

# Human Workforce in the Digital Age

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## Introduction

In the digital economy, the role of human workforce ranges from a great asset to a costly liability, and the prospects for the next generation of human workforce are far from settled (Riemer & Peter, 2020; Wang et al., 2020). Here, we explore how fundamental approaches to people (such as labor or human capital) in the digital workplace can inform the debates on these prospects.

The people who comprise an organization's human workforce are conventionally referred to as either *labor* or *human resources*. These terms come with layers of historical “baggage” and denote fundamentally different approaches to a workforce (Bratton et al., 2021). Indeed, many organizations have now adopted terms such as *human capital* or just *people*. In this work-in-progress we ask:

1. *What can terminological shifts in how we talk about people in the workplace reveal about the role of the human workforce in today's business environments?*
2. *What can past terminological shifts foreshadow for workforce in the digital age?*

To address these questions, we query the Google Books Corpus and map the rise and fall of four fundamental approaches to people in the workplace (labor relations, human capital, human resources and people management) in terms of word frequencies from 1800-2019. Going further, we examine the rise and fall (from 1951<sup>1</sup>-2019) of some of the key digital workplace trends (Dery et al., 2017; Jensen & Stein, 2021) with an eye towards uncovering the underlying assumptions about the human workforce present in these trends.

## *Foundational Approaches to People in the Workplace*

In this section, we very briefly describe the four fundamental approaches to people in the workplace that influence today's workplaces.

**Labor relations** denotes the first holistic approach to human workforce from the industrial revolution onward (post 1850s) that specifies the relations between “managers (representing ownership interests) and a labor organization (union), selected by employees as their bargaining agent to represent their interests” (Holley et al., 2011, p. 5-6). The fundamental assumption in labor relations is that human workforce (labor) is a *factor of production*, i.e., representing *human effort* in the production of goods and services (Nafukho et al., 2004).

**Human capital** as a distinct approach to human workforce began taking shape in the early 1960s, when economists proposed that the traditional factors of production (land, capital, labor) cannot fully explain economic growth (Nafukho et al., 2004). The gap was identified as “human capital.” Here, “peoples’ learning capacities are of comparable value to other resources involved in production” (Nafukho et al., 2004, p. 545-546). Thus,

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<sup>1</sup> We chose 1951 as the symbolic beginning of “digital workplaces” as this is the year that the first business application was run on LEO I (first computer used for commercial business applications).

education and training are seen as investment in capital, and at least part of the human workforce is considered as *capital for development* (Nafukho et al., 2004).

**Human resources** approach also began taking shape in the early 1960s as labor relations began to shift towards individualized non-union employment relations. A “hard” and a “soft” version of HRM emerged. The hard version, in particular, aligned itself with the ‘resource’ concept, where human workforce is seen as a set of *individual resources*, with differential individual value, cost and bargaining power (Bratton et al., 2021).

**People management** as a distinct approach to human workforce grew out of the “soft” version of HRM, as a critique of the classical command and control management, and involved a shift from “control” to “commitment” strategies to enlist worker loyalty and motivation (Bratton et al., 2021). The key assumption in people management follows human resources, but more strongly views the human workforce as *individual assets*.

### ***People in Digital Workplaces***

Digital workplace is an umbrella term denoting “the physical, cultural and digital arrangements that simplify working life in complex, dynamic and often unstructured working environments” (Dery et al. 2017, p. 136). We next distill five trends that characterize digital workplaces and consider their assumptions about people.

1. *Flexible employment*. This trend is often described as an expansion of the *labor* pool organizations have access to through gig and crowd work, but also as an extension to organization’s *human resources* beyond standard employees (Altman et al., 2021).
2. *Flexible work*. This trend is often described in terms of the conditions, such as work-from-home, remote work, and agile work (Hafermalz, 2021) that organizations must be able to provide to today’s *human resources or assets* to keep them motivated.
3. *Intelligent automation with humans-in-the-loop*. This trend encompasses three sub-trends: (a) automation of workforce management, often discussed in terms of the rights and responsibilities of *management and labor* (Möhlmann et al., 2021); (b) automation of routine white-collar work, often described as automating boring repetitive parts of white-collar jobs, while freeing up *human resources* for more creative, innovative tasks (Lacity & Willcocks, 2015); (c) automation of automation itself, often described in terms of using expendable human *labor* to power “automated” and “intelligent” online services (e.g., humans training ML algorithms, etc.) (Gray & Suri, 2019).
4. *Strategic, data-driven people development*. This trend includes various analytics (people analytics, HR analytics) that allow organizations to measure ROI on *human capital* (Tursunbayeva et al., 2018).
5. *Digital mindfulness*. This is often described in terms of employee wellbeing and reduction in toxic workplace cultures. Digital workplaces can be overwhelming and stressful because they are so technology-saturated (Marsh et al., 2022), and organizations must do their part to alleviate these challenges for their human *assets*.

### **Method**

We examine terminological trends in the Google Books Corpus, which contains millions of digitized books and documents. We assume that the popularity of particular

words and phrases in texts is, to some extent, indicative of the concepts that people have an interest in. While this assumption is contentious (see, e.g., DeDeo, 2022), it has been accepted in large-scale analyses of topics like risk communication (Li et al., 2020) and influential theories in IS research (Soper & Turel, 2016).

For this preliminary work, we conduct a series of queries with the Google Ngram Viewer via R (all case insensitive with the “English 2019” corpus). Ngram queries retrieve data on the frequency of a given  $n$ -gram relative to the total number of  $n$ -grams of equal size, such that  $n$ -grams’ frequencies over time can be comparatively analyzed. In our first query, we aim to capture the popularity of the four foundational approaches to people in the workplace from 1800 to 2019 by querying with the phrases *labor relations*, *human resources*, *human capital*, and *people management*. For our second query, we represent the four approaches as groups of associated terms derived from the five characteristic trends of digital workplaces. For example, labor relations approach is represented in trends like *gig work* and *algorithmic management*; human resources in trends such as *remote work* and *digital natives*; human capital in trends like *people analytics* and *talent marketplaces*; people management in trends like *employee wellbeing* and *mindfulness apps*.

## Preliminary Results

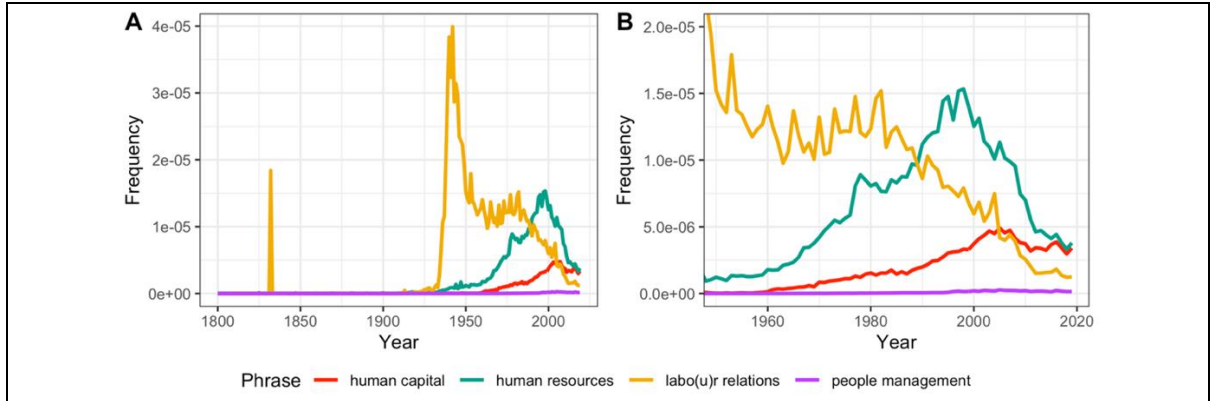
Figure 1 displays the first query’s results. Corresponding to historical narratives of *labor relations*, we see the frequency of that term drastically increase around 1900<sup>2</sup> and remain the most popular of the four approaches for nearly a century. In the digital age, however, we observe interesting terminological shifts. In 1990, *human resources* becomes the most popular approach and maintains this position through 2019. Meanwhile, *human capital* displays a steady but slower increase in popularity, and by 2005 also surpasses labor relations. Finally, *people management* follows a similar pattern of increasing frequency from about 1960 onwards, but this occurs at such a scale that it hardly registers when plotted alongside the other approaches.<sup>3</sup> These results suggest that, in today’s workplaces, the human workforce is increasingly viewed as capital to be invested in.

We then moved on to the second query. Examining the terms associated with the labor relations approach, we find that specific digital workplace terms (*gig work* and *algorithmic management*) begin to exponentially gain frequency from 2010 onwards. Studies on these digital workplace topics often resurrect classic labor relations theories. For example, Kellogg et al.’s (2020) study on algorithmic control draws on Braverman’s labor process theory to highlight the important role of *collective* resistance to such control. When we examine the terms associated with human capital, we find that every one of the terms displays a steep increase also from roughly 2010 onwards. Meanwhile, the peak in popularity of the human resources approach in the digital workplace context happened around 2000 and is related to the peak and subsequent decline in frequency of the terms *work from home* and *telework*. However, the decline in frequency of these terms halts in 2015 and it is possible that the COVID-19 years may lead to a resurgence.

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<sup>2</sup> The labor relations peak around 1840 is from misdated court documents belonging to the early 1900s, which does not affect our interpretation, but shows limitations of the Google Books Corpus.

<sup>3</sup> Yet, the popularity of people management in 2019 is approximately 209 times what it was in 1951.



**Figure 1.** Frequency (y-axis) of terms representing four foundational approaches to people in the workplace in the Google Books Corpus over time (x-axis). **A.** All bi-gram data for the years 1800-2019. **B.** Zoomed in view of the bi-gram data for the years 1951-2019.

Finally, the popularity of nearly all the terms associated with the people management approach in the digital workplace are increasing rapidly. For some of these terms (e.g., *technostress* and *employee wellness*), the recent increase comes as a resurgence from an initial peak in the late 1980s/early 1990s, rather than a first appearance.

## Discussion

Our exploratory analysis of  $n$ -gram frequencies adds new evidence to the discourse around the human workforce in the digital age. For one, our analysis of terminological shifts suggest that views of the workforce have noticeably changed over time, moving away from a collectivistic approach (labor relations) towards individualism and development (human resources and human capital). Second, our results foreshadow a future in which the human capital approach becomes increasingly influential. These findings are particularly interesting in light of critiques of the associated initiatives (e.g., People Analytics) (Giermindl et al., 2021), which question whether treating humans as measurable capital promotes individual development (Gal et al., 2020). Alternative, more community- or team-oriented approaches to human workforce are now emerging (Altman et al., 2021) and it is important to study their influence on digital workplace trends.

Beyond these substantive points, this paper also demonstrates the value of computational methods for understanding cultural views on the human workforce in the digital age. An extension of this study could utilize word embeddings to examine semantic changes in those terms. A word embedding encodes the meaning of a word (or phrase) as a numeric vector based on its co-occurring relationship with other words; it represents the context in which the word or phrase is used in a given corpus. Thus, it seems plausible that a historical analysis of embeddings (i.e., comparing embeddings mined from texts from different points in time) of the four foundational approaches may reveal whether one of the approaches has moved semantically closer to terms associated with digital workplaces. For example, has *human capital* become a closer semantic neighbor to *digital workplace* than *human resources*?

Taken together, this work contributes to debates on the digital future of work by bringing people (the human workforce) back in.

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