

Unlocking Five Decades of Meaningfulness-Job Satisfaction Dynamics in Public Employment: A Bibliometric Analysis

Jujun Juhedi¹, Widodo², Zaenal Mustafa El Qadri³, Wisnu Prajogo⁴

¹Student, Doctor of Economics, Faculty of Business and Economics, Universitas Islam Indonesia,
19931007@students.uui.ac.id

²Department of Management, Faculty of Economics and Business, Universitas Islam Sultan Agung Semarang,
widodo@unissula.ac.id

³Department of Management, Faculty of Economics and Business, Universitas Sarjanawiyata Tamansiswa,
zetmeq060@gmail.com

⁴Department of Management, Faculty of Economics and Business, STIE YKPN Yogyakarta, wisnuprajogo@gmail.com
Corresponding Author: 19931007@students.uui.ac.id¹

Abstract

This study explores the relationship between meaningful work and job satisfaction in the public sector over the past five decades using bibliometric analysis. Guided by the SALSA protocol, 701 publications from Scopus were analyzed. Results show a rising trend in research interest, especially in the last decade, with dominant contributions from the United States and Europe. Two main research clusters emerged, organizational and individual aspects, highlighting the multidimensionality of both constructs. Thematic mapping indicates that work meaningfulness remains an emerging topic, while job satisfaction is a central, mature theme. Factorial analysis revealed four major themes: organization, HRM, healthcare, and research methodology. This study contributes by mapping the evolving knowledge structure and identifying gaps, particularly in understudied regions and digital transformation contexts. It emphasizes the need for public sector HRM strategies that enhance employees' sense of purpose and well-being.

Keywords: meaningfulness, job satisfaction, public sector, bibliometric analysis, human resource management

Introduction

As organisations become more complex, job satisfaction has become an important topic of research for both management researchers and practitioners. Job satisfaction refers to a pleasurable or positive emotional state resulting from an individual's appraisal of their job or job experience (Locke, 1976), reflecting the extent to which work meets personal needs and expectations. Meaningful work is defined as the perception that one's work is significant and aligned with personal values and purposes (Steger et al., 2012), representing a central dimension of intrinsic motivation. Internationally, job satisfaction is a ubiquitous driver of diverse positive outcomes for organisations (Allan et al., 2018a; Rothausen & Henderson, 2019). One of the strongest predictors of job satisfaction is work meaningfulness, as evidenced by meta-analytic findings showing strong relationships between work meaningfulness and various correlates including work engagement, organisational commitment, job satisfaction (Allan et al., 2018a), and employee mental well-being (Allan et al., 2018a). There is a shift happening among employees (Hu and Hirsh, 2017; Ward, 2023) toward pursuing meaningful work. This trend has been exacerbated by the post-COVID-19 pandemic "Great Resignation" opportunities (Kuzior et al., 2022; Xu et al., 2023), whereby many individuals have left their jobs in search of more meaningful work. Studying the relationship between meaningful work and job satisfaction has become increasingly important, especially in the public sector. Research shows that having a purposeful working experience is related to greater satisfaction, engagement, and organisational commitment among employees (Albrecht et al., 2021; Martela & Riekk, 2018). However, the private sector still comprises the focus of much of the existing research whilst there remains little known about the way that job meaningfulness and satisfaction are connected within the context of the public sector (Sánchez-Sánchez & Puente, 2020; Vigan & Giaque, 2018). In this context, this knowledge gap is becoming progressively salient, as the public sector plays an increasingly significant role in the provision of services to society, particularly in light of global challenges such as the COVID-19 pandemic (Zhu et al., 2021).

However, the fast-paced acceleration of digital transformation and work practices following the COVID-19 crisis poses new challenges in how the topic of job satisfaction is understood and addressed within the public sector. With hybrid work models being adopted, government services being automated, and a demand for increased responsiveness, public servants' perceptions and appreciation of their work and their moving toward a new paradigm has changed substantially (Kumar et al., 2013; Taylor & Westover, 2011). In this changing scenario, public sector institutions encounter a double challenge; according to Ravid et al. (2017), they need to guarantee the provision of public services while at the same time

maintaining the well-being of their workforce and job satisfaction.

Although previous research highlights a positive relationship between work meaningfulness and job satisfaction (Dechawatanapaisal, 2020; Lorente et al., 2018), the available literature is fragmented and lacks consistency. Thus, the different strategies to conceptualize and measure work meaningfulness (Ghislieri et al., 2019) and the limited understanding of how this relationship develops in public sector organizations justify the need for a systematic literature review based on bibliometric analysis. Bibliometric approaches allow an unbiased assessment and visualization of academic publications (Greener, 2022; Zupic & Čater, 2014), recognition of the gradually developed research patterns (Mora et al., 2019) as well as revealing cooperation networks capable of facilitating future enhancement of the knowledge (Donthu et al., 2021).

Over the past five decades, research on meaningful work and job satisfaction in public organizations has evolved from fragmented descriptive studies to an integrated perspective that bridges psychology, management, and public administration. This evolution remains rooted in classical motivational theories, which continue to inform modern scholarship. Herzberg's Two-Factor Theory (Herzberg et al., 1959) first distinguished intrinsic motivators, such as achievement, recognition, and responsibility, from extrinsic hygiene factors, such as pay and policy, positioning meaningfulness as a key driver of satisfaction. Building on this foundation, Hackman and Oldham's Job Characteristics Model (Hackman & Oldham, 1976) identified five job dimensions (skill variety, task identity, task significance, autonomy, and feedback) that foster the psychological states of meaningfulness, responsibility, and knowledge of results, thereby enhancing intrinsic motivation. Later, the Person-Environment Fit perspective (Edwards et al., 1998) highlighted how value congruence between individuals and organizations strengthens perceived meaning and satisfaction. Collectively, these frameworks depict meaningful work as a psychological bridge between job design and satisfaction, particularly relevant to public employment, where intrinsic purpose and social contribution often substitute material incentives.

The purpose of this study is to explore and visually map out the research landscape on the association between job meaningfulness and job satisfaction in the public sector through bibliometric analysis. To our knowledge, this article provides the first systematic mapping of the relationship between job satisfaction and the associated discrepancies in the public sector.

Materials and Methods

The investigation utilized a systematic bibliometric approach underpinned by the SALSA protocol (Search, Appraisal, Synthesis, Analysis) to analyze the trajectory of the literature concerning meaningfulness and job satisfaction (Papaioannou et al., 2010). This approach was chosen for its ability to deliver an extensive and impartial overview of the existing literature.

During this searching phase, a systematic search was performed using the Scopus database as the main data source. Scopus has been chosen because it is one of the best available abstract and citation database providing broad coverage of scientific publications ranging from journal, conference proceeding, and other literature worldwide (Baas et al., 2020). Scopus has been empirically validated and is widely regarded by the academic community as a high-quality source of bibliometric data that can be used for large-scale research analyses, science policy evaluations, and mapping the development of science (Baas et al., 2020). As a content aggregator, Scopus significantly benefits from a stringent content curation process from the independent Content Selection and Advisory Board (CSAB) system that ensures the quality and validity of the data present. The search was performed with a search string that included: TITLE-ABS-KEY ("meaningfulness" OR "meaningful work" OR "meaning in work" OR "work meaningfulness" OR "job meaningful" OR "job meaningfulness") AND TITLE-ABS-KEY ("job satisfaction" OR "employee satisfaction" OR "work satisfaction" OR "job fulfillment" OR "employee well-being" OR "employee engagement" OR "work engagement"). The initial search retrieved a total of 701 publications. This metadata was then downloaded in bibtex format for analysis.

During the Appraisal phase, the research methodology intentionally refrained from implementing additional filter criteria, such as publication year, document type, language, or field of study, to ensure comprehensive coverage of the literature and mitigate the potential omission of significant articles that might have been excluded due to search limitations. This inclusive approach allowed this research to comprehensively capture the dynamics and evolution of the concepts of meaningfulness and job satisfaction in the academic literature. The decision not to apply any filters at this stage was taken to get a full picture of how these two concepts emerge and evolve across different scholarly fields, allowing for a richer analysis of the interdisciplinarity of this research topic. Thus, 701 publications were further analyzed, as shown in Table

2.

It was in the Synthesis phase where bibliometric data extracted from selected documents were arranged and unified. Extracted data considered were bibliographic data (author, year of publication, journal, citations, affiliations, and keywords). The data were also standardized to provide consistency in the analysis, in particular to overcome potential discrepancies in author or institution names.

The Analysis stage used this study a combination of the R software (libraries bibliometric) for the bibliometric analysis, advanced bibliometric. The analysis of this study involves three aspects including (1) Descriptive Analysis, covering descriptive data; core journals according to Bradford's law; the evolution trend of core journal production over years; and corresponded authors and countries' collaborative networks; (2) Network Analysis, involving co-occurrence networks between literature components, thematic research networks; and (3) Factorial Analysis, covering identifying and visualizing the conceptual structures that explain the relationships between meaningful work and job satisfaction themes in academic literature.

Table 1. Data Analysis

Analysis	Description	Aspects used
Descriptive Analysis	Since descriptive analysis is a methodological process for summarizing and explaining characteristics and patterns in scientific publications, it allows researchers to get an overview of findings of their research.	<ul style="list-style-type: none">• Data Description• Core journal• Production over time of core journal• Author, affiliations and corresponding country• Most cited documents
Network Analysis	Authors, institutions, journals, and publications in the studies are analyzed regarding their interrelationships. This is the path through which, by exploring research texts, researchers can make apparent the evolutionary and trending processes of scientific research.	<ul style="list-style-type: none">• Co-occurrence network Analysis• Thematic research network analysis
Factorial Analysis	This method has been used to reveal and graph conceptual structures depicting relationships in themes between academic literature. It is the analytical technique that condenses the complexity between entities, into simpler relationships.	<ul style="list-style-type: none">• Visualize conceptual structures that show how themes are interrelated in academic literature

Source: Prepared by Authors.

Visualization of the analysis results used various mapping techniques, including bibliometric network maps, density maps, and temporal trend analysis. This combination of quantitative analysis and visualization allows for a deeper understanding of how meaningfulness and job satisfaction research has evolved, including the identification of key themes, research gaps, and potential directions for future research.

Result

Descriptive Analysis

Descriptive analysis explains the data description, sources, authors, affiliations, and countries of origin, the most cited articles globally, and the most relevant words. Based on Table 2 on Data Description, this bibliometric study covers the timespan from 1974-2025, with a total of 449 sources consisting of journals and books, and contains 701 documents with an average annual growth of -1.35% and an average document age of 6.13 years. The analysis showed that the average number of citations per document was 32.87, with a total of 1613 keywords (ID) and 1617 author keywords

(DE). In terms of authorship, there were 2051 authors with 93 documents written by a single author, an average of 3.3 co-authors per document, and 23.97% international collaboration. Document types were dominated by articles (611), followed by various other types of publications, such as book chapters (10), conference papers (21), editorials (4), erratum (5), letters (2), notes (3), retracted (1), and reviews (17). These data have provided a comprehensive picture of the characteristics of publications in the field of work meaningfulness and job satisfaction in the public sector over the past five decades.

Table 2. Data Description

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1974:2025
Sources (Journals, Books, etc)	449
Documents	701
Annual Growth Rate %	-1.35
Document Average Age	6.13
Average citations per doc	32.87
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	1613
Author's Keywords (DE)	1617
AUTHORS	
Authors	2051
Authors of single-authored docs	93
AUTHORS COLLABORATION	
Single-authored docs	105
Co-Authors per Doc	3.3
International co-authorships %	23.97
DOCUMENT TYPES	
article	611
article article	5
article conference paper	1
book	10
book chapter	20
conference paper	21
conference paper article	1
editorial	4
erratum	5
letter	2
note	3
retracted	1
review	17

Source: Prepared by Authors, based on Biblioshyni Output

The "Most Relevant Sources" analysis in Figure 1 shows the distribution and contribution of scientific journals in the study of meaningfulness and job satisfaction. Frontiers in Psychology dominate as the source of most publications, with 21 documents, indicating the significance of psychological aspects in this field. PLOS ONE and SA Journal of Industrial Psychology had 10 publications each, followed by the Journal of Nursing Management and Sustainability (Switzerland), which contributed nine documents. Current Psychology, International Journal of Environmental Research, Journal of Advanced Nursing, Journal of Business Ethics, and Journal of Career Assessment each contributed seven

documents. This distribution of publications reflects the interdisciplinary nature of meaningfulness and job satisfaction studies in the public sector with the integration of perspectives from fields such as psychology, management, sustainability, and business ethics. The dominance of Frontiers in Psychology indicates that psychological approaches are a fundamental foundation for understanding the dynamics of meaningfulness and job satisfaction in the public sector.



Figure 1. Most Relevant Sources

Source: Prepared by Authors, based on Biblioshyni Output

The author-related description shown in figure 2 indicates that Allan BA showed the highest productivity, with 10 documents, followed by Rothmann S, who also contributed 10 documents, indicating their dominant role in the development of literature in this field. Shanafelt TD was third with nine documents, while Albrecht SL contributed seven documents. Duffy RD and Na Na each produced 6 publications. The remaining researchers, Al-Hakim L, Chaudhary R, Dyrbye LN, and Oprea B, contributed four documents each. This distribution of productivity reflects the existence of a core group of researchers who have consistently contributed to the development of knowledge on meaningfulness and job satisfaction in the public sector, with a significant concentration of publications by a few key researchers. This suggests that the field has a well-established research community, with several key figures leading the way in scientific knowledge production.

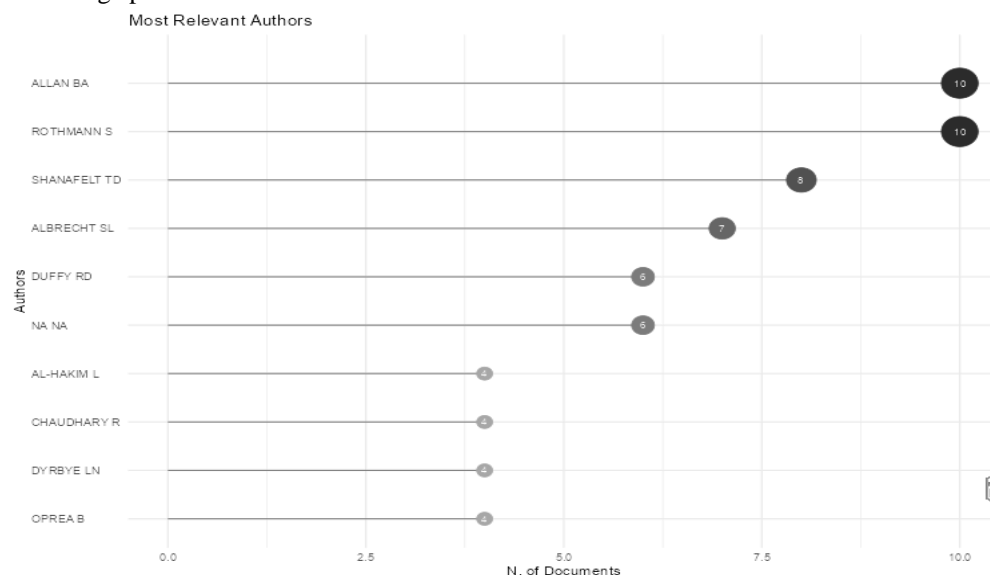


Figure 2. Most Relevant Authors

Source: Prepared by Authors, based on Biblioshyni Output

In addition to the most relevant authors related to the research topic, there is also an analysis of each author's productivity level. As shown in Figure 3, the authors' productivity in the period from 2009 to 2023 shows the evolution and consistency of the researchers' contributions in the field of meaningfulness and job satisfaction in the public sector. Allan BA shows concentrated productivity between 2017-2021 with a significant level of citations, indicated by the larger circle size in that period, while Rothmann S shows a longer publication consistency from 2011 to 2023. Shanafelt TD has the longest publication track record (2009-2023) with a significant increase around 2017, while Albrecht SL and Duffy RD show consistent publication patterns in the periods 2013-2023 and 2011-2019 respectively. Na NA, despite having fewer publications, showed consistency from 2009 to 2023. Newer researchers such as Al-Hakim L, Chaudhary R, and Oprea B show concentrated productivity in the period 2019-2023, while Dyrbye LN has a scattered publication pattern from 2011 to 2021. The size of circles in the graph indicates the number of articles (N). Articles) and citations per year (TC per year), providing a comprehensive picture of the quantity and impact of publications while highlighting the dynamic development of this research field with a combination of senior researchers who have long contributed and newer researchers who have started to have a significant impact in recent years.

Authors' Production over Time

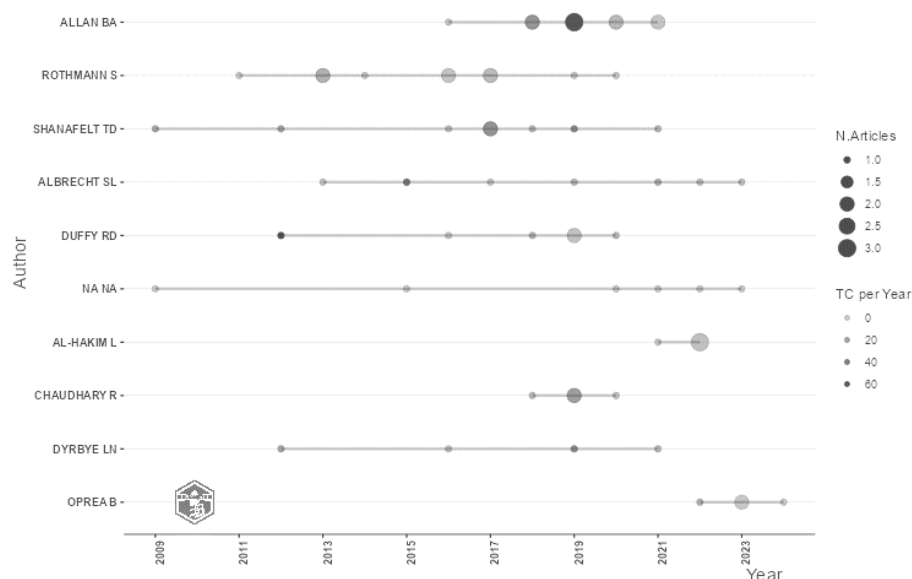


Figure 3. Authors' Production over Time

Source: Prepared by Authors, based on Biblioshyni Output

In addition, further analysis of author productivity can be seen through Lotka's law graph (see Figure 4). The graph visualization shows the relationship between the percentage of authors (Y-axis) and the number of documents produced (X-axis), where the two lines represent the actual distribution (solid line) and the theoretical prediction of Lotka's law (dashed line). The curve shows a very sharp decline, indicating that the majority of authors (around 90%) produce only a few publications (1-2 documents), while only a handful of researchers have high productivity by producing many publications.

The difference between the actual distribution and Lotka's theoretical prediction can be seen from the gap between the two lines; at the beginning of the curve (1-2 documents), the actual distribution tends to be higher than the prediction, whereas the middle of the curve shows a lower actual distribution than the prediction. This phenomenon confirms the principle of Lotka's Law, which states that in a research field, a small number of researchers are responsible for most publications, while the majority of researchers only contribute to a few publications. In the context of meaningfulness and job satisfaction research, this pattern reveals significant unevenness in researcher productivity, with a strong dominance of contributions from a small group of highly productive researchers. Furthermore, it is important to analyze the institutional affiliations of these researchers to understand the research centers that contribute significantly to this area.

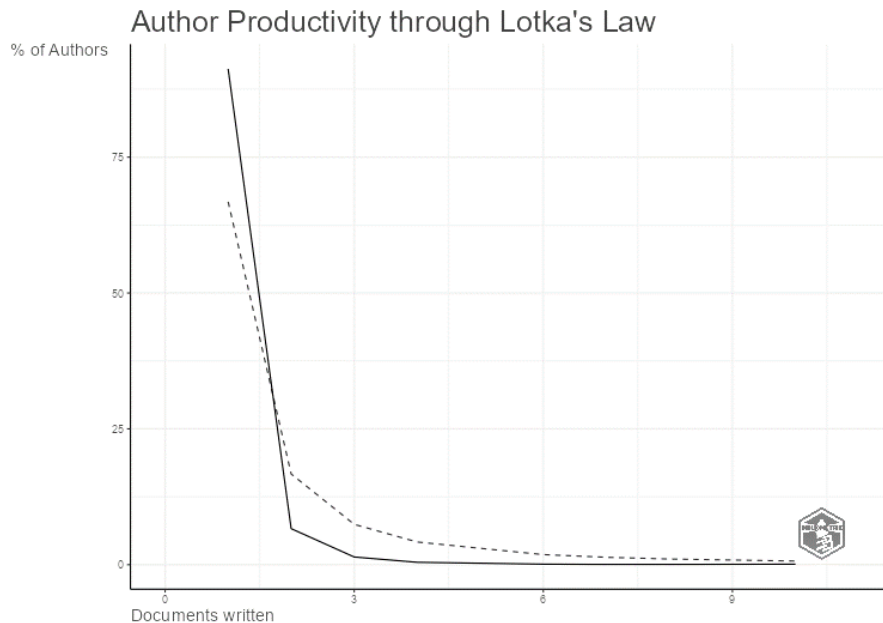


Figure 4. Author Productivity through Lotka's Law

Source: Prepared by Authors, based on Biblioshyni Output

The authors associated with the concept of job meaningfulness satisfying job based on their affiliations are illustrated in Figure 5 quiet most relevant affiliations. The affiliations of the authors in this study have a diverse range from leading institutions from around the world. The Mayo Clinic made the greatest contribution with 16 articles, followed by the University of Florida with 15 articles and Northwest University with 14. Also exhibiting significant contributions were Purdue University and Erasmus University Rotterdam, with 12 and 11 articles, respectively. Ninety articles were authored by nine from Deakin University with four from five institutions–University of Pittsburgh School of Medicine, McGill University, University of Bucharest, and University of Oulu, contributing eight articles each. Such data suggest that research on both meaningfulness at work and job satisfaction in the public sector is largely undertaken by institutions based in North American and European countries, with there being some contribution from institutions based in Australia. The wide range of affiliations indicate that the subject is of global interest, with much work having been done by a number of elite academic and medical institutions across the globe.

Moreover, the productivity of publications by key institutions over five decades reflects a meaningful trend in research for meaning and job satisfaction. A temporal analysis of five prominent institutions (Mayo Clinic, University of Florida, Northwest University, Purdue University, Erasmus University Rotterdam), in the period from 1974 to 2021, shows that this research area has increased significantly, especially after 2017, with Mayo Clinic and University of Florida leading the publication output, with over 15 articles each produced. Northwest University showed steady and consistent growth from the beginning, whereas Purdue University and Erasmus University Rotterdam started to show significant productivity increases after 2019. Interestingly, although this topic has been around since 1974, substantial research productivity has only been observed in the last decade, indicating the increasing attention and urgency of the issue of meaningfulness and job satisfaction in the public sector in the modern era.

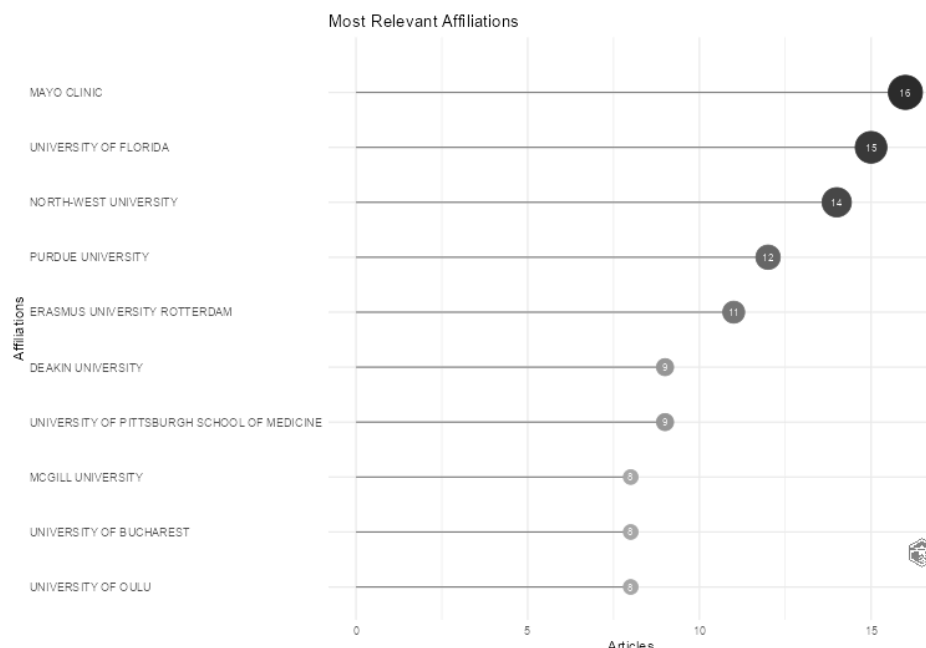


Figure 5. Most Relevant Affiliations

Source: Prepared by Authors, based on Biblioshyni Output

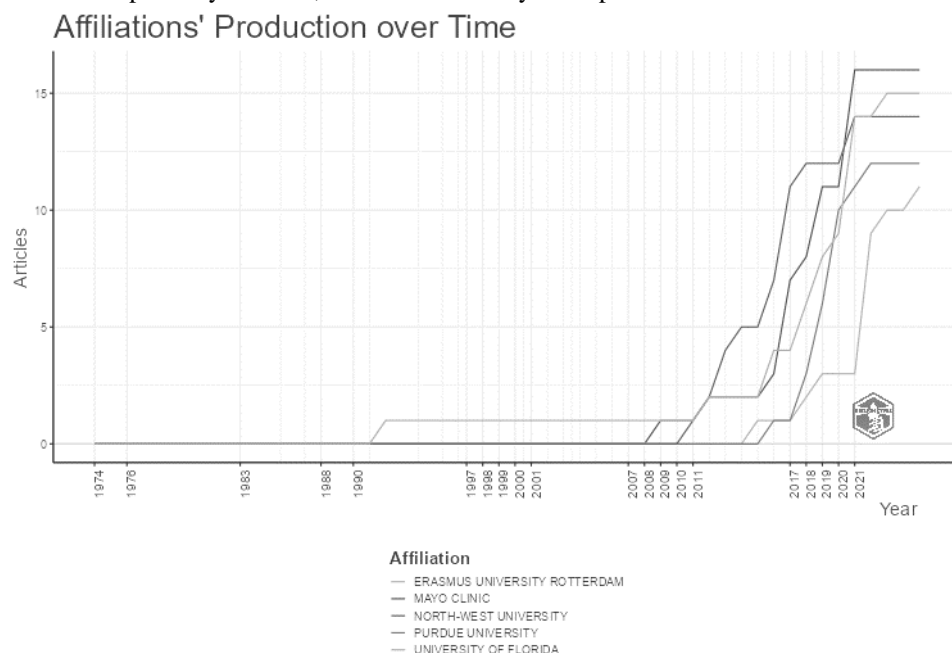


Figure 6. Affiliations' Production over Time

Source: Prepared by Authors, based on Biblioshyni Output

The geographical distribution of research on meaningfulness and job satisfaction shows a significant global reach (see Figure 7), with the clear dominance of the United States as the center of scientific production with 533 publications. Although Asia shows good participation, with contributions from China (91 publications), India (82 publications), Japan (32 publications), South Korea (27 publications), and the Southeast Asian region with Indonesia (23 publications) and Malaysia (22 publications), these numbers are still relatively small compared with North America and Europe. This indicates a significant research gap, especially considering the large population and complexity of the public sector in the Asian region, especially Indonesia, which has the world's fourth largest population and a large bureaucracy. The need for increased research in Asia, especially Indonesia, is relevant given the unique characteristics of the region's

public sector, such as strong collective cultural values, different bureaucratic structures, and specific challenges in public administration reform. Moreover, with the digital transformation and bureaucratic reforms underway in Indonesia, a deeper understanding of meaningfulness and job satisfaction in the public sector is crucial to improving the quality of public services and civil servants' welfare. Research contributions from an Asian perspective can provide new insights and enrich the global understanding of this topic, given that different sociocultural contexts can influence public sector employees' perceived and experienced meaningfulness and job satisfaction.

Top 15 Countries Scientific Production

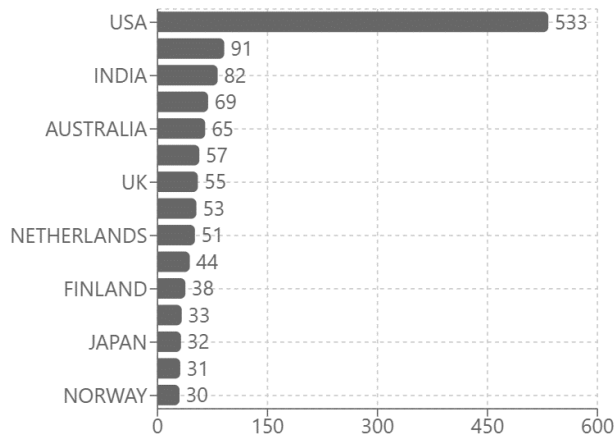


Figure 7. Top 15 Countries Scientific Production

Source: Prepared by Authors, based on Biblioshyni Output

The final descriptive analysis relates to the most cited documents on the research topics of meaningfulness and job satisfaction. Figure 8 shows that the global citation analysis of documents related to meaningfulness and job satisfaction research in the public sector significantly contributes to the development of this field. Articles by May et al. (2004) published in the *Journal of Occupational and Organizational Psychology* are the most influential with more than 2000 citations, followed by the article by Steger et al. (2012) in the *Journal of Career Assessment* with around 750 citations. Other articles, such as Arnold et al. (2007) in the *Journal of Occupational Health Psychology*, Sikka et al. (2015) in *BMJ Quality & Safety*, and Albrecht et al. (2015) in the *Journal of Organizational Effectiveness: People and Performance*, despite having under 500 citations, still make an important contribution to the development of the literature. The distribution of citations and the diversity of journals spanning the fields of organizational psychology, career management, occupational health, and organizational effectiveness reflect the interdisciplinary nature of this topic and show how the understanding of meaningfulness and job satisfaction has evolved through various disciplinary perspectives.

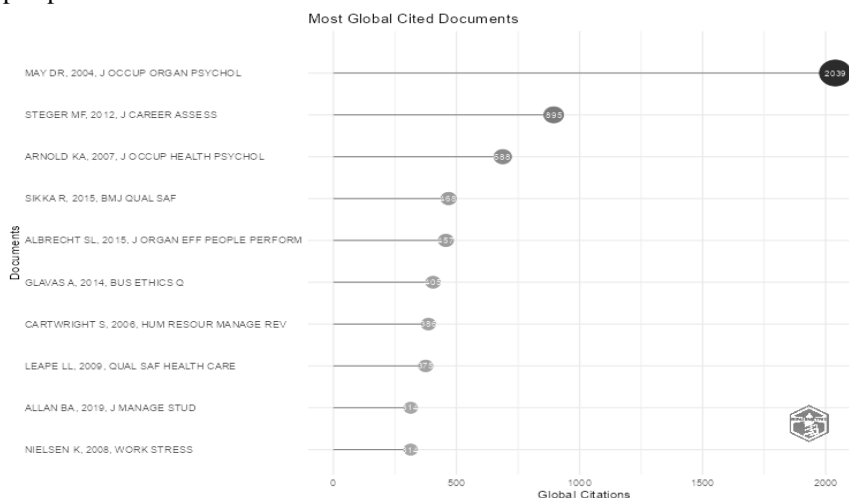


Figure 8. Most Global Documents

Source: Prepared by Authors, based on Biblioshyni Output

Table 3. Top 10 Most Globally Cited Documents

Author	Title	Journal	Total Citations	TC per year	Normalized TC
May et al. (2004)	The Psychological Conditions of Meaningfulness, Safety and Availability and The Engagement of the Human Spirit at Work	Journal of Occupational and Organizational Psychology	2039	97.095	1
Steger et al. (2012)	Measuring Meaningful Work: The Work and Meaning Inventory (WAMI)	Journal of Career Assessment	895	68.846	6.258
Arnold et al. (2007)	Transformational Leadership and Psychological Well-Being: The Mediating Role of Meaningful Work	Journal of Occupational Health Psychology	688	38.222	2.890
Sikka et al. (2015)	The Quadruple Aim: Care, Health, Cost and Meaning in Work	BMJ Quality and Safety	468	46.8	5.348
Albrecht et al. (2015)	Employee Engagement, Human Resource Management Practices and Competitive Advantage: an Integrated Approach	Journal of Organizational Effectiveness	457	45.7	5.222
Glavas & Kelley (2014)	The Effects of Perceived Corporate Social Responsibility on Employee Attitudes	Business Ethics Quarterly	405	36.818	5.408
Cartwright & Holmes (2006)	The Meaning of Work: The Challenge of Regaining	Human Resource Management Review	386	20.315	2.824

Author	Title	Journal	Total Citations	TC per year	Normalized TC
	Employee Engagement and Reducing Cynicism				
Leape et al. (2009)	Transforming Healthcare: A Safety Imperative	Quality and Safety in Health Care	375	23.437	3.813
Allan et al. (2018)	Outcomes of Meaningful Work: A Meta-Analysis	Journal of Management Studies	314	52,333	9,001
Nielsen et al. (2008)	The Effects of Transformational Leadership on Followers' Perceived Work Characteristics and Psychological Well-Being: A Longitudinal Study	Work and Stress	314	18.470	4.151

Source: Prepared by Authors, based on Biblioshyni Output

Network Analysis

The first analysis relates to co-occurrence (Figure 9). Co-occurrence network analysis of the keywords revealed two main clusters in the public sector in terms of meaningfulness and job satisfaction. The first cluster (in blue) highlights the organizational aspects that influence meaningfulness and job satisfaction, such as "job satisfaction," "workload" and "leadership." This shows that meaningfulness and job satisfaction are strongly related to workload, leadership style, and work environment conditions, especially in the public service sector such as nursing staff. Meanwhile, the second cluster (red color) focuses on the individual dimension with dominant keywords such as "human," "adult," "female," and "male," indicating that the experience of meaningfulness and job satisfaction is strongly influenced by individual demographic and psychological characteristics.

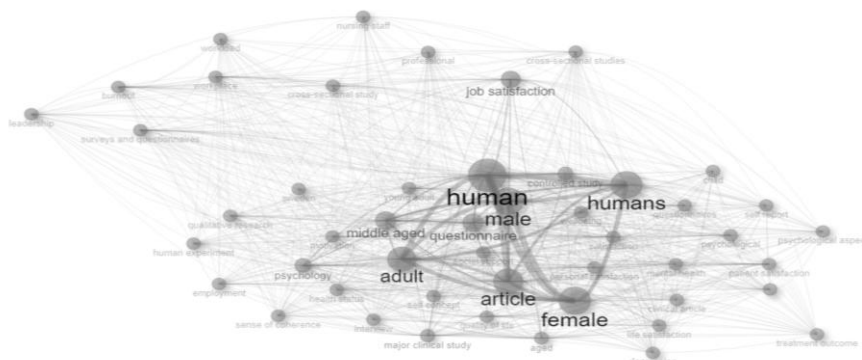


Figure 9. Co-Occurrence Network Map

Source: Prepared by Authors, based on Biblioshyni Output

Based on the centrality value, the dominance of the keywords "human" (47.33), "adult" (43.01), and "article" (42.06) implies that research on meaningfulness and job satisfaction strongly emphasizes the human aspects and experiences of adult individuals in the context of work. This reflects that understanding how people find meaning and satisfaction in their work in the public sector cannot be separated from their personal characteristics, life experiences, and socio-demographic contexts. The findings also highlight the importance of a holistic approach to understanding meaningfulness and job satisfaction, which considers both organizational and individual factors.

The results of the co-occurrence network analysis were then mapped in the form of a thematic map, as shown in Figure 10. The thematic map presented shows an interesting distribution of various research themes in the context of job satisfaction and meaningful works. The map uses two main dimensions: development degree (density) on the Y-axis and Relevance degree (centrality) on the x-axis, dividing the area into four distinct quadrants. Meaningful works positioned in the lower left infers that this theme has low density and centrality in recent literature (Emerging/Declining Themes). Its positioning, in contrast to that of, for instance, "job satisfaction" in the upper right quadrant (Motor Themes), coinciding with that of "human/humans", should indicate that job satisfaction appears to be reasonably mature theme in terms of research output.

The difference implies room for more investigation of the relationship between meaningful work and job satisfaction. As can be seen from the thematic map, an important relationship that is still found in an emerging state is between meaningful work and job satisfaction, which already belongs to a more established line of movement (motor theme). It is used to indicate links between related concepts, such as the niche themes of "emotional stress" and its proximity to "professional well-being" and "burnout" sectors, both of which exist in their own area of the map. It is this positioning which suggests to us that the study of meaningful work merits further development, especially in relation to its connection with job satisfaction and general well-being at work.

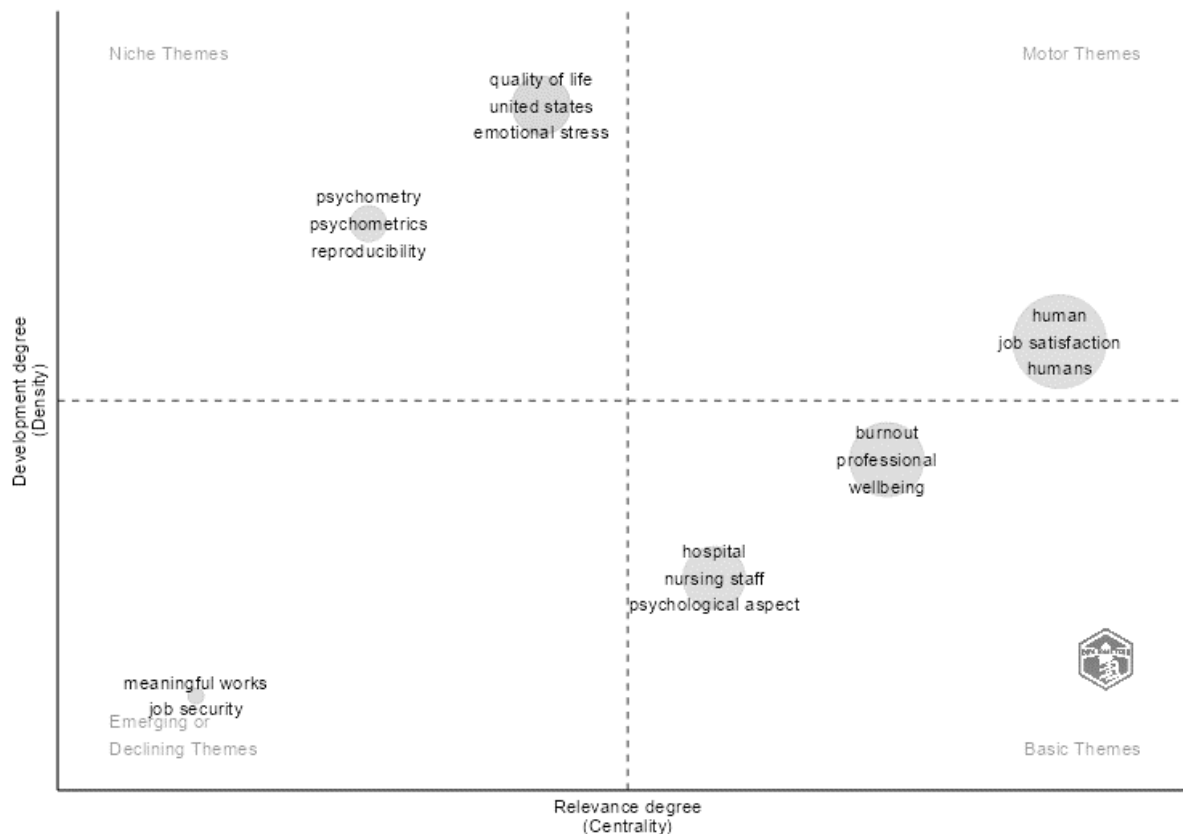


Figure 10. Thematic Map

Source: Prepared by Authors, based on Biblioshyni Output

The distribution of themes in the map shows that psychometry and reproducibility are in the niche theme area, indicating

that measurement and evaluation in this area still require the development of more robust methodologies. "Job security" being in the same area as meaningful works suggests a potential link between the two concepts that has not been fully explored in the existing literature.

Factorial Analysis

Based on the conceptual structure map displayed with the MCA method, the results of the factorial analysis in this study reveal the conceptual structure in the field of meaningfulness and job satisfaction. Figure 11 shows the distribution of the research themes that can be grouped into several main areas.

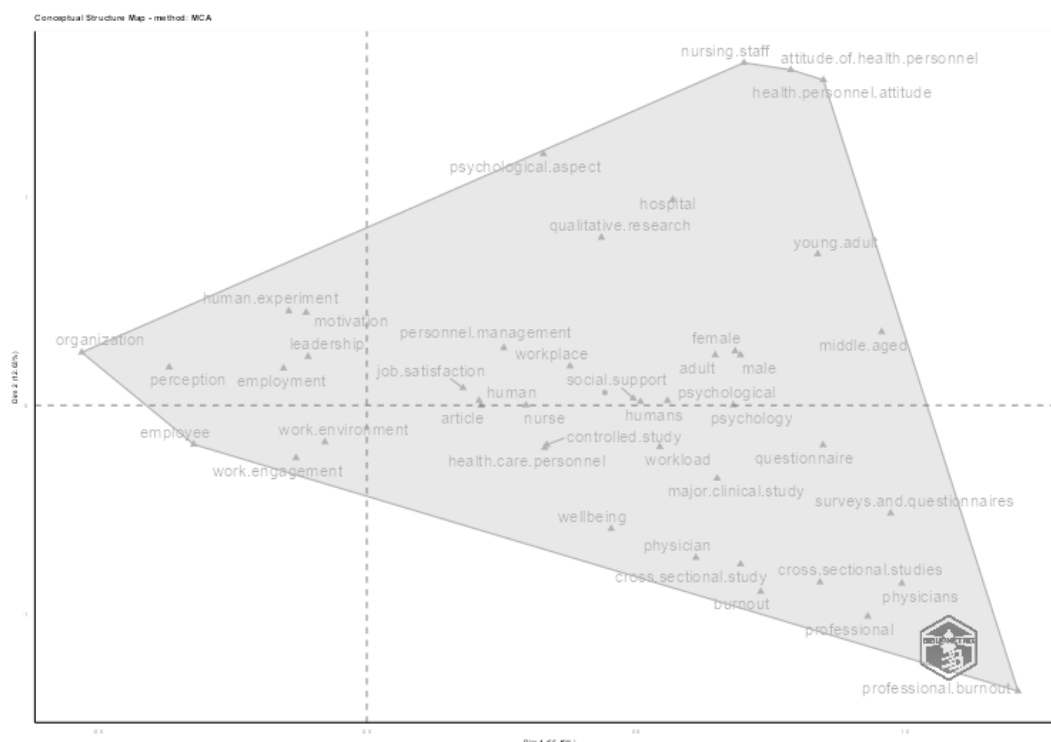


Figure 11. Factorial Analysis

Source: Prepared by Authors, based on Biblioshyni Output

The bottom left area contains themes related to organizational aspects such as "organization," "work engagement," "work environment," and "employee." The middle section is dominated by concepts related to human resources and job satisfaction, such as "personnel management," "job satisfaction," "workplace," and "human," and humans. While in the upper right section there are themes related to health workers such as "nursing staff," "attitude of health personnel," and "hospital" which represent the public sector in health services. The bottom right section shows the methodological aspects of research, as seen from the appearance of themes such as "cross sectional studies," "surveys and questionnaires," and "major clinical studies." The theme "professional burnout" also appears in this area, indicating the large number of studies that use quantitative approaches to study burnout in professionals.

The distribution pattern in the map shows the relationship between work meaningfulness associated with "work engagement" and "work environment," and job satisfaction. This can be seen from the spatial proximity between the organizational aspects of the theme group and personnel management. This closeness indicates that meaningful work aspects play an important role in shaping employee job satisfaction, especially in the context of the public sector and in the healthcare setting, which is indicated by the dominance of themes related to health workers. The position of "wellbeing" adjacent to "burnout" and "professional" in the lower area also indicates the relationship between meaningful work and professional well-being and potential burnout. This clustering pattern not only illustrates the current research landscape but also indicates how meaningfulness and job satisfaction influence each other in the context of professional well-being in the public sector, with a particular focus on healthcare.

Discussion

The bibliometric analysis in this study reveals a significant evolution in the research landscape of job meaningfulness and



job satisfaction in the public sector over the past five decades. The exponential increase in the number of publications, particularly in the last decade, reflects the growing recognition of the importance of these topics in the context of human resource management in the public sector. The shift in research focus from general job satisfaction to the role of work meaningfulness as a key antecedent of job satisfaction and employee well-being indicates the development of a more sophisticated and holistic understanding of the factors that contribute to positive work attitudes and behaviors. These findings are in line with the results of the descriptive analysis that highlighted the trend of continued publication growth and increased research interest on this topic, as discussed in the Results section.

Although this research has grown rapidly globally, the analysis revealed a significant geographical imbalance in research contributions, with a predominance of publications from Western countries, particularly the United States and Europe. This finding emphasizes the need to improve the representativeness and diversity of perspectives in the study of job meaningfulness and job satisfaction in the public sector, especially by encouraging greater contributions from researchers in Asia, as highlighted in the geographical analysis in the Results section. In addition, bibliometric analysis revealed research gaps and opportunities for further exploration. While research has identified a positive relationship between the meaningfulness of work and job satisfaction, the underlying mechanisms and contextual factors that moderate this relationship still require deeper understanding. Future research should explore the role of variables such as job characteristics, leadership, and organizational culture in shaping perceptions of job meaningfulness and job satisfaction among public sector employees. The implication of this fact was that there are limitations of research designs primarily comprised of cross-sectional studies and quantitative methodologies (which are outlined in the document type analysis shown in Results) and it requires longitudinal studies and mixed-methods approaches to provide more comprehensive information on the temporal interplays of work meaningfulness and job satisfaction.

This study's co-occurrence analysis and thematic mapping results shed light on important trends and intellectual frameworks on work meaningfulness and job satisfaction in the public sector. The organizational and individual themes that explain the two primary clusters of meaning demonstrate support for the multidimensionality of meaningfulness and job satisfaction and the importance of assessing contextual and dispositional explanations in the study of these phenomena. These results are consistent with theoretical models in the literature, for example the Job Characteristics Model (Hackman & Oldham, 1976) and Person-Environment Fit Theory (Edwards et al., 1998), which highlight the importance of the interplay between job and individual attributes in determining meaningful and satisfying work experiences. The position of work meaningfulness as an emerging theme in the research landscape while job satisfaction remains an established and widely researched theme reflects the potential of work meaningfulness as an important predictor of job satisfaction and other employee outcomes. These findings support the theoretical argument that work meaningfulness is the most important intrinsic aspect of job satisfaction (Chalofsky 2003) and a core component of employee well-being (Steger et al. 2012). However, the nature of the causal relationship between work meaningfulness and job satisfaction requires further investigation given the limitations of the existing research design.

Beyond these empirical patterns, it is essential to interpret how these findings extend the theoretical development of meaningful work and job satisfaction. This study advances the conceptual understanding of these constructs by integrating insights into classical and contemporary theoretical traditions. The bibliometric evidence reveals that modern scholarship continues to validate the motivational logic of Herzberg et al. (1959), Hackman & Oldham (1976), and Edwards et al. (1998), while enriching it with perspectives that emphasize meaning construction and value alignment. As Rosso et al. (2010) argue, meaningful work arises from the dynamic interplay between personal values, task design, and social purpose—dimensions increasingly mirrored in public administration research. Meta-analytic findings by Allan et al. (2019) confirm that meaningful work functions as a proximal predictor of job satisfaction and well-being; however, its mechanisms depend on contextual and organizational factors. Lysova et al. (2019) further demonstrate that organizational cultures fostering autonomy, purpose, and trust amplify this connection, indicating a shift from static to relational models of meaning at work. Consistent with Wright & Pandey (2011) and Kim (2012), these insights underscore that, within public employment, meaningful work operates through a dual pathway of intrinsic motivation and person–organization value congruence. Therefore, this study advances the literature by integrating these dispersed perspectives into a coherent framework that shows how theories of job design, public service motivation, and value-based alignment converge in shaping the meaningfulness–satisfaction nexus over time.

While the theoretical integration above consolidates the conceptual foundations of meaningful work and job satisfaction, it is equally important to acknowledge the contextual heterogeneity that shapes how these constructs are experienced

across the employment sectors. The relationship between meaningful work and job satisfaction should be interpreted within the differing institutional logics of public and private organizations. Classic motivational distinctions outlined by Perry & Wise (1990) explain that public employees are primarily driven by prosocial and altruistic motives, such as serving the public interest and advancing collective welfare, rather than extrinsic economic rewards. This orientation contrasts with that of private sector employees, whose motivation is more closely tied to material incentives and performance-based outcomes (Buelens & Broeck, 2007). Empirical findings further demonstrate that public servants tend to prioritize intrinsic values, such as responsibility, self-development, and work-life balance, over financial compensation, reflecting a conscious choice for stability and social contribution. More recent research adds that leadership in public organizations can amplify these intrinsic motives by articulating a clear mission and reinforcing public service values, thereby increasing employees' sense of purpose and mission valence (Wright et al., 2012). These contextual distinctions suggest that meaningfulness and satisfaction in public employment are deeply intertwined with institutional missions, ethical commitment, and leadership-driven goal clarity, which fundamentally differ from the performance-oriented paradigms typical of private organizations.

Building on the distinctions between public and private employment, the post-pandemic era has accelerated a profound transformation in how public employees perceive meaning and satisfaction in their work. The rapid digital transformation of public administration has introduced new models of interaction, service delivery, and organizational culture (Mergel et al., 2019). These developments have compelled public servants to redefine their sense of purpose and contribution in technologically mediated environments. The adoption of digital tools has not only altered bureaucratic procedures, but also reshaped relationships between employees, citizens, and institutions, emphasizing responsiveness, transparency, and continuous adaptation. In such evolving environments, individual motivation increasingly depends on the alignment between personal values and organizational purposes. As Kim (2012) highlighted, public service motivation acts as a psychological bridge linking employees' value congruence with positive work attitudes. When digital transformation initiatives are designed around intrinsic motives such as service, self-development, and civic duty, they enhance perceived meaningfulness and sustain higher levels of job satisfaction. This shift suggests that digital-era governance should be viewed not merely as technological modernization but as a human-centered transformation grounded in purpose, ethics, and engagement as the pillars of employee well-being.

The findings of this study have significant theoretical and practical implications for the development of human resource management knowledge and practices in the public sector. Theoretically, the results of this study contribute to a more comprehensive understanding of the dynamics of job meaningfulness and job satisfaction in the public sector by strengthening the conceptual relationship between the two constructs (Michaelson, 2011; Steger et al., 2012). The identification of organizational and individual factors that influence meaningfulness and job satisfaction also provides a strong foundation for the development of theoretical models that explain the antecedents and consequences of meaningful and satisfying work experience in the public sector. (Steijn & van der Voet, 2019; Tummers & Knies, 2013).

Practically, the findings of this study highlight the importance of public sector organizations placing a higher priority on strategies that encourage employees' perceptions of meaning and purpose. Various interventions exist, such as job redesign to increase task significance (Grant, 2008), alignment of individual and organizational values (Paarlberg & Perry, 2007), and leadership practices that empower and inspire (Wright et al., 2012). (Wright et al., 2012) can be considered to increase the meaningfulness of work and job satisfaction. Furthermore, by comprehending the contextual and dispositional factors that influence meaningfulness and job satisfaction, organizations can develop more targeted and individualized strategies to enhance employees' diverse work experiences (Buelens & Broeck, 2007).

Conclusion

This bibliometric analysis presents a comprehensive examination of the evolution and research landscape pertaining to meaningfulness and job satisfaction within the public sector over the past five decades. By integrating findings from various bibliometric analyses, including descriptive, network, and factorial analyses, this study provides deep insights into the dynamics, patterns, and structure of knowledge underlying this area of research.

The results show exponential growth in publications related to work meaningfulness and job satisfaction in the public sector, reflecting the growing recognition of the importance of this topic. The shift in research focus from general job satisfaction to the role of work meaningfulness as a key antecedent of job satisfaction and employee well-being indicates the need to develop a more sophisticated and holistic understanding. However, the analysis also revealed a geographical imbalance in research contributions, with a predominance of publications from Western countries as well as research



gaps in terms of the underlying mechanisms and contextual factors that moderate the relationship between job meaningfulness and job satisfaction.

Conceptual structure mapping revealed two major theme clusters - organizational and individual—confirming the multidimensional nature of meaningfulness and job satisfaction. These findings align with existing theoretical models and support the argument that work meaningfulness is the most important intrinsic aspect of job satisfaction and a core component of employee well-being. However, the causal relationship between work meaningfulness and job satisfaction requires further investigation.

The theoretical implications of this study include contributing to a more comprehensive understanding of the dynamics of job meaningfulness and job satisfaction in the public sector context as well as a stronger foundation for the development of theoretical models. Practically, the findings highlight the importance of implementing strategies that promote employee perceptions of meaning and purpose, such as job redesign, value alignment, and empowering leadership practices.

This study highlights the need for strong collaborations between academics, practitioners, and government officials to further research and practical discourse around work meaningfulness and job satisfaction in public sector organizations. With insights gained from this investigation, government organizations can take a data-driven approach to their initiatives, designing personnel work environments that are challenging and rewarding, enhancing individual employee well-being and productivity, as well as the quality of public services rendered. It is thus expected that future studies will uncover more facets of the meaningfulness of work, job satisfaction, and the process by which an individual makes sense of their job in the framework of the public sector, advancing theories and practices of human resource management alike.

Limitation of the Study

Although this research provides useful information, it is important to recognize the limitations. This use of a database may not include all literature relevant to the discussion, and bibliometric analysis cannot completely subsume the subtleties of a conceptual debate. In addition, it is difficult to infer causal relationships from the data. However, this research lays solid ground for future investigations. Future research should employ longitudinal methods, mixed-methods, check if organizational and individual variables moderate outcomes, and become more inclusive and geographically diverse.

References

- Albrecht, S., Green, C., & Marty, A. (2021). Meaningful Work, Job Resources, and Employee Engagement. *Sustainability*, 13, 4045. <https://doi.org/10.3390/SU13074045>
- Albrecht, S. L., Bakker, A. B., Gruman, J. A., Macey, W. H., & Saks, A. M. (2015). Employee Engagement, Human Resource Management Practices and Competitive Advantage: an Integrated Approach. *Journal of Organizational Effectiveness*, 2(1), 7 – 35. <https://doi.org/10.1108/JOEPP-08-2014-0042>
- Allan, B. A., Batz-Barbarich, C., Sterling, H. M., & Tay, L. (2018). Outcomes of Meaningful Work: A Meta-Analysis. *Journal of Management Studies*, 56(3), 500 – 528. <https://doi.org/10.1111/joms.12406>
- Allan, B. A., Batz-Barbarich, C., Sterling, H. M., & Tay, L. (2019). Outcomes of Meaningful Work: A Meta-Analysis. *Journal of Management Studies*, 56(3), 500 – 528. <https://doi.org/10.1111/joms.12406>
- Arnold, K. A., Turner, N., Barling, J., Kelloway, E. K., & McKee, M. C. (2007). Transformational Leadership and Psychological Well-Being: The Mediating Role of Meaningful Work. *Journal of Occupational Health Psychology*, 12(3), 193 – 203. <https://doi.org/10.1037/1076-8998.12.3.193>
- Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, 1, 377–386. https://doi.org/10.1162/qss_a_00019



Buelens, M., & Broeck, H. Van den. (2007). An Analysis of Differences in Work Motivation between Public and Private Sector Organizations. *Public Administration Review*, 67(1), 65–74. <http://www.jstor.org/stable/4624541>

Cartwright, S., & Holmes, N. (2006). The Meaning of Work: The Challenge of Regaining Employee Engagement and Reducing Cynicism. *Human Resource Management Review*, 16(2), 199 – 208. <https://doi.org/10.1016/j.hrmr.2006.03.012>

Chalofsky, N. (2003). An emerging construct for meaningful work. *Human Resource Development International*, 6, 69–83. <https://doi.org/10.1080/1367886022000016785>

Dechawatanapaisal, D. (2020). Meaningful work on career satisfaction: a moderated mediation model of job embeddedness and work-based social support. *Management Research Review*. <https://doi.org/10.1108/mrr-06-2020-0308>

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/J.JBUSRES.2021.04.070>

Edwards, J., Caplan, R., & Harrison, V. (1998). Person-environment fit theory: Conceptual foundations, empirical evidence, and directions for future research. In C. L. Cooper (Ed.), *Theories of organizational stress*. (pp. 28–67). Oxford University Press.

Ghislieri, C., Cortese, C., Molino, M., & Gatti, P. (2019). The relationships of meaningful work and narcissistic leadership with nurses' job satisfaction. *Journal of Nursing Management*. <https://doi.org/10.1111/jonm.12859>

Glavas, A., & Kelley, K. (2014). The Effects of Perceived Corporate Social Responsibility on Employee Attitudes. *Business Ethics Quarterly*, 24(2), 165 – 202. <https://doi.org/10.5840/beq20143206>

Grant, A. M. (2008). The significance of task significance: Job performance effects, relational mechanisms, and boundary conditions. In *Journal of Applied Psychology* (Vol. 93, Issue 1, pp. 108–124). American Psychological Association. <https://doi.org/10.1037/0021-9010.93.1.108>

Greener, S. (2022). Evaluating Literature with Bibliometrics. *Interactive Learning Environments*, 30(7), 1168–1169. <https://doi.org/https://doi.org/10.1080/10494820.2022.2118463>

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior & Human Performance*, 16(2), 250–279. [https://doi.org/10.1016/0030-5073\(76\)90016-7](https://doi.org/10.1016/0030-5073(76)90016-7)

Herzberg, F., Mausner, B., & Snyderman, B. (1959). The motivation to work, 2nd ed. In *The motivation to work*, 2nd ed. John Wiley.

Hu, J., & Hirsh, J. (2017). Accepting Lower Salaries for Meaningful Work. *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.01649>

Kim, S. (2012). Does Person-Organization Fit Matter in the Public Sector Testing the Mediating Effect of Person-Organization Fit in the Relationship between Public Service Motivation and Work Attitudes Public. *Public Administration Review*, 72, 830–840. <https://doi.org/10.1111/j.1540-6210.2012.02572.x>

Kumar, R., Ahmed, J., Shaikh, B., Hafeez, R., & Hafeez, A. (2013). Job satisfaction among public health professionals working in public sector: a cross sectional study from Pakistan. *Human Resources for Health*, 11, 2. <https://doi.org/10.1186/1478-4491-11-2>

Kuzior, A., Kettler, K., & Rąb, Ł. (2022). Great Resignation—Ethical, Cultural, Relational, and Personal Dimensions of Generation Y and Z Employees' Engagement. *Sustainability*. <https://doi.org/10.3390/su14116764>



Leape, L. L., Berwick, D., Clancy, C., Conway, J., Gluck, P., Guest, J., Lawrence, D., Morath, J., O'Leary, D., O'Neill, P., Pinakiewicz, D., & Isaac, T. (2009). Transforming Healthcare: A Safety Imperative. *Quality and Safety in Health Care*, 18(6), 424 – 428. <https://doi.org/10.1136/qshc.2009.036954>

Locke, E. A. (1976). The Nature and Causes of Job Satisfaction. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology* (pp. 1297–1349). Rand McNally.

Lorente, L., Tordera, N., & Peiró, J. M. (2018). How Work Characteristics Are Related to European Workers' Psychological Well-Being. A Comparison of Two Age Groups. *International Journal of Environmental Research and Public Health*, 15(1). <https://doi.org/10.3390/ijerph15010127>

Lysova, E. I., Allan, B. A., Dik, B. J., Duffy, R. D., & Steger, M. F. (2019). Fostering meaningful work in organizations: A multi-level review and integration. *Journal of Vocational Behavior*, 110(July 2018), 374–389. <https://doi.org/10.1016/j.jvb.2018.07.004>

Martela, F., & Riekk, T. (2018). Autonomy, Competence, Relatedness, and Beneficence: A Multicultural Comparison of the Four Pathways to Meaningful Work. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.01157>

May, D. R., Gilson, R. L., & Harter, L. M. (2004). The Psychological Conditions of Meaningfulness, Safety and Availability and The Engagement of The Human Spirit at Work. *Journal of Occupational and Organizational Psychology*, 77(1), 11 – 37. <https://doi.org/10.1348/096317904322915892>

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385. <https://doi.org/10.1016/j.giq.2019.06.002>

Michaelson, C. (2011). Whose responsibility is meaningful work? *Journal of Management Development*, 30(6), 548 – 557. <https://doi.org/10.1108/02621711111135152>

Mora, L., Deakin, M., & Reid, A. (2019). Combining co-citation clustering and text-based analysis to reveal the main development paths of smart cities. *Technological Forecasting and Social Change*. <https://doi.org/10.1016/J.TECHFORE.2018.07.019>

Nielsen, K., Randall, R., Yarker, J., & Brenner, S.-O. (2008). The Effects of Transformational Leadership on Followers' Perceived Work Characteristics and Psychological Well-Being: A Longitudinal Study. *Work and Stress*, 22(1), 16 – 32. <https://doi.org/10.1080/02678370801979430>

Paarlberg, L. E., & Perry, J. L. (2007). Values Management: Aligning Employee Values and Organization Goals. *The American Review of Public Administration*, 37(4), 387–408. <https://doi.org/10.1177/0275074006297238>

Papaioannou, D., Sutton, A., Carroll, C., Booth, A., & Wong, R. (2010). Literature searching for social science systematic reviews: consideration of a range of search techniques. *Health Information and Libraries Journal*, 27(2), 114–122. <https://doi.org/10.1111/j.1471-1842.2009.00863.x>

Perry, J. L., & Wise, L. R. (1990). The motivational bases of public service. *Public Administration Review*, 50(3), 367–373. <https://doi.org/10.2307/976618>

Ravid, O., Malul, M., & Zultan, R. (2017). The Effect of Economic Cycles on Job Satisfaction in A Two-Sector Economy. *Journal of Economic Behavior and Organization*, 138, 1–9. <https://doi.org/10.1016/J.JEBO.2017.03.028>

Rosso, B. D., Dekas, K. H., & Wrzesniewski, A. (2010). On the meaning of work: A theoretical integration and review. *Research in Organizational Behavior*, 30(C), 91–127. <https://doi.org/10.1016/j.riob.2010.09.001>



Rothausen, T., & Henderson, K. (2019). Meaning-Based Job-Related Well-being: Exploring a Meaningful Work Conceptualization of Job Satisfaction. *Journal of Business and Psychology*, 34, 357–376. <https://doi.org/10.1007/S10869-018-9545-X>

Sánchez-Sánchez, N., & Puente, A. F. (2020). Public Versus Private Job Satisfaction. Is there a Trade-off between Wages and Stability? *Public Organization Review*, 21, 47–67. <https://doi.org/10.1007/s11115-020-00472-7>

Sikka, R., Morath, J. M., & Leape, L. (2015). The Quadruple Aim: Care, Health, Cost and Meaning in Work. *BMJ Quality and Safety*, 24(10), 608 – 610. <https://doi.org/10.1136/bmjqs-2015-004160>

Steger, M., Dik, B., & Duffy, R. (2012). Measuring Meaningful Work. *Journal of Career Assessment*, 20, 322–337. <https://doi.org/10.1177/1069072711436160>

Steger, M. F., Dik, B. J., & Duffy, R. D. (2012). Measuring Meaningful Work: The Work and Meaning Inventory (WAMI). *Journal of Career Assessment*, 20(3), 322 – 337. <https://doi.org/10.1177/1069072711436160>

Steijn, B., & van der Voet, J. (2019). Relational job characteristics and job satisfaction of public sector employees: When prosocial motivation and red tape collide. *Public Administration*, 97(1), 64–80. <https://doi.org/https://doi.org/10.1111/padm.12352>

Taylor, J., & Westover, J. (2011). Job Satisfaction in The Public Service. *Public Management Review*, 13, 731–751. <https://doi.org/10.1080/14719037.2010.532959>

Tummers, L. G., & Knies, E. (2013). Leadership and Meaningful Work in the Public Sector. *Public Administration Review*, 73(6), 859–868. <https://doi.org/https://doi.org/10.1111/puar.12138>

Vigan, F. A., & Giauque, D. (2018). Job satisfaction in African public administrations: a systematic review. *International Review of Administrative Sciences*, 84, 596–610. <https://doi.org/10.1177/0020852316651693>

Ward, S. (2023). Choosing Money Over Meaningful Work: Examining Relative Job Preferences for High Compensation Versus Meaningful Work. *Personality and Social Psychology Bulletin*, 50(7), 1128 – 1148. <https://doi.org/10.1177/01461672231159781>

Wright, B. E., Moynihan, D. P., & Pandey, S. K. (2012). Pulling the Levers: Transformational Leadership, Public Service Motivation, and Mission Valence. *Public Administration Review*, 72(2), 206–215. <https://doi.org/https://doi.org/10.1111/j.1540-6210.2011.02496.x>

Wright, B. E., & Pandey, S. K. (2011). Public Organizations and Mission Valence: When Does Mission Matter? *Administration and Society*, 43(1), 22–44. <https://doi.org/10.1177/0095399710386303>

Xu, M., Dust, S., & Liu, S. (2023). COVID-19 and the great resignation: The role of death anxiety, need for meaningful work, and task significance. *The Journal of Applied Psychology*. <https://doi.org/10.1037/apl0001102>

Zhu, Y., Chen, T., Wang, J., Wang, M., Johnson, R. E., & Jin, Y. (2021). How critical activities within COVID-19 intensive care units increase nurses' daily occupational calling. *Journal of Applied Psychology*, 106(1), 4 – 14. <https://doi.org/10.1037/apl0000853>

Zupic, I., & Čater, T. (2014). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>



Authors' Contributions

Author 1: Conceptualization (lead); Data curation (equal); Formal analysis (equal); Investigation (equal); Methodology (equal); Project administration (equal); Supervision (lead); Validation (lead); Writing – original draft (equal); Writing – review & editing (equal); **Author 2:** Data curation (lead); Formal analysis (equal); Investigation (equal); Methodology (lead); Project administration (equal); Resources (equal); Software (equal); Writing – original draft (equal); **Author 3:** Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (lead); Software (lead); Visualization (lead); Writing – review & editing (equal); **Author 4:** Investigation (equal); Project administration (lead); Visualization (equal); Writing – original draft (lead); Writing – review & editing (lead)

Conflicts of Interest

The author(s) did not report any potential conflict of interest.