Sustainable Employment Relationships in Work 4.0 Era

Subjects: Social Sciences, Mathematical Methods

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The working environment has gradually transformed toward Industry 4.0 for the next few decades. Work 4.0 is referred to as Industry 4.0 but with a focus on sustainable employment relationships and the forms of work that has essentially changed due to the transformation of digitalization.

fuzzy Delphi method Industry 4.0 talent management

1. Work 4.0

“Work 4.0” was launched in 2015 [1] (p. 8) and based on the vision of “Industry 4.0” while focusing particularly on sustainable employment relationships and the forms of work. The characteristics of work in Industry 4.0 are oriented toward digitalization, flexibilization, and globalization [2][3][4]. The extension of the debate regarding the digital transformation in the economy has been addressed in BMAS [2], offering initial answers for relevant questions. Considering technological trends, and developments in society and the talent market, do researchers require a novel perspective on work to deal with the corresponding TM/TR issues [1]? Notably, Work 4.0 emphasizes new opportunities for shaping future work rather than describing the status quo workforce. Its TM/TR issues require further investigation.

Researchers are in a “working society in evolution” [1][5], which has opened great possibilities to shape the development of work. Although new trends of digitalization have opened up possibilities for greater self-determination in work, providing innovative possibilities for design, process, collaboration, and workforce-shaping [1][6], they also have a huge impact on existing culture and work styles. The trend of flexibility, concerning the time and place of work, which is being reinforced by digitalization, contributes to talents acting as smart workers by offering themselves in the workforce for agile projects or mostly self-directed work processes. Furthermore, the trend of globalization is driven by digitalization: with technological changes, digitalization will drive exchanges within a global information and communication space. Regarding the most important skills for future industries, according to The World Manufacturing Forum [7], the top 10 skills for future needs include not only digital skills (e.g., AI, data analysis, cybersecurity, and data-mindfulness) but also non-digital skills, such as those related to open-minded thinking, flexibility, creative, and entrepreneurship [8].

2. Talent, TM, and TR

Talent is the set of a person's competencies, commitment, and contribution [9] or the sum of their abilities, including "intrinsic gifts, skills, knowledge, experience, intelligence, judgment, attitude, character and drive" through learning and subsequently growing to enhance their capabilities [10][11]. Barney [12], from a resource-based view, found that such "valuable resources" help to create a firm's sustained competitive advantage. Cumulatively, a variety of authors based on strategic HRM have argued that the resources and capabilities that contribute to the sustained competitive advantage of a firm are strongly affected by the capabilities of talents [13][14]. Meanwhile, the talents with high value, or that are difficult to replace, need to be segmented in a way that conforms with the strategic HRM in an organization [15]. Accordingly, the talents who are above high-average value should be unquestioned as those who should be retained in firms.

In comparison with Work 4.0 scenarios, fostering high-skilled talents and continually developing individual/organization competencies will provide great benefits to both the employer and employee. The talents in new generations desire career prospects and a prosperous working life while firms facing the Work 4.0 era require qualified skilled talents to retain their innovative and competitive advantage during the digital transformation [2].

TM is a specific group of HRM practices, including the activities of attraction, selection, development, and retention for those talents who show a high performance or high potential [16][17]. TM was introduced over a decade after the phrase "War for Talent" was coined by McKinsey Consultants in the late 1990s [18][19]. Boudreau and Ramstad [20] (p. 131), who coined the term "talentship", have noted the strategic implications related to TM, evaluated by a decision model with three independent levels of analysis: impact, effectiveness, and efficiency, which can underpin TM. HRM must consider a talent-oriented perspective on improving decisions, rather than implementing a process based on decisions alone [21]. Additionally, TM is a unique function integrating all responsibilities and activities concerning the talent life cycle, which includes the interactive processes between the organization and its human capital [22].

TR is an essential element in the talent life cycle. Schiemann [22] (p. 282) has argued that the talent life cycle is the path involving the talent's interaction with the organization concerning HR and, above all, human capital, of which the scope has been defined in terms of the serial steps of "attracting, acquiring, onboarding, training, managing performance, developing and succession, retaining and recovering". Moreover, Narayanan et al. [5] have debated that "organizational justice" and "talent perception congruence" play mediating roles between TM and TR, thus having key impacts on management outcomes. When the organization seeks to maximize the outcomes of talent investments through the principle of people equity, it is likely to have a more positive impact on the major outcomes, including financial and/or non-financial performances (e.g., greater quality, higher productivity, and higher employee retention) [23], which can help the organization in managing the talent life cycle and contributing to its competitive advantage.

Regarding the relationship between TM and TR, academic works have examined the impact of TM on TR [24], which is still a gap in the literature regarding mediating mechanisms such as generations [25], particularly in the face of dramatic industrial revolution. Festing and Schäfer [26] have identified three distinct types of TM, including highly engaged, retention-based, and reactive TM. In particular, retention-based TM outlines the considerable

activities related to talent development and training, HR development for succession, and career planning for the talents.

3. Work 4.0 Impacts on TR in Socio-Technical System

In Work 4.0, the concept of a socio-technical system links with the overall interaction and combination of technical and non-technical elements [27]. Such a socio-technical system provides a promising observation and analysis framework for corresponding TR/TM issues. Human–machine interactions (HMIs) in Work 4.0 are designed to increase the mental and emotional well-being of the workers. Further, digitalization is transforming the whole socio-technical system, based on the "people, process, and technology" concept [2].

Whether for industrial, service, or knowledge work, the intersections of a socio-technical system in a Work 4.0 scenario are delineated in **Table 1**. However, there is a dilemma regarding up-skilling or re-skilling [2]. The specific design of HMI will become more complex, offering challenges for workers in terms of integrating some activities or connecting inter-disciplinary models. However, these complex activities will be simplified or standardized, such that only a low level of expertise and experience will be required. Accordingly, the transformation of HMI, as a result of digitalization, will offer new opportunities for shaping work, production, and/or service processes in a way that not only relieves the workers from routine activities but also develops their skills, making it easier to reach a better work–life balance [2]. Therefore, there exists an urgent need to investigate the major influencing factors from the literature and to identify the criteria for TR based on HMI in Work 4.0 scenarios from a comprehensive socio-technical perspective.

Table 1. Three interactions in a socio-technical system.

Interactions	Contents
People and technology	The functions are based on situational and specific strengths to be re-assigned in new ways.
Process and technology	The sub-processes are hierarchically separated and substituted for integrated, simultaneous, and decentralized processes.
People and process	The new delineation of tasks is reshaped, and the roles of work are assigned in a novel manner.

4. Generational Cohorts

Generational cohorts are defined by birth year, instead of current age. Those within a given generation were born in the same historical period, sharing common life events during similar formative and developmental ages [26][28][29]. In terms of labeling, the birth-year periods associated to generations are somewhat loose [30]. According to Twenge et al. [29], four generations may be separated in the current main workforce, including the Silent Generation (born 1925–1945), Baby Boomers (born 1946–1964), Generation X (Gen X: born 1965–1981), and Generation Y (Gen Y: born 1982–1999). Each generation has distinct characteristics, resulting from events that the members of

the same generation experienced, which shaped their lives, spirits, values, and attitudes. Essentially, consideration of these aspects is necessary when analyzing the factors influencing the retention of talents who belong to various generations [25][30][31]. These generations can be characterized as follows.

Baby Boomers are the post-World War II generation, thus including those who experienced the rise of economic prosperity, which pre-disposed them to optimism. Most notably, they tend to believe in professional ethics, loyalty, and lifetime employment. Compared to the younger generations, some studies found that they were significantly more satisfied with their jobs, resulting in a lower turnover rate [30][32][33].

Gen X individuals are prone to lower loyalty in their work, leading to higher turnover rates, when compared to Baby Boomers. Moreover, they emphasize work–life balance, self-direction, and independence, and are more technology-savvy than Baby Boomers, as they have effectively grown up with various technologies (e.g., the Internet) [29][31][32][33].

Gen Y is known for attaching greater importance to work–life balance, development opportunities, and training. In the workplace, the members of this generation expect to have greater mobility in the early careers, and place special emphasis on corporate social responsibility [34][35][36][37].

In brief, **Table 2** lists the key terms used in the study, along with their definitions and major concepts.

Table 2. Key terms in the conceptual model.

Variables	Definitions and Major Concepts
Work 4.0	Work 4.0 shapes work based on future views, in order to embark on new paths in a way that benefits people and facilitates the economy in the digital era, instead of describing the workforce status quo. It will alter the technical field and collaboration at all levels of work [2].
TR	The definition of TR is close to that of retention-based TM, which outlines the considerable activities with respect to the development and training of talents to assist the organization in retaining talent and reducing the rate of turnover by applying motivated approaches [26].
Generation	A group of people who were born in the same historical age (Twenge et al. [29]), such as Baby Boomers (1946–1964), Gen X (1965–1981), and Gen Y (1982–1999), sharing common life events during their formative development period, leading to the views, values, and even attitudes being alike within each generation.

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