


## A Comparative Review of Postdoctoral Experiences Around the World

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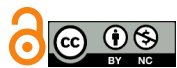
### Article Info

#### Article type:

Review Article

#### How to cite this article:

Ehteshaminejad, E. (2023). A Comparative Review of Postdoctoral Experiences Around the World. *International Journal of Innovation Management and Organizational Behavior*, 3(4), 36-43.  
<https://doi.org/10.61838/kman.ijimob.3.4.5>



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### ABSTRACT

**Objective:** To compare postdoctoral experiences globally, focusing on funding models, career development, work environment, and the challenges and opportunities in diverse academic disciplines.

**Method:** A comprehensive review of recent literature and academic sources was conducted, focusing on various countries and disciplines. This review included qualitative and quantitative studies, reports, and firsthand accounts from postdoctoral researchers.

**Findings:** The analysis revealed significant disparities in funding models, with some regions offering robust governmental support while others rely on competitive grants. Career development opportunities varied, often influenced by regional academic and industry demands. Work environments also differed markedly, with some offering supportive and balanced atmospheres and others posing challenges like job insecurity and limited work-life balance. Additionally, the challenges and opportunities faced by postdoctoral researchers were found to be closely linked to geographic and institutional contexts.

**Conclusion:** The global postdoctoral landscape is marked by diversity and disparity. These findings underscore the need for more equitable distribution of resources and support systems. They suggest that policy reforms and institutional strategies should be directed towards creating a more balanced, supportive, and globally interconnected research environment.

**Keywords:** Postdoctoral, Worldwide, Comparative Review.

### 1 Introduction

Postdoctoral research positions, often seen as a rite of passage in the academic world, play a pivotal role in shaping the landscape of scholarly inquiry and innovation. These positions are instrumental in forging the next generation of scholars, researchers, and academics. In this comprehensive review, we delve into the multifaceted nature of postdoctoral experiences across the globe, highlighting

their significance, evolution, and the varying challenges and opportunities they present (Yao et al., 2022).

Postdoctoral research is more than just an academic endeavor; it's a critical phase in a researcher's career that significantly impacts future prospects in academia and beyond (Valieva, 2021). This period often involves intense research activities, skill development, and the establishment of professional networks.

The central thesis of this article posits that postdoctoral experiences, while universally challenging, vary significantly around the world. These variations are influenced by factors such as funding availability, institutional support, cultural norms, and the overall state of higher education and research in different countries (Bakshi et al., 2023; Yao et al., 2022). Thus, the primary objective of this review is to compare and contrast postdoctoral experiences worldwide. By examining these experiences in various geographical and disciplinary contexts, we aim to provide a comprehensive understanding of the global postdoctoral landscape.

## 2 Methods and Materials

### 2.1 Study Design

This article adopts a narrative review methodology, focusing on synthesizing and interpreting a wide range of literature to provide a comprehensive overview of postdoctoral experiences globally. This approach involves a systematic search and analysis of existing literature, including academic articles, institutional reports, and policy documents. The narrative review is chosen for its flexibility in exploring the diverse aspects of postdoctoral experiences, such as funding, career development opportunities, and cultural differences. It allows for a nuanced discussion that integrates various perspectives and findings from different studies, providing a rich, contextual understanding of the topic.

### 2.2 Data Collection

The selection of sources for this review is guided by relevance, recency, and credibility. A comprehensive search of databases such as PubMed, Scopus, and Google Scholar is conducted to identify articles and reports published within the last decade. Priority is given to peer-reviewed articles, official global and national reports on postdoctoral research, and firsthand accounts from postdoctoral researchers. The synthesis of this literature involves critically evaluating and integrating findings from these diverse sources, aiming to construct a coherent and informative narrative that reflects the current state of postdoctoral experiences worldwide.

### 2.3 Data Analysis

The core of this review is a comparative analysis, which is structured to highlight similarities and differences in postdoctoral experiences across different geographical

regions and academic disciplines. This analysis involves categorizing the literature into thematic areas such as funding models, career progression opportunities, work-life balance, and institutional support systems. Each theme is then examined across different contexts, comparing and contrasting the experiences in various countries and disciplines. This comparative framework is designed to uncover patterns and trends, as well as unique regional and disciplinary features, offering a global perspective on postdoctoral experiences.

## 3 Literature Review

### 3.1 Historical Context of Postdoctoral Roles

The evolution of postdoctoral roles in academia is a narrative that intertwines with the broader development of the global knowledge system. This historical journey reflects changing academic norms, the globalization of research, and the shifting priorities of educational and research institutions worldwide.

The postdoctoral role, as we know it today, has its origins in the early 20th century. Initially, these roles were conceptualized as additional training periods for doctoral graduates, primarily in the fields of science and engineering. Over time, postdoctoral positions evolved from being a rarity to a prerequisite for a career in academia, especially in the sciences (Cortes-Rodriguez et al., 2014).

During the mid-20th century, particularly in the post-World War II era, there was a significant expansion of postdoctoral roles, fueled by the growth in research funding and the emphasis on scientific advancement. This period saw the institutionalization of postdoctoral positions in universities across the United States and Europe, setting a precedent that would be followed worldwide (Bakshi et al., 2023).

In recent decades, the concept of postdoctoral research has become a global phenomenon, with countries around the world recognizing the value of these roles in advancing academic and scientific research. Researchers discuss the increasing engagement of scientists, including postdoctoral researchers, in global policy-making, signifying the expanded role and influence of postdoctoral researchers beyond traditional academic boundaries (Dupont et al., 2023; Feeney, 2017).

Today, postdoctoral roles are integral to academic research frameworks globally. They serve as crucial bridges between doctoral research and independent academic or research careers. However, this expansion has introduced

challenges such as job security, funding, and career progression, reflecting the need for a re-envisioning of postdoctoral roles in modern academia (Kerr, 2022; Nowell et al., 2019).

### 3.2 Global Trends in Postdoctoral Practices

The landscape of postdoctoral practices has been dynamically evolving, reflecting broader shifts in academic priorities, funding structures, and research output expectations. This section provides an overview of current global trends in postdoctoral practices, including aspects such as funding, duration, and output expectations.

One of the most critical aspects of postdoctoral research is funding. The traditional model of funding, largely dependent on government grants and institutional support, is increasingly supplemented by alternative sources. These include industry collaborations, private foundations, and international funding bodies. However, the challenge of securing stable and sufficient funding remains a significant concern for postdoctoral researchers worldwide (Feeney, 2017; Schenker et al., 2021).

The duration of postdoctoral appointments has been a subject of considerable variability. Traditionally, these roles were intended as short-term positions lasting a couple of years. However, in recent times, there has been a trend towards longer postdoctoral engagements, often influenced by the competitive academic job market and the escalating requirements for research output and publications. This trend has implications for career progression and job security for postdoctoral researchers (Christian, 2021; Rybarczyk et al., 2011; Schenker et al., 2021; Yoon et al., 2018).

The expectations for research output and publications from postdoctoral researchers have intensified over the years. This increase is partly due to the growing emphasis on metrics such as publication counts and impact factors in academic evaluations. The pressure to produce high-quality research and publish in prestigious journals is a global phenomenon, affecting postdoctoral researchers in various disciplines (Schenker et al., 2021; Sobrado, 2004).

While these trends are globally observed, regional variations exist. For instance, in East Asia, there is a strong emphasis on research output and international collaboration, as evidenced in the focus of research universities in the region (Finkelstein et al., 2014; Yao et al., 2022). These regional differences reflect the diverse academic cultures and priorities across different parts of the world.

### 3.3 Regional and Disciplinary Variances in Postdoctoral Experiences

The postdoctoral experience is not monolithic; it varies significantly based on regional contexts and academic disciplines. This diversity reflects the unique academic cultures, economic conditions, and institutional priorities of different regions, as well as the distinct nature of various academic fields.

**Eastern vs. Western Regions:** In a study focusing on online learning experiences in China, Researchers (Chen, 2014; Finkelstein et al., 2014) identified significant regional disparities in educational experiences, indicative of broader trends that likely extend to postdoctoral experiences. Typically, postdoctoral fellows in Eastern regions (e.g., North America, Western Europe, and Eastern Asia) often have access to more resources and opportunities compared to their counterparts in Western regions (e.g., Africa, South America).

**Developed vs. Developing Countries:** There is a notable contrast in postdoctoral experiences between developed and developing countries. Developed countries often provide better funding opportunities, more sophisticated research infrastructure, and a greater emphasis on publishing in high-impact journals. In contrast, postdoctoral researchers in developing countries may face challenges such as limited funding, resource constraints, and less access to international collaborations (Bakshi et al., 2023).

**STEM vs. Humanities and Social Sciences:** In STEM fields, postdoctoral positions are often well-funded, with clear expectations regarding research output and publication. In contrast, postdoctoral researchers in the humanities and social sciences might experience less structured programs, with greater emphasis on individual scholarship and less predictable funding sources (Cortes-Rodriguez et al., 2014).

**Interdisciplinary Research:** Chen (2014) discuss the impact of interdisciplinary experiences on learning performance, highlighting the growing trend of interdisciplinary research in postdoctoral programs. These experiences vary significantly across disciplines, with some fields offering more opportunities for interdisciplinary collaboration than others (Chen, 2014).

## 4 Comparative Analysis

### 4.1 Funding Models

The funding models for postdoctoral positions exhibit considerable variation across different countries and

disciplines, profoundly impacting the nature and scope of research conducted.

In China, the increase in funding for fundamental sciences has transformed the landscape for junior investigators. Chen's experience illustrates how the Chinese government's bolstered support has led to more lucrative grant opportunities, creating a more attractive environment for researchers. This shift is indicative of a broader trend where emerging economies are increasingly prioritizing scientific research funding (Chen, 2014).

Comparatively, in Western countries, funding models often involve a combination of government grants, industry partnerships, and academic funding. For instance, in the United States, funding sources like the National Institutes of Health (NIH) and the National Science Foundation (NSF) are crucial for postdoctoral researchers, especially in fields like biomedicine and environmental science. However, these grants are highly competitive, and the uncertainty of funding can pose significant challenges for career stability and research continuity (Finkelstein et al., 2014; Schenker et al., 2021).

European funding models also present a unique landscape. The European Union's Horizon 2020 program, for instance, offers significant funding opportunities for researchers, including postdoctoral fellowships. These programs are designed to foster innovation and collaborative research across member states, thus offering a different set of opportunities and challenges compared to national funding bodies (Dupont et al., 2023; Finkelstein et al., 2014).

Furthermore, in disciplines like the humanities and social sciences, funding models are often less generous compared to STEM fields. Postdoctoral researchers in these areas may rely more on university fellowships, private foundations, and limited government grants (Dupont et al., 2023). This disparity highlights the varying levels of resource allocation across different academic disciplines.

It's also important to note the rising trend of short-term and project-based funding in many regions, which has implications for the career stability of postdoctoral researchers. While this model promotes a diverse range of research projects, it can also lead to a precarious employment situation for researchers who must continuously secure funding for their positions and projects.

In conclusion, the global landscape of postdoctoral funding is marked by its diversity, with significant variations based on geographic location and discipline. This variance not only affects the quality and direction of research but also

has profound implications for the career development and stability of postdoctoral researchers.

#### 4.2 Career Development

Career development for postdoctoral researchers is a multi-faceted issue, influenced by geographical location, discipline, and the evolving nature of academic careers. For example, in health sciences, there is a push towards training in translational and transdisciplinary team science, which is not traditionally offered in many graduate programs (Kerr, 2022).

In South America, for instance, obtaining a postdoctoral position often involves going abroad to countries like the USA or Europe. This requirement poses significant challenges, including language barriers and cultural adjustments. Despite these difficulties, such opportunities are crucial for career advancement in academic settings in South America (Feeney, 2017; Yoon et al., 2018).

Feeney (2017) highlights the widening gap in career and professional development training for STEM doctorate recipients. As the employment landscape shifts away from traditional academic roles, there's a growing need for training that equips doctoral and postdoctoral trainees for diverse career paths, including non-academic sectors (Feeney, 2017).

In South African universities, postdoctoral fellowships are often viewed as 'professional development' opportunities. However, Kerr (2022) argues that this can sometimes lead to the de-professionalizing of academic work, as postdocs are often treated more like students receiving training rather than employees contributing to university research. This situation underscores a broader issue of how postdoctoral roles are perceived and structured within academic institutions (Kerr, 2022).

A study by Rybarczyk et al. (2011) presents a postdoctoral training program designed to prepare scholars for academic careers balancing research and teaching. The program's success demonstrates the value of structured training that aligns with specific career trajectories in academia, suggesting a model that other institutions could emulate (Rybarczyk et al., 2011).

These perspectives reveal that while career development opportunities are available, they are often influenced by regional norms and the changing dynamics of the global academic job market. There is a clear need for more inclusive and flexible training programs that can cater to a

wide range of career paths, both within and outside academia.

#### 4.3 Work Environment and Culture

The work environment and culture within academic settings are critical factors that significantly affect the experiences of postdoctoral researchers. These aspects vary globally and are influenced by institutional policies, societal norms, and the specific demands of academic disciplines. Dupont et al. (2023) emphasize the need for greater support in terms of social support and well-being, indicating that the work environment in some regions may not adequately support these aspects (Dupont et al., 2023). In contrast, other regions or disciplines might offer more holistic support systems, impacting the overall postdoctoral experience.

In Australia, Christian (2021) explored the challenges faced by early-career researchers (ECRs) in the sciences. The study highlighted issues such as job insecurity, the constant need for funding, lack of work-life balance, and workplace difficulties like bullying or harassment. These factors contribute to job dissatisfaction and a high intention among ECRs to leave their positions, underscoring the stressful environment that can prevail in academic research (Christian, 2021).

A case study by Lakkoju and Jeyalakshmi (2015) on work-life balance among women faculty members in an engineering college revealed that balancing professional responsibilities with personal life is a significant challenge. The study found that 'married without children' respondents experienced a poorer work-life balance compared to 'unmarried' respondents, highlighting the additional challenges faced by women in academia (Lakkoju & Jeyalakshmi, 2015).

In Singapore, a study by Yoon et al. (2018) on early-stage clinician-scientists identified several factors influencing career progress. The study pointed out the difficulty in delineating responsibilities between clinical care and research and a perceived lack of institutional support for research. This situation illustrates the unique challenges faced in emerging academic medical centers in Asia, where balancing clinical and research responsibilities can be particularly taxing (Yoon et al., 2018).

Additionally, Shabir et al. (2021) examined the work-life interference experienced by working women in India's health-care sector. The study revealed that higher support from employers, families, and colleagues could reduce the levels of interference in personal lives, emphasizing the

importance of institutional and emotional support in managing work-life balance (Shabir et al., 2022).

These studies address the diverse challenges and cultural nuances that shape the work environment for postdoctoral researchers. They underscore the need for more supportive institutional policies and a culture that recognizes and addresses the unique challenges faced by researchers, especially in balancing professional and personal responsibilities.

#### 4.4 Challenges and Opportunities

The landscape of postdoctoral research is filled with both challenges and opportunities, varying significantly across different regions and academic disciplines. For example, Cortés-Rodríguez et al. (2014) discuss the importance of cultural competence and international exposure for postdocs, especially for those in STEM fields aiming for global leadership roles (Cortés-Rodríguez et al., 2014).

A global comparison and assessment study by Finkelstein et al. offered an analytical model to assess the prospects for young faculty based on conditions and opportunities for PhD graduates entering the academic market in ten countries. This study highlighted the importance of factors such as student enrollment growth, research and development expenses, the age and rank distribution of current faculty, and the development of technology and new learning models. These factors collectively influence the opportunities and challenges for postdoctoral researchers in different countries (Finkelstein et al., 2014).

The challenges for early career researchers have evolved over recent years, as described by Johnson and Weivoda (2021). They noted increased awareness of unconscious bias and its impact on hiring and promotions, but also new obstacles like reduced availability of tenure-track positions, the shift towards soft-money positions, and lower funding rates. The COVID-19 pandemic added further layers of complexity, affecting research progress, funding, and career development for postdoctoral researchers (Johnson & Weivoda, 2021).

In the specific field of palliative care, the National Postdoctoral Palliative Care Research Training Collaborative faced challenges in recruiting diverse trainees, fostering a shared identity, advocating for trainees, and securing funding. However, they also identified opportunities such as expanding mentorship of predoctoral and clinical trainees, increasing the number of training

programs, and expanding funding support for career development grants (Schenker et al., 2021).

Moreover, a study by Nowell, Grant, and Mikita (2019) discussed the challenges faced by postdoctoral scholars in academic development and the Scholarship of Teaching and Learning (SoTL). They emphasized the need for further conceptualizing the roles of postdoctoral scholars in these fields to ensure their success, pointing to both the challenges and the potential for increased research in teaching and learning (Nowell et al., 2019).

In sum, studies show the dynamic nature of the postdoctoral research landscape, with its varied challenges and opportunities. Factors such as funding availability, institutional support, academic market conditions, and evolving research areas play a significant role in shaping the experiences of postdoctoral researchers.

## 5 Discussion and Conclusion

The comparative analysis of postdoctoral experiences across different regions and disciplines addresses a landscape marked by diversity and complexity. Key findings include significant variances in funding models, career development opportunities, work environments, and the challenges and opportunities encountered by postdoctoral researchers. These disparities highlight the uneven distribution of resources and support, impacting the quality and direction of research globally.

The funding models, ranging from substantial governmental support in countries like China to more diversified and competitive funding sources in Western nations, indicate that the geographical location of a postdoctoral researcher can significantly influence their research opportunities and career trajectory. Similarly, career development opportunities, while increasingly available, are often region-specific and aligned with local academic and industry demands.

The analysis also revealed that work environments and cultures in academia vary widely, with some regions offering more supportive and balanced atmospheres than others. Challenges such as job insecurity, work-life balance, and institutional support are common, yet their intensity and the responses to them differ markedly across different settings.

Moreover, findings paint a picture of a global postdoctoral landscape where opportunities and challenges are inextricably linked to geographic and institutional contexts. While some regions and disciplines offer robust

support systems and ample resources, others lag, potentially leading to a brain drain where talent moves to more favorable environments. This disparity raises concerns about the equitable distribution of knowledge and the potential for certain regions or fields to dominate specific areas of research. It also underscores the need for a more interconnected global research community that can share resources, opportunities, and best practices more effectively.

Further, the insights gained from this comparative analysis could significantly inform policy and institutional strategies. Policies aimed at equalizing opportunities for postdoctoral researchers, such as international collaborations, equitable funding mechanisms, and global exchange programs, could be instrumental in addressing the current disparities. Institutions could focus on creating more inclusive and supportive work environments, considering factors like job security, career development opportunities, and work-life balance. They could also advocate for and implement policies that foster diversity in research and ensure fair access to resources and opportunities for all postdoctoral researchers.

Furthermore, there is a clear need for policies that address the challenges posed by the changing landscape of academia, including the increasing reliance on soft-money positions and the impact of global crises like the COVID-19 pandemic.

In conclusion, the global postdoctoral research environment, while full of opportunities, faces significant challenges that require concerted efforts at the policy and institutional levels to create a more equitable, supportive, and productive research landscape worldwide.

## 6 Future Directions and Suggestions

To address the disparities in opportunities and resources, a stronger emphasis on global collaboration is suggested. International partnerships and networks can facilitate the sharing of best practices, resources, and knowledge, contributing to a more balanced global research environment.

Policymakers should consider reforms that promote equitable access to funding and career development opportunities. This includes establishing international grants, fellowships, and exchange programs that are accessible to postdoctoral researchers from various regions and disciplines.

Institutions need to prioritize creating supportive and inclusive work environments. This involves implementing

policies that ensure job security, provide adequate work-life balance, and foster a culture of respect and diversity.

In light of emerging challenges, such as those highlighted by the COVID-19 pandemic, institutions and policymakers should develop strategies to ensure the resilience and continuity of research. This includes establishing flexible funding mechanisms and support systems that can adapt to changing circumstances.

Special attention should be given to underrepresented disciplines, particularly in the humanities and social sciences, where funding and career development opportunities are often more limited. Policies should be designed to support these fields and promote a diverse research ecosystem.

Institutions and funding bodies should focus on creating long-term career development pathways for postdoctoral researchers. This involves providing clear and viable career progression opportunities, mentorship programs, and training in diverse skills, including those outside traditional academic roles.

Moreover, to combat the issue of brain drain, where talent moves to regions with more favorable conditions, policies should aim at creating attractive research environments in various regions, ensuring that researchers have compelling reasons to work and thrive in their home countries or regions.

In conclusion, while the global postdoctoral landscape presents numerous challenges, it also offers a wealth of

opportunities. Addressing these challenges and capitalizing on these opportunities requires concerted efforts from policymakers, institutions, and the global research community. Through collaborative efforts and strategic reforms, we can work towards a more equitable, supportive, and dynamic global postdoctoral research environment.

### Acknowledgments

None.

### Declaration of Interest

The author of this article declared no conflict of interest.

### Authors Contributions

Not Applicable.

### Ethics principles

In this article, researcher adhered to ethical guidelines to ensure the integrity and credibility of our narrative review. Author prioritized source credibility, avoid plagiarism, maintain objectivity, respect intellectual property rights, transparently disclose conflicts of interest, and demonstrate sensitivity to cultural and ethical differences in the review process. These principles address the commitment to upholding ethical standards in research and publication.

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