The Knowledge Economy and Quality of Work in the Future: An Exploratory Study

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Abstract: The emergence of digital technologies is transforming economic paradigms and leading to significant changes in product and factor markets, as well as how businesses operate. While these technologies enhance productivity, they also present new challenges for businesses regarding manufacturing methods, sources of competitive advantage, and market structures, impacting how work is conducted. Workplace transformations are happening at a faster pace than anticipated, raising important questions for employees, business decision-makers, and policymakers. We conducted an exploratory study to analyze the realism of the Knowledge Economy model's perspective on workplace changes. The study was based on a non-exhaustive literature review and an empirical study conducted with professionals from companies in Portugal belonging to several sectors of activity. Our research leads to the conclusion that the Knowledge Economy model, through technological innovation, has shaped the quality of work, bringing new insights and self-engagement of employees. However, digitalization might induce urgent needs for reskilling and upskilling. Therefore, it is essential to request such a challenge not only to employees but also to organizations and public authorities by investing in lifelong education and training and implementing policies, actions, and tools to facilitate the digital economy transition. Such proactive measures will propel the labor market towards greater availability of decent work, foster a more inclusive society, and promote social well-being and economic prosperity.

Keywords: Knowledge economy, Technological innovation, Labour market, Quality of work, Sustainability

1. Introduction

In the era of the Knowledge Economy and Sustainable Development, where countries integrated into the World Trade Organization, businesses, and markets are undergoing significant structural changes driven by digital transformation, impacting work conditions. This question has become even more pertinent in the new millennium, particularly after the recent Covid-19 pandemic. The digitalisation of processes in businesses and companies has experienced a sudden acceleration, leading to the rapid adoption of organisational innovations, and significantly increasing work flexibility in terms of both mode and location (Jaumotte, Oikonomou, Pizzinelli, & Tavares, 2023; Stalmachova, Chinoracky, & Strenitzerova, 2022; Williamson et al., 2021). The shift towards remote working has been accelerated, and the development of digital technologies has enhanced their implementation for this way of working (Battisti, Alfiero, & Leonidou, 2022).

Globally, it is estimated that approximately 81% of the workforce has been impacted by total or partial workplace closures, necessitating swift adaptation to a new reality dominated by rapid and irreversible technological changes (Savić, 2020). This period has marked a fundamental milestone, prompting individuals and organisations to navigate the challenges and opportunities presented by the digital age.

To ensure the sustainable growth of businesses, it is crucial for entities to adapt to the new needs and demands of an increasingly skilled workforce to attract and retain the best talent (Forbes, 2021), in accordance with the *Decent Work Agenda* (International Labour Organization, 2023). The 2018 reports from the World Economic Forum (2018a; 2018b) confirm the urgent need for the reskilling of millions of jobs that are at risk of becoming obsolete. In line with this reasoning, an earlier report by McKinsey (2017) states that for about 60% of occupations, at least one-third of activities could be automated, implying significant transformations and changes for all workers, who should, together with their employers, determine how to remain relevant and which tools to utilise.

In a relatively recent report from the International Labour Organization (2019), the following aspects are highlighted as needing increasing attention: the universal right to lifelong learning, support for individuals during transitions, a transformative agenda for gender equality, and stronger social protection in the face of the imminent threat to jobs resulting from digital transformation. The report also emphasises that all countries should prioritise investment in people's capabilities as part of government policy, valuing work as a driver of human development.

The European Commission's research and policy initiatives since the last decade have shed light on the multidimensional nature of quality of work and provided valuable insights into its determinants and strategies for improvement (European Commission, 2016, 2017 and 2019). Organisations and policymakers can create high-quality work environments that foster employee well-being, productivity, and sustainable growth by addressing working conditions, psychosocial risks, skills development, and promoting social dialogue.

In this current global economic scenario of transformation and uncertainty regarding modes of work, job satisfaction, technology, and learning, this research aims to answer the question: What is the future of work in most sectors of activity globally and, incidentally, in Portugal?

Essentially, the objective is to identify the main challenges, opportunities, and risks for individuals based on an exploratory study, encompassing theoretical contributions from "classic" authors such as Adam Smith and Karl Marx, as well as evolutionary and new institutional economics perspectives. The discussion also includes authors affiliated with management theoretical currents, particularly resource-based, transaction cost, and agency theories (Teece, 2019). The novelty of this paper lies in its empirical evaluation, which includes a heterogeneous spectrum of companies and organizations, both in the private and public sectors. Overall, the paper aims to contribute to the knowledge and understanding of workplace changes within the context of the knowledge economy in Portugal, providing insights for policymakers, scholars, and other stakeholders.

Bearing in mind the object of our research, the paper contains the following structure. The Section 2 includes a literature review focused on this research's underlying concepts and key issues: the concept and foundations of the knowledge economy, the historical antecedents of the economic concept of quality of work, and digitalisation and expected consequences for the future of work. The Section 3 describes an empirical study on the Portuguese labour market aimed at gathering data on the perception of employed individuals, followed by the analysis of the results in Section 4 and the research conclusions in Section 5.

2. Theoretical Framework

The literature supporting this article was collected using several databases: B-On-Online Knowledge Library, Scopus, and Web of Science. To refine the search, we have set limits on the publication dates of articles to include papers published mostly from 2014 onwards, with a special focus on last 4 years. Older references were included in our research due to their valuable insights and significant theoretical contributions pertaining to our research question.

2.1 Knowledge Economy

The knowledge economy refers to an economic system in which knowledge generation, distribution, and application play a central role in wealth creation and economic growth (Foray, 2004; OECD, 1996; World Bank, 1999). Unlike traditional economies that heavily rely on tangible resources and physical labour, the knowledge economy places a greater emphasis on intangible assets and dynamic capabilities such as intellectual capital, learning, innovation, and information (Bogers et al., 2019; Florida, 2002; Lundvall, 1992; Machlup, 1962). As key characteristics, the literature widely recognizes the following:

- Knowledge Creation and Innovation: The knowledge economy (KE) thrives on continuously generating new knowledge through R&D and innovation (OECD, 1996). It recognises the importance of intellectual property and encourages the protection and commercialisation of ideas (Hou et al., 2023; Carayannis & Campbell, 2009).
- Information and Communication Technologies (ICT): These are fundamental enablers of the KE. Digital platforms, internet connectivity, and data analytics facilitate the efficient dissemination, interactive learning and knowledge spillovers across borders and sectors (Yang et al., 2023; Hwang & Krackhardt, 2020; Audretsch & Feldman, 1996; Drucker, 1992, 2017; Lundvall, 1992).
- Human Capital and Skills: The KE relies on a highly skilled workforce capable of acquiring, applying, and adapting knowledge to address complex challenges. Education, lifelong learning, and a culture of innovation are essential for developing human capital in such an economy (Öberg & Alexander, 2021; Oliveira & Turčinková, 2019; Florida, 2002; Audretsch & Feldman, 1996).
- Collaboration and Networking: Partnerships between individuals, organisations, and institutions are vital to leverage collective knowledge, share expertise, and promote cross-sectoral collaborations (Cai, Ferrer & Lastra, 2019; World Bank, 1999; Edquist, 1997; Oliveira & Natário, 2016; Machlup, 1962).

The Knowledge Economy (KE) plays a vital role in driving economic growth, fostering innovation, and enhancing competitiveness. It promotes the transition from low-value, labour-intensive industries to high-value, knowledge-intensive sectors (Hwang & Krackhardt, 2020). Knowledge-based industries such as technology, finance, research and development, and creative services contribute significantly to GDP and job creation in the world economy (UNCTAD, 2022).

Furthermore, the KE encourages sustainable development by focusing on social innovation. New problem-solving insights, concepts, activities, services, and applications can provide an appropriate platform for the exchange of creative and innovative ideas, research findings, experiences, and skills between university, industry, and society in a kind of "community engagement" to meet business and social needs (Phonthanukitithaworn et al., 2023; Rashid et al., 2023; Bogers et al., 2019).

To synthesise, the KE represents a shift towards an economy driven by the creation, distribution, and application of knowledge (OECD, 1996). It emphasises the importance of intellectual capital, technological advancements, and skilled human resources (Phonthanukitithaworn et al., 2023). Understanding the concept of the KE is crucial for policymakers, businesses, and individuals to adapt to the changing dynamics of the globalised, digitalised, and innovation-oriented world. By harnessing the power of knowledge, societies can foster economic prosperity, sustainable development, and societal well-being (Wang et al., 2022).

2.2 Quality of Work

Work conditions have been a significant aspect of the history of economic thought. Adam Smith was a pioneer in addressing the topic of work quality, analysing the process of creating competitive advantages for countries in international markets based on labour costs and free trade. In "The Wealth of Nations" (1776), Smith argued that improving facilities, tools and providing a safe and healthy environment for workers could increase their productivity, reduce unit labour costs, and consequently contribute to the accumulation of capital for the nation. This pioneering author recognised that the labour division could lead to monotonous and repetitive tasks for workers, having eventually negative effects on their psychological and emotional well-being, resulting in a sense of alienation. However, despite these concerns, Smith believed that the overall balance of such division would be positive for society due to the productivity gains it provided.

With a less optimistic view than Adam Smith regarding the virtues of private initiative and the "invisible hand", Karl Marx proposed a radical analysis of the process, relationships, and the very concept of work. In "Das Kapital" (1867), Marx exposes his thesis on the asymmetrical relationship between workers and employers: the former sell their labour power as a common commodity, while the latter purchase that labour-power with the prerogative to determine the time and value paid for it. Based on this premise, during each daily work shift, the worker receives enough to ensure their subsistence. At the same time, there exists a surplus period that benefits the employer (the holder of capital), during which "surplus value" is generated. Surplus value is defined as the portion of the value obtained at the expense of the worker and appropriated by the capitalist (employer). This dichotomous perspective advocate for an antagonistic relationship between employers and workers.

A more contemporary approach is labour market segmentation, proposed by Doeringer and Piore (1971). According to the authors, such market is divided into primary and secondary segments. In the primary segment, you find the "good" jobs, occupied by the most skilled workers, with better salaries and the possibility of career progression, without the risk of losing their jobs to less qualified and poorly paid workers. In the secondary segment will be found only the jobs considered as "bad," intended for workers with low qualifications, lower wages, more precarious working conditions, and having to deal with competition from cheap labour from abroad. Thus, in the theory of labour market segmentation, contractual relationships and job characteristics play a fundamental role in determining the quality of work.

Over the past decade, the European Commission has undertaken extensive research and policy initiatives to promote high-quality work environments. The European Commission emphasises that quality of work encompasses various dimensions beyond mere job stability and income. It includes factors such as job security, work-life balance, skills development, social dialogue, health and safety, and career progression (European Commission, 2017 and 2019). Understanding these dimensions helps to identify the key determinants of high-quality work and shape effective policies.

Previous academic studies also provide recommendations such as promoting work-life balance, providing support for mental health, fostering positive working relationships, and implementing prevention measures (e.g., Wynne et al., 2014). Skills development is crucial for ensuring high-quality work and maintaining

employability. About this the EC highlights the importance of lifelong learning and continuous upskilling to adapt to evolving job requirements (European Commission, 2016). Initiatives such as the *European Skills Agenda* emphasise the need to enhance digital, green, and social skills to promote quality of work and facilitate transitions in the labour market.

More recently the European Commission has emphasised the importance of social dialogue and worker involvement in shaping the quality of work (European Commission, 2019). Engaging workers and their representatives in decision-making processes leads to more inclusive workplaces and better outcomes. The 2019 report also highlights the significance of factors such as work intensity, job demands, work schedules, and job control in determining the quality of work. It suggests that favourable working conditions contribute to higher job satisfaction, increased productivity, and better overall well-being of employees. Psychosocial risks, such as stress, bullying, and harassment, pose significant challenges to the quality of work.

The report emphasises, in a final statement, the need to address these risks through effective policies and practices through effective social dialogue mechanisms, worker participation, and collective bargaining to improve working conditions and promote the quality of work (European Commission, 2019).

2.3 Digitalization and the Future of Work

Digitalisation, also commonly known as digital transformation, refers to the adoption of digital tools, such as cloud computing, artificial intelligence (AI), machine learning, and the Internet of Things (IoT), cloud computing, among others, aiming to create value for organizations and clients (Calderon-Monge & Ribeiro-Soriano, 2023). These technologies enable the collection, storage, analysis, and utilisation of vast amounts of data, facilitating efficient decision-making and improving the overall operational effectiveness of organisations.

The impact of digitalisation on the quality of work – e.g., new processes such as telework, remote work or hybrid work - is a crucial area of study (Gifford, 2022), as it has significant implications for employees' well-being, productivity, and job satisfaction (Eurofound, 2023).

Technological innovation, underlined to digitalisation as defined above (which is commonly accepted as the back stone of digital transformation in productive systems), has revolutionised the way we work, transforming industries and redefining the concept of quality of work (Brynjolfsson & McAfee, 2014). How technological advancements have influenced the quality of work, highlighting both positive and negative aspects.

Drawing on relevant research and studies, we can gain valuable insights into the multifaceted relationship between technological innovation and work quality, namely:

- Enhanced efficiency and productivity: Technological innovation has significantly improved efficiency and productivity in the workplace. Automation, artificial intelligence, and machine learning have streamlined processes, reduced human error, and increased output (Ramachandran et al., 2022). A study by Brynjolfsson & McAfee (2014) found that advanced automation technologies led to a 5-20% increase in productivity across various industries. The improved efficiency resulting from technological innovation positively impacts the quality of work by enabling employees to focus on more complex tasks and fostering a sense of accomplishment.
- Skill enhancement and workforce adaptability: Technological innovation has shifted the required skill sets for many job roles. While automation may replace repetitive and mundane tasks, it also creates opportunities for skill enhancement and workforce adaptability. Employees can acquire new skills to operate and manage emerging technologies, leading to a more knowledgeable and versatile workforce. A study by the Organisation for Economic Co-operation and Development (OECD, 2019) highlights that individuals with higher levels of digital skills tend to have better job prospects and higher job quality. Thus, technological innovation contributes to improving work quality by encouraging continuous learning and professional development.
- Work-Life balance and flexibility: The advent of technological innovation has brought about remote work and flexible work arrangements, significantly impacting work-life balance. Employees now have the freedom to work from home or choose flexible working hours, allowing them to better manage personal and professional commitments. This flexibility has been shown to positively influence work quality, job satisfaction, and overall well-being (International Labour Organization, 2022). Technology-enabled communication tools and collaboration platforms facilitate seamless connectivity and efficient teamwork, further enhancing the quality of work in a remote or flexible work environment (Allen et al., 2015).

- Potential for deskilling and job insecurity: While technological innovation has numerous benefits, there are concerns regarding deskilling and job insecurity. Automation and AI can potentially replace certain job functions, leading to a mismatch between workers' skills and the demands of the evolving job market (Au-Yong-Oliveira et al., 2019). This could result in job insecurity and decreased work quality for individuals who are unable to adapt. A study by Acemoglu & Pascual (2020) highlights that workers in industries that are highly exposed to automation experience adverse effects on job quality, showing theoretically that robots may reduce employment and wages. It is crucial for organisations and policymakers to address these challenges and provide reskilling opportunities to ensure a sustainable and inclusive work environment (World Economic Forum, 2018b).

According to the previous points it is possible to draw the following considerations with respect to the purpose of our research, Technological innovation has both positive and negative implications for the quality of work. It enhances efficiency, productivity, and workforce adaptability, improving job satisfaction and opportunities for skill enhancement.

Additionally, technological advancements enable flexible work arrangements, promoting work-life balance. However, concerns regarding deskilling and job insecurity need to be addressed to ensure a smooth transition and inclusive work environment. Organisations, policymakers, and individuals must collaborate to harness the benefits of technological innovation while mitigating its potential negative consequences (European Agency for Safety and Health at Work, 2023), thus fostering a high-quality work environment in the era of technological advancement (Eurofound, 2023; Ramachandran et al., 2022).

3. Empirical Study

To gather empirical evidence regarding Portuguese employees' perceptions concerning digitalisation's future impact on their jobs, we rely on data collected from an inquiry fully presented in Anjos (2021). The inquiry utilised online questionnaires. All the issues included ordinal scales of response, as well as multiple choice to realise a descriptive analysis strictly based in relative frequencies.

Regarding to data collecting a non-probabilistic sampling method of the snowball type was applied during the pandemic years of 2020-21. A total of 280 workers from various sectors of activity, including banking, insurance, management, consulting and accounting services, education, real estate, public administration, ICT, health, warehouse and logistics, and legal services, participated in the survey. The most frequent activity was banking and finance sector (66%), overrepresented in our sample compared to Portuguese share. About the other activities essentially these are services divided into a huge diversity, where public services are reduced to around 6% of the inquired people (which is underrepresented according to the national reality).

Most respondents were senior workers with over 20 years of professional experience in their respective fields, mainly in the financial services sector, almost all with effective work contracts. Regarding to age, 88% were 42 or more years old, and 61% were men. Notice that 18% had a secondary level of education. About education level, 81% have tertiary education (54% have a bachelor, 15% a post-graduation and 10% a master's degree). Personal's gross monthly income was mainly between 1.500 and 3.000€ (41%), followed by the interval of 3.001 and 5.000€ (26%).

In the following section, we present and discuss the results derived from the survey realised in 2021, going further in terms of illustration and discussion by bringing new insights.

4. Results Analysis

In the context of digitalisation, with the aim of assessing the potential replaceability of current job positions by machines, approximately 75% of the respondents stated that they engage in tasks involving complex problem-solving, imagination, and creativity on a weekly basis.

These tasks rely on typically human characteristics and are difficult to replicate by machines, indicating that a significant portion of the workforce involved in such activities is unlikely to be automated. This finding aligns with the insights provided by Forbes (2020), which emphasise that strategic decision-making, creative work, and critical thinking are among the types of jobs that are less susceptible to automation.

However, it is important to note that 50% of the respondents mentioned the need to identify errors and irregularities as part of their daily tasks, followed by a percentage of 26% admitting doing so more than once per week (although not weekly). Noticed that such activity can be carried out with greater accuracy and

efficiency by machines. This development is beneficial for workers as it relieves them from routine tasks, allowing them to focus on more challenging endeavours to create sustainable competitive advantage.

Furthermore, a significant 75% of the respondents acknowledged the relevance of automation in their respective industries, highlighting the widespread presence of digitalisation in the workforce. Regarding skills and learning, around 50% of the respondents reported regularly engaging in tasks such as advising, planning, and negotiating, both within and outside their organisation. These tasks are challenging for machines to replicate, suggesting that approximately half of the sample is actively developing skills that make them valuable in an increasingly digitalised work environment. Moreover, over 65% of the respondents expressed the need to continuously learn new tools and work methods, at least weekly.

When asked about the most valuable skill to develop, 70% of the respondents chose technical competencies such as computer programming and industry-specific knowledge. In comparison, only 10% selected a social skill, specifically negotiation.

Regarding social protection, around 58% of the respondents believed that technology would lead to a significant overall loss of jobs within their organisation. This perception aligns with a projected scenario, although subject to debate, indicating that 47% of jobs in the United States are at risk of automation in the next 10 to 20 years (Frey & Osborne, 2013).

About the impact of technology on work, 63% of the respondents recognised experiencing changes in their job roles, consistent with the findings of the McKinsey & Co report (2017), which suggests that approximately 50% of work activities have the potential to be automated. Notice that 39% admitted a huge change suggesting that affected employees had very likely to adapt themselves to new modes of work, including new tools and practices. Only 16% had to change of job because of technological novelties.

About the risk of unemployment, when asked who should bear the responsibility for mitigating potential adverse consequences of technology diffusion, such as replacing workers with machines, 50% of the respondents believed that individuals should be accountable for safeguarding their well-being.

Concerning work quality, defined as *the level of well-being derived from work*, 57% mentioned the wish of working fewer hours and having time for other activities outside of work. Only 20% indicated an attractive salary, lower than the percentage of responses indicating job security.

About the potential impact of digitalisation 65% believe that it can contribute to improving the balance between personal and professional life, with 30% specifically highlighting the benefits of flexible working hours. The percentage of responses assuming wage improvement is extremely low (2%).

In overall, these employees' expectations results suggest they are more concerned with non-monetary aspects of their wellbeing in their jobs. These can be the result of relevant charges in the respective organizations, considering the specific features of the surveyed sample (especially, seniority).

These findings align with a study reported by Business Insider (2021), which revealed that 68% of respondents considered a career change and prioritised work-life balance over a higher salary.

Regarding teleworking, 91% of the surveyed workers identified this as an opportunity to improve the quality of their work, but 77% still recognize the importance of having periodic face-to face meetings of the team.

Additionally, 65% believe that working from home 2 or 3 days a week is the ideal arrangement, indicating a preference for a hybrid work model. These findings align with Eurofound (2023) and and Forbes (2021) perspectives.

Finally, regarding to job security, considering many workers are confident in their current employment. However, 35% expressed a high (or even very high) level of concern about losing their position, highlighting a strong sense of competition among highly educated employees within organisations and significant workplace tensions in the Portuguese labour market.

5. Conclusions

Digital transformation is profoundly impacting industries and services on a global scale, moulding the dynamic between humans and machines in the workplace. Our research contributes to demonstrating how this transformation has reinforced the significance of the Knowledge Economy model in shaping the quality of work. It systematically enhances individual cognitive and technical skills, prioritising creativity, critical thinking,

and strategic analysis. Repetitive and routine tasks can now be automated, allowing workers to redirect their focus towards more complex and innovative activities. This shift improves work efficiency and overall quality.

Digitalisation has facilitated remote and flexible work expanding employment opportunities and improving the work-life balance. The Internet and digital technologies provide convenient access to information and learning resources. Individuals can independently acquire new skills and knowledge, enabling them to adapt to changes in the job market. The rapid pace of digital transformation requires professionals to engage in continuous learning and adaptation, ensuring that their skills remain up-to-date and relevant.

In essence, the ongoing technological revolution necessitates governments, businesses, public services, and individuals to be prepared to embrace these changes. This preparedness involves investing in lifelong education and training and implementing policies, actions, and tools to facilitate the digital economy transition. Such proactive measures will propel the labour market towards greater availability of decent work, foster a more inclusive society, and promote social well-being and economic prosperity. This approach aligns with the holistic concept of sustainability advocated by the United Nations Sustainable Development Goals (United Nations, 2015).

As limitations the research lacks more data, following a more representative sample of the Portuguese reality using a stratified sampling process according to the most recent Census edited by Portuguese Statistics (2021). It would be also interesting to analyse how workers, especially those working in public administration (including education sector), evaluate digitalization impact in their quality of work after the pandemic situation and the huge pressure to change considering the new paradigm of labour valuation and the challenge of decent work for all.

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Ethical commitment

The authors declare that in the collection and use of data referred to in the paper all ethical aspects were considered.

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