

"Be a plumber!" Career decision-making during technological transformation: a conceptual paper

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Key words

Technological disruption and careers; Artificial Intelligence; Sustainable careers; Career Decision-making; Future careers; Career patterns.

Abstract

The purpose of this paper is to explore how existing career decision-making and sustainable career literature can help individuals and organisations to understand and prepare for the ways in which Artificial Intelligence (AI) may reshape future career paths. We apply current academic insights about career trends to understand how these trends will play out in workplaces that are increasingly integrating AI technologies. We have applied recent academic theories of Career Decision-Making and Sustainable careers to representations of the future AI-enhanced workplace, to understand how these might elucidate choices for new entrants and mid-career job-seekers to sustain their employment. To explore successful transitions between roles and exit from paid employment, we examine the literature on contemporary discontinuous career patterns including career shocks, and the retirement literature.

We synthesise the findings of the current career literature to explore how future careers might evolve, and how to prepare for the transition. We find that contemporary patterns of discontinuous employment, career renewal and rebalancing, and unpaid contribution to society have already been identified, that can provide a template for future paid and unpaid employment patterns. Career advice should prepare new and existing workers for future careers that incorporate continual re-engagement, reinvention and rebalancing, whilst meaning and purpose may be found through intensive learning and achievement, interspersed with family focus and cultural renewal. The conceptual contribution of this paper is our call for careers to be viewed as part of a larger ecosystem that encompasses an individual's entire lifespan, whereby individuals will need to re-engage with the changing workplace, and retrain and reinvent themselves for new future roles, whilst periodically reprioritising their values and engaging in unpaid prosocial citizenship. This perspective encourages us to think about careers in a broader life perspective that includes continuous learning, charitable work, caregiving, cultural renewal and building relationships.

Introduction

Background

Artificial Intelligence (AI) and more specifically, Generative AI (GenAI), is set to transform every aspect of the marketplace and workplace by increasing productivity through enhancing or displacing traditional manual repetitive tasks and, for the first time, skilled white-collar careers. Over ten years ago, a seminal paper by Frey and Osborne (2013) predicted that computerisation would displace 47% of jobs (p.1), where lower-paid jobs requiring less education would be more negatively affected. Their paper was based upon advances in Machine Learning and Mobile Robotics, however, with the advent of AI, specifically Generative AI (GenAI), white-collar labour is also already being displaced, and the immediate effects and implications are already being addressed in the current literature (Bankins et al., 2024 b).

The idea of technological innovations disrupting the labour market is not new. For example to address the predicted lack of occupations due to increasing mechanisation, the economist Keynes (Kaplan et al., 2025) proposed that people in the late 20th Century would face a challenge as to what to do with their freed-up time. This did not materialise. Instead of mere job destruction, new occupations were created using the new technology. Meanwhile, when asked for his advice on future career choices, Geoffrey Hinton, a key original researcher and developer of AI, advised: "Be a plumber" (Bartlett, 2025), reasoning that AI is set to

replace jobs involving "mundane intellectual labour", for example, data entry or call-centre work. Governments are concerned about supporting and motivating workers and non-workers alike.

The long-term effects of AI disruption on the labor market are still uncertain, and there is no consensus on major outcomes such as net job creation or destruction (Ghosh et al., 2025). One potential outcome is increasing social inequality arising from the polarisation of the labour market. In this scenario, a small number of dominant employers, primarily 'tech giant' AI companies, would gain the most from increased productivity. The workforce would then become divided into three groups: highly skilled workers who can effectively use AI, those in lower-skilled physical jobs that are harder to automate, and the remaining workers whose routine cognitive roles face significant displacement risk (Lei and Kim, 2024). As a result of these shifts, many workers are concerned about the negative implications of AI for employment, expressing heightened anxiety and fears of job substitution (Zhao et al., 2024). Furthermore, the challenge of adapting to these changes creates a double-edged sword effect on career decision-making: while AI awareness can increase difficulties by enhancing employment anxiety, it also stimulates the active career exploration required to make informed decisions about sustainable career paths (Ge et al., 2025).

The gap addressed by this paper:

The advice provided to governments, organisations and individuals often comprises generic policy recommendations such as lifelong training and social support to assist in workers' transitions to an AI-enhanced work environment (e.g. OECD, 2025; Shet, 2024). Nevertheless, in the short-term, new labour market entrants have a practical concern to understand which careers will be sustainable, and what form the future working environment will take, against a backdrop of reduced graduate recruitment for many of the traditional professions. Individuals and employers alike are seeking guidance as to how to prepare for those (AI-enhanced) roles that will remain. For governments, the solution of Universal Basic Income (UBI) has been proposed to provide financial support for those who will not have paid employment (Bidadanure, 2019; Castel-Branco and Pons-Vignon, 2025; Perkins et al., 2022), due to polarisation leading to job displacement and destruction. This universal approach to social financial support has a precedent in the widespread practice of furloughing during the Covid-19 pandemic.

Meanwhile, the effects of these changes on career decision-making (CDM) and career sustainability, particularly the potential need for individuals to reassess their career paths in their current or future roles, have not yet been fully explored. For example, the need to find identity and purpose through work throughout one's career trajectory is well-researched (Sullivan and Al-Ariss, 2019; Baruch and Sullivan, 2022) but it may be possible for only a small number of individuals in the future.

Research Approach

Our research approach was to analyse the career decision-making and career sustainability literature and apply it to the future workplace disruption predicted to be caused by AI, in order to identify the insights in the extant literature which will be most useful in analysing the changes that individuals will encounter in their future careers.

Our Analysis

Our starting-point was to identify the key concerns expressed in both academic literature and the media, relating to the effect of AI upon jobs. Concerns were firstly, job obsolescence and displacement, and secondly, polarisation, such that only manual labour on the one hand, and a limited number of high level roles on the other hand would remain, polarised by the disappearance of middle-ranking white-collar positions (Lei and Kim, 2024; Pandya and Wang, 2024; Romeo and Lacko, 2025; Zhao et al., 2024). We found that existing guidelines were often generic (OECD, 2025), recommending training for workers who needed new jobs and support for those without jobs. Meanwhile academic papers generally focused on specific subjects such as the accounting profession (Kassar and Jizi, 2025; Maulana et al., 2025; Rawashdeh, 2025) or the current situation (Romeo and Lacko, 2025; Zhao et al., 2024). A gap remained on the subject of how individuals' relation to their careers would be affected by the changes. We therefore designed our study to synthesise individual-focused insights targeted on individual decision-making, career structures and attitudes to work and other prosocial behaviours that contribute to the wider community.

To sum up, from the wide range of literature that could be considered relevant, we focused on two key areas: career decision-making (CDM) and sustainable careers. We respond to the call for the application of the sustainable career literature to future careers with AI (Bankins et al., 2024a) and conceptually apply its principles to a disrupted future workforce.

Purpose of the Research and Research Question

The purpose of this paper is therefore to explore how existing career theories can inform and shape a response to major changes to individuals' career decision-making and sustainability introduced by AI in the workplace. We review how the literature on work centrality and meaningful work can be adapted to a future lifespan which may have long periods of no paid employment, and how the retirement literature can also provide a template for analysis of the transition from work to permanent retirement, but also to temporary periods of non-work. Finally, we explore the ways in which a new approach to CDM can facilitate sustainable careers in an AI-enhanced workplace.

Our Research Question is therefore: to explore how existing career decision-making (CDM) and sustainability literature can inform individuals' understanding of and preparation for the ways in which artificial intelligence may reshape future career paths.

Literature Review

In this section we review the career literature, focusing on the topics that seemed most pertinent to a new approach to address the key concerns about AI in the workplace that we identified.

Career Decision-Making (CDM)

The theoretical framework that we used was the literature on CDM and sustainable careers. The academic perspectives on the determining factors in career trajectories have shifted back and forth between an emphasis on agency and context over time: Career decision-making theories evolved from the first scientific approach of Parsons' (1909) 'trait and factor' analysis and guidance, when the needs of the job took precedence, although individuals' aptitudes were also taken into account. However, careers were still often determined by the trade of a boy's father (Form and Miller, 1949). Late 20th Century models of career choice emphasised an individual's agency to reshape themselves, in a 'protean' approach, to fit a changing work context, and to move across roles and organisations in a 'boundaryless' career (Hall, 1996; DeFillippi and Arthur, 1994). These agentic approaches have recently been challenged in the career literature by a focus on the role of the career context, in the form of the influence of social expectations (Hallpike et al., 2022), organisational structure (Lone et al., 2015) and career scripts (Laudel et al., 2019), and the unpredictable role of happenstance (De Vos et al., 2020; De Vos and Van der Heijden, 2015). Furthermore, there has been increasing emphasis on the role of exogenous career shocks (Akkermans et al., 2020) including the Covid-19 pandemic, which illustrate that an individual is only partly able to determine the trajectory of their own career. Nevertheless, to counter this circumstantial focus, the literature on proactivity in careers has re-emphasised an agentic approach to career success (Akkermans and Hirschi, 2023), by highlighting the salience of individual motivation to direct and drive one's own career trajectory in an uncertain environment.

Sustainable Careers

A sustainable career is defined by Van der Heijden and De Vos (2015) as: "sequences of career experiences reflected through a variety of patterns of continuity over time, thereby crossing several social spaces, characterized by individual agency, herewith providing meaning to the individual"(p. 7). This definition already incorporates the concept of a changing career context, whilst reasserting the primacy of individual agency and an individual's desire to find meaning and purpose in their pursuit of a career. The outcomes of a sustainable career have been characterised as happy, healthy and productive individuals (Van der Heijden, 2005). Having a sustainable career will, however, take on a new significance as AI takes over first basic manual white-collar jobs and increasingly middle-management and professional roles. Both the definition and outcomes of a sustainable career will need to be adapted to suit the envisaged discontinuous future work context, as discussed in the following sections. Meaningful work provides

purpose, not only at work, but also for individuals' broader lives (Lysova et al., 2019; Wrzesniewski, 2003). This combines with the concept of work centrality (Baruch and Sullivan, 2022) to illustrate the salience of careers in many individuals' broader lives, providing motivation through competence, autonomy and relationships derived from work (Ryan and Deci, 2017). The individual's expectations of their work are encapsulated in the psychological contract (Bal and Kooij, 2011), and these expectations will also need to adapt to the changing future career environment, and meaning may, for many individuals, need to be derived from other sources than work, as discussed in Sections 4 and 5 below.

Career structures:

The predominant understanding of career paths is still largely based on Super's (1980) career development theory, which describes the concept of predictable career stages leading to long-term employment. This framework remains so familiar that it continues to be used in contemporary career research (Bankins et al., 2024a). However, whilst CEOs nearing the end of their careers may consider AI as a commercial opportunity or threat, and some commercial organisations are very optimistic about the consequences for individuals, claiming that relatively few jobs will disappear in exchange for increased productivity (Goldman Sachs, 2025), employees at earlier stages in their careers are fearful for their jobs and incomes (Zhao et al., 2024). There are however, three streams of research in particular that can illuminate how AI may restructure work, namely the literature on the gig-economy, "Women's careers", and literature on Retirement.

Research on the gig economy reveals a pattern of disrupted and discontinuous work as technology evolves quickly. In this model, individuals often do not work continuously for one employer. Instead, they engage in intensive, project-based work with various employers, and may experience gaps of unemployment between projects (Petriglieri et al., 2019).

Studies on "Women's careers" show that many women choose to follow discontinuous career paths instead of traditional full-time jobs. They often shift their focus between work and responsibilities like childcare or eldercare in what is known as a "kaleidoscope career" (Mainiero and Sullivan, 2005). This type of career weaves together various "entangled strands" (Lee et al., 2011). Women's interrupted patterns of work may incorporate career breaks, after which they may return to work either in the same career or a different career, working at times full-time and at other times part-time (Duberley and Carmichael, 2016). Their careers may advance much later in their lifespan, after interruptions (Bailyn, 2004) and they may extend their commitment even after retirement from paid employment by taking on a new generation of childcare, looking after grandchildren whilst their own children go out to work.

Finally, the Retirement literature provides an alternative structure of life at the end of work (Sullivan and Al Ariss, 2019; Wang and Shultz, 2010). It includes analysis of 'Bridge employment' which is a reduction of working hours and responsibilities currently defined as taking place at the end of a person's career, after retirement from their full-time work, either at the same employer in a different type of work and employment. The decision to retire has been analysed by several researchers, including Feldman (1994), who analysed the decision to retire early, and by Hallpike et al. (2025), who analyse the strategies that workers can use and the situation they face when they make the decision to retire or to continue working. They analyse the decision along two dimensions: firstly whether workers still have the motivation to work, and secondly, whether the career context provides affordances for them to work, in the form of employers or entrepreneurial opportunities. The researchers identify specific strategies of re-engagement and reinvention adopted by later stage workers to sustain their careers. In this situation, the outcome for older workers, if they do not have the motivation, nor the affordance, to continue working, is to retire. In the present paper, we build upon their approach and extend it to workers of all ages in a future AI-enhanced workplace, who, for reasons of financial stability or personal fulfilment, may not feel able to withdraw from the workforce without an alternative way to contribute to the wider world.

Findings

The contribution of this paper is to highlight and synthesise the insights in the extant literature which can inform career decisions and sustainable career structures in the future AI-enhanced workplace. In this section we set out the challenges and suggested solutions already to be found in extant career literature.

The sustainable career ecosystem (Donald et al., 2024), is anticipated to be disrupted by the introduction of AI, including that work might become discontinuous and not provide sufficient income per se for an individual to earn a living. This will require a change of attitude and lifestyle as detailed below. Careers advice still works on the premise that mainstream careers will be full-time, however it may well be that in future, highly paid roles, entailing intense and long hours, and characterised by work centrality, may be restricted to a few senior executives, in a potential polarisation of the jobs market, whereby middle management roles will be carried out by AI, in addition to manual white-collar and blue-collar labour. Current conceptions of motivation through traditional forms of reward, including pay (Thompson, 2002), may no longer apply in a precarious labour market.

Individuals are seeking guidance as to how to make their career decisions and how to engage with the new world of work and possible non-work. We identified three strategies which workers can employ to sustain their contribution to society with or without full-time, permanent work. Previous research focusing on executives in later career stages shows that re-engagement and reinvention are important strategies for maintaining career sustainability (Hallpike et al., 2025). We furthermore identified a third strategy, that of rebalancing, built upon a combination of the literature on women's careers and on retirement.

Re-engagement:

Re-engagement is a personal strategy necessary to optimise career sustainability when the individual lacks motivation or skills in their later career stage. One way to re-engage is renewal through learning, which appears in the context of decision-making modes, for example the MBA decision path taken by many executives (Hallpike, et al., 2024). Individuals will need to re-engage proactively with the changing work context by taking on new AI-enhanced and constantly evolving roles, and through a readiness for continuous lifelong learning, even without a clear short-term work goal. Individuals will also need to re-engage with their perception of a sustainable career, when future careers may not necessarily entail continuous paid employment, and therefore work may not provide continuous meaning to an individual. Instead, in addition to the first two criteria for a sustainable career, namely that individuals should be happy and healthy, the third criterion relating to an individual's productivity will need to be redefined as the individual's overall contribution to society.

Reinvention:

Reinvention is a contextual strategy for optimising career sustainability when the career context no longer affords sufficient opportunities for work (Hallpike et al., 2025). This need often occurs when a person's original career plan "runs out" (p. 1) which may happen more frequently in the future. To take a proactive approach to their employment, individuals will need to continually retrain and embrace lifelong learning. They must also accept that their current jobs may become obsolete, requiring them to shift to completely different roles throughout their careers, potentially facing significant periods of unemployment. Therefore, individuals may need to be flexible and proactive in reinventing both their careers and themselves. While obsolescence can lead to job loss, it can also encourage retraining and new opportunities (Allen and de Grip, 2012).

Rebalancing:

For periods when people have no work or have no prospect of work, they need to find meaning and purpose outside of work. We found that the literature analysing different forms of discontinuous careers, such as the gig economy or women's careers (Duberley and Carmichael, 2016; Lee et al., 2011; Petriglieri et al., 2019), provided relevant frameworks to understand AI-enhanced careers of the future. This literature also provided a template for how individuals could change the structure of their work to rebalance their lifestyle, both across the life space and along the lifespan (Super, 1980), by working part-time or by taking a career break.

The question remains as to how people will continue to feel satisfied and useful. An individual may become dissatisfied with their career if they continue to rely on current career theories, focused on work centrality and vocational self-concept, to define their identity, and the significance and purpose of their lives. Work centrality will no longer provide sufficient meaning and purpose, which will instead need to be derived from their broader life, in the way that retired persons or unpaid carers might do today, through volunteering and prosocial activities, including childcare and eldercare. In other words, individuals will need to adopt a broader, holistic approach to life and work. The retirement literature offers insights on how to create meaningfulness during a period of reduced work hours. Old age and retirement have been characterised as a time when individuals withdraw from active and social life (Baltes, 1997; Carstensen et al., 1999). However, given increasing Healthy Life Expectancy, the retirement literature finds individuals who are active in prosocial volunteering, and we propose this as the norm for the future. Whilst models of UBI provide unconditional income, it seems likely that the remaining roles, not carried out by AI, will often be caring roles, which would be meaningful to society and improve general wellbeing. Volunteering is a key feature of the retirement literature, which materially contributes to society, even though it is not paid work and therefore not currently measured in national productivity figures (termed 'Gross Domestic Product', GDP). In the new workplace, individuals of all ages may find their work disappearing, in repeated experiences of redundancy, as described in the career shock literature. However, even individuals who become permanently unemployed will be able to seek meaning, and to contribute to society, in a future work environment, if all contributions to society are valued, and productivity gains from AI are able to financially support all citizens at a respectable level of income.

Finally, research on the new generation termed 'Generation Z' (Gen Z), who are currently entering the workforce, indicates that they may be adapting to, or aspiring to, new ways of working. Whilst still aspiring to career advancement, Gen Z have been found to value work-life balance and meaningful purpose in their careers. They are 'digital natives' and comfortable with the internet and independent learning (Barhate and Dirani, 2022), and do not have expectations of a 'job-for-life' associated with work in the twentieth century. The new perspective identified in Gen Z could provide a model for a new form of future worker psychological contract (Bal and Kooij, 2011), which combines acceptance of the need for continual personal re-engagement, and the need to reinvent both themselves and their roles, with expectations that individuals will periodically have the opportunity to rebalance their life and work along their life course.

Discussion, Theoretical and Practical Implications and Conclusions

We draw on the literature of career decision-making, sustainable career ecosystems, and career shocks to advocate individual flexibility and resilience. Discontinuous career patterns, entailing rebalancing of work, leisure and voluntary citizenship behaviours, could form the basis of a new model for future career trajectories. In future careers, decision-making will need to incorporate continual re-engagement, reinvention and rebalancing. We suggest that meaning will be found, at least for some workers, through intensive learning and advancement in the workplace, interspersed with periods of rebalancing their time towards family or pro-social and citizenship roles. Thus, career advice should prepare new and existing workers for this new AI-enhanced rebalancing of work, leisure and voluntary citizenship behaviours. Education will need to propose multiple sources of meaning and purpose, and to prepare students for lifelong learning, as indeed is already advocated by the literature and required by most organisations in a volatile environment (Shet, 2024). Skill obsolescence need not lead to job loss (Allen and de Grip, 2012) as long as there remains a motivation to retrain. We also propose that the circular economy which highlights mending, recycling and repurposing might be able to thrive in an economy where individuals have periods of renewal and retraining in between periods of employment (Raworth, 2018). The advice to "Be a plumber!" may in future apply to all individuals, and could be adapted to: "With AI, you, too, can be a plumber!" Or, in other words, with more free time and the help of AI, individuals may be empowered with greater self-efficacy to do practical tasks in their broader lives.

Limitations and Direction for Future Research

Limitations:

There are several limitations to our proposals. Firstly, our proposal is based on predictions about AI workplace disruption, not on realised outcomes. Secondly, the academic literature on AI workplace disruption is constrained due to the time-consuming academic process of data collection to publication,

whilst the speed of AI development is much faster. Most current articles on the future of careers in AI are published in non-academic magazines or broadcast in podcasts, whilst only very recent academic texts address the new issues. We also make assumptions about the discontinuous nature of future work, and the readiness of governments to provide social support, in the form of Universal Basic Income, for those who cannot find work, or are in between jobs.

Future Teaching and Research:

We call for universities to take up a leading position in the technical development of AI, the technical application of AI in the workplace, and in the development of AI-enhanced students, who are prepared for the new workplace and optimise their capabilities by embracing every assistance from AI in the learning experience.

Within the education sector we need to move from inward-looking concerns relating to AI such as: "How can we stop the students using AI to write their assignments?" to ask: "How can we empower students to optimise their learning and assignments with AI?"

Future research should explore how organisations and institutions, especially government bodies, can effectively support, house, feed and value individuals who are unemployed. It is essential to re-establish values that emphasize the importance of lifelong learning and contribution to society, while not necessarily advocating for continuous lifelong working. It is also important to incorporate these perspectives in our frameworks for understanding the purpose and meaning of quality work in the future. Additionally, studies should examine insights from sustainable careers and decision-making processes to investigate examples of personal and vocational skill renewal and resilience.

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