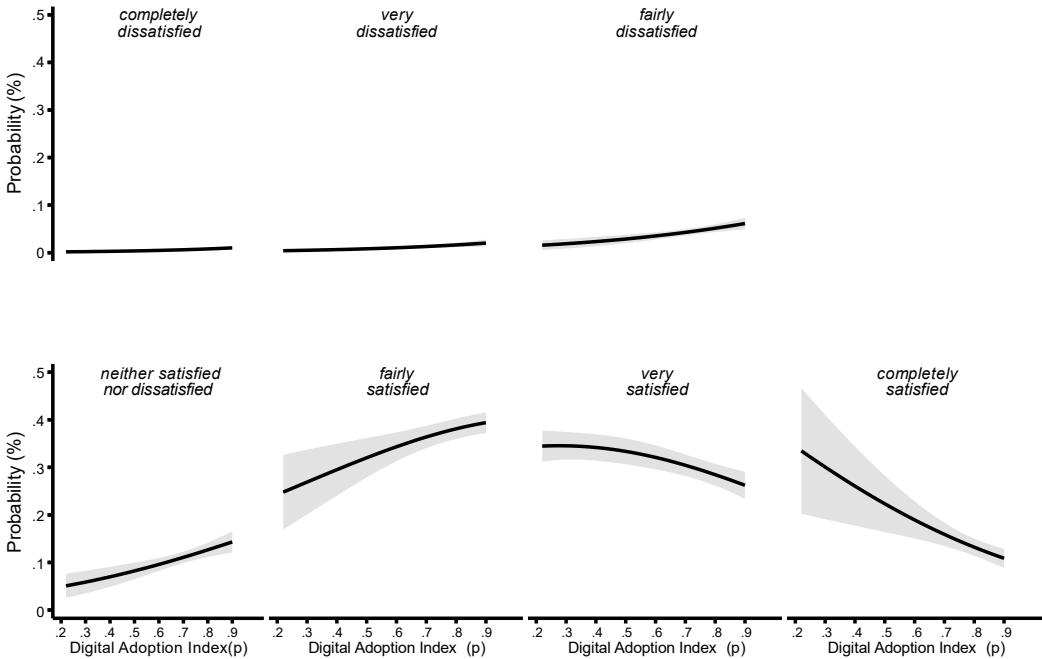


Fig. 2 Impact of digitalization (DAI_P) on job satisfaction: Predicted probabilities based on international survey data

Naturally, and, as previously mentioned, digitalization can also be expected to affect the pecuniary dimension of job satisfaction (see also AWS-Gallup 2022). The ISSP contains detailed survey data on the income dimension of job satisfaction as well, in particular, whether a job is considered as just a way of earning money (ISSP, variable v1) or whether it has some intrinsic value from the employee’s perspective. Answers to the question range from “strongly disagree” to “strongly agree”, in this case, as Table 2 shows, covering five ordered categories, but again with the actual answers quite unevenly distributed over the categories. The variation within and across countries suggests that, here, a closer look at the data might, as well, deliver insights into the question whether digitalization changes the motivational structure (and, if so, how), thereby addressing increasingly important matters in human resource management, such as, for instance, the mixture of pecuniary and non-pecuniary compensation.

Figure 3 shows the distribution of probabilities of answering to a specific category depending on the extent of digitalization while again controlling for other factors which might influence how people rate their jobs, this time, specifically with respect to the income dimension of job satisfaction.

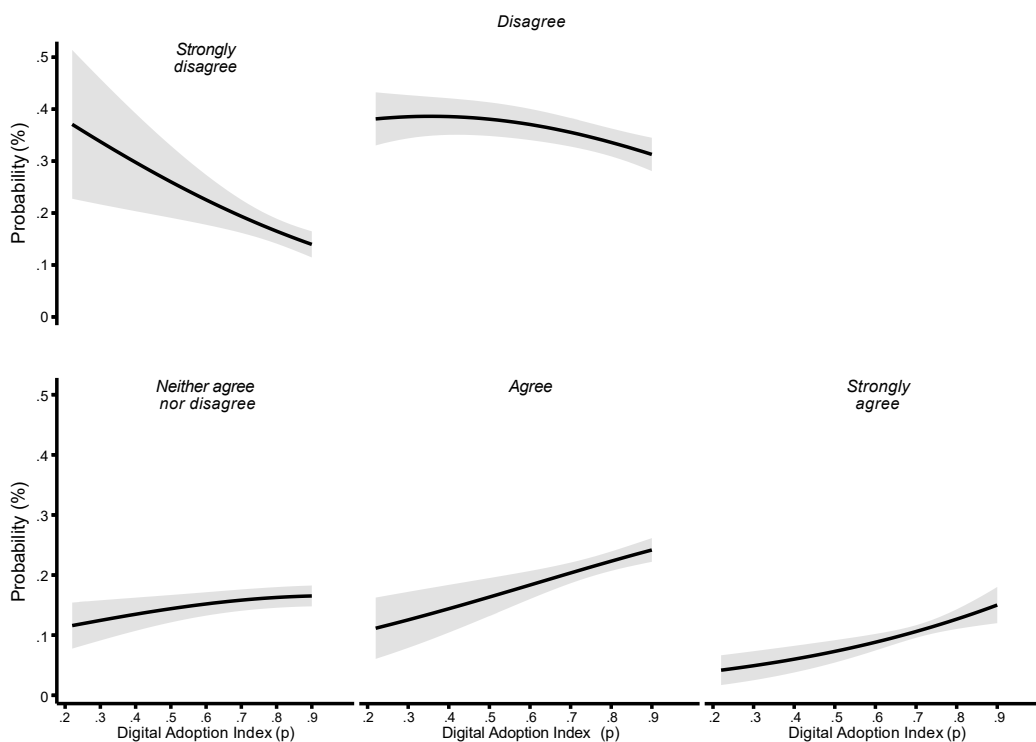


Fig. 3 Impact of digitalization (DAI_P) on job attitudes: Predicted probabilities of whether the job is (just) seen as a way of earning money

Panels in the bottom row of Fig. 3 reveal that the probability of answering the question whether a job is just a way of earning money with “agree” or even with “strongly agree” significantly increases as the digital adoption of an economy proceeds. The top row, by contrast, indicates that, with digitalization, a lower share of individuals probably “strongly disagree” or “disagree” with the statement that a job is just a way of earning money.

Wrapping up, a thorough econometric analysis that disentangles the various determinants of job satisfaction and its dimensions, thus reveals that individual job satisfaction significantly decreases with digitalization, whereas the income dimension of job satisfaction significantly increases, meaning that more and more people see a job just as a way of earning money.

Both results with respect to job satisfaction point towards a clear direction. A detailed analysis of international (survey) data thus spotlights the importance for the management of a firm to actively engage in the labor aspect of digitalization in order to realize any digital dividend. From a managerial perspective, one might distinguish two groups of variables important for management at the micro level enfolding a leverage on the two dimensions, overall job satisfaction and its income dimension, which might be labeled “hard” variables and “soft” variables. Variables of the former refer to the characteristics of the workforce. Prima facie, some of these variables might be considered data at the individual level, such as gender, age, years of education and degrees attained. Nevertheless, they may reveal information about how the composition of the workforce at the firm level, which is (at least partially) a management issue, affects how well digitalization is being managed. It allows, for instance, to make conclusions about necessary skills, issues of diversity, and in-house training measures in raising productivity with digitalization (via betterment of job satisfaction). Two of the “hard” variables that show a significant impact on job satisfaction are actually the age and the education of the employees. While age seems to have a positive nexus with job satisfaction, education seems to be negatively correlated. In order to reap any digital dividend, or to ease distress with digitalization, management could, for instance, take care of a proper age composition which also considers elder people. A special focus on guidance and adoption support could be set on the higher educated employees as they are apparently those being more easily depressed by digitalization.

Variables of the second group refer more closely to workplace characteristics, with some of them eventually subjective, namely feelings about job security, income comparisons, opportunities for advancement, or even more so, whether the job is considered interesting or mainly for making a living, whether it is considered as stressful or various other social dimensions. As described in Fig. 1, job characteristics are among the key determinants of individual job satisfaction. For management, it is thus important to understand and possibly to form to some extent the nexus between digitalization – job characteristics – and job satisfaction. Characteristics that significantly affect job satisfaction are, for example, job security, a high income, opportunities for advancement, interesting tasks and an independent work environment.⁴ These are important setscrews the management could use to accompany and support their employees in the process of digitalization in order reap a digital dividend. Recent literature also contains some indication that what matters is motivation and employee retention for job satisfaction and, consequently, for the productivity of a firm. Supposing that job satisfaction is a crucial factor in productivity and in gaining an edge over competitors (either by attracting new workers or by selecting individuals for upper management positions), as much of empirical evidence shows, the depressing impact indicates the leverage of leadership at the level of the firm. If the management fails to deal with the nexus of digitalization and job

⁴ For a discussion on how different Generation (with a focus on the Gen Z) deal with digitalization when taking over responsibility and leadership roles in management, see Silke Schätzer & Katharina Olschewski “About the mindset of a leader who is a Gen Z and why this generation will be the pioneer of innovative leadership roles”. A discussion on how executive coaching can contribute to form a digital mindset necessary to cope with the challenges of digitalization can be found in Rainer Zeichhardt “How to develop a digital mindset – insights from executive coaching in Germany”, both also published in this Volume “Leadership for Digital Transformation”.

satisfaction proactively, firms may not (only) waive a possible digital dividend, but may also be at a disadvantage in an increasingly tight labor market, suffer from quit and stay or actually lose employees. (see, for instance, Vieira et al. 2023, or Pelly 2023). Satisfaction with digitalization does not come by itself, nor is a productivity effect for sure, but substantially depends on how well it is managed.

5. Conclusions

Even though research has illuminated the positive correlation of job satisfaction on productivity and thus the importance of individual perceptions of the work and the workplace, most contributions, which investigate the effects of digitalization focus on employment issues and less so on job satisfaction. There is thus the need for a thorough understanding of the nexus between digitalization and how individuals perceive the change in working conditions.

Regarding digitalization, the literature distinguishes between an augmenting and an automating impact on labor. In case of augmentation, productivity of the workforce increases. When the automating effect dominates, labor is being substituted. As those effects clearly work in opposite directions, the question arises as to the role of management. Can the management of a firm influence the nexus between digitalization and job satisfaction? In case of an automating effect and a negative impact on perceptions, (how) can management ease the distress of labor which might go along with changes in the technology? In case of an augmenting effect, (how) can management set the basis for realizing a possible digital dividend and a sharing in the gains?

In order to understand the effects of digital adoption in an economy on individual perceptions of workplaces and tasks and to obtain some insights into the management issues, we have put together a comprehensive cross-sectional set of data from 2016. As main exogenous variable we refer to the Digital Adoption Index (DAI) provided by the World Bank. The index measures digital adoption of the people in 180 countries. As our main endogenous variable, we use individual job satisfaction from the ISSP. The ISSP asked more than 50,000 individuals in 36 countries about their perceptions of the workplace and the job itself. The data is completed by a range of individual and macroeconomic control variables, taken from the ISSP and the World Development Indicators, also published by the World Bank.

As our endogenous variable(s) are measured on an ordinal scale, we applied ordered logit regressions to identify the effects of digitalization on job satisfaction. On the one hand, our results show that digital adoption of an economy has a significant negative impact (on individual job satisfaction). As the digitalization, as measured by the DAI of an economy, increases, job satisfaction decreases. On the other hand, the income dimension of job satisfaction increases. This means, that when digitalization moves forward, more and more people state that a job is just a way of earning money – not more. Both of these results indicate the leverage leadership has at the level of the firm. Digging deeper into the data, it is possible to spot job and workforce characteristics on which management could focus when proactively managing the impact of digitalization on human resources, such as, for instance, the composition of pecuniary and non-pecuniary compensation, the composition of the workforce (age structure, education), opportunities for advancement and income perspectives, and age-specific employee development.

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