



A bibliometric analysis on training, effectiveness and efficiency

Tamanna Arya

Research Scholar, OM Sterling Global University, MBA (HR and Marketing), MDU Rohtak,
Haryana

Abstract

This study presents a bibliometric analysis of academic research on training, effectiveness, and efficiency. The study examines literature obtained from major academic databases such as Scopus and Web of Science, using keywords including “training,” “effectiveness,” “efficiency,” “training effectiveness,” and “training efficiency.” The main objective of the study is to understand how training programs influence employee knowledge, skills, work efficiency, productivity, and overall organizational performance. The reviewed literature indicates that effective training plays a significant role in improving employee motivation, commitment, performance, and long-term organizational success. The bibliometric results show a noticeable increase in publications after 2020, reflecting growing academic interest in digital learning, technological advancement, artificial intelligence, and performance-based training evaluation. Country-wise analysis highlights the United States, China, and India as major contributors to this research area. The document type analysis shows that journal articles are the dominant medium of scholarly communication, followed by conference papers and review articles. The study also reveals that training effectiveness and efficiency are no longer limited to human resource management, but have expanded into education, healthcare, technology, sustainability, and organizational studies. Overall, this study maps the growth, publication trends, major contributors, research domains, and future directions of training-related research.

Keywords

Training, Training Effectiveness, Training Efficiency, Employee Performance, Bibliometric Analysis, Human Resource Management, Organizational Productivity, Skill Development, Scopus, Web of Science.

Introduction

A significant competitive advantage in a worldwide market may be found in the expanded abilities, knowledge and skills of a competent workforce (McKinsey, 2006). In order for employees to get the knowledge, competence and experience they need to do their jobs well, training programs must be designed with their needs in mind. According to Meyer and Allen (1991), these initiatives could also affect the level of dedication and enthusiasm among employees. In order to help its workers reach their full potential and do their jobs effectively, organisations provide training. The majority of companies use long-term planning to put money into their workers' skill sets so they can handle whatever the future throws at them. Employees are more invested and motivated, which in turn boosts their performance. When a company invests in its employees by offering training programs, those employees are more invested in the company's success and work harder to achieve its goals. Employees are a company's most valuable asset because of the influence they have on public perception and financial success. It



is not uncommon for staff to shoulder the most of the workload, ensure customer satisfaction and guarantee high-quality events and items. Inadequate training leaves both new recruits and veteran employees lacking in the information and talents necessary to execute their tasks well. People tend to stay in their jobs for longer if they get proper training. Training is a must for the work. Programs that teach workers new things or provide them opportunities to advance in their careers are known as employee training. Without it, workers don't know what they're supposed to be doing. The importance of training in increasing employee productivity was realised by businesses that were looking to gain a competitive advantage. Training programs boost productivity in the workplace, according to prior research. Prior research in the field has shown that effective training programs lead to a higher return on investment, even if other studies have pointed out that training is useful for reaching the best levels of employee retention (Colarelli & Montei, 1996; Becker, 1993). Because of the world's and technology's fast development, companies are now facing new challenges and changes. The abilities and knowledge required to do certain tasks have evolved in response to technological advancements. Consequently, in order to tackle these challenges, all business entities need training programs that are both better and more efficient. A more conducive learning environment and better prepared individuals to deal with future challenges are two outcomes of high-quality training programs (Wei-Tai, 2006).

Managers are doing everything in their power to encourage workers to realise their potential, which will lead to a happier workplace in the long run (Farooq & Aslam, 2011). In order to boost capacity, managers are hard at work designing effective training programs for their employees. These programs will equip workers with the knowledge, skills and talents they need to achieve the organization's goals. Aside from improving the company's worldwide reputation, the senior management's fight increases worker productivity (Jia-Fang, 2010). Worker familiarity with the intended new technology breakthrough, mastery of the competences and abilities required to perform a given profession and elimination of errors and mistakes committed on the job are all outcomes of well-designed training programs (Robert, 2006). One of the primary roles of human resource management is to foster employee growth via well-designed training and development programs. The goal of employee development, as stated by Elena P. (2000), is to raise both the level of performance of individuals and the company as a whole. When workers are happy in their jobs, they are more invested in the company's success, which in turn raises production and profits. Champathes on the first (2006). Although several studies have examined the topic, very little has focused on how training affects employee performance. To address this knowledge vacuum, this study will review the relevant literature on the topic, shed light on the link between high-quality training and improved performance and provide companies with recommendations for how to maximise the impact of training programs on staff output.

Research Methodology

The current academic literature on the interrelated topics of training, effectiveness and efficiency is methodically examined in this study using a bibliometric research strategy. In order to identify significant authors, institutions, core journals, subject clusters and research

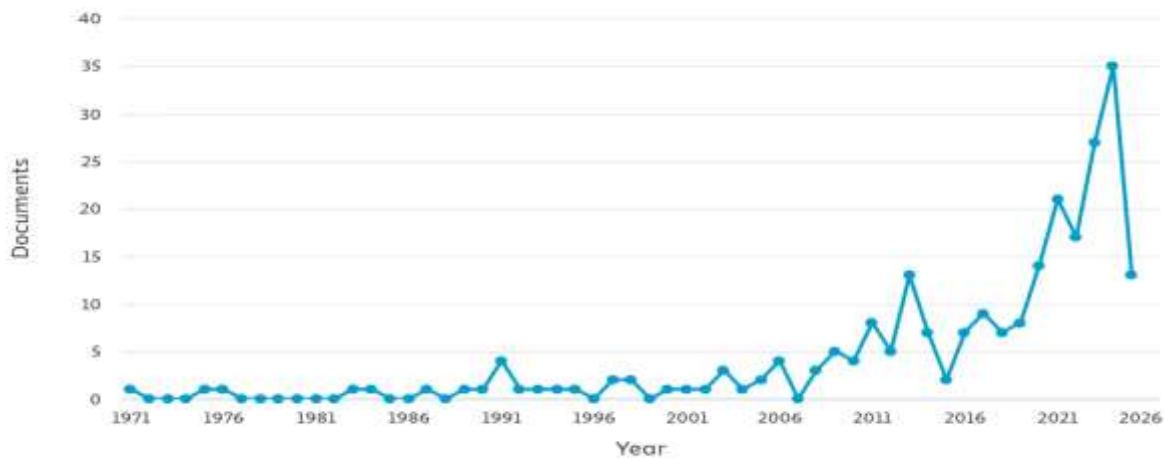


trends throughout time, bibliometric analysis is a quantitative tool that helps in mapping, measuring and evaluating published research. The data used in this study came from two major academic databases, Scopus and Web of Science (WoS), which are known for their comprehensive coverage of peer-reviewed scholarly work and advanced search capabilities. For this literature review, we selected a hand-picked set of keywords that included things like "training," "effectiveness," "efficiency," "training effectiveness," and "training efficiency." By concentrating on terms found in article titles, abstracts and keywords, the search criteria were fine-tuned using Boolean operators (AND/OR). We limited our search to English-language publications published between 2010 and 2024 to highlight the most recent findings and developments in the field. Articles from scholarly journals, conference proceedings and review papers were considered for inclusion if they addressed the relationships among training, effectiveness and efficiency in a range of domains, including but not limited to business, education, healthcare and technology. Not included in the research were articles that are not indexed, such as book reviews, editorials, or opinion pieces.

Data Analysis

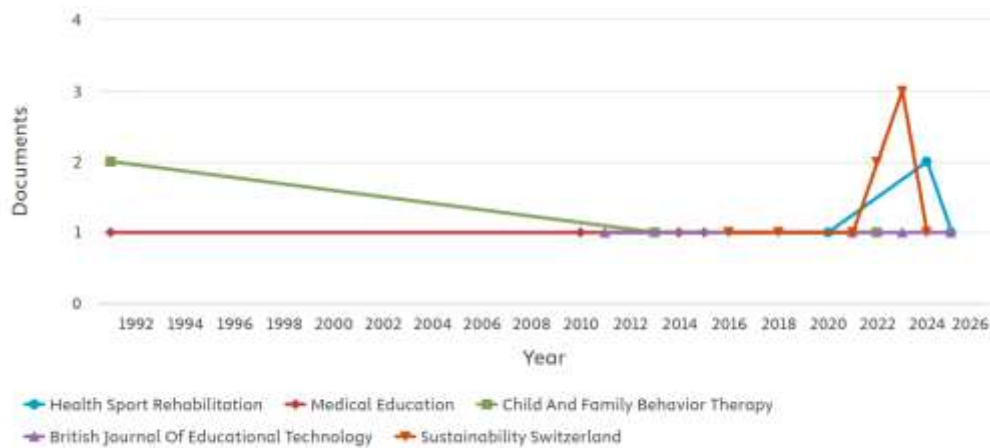
From 1971 to 2026, the figure headed "Documents by Year" shows the trends in yearly publications of training, effectiveness and efficiency. With an average of less than five publications produced annually and very little variations between 1971 and 2005, the data shows that academic interest in these topics was modest. About 2006, a little uptick in publications started to show up, signalling the beginning of a period of slow expansion. This most likely occurred at the same time as there was a greater focus on evaluating the results of training programs and on training itself as a strategic function of HRM. Starting in 2016, there is a noticeable increase in the rate of publishing, reaching a high in 2023 with the release of more than 35 publications. The incorporation of data analytics and AI in training assessment, the worldwide move towards digital learning and the heightened emphasis on optimising training effectiveness and efficiency in response to fast technological and organisational developments are all factors that have contributed to this spike. As is typical in bibliometric studies including either current or future years, the apparent decline in 2026 is probably because data indexing was either incomplete or continuing when the research was conducted. As a whole, the figure shows that there is a lot of academic interest in linking training methods with observable results, which bodes well for the future of study in this crucial field.

Documents by year



Document per year by source

Training, efficacy and efficiency have been study subjects over the years and this chart shows the distribution of publications across chosen academic journals in relation to time. Medical Education, Health Sport Rehabilitation, Child and Family Behaviour Therapy, Sustainability (Switzerland) and the British Journal of Educational Technology are among the highlighted publications. One of these journals, Child and Family Behaviour Therapy, had two articles published in 1991 and then had a steady decrease in activity in the years that followed. Over the course of many years, Medical Education produced a single publication, which was both constant and modest. A more recent upsurge in contributions may be seen in the Swiss journal Sustainability, which had a dramatic increase in publishing beginning in 2021 and reaching a high of three papers in 2023, suggesting a rising interest in bridging sustainability with efficiency and training. Similarly, there has been a growing tendency in incorporating training effectiveness into health-related fields, as seen by the increased number of publications in the field of Health Sport Rehabilitation beginning in 2021. The relevance of educational technology in improving training results is highlighted by the dispersed but constant contributions to the British Journal of Educational Technology, especially from 2020 onwards. Scholarly production has increased significantly over the last five years, particularly in publications that concentrate on sustainability, health and educational innovation, as seen in the image, which indicates a diversification of interest across domains. This movement is in line with the larger trend in academia toward multidisciplinary methods that investigate training for more than just skill acquisition; they also aim to improve efficiency, well-being and sustainability in the long run.

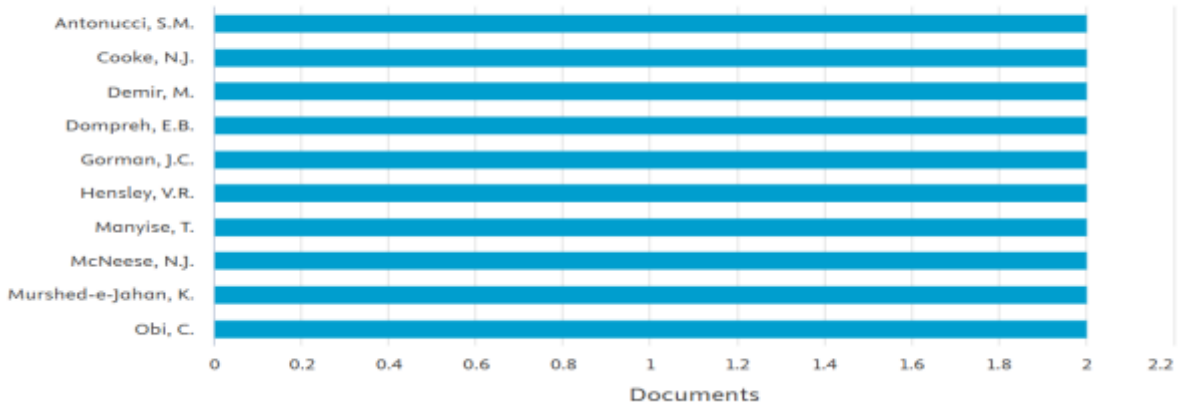


Document by Author

The "Documents by Author" figure displays the top ten writers in terms of the number of publications in the training, effectiveness and efficiency fields, illuminating their remarkable contributions. Anthonyntonucci, S.M., Cooke, N.J., Demir, M., Dompseh, E.B., Gorman, J.C., Hensley, V.R., Manyise, T., McNeese, N.J., Murshed-e-Jahan, K. and Obi, C. have all made two contributions to the academic discussion. Leading researchers in this field have a very equitable distribution of research contributions, as seen by the consistency in the number of publications among these writers. This also implies that there may be a large number of scholars making significant contributions to the topic, rather than just a few of really productive people. The fact that the authors come from all over the world and work in different fields demonstrates that this is an international and multidisciplinary effort to address the problem of training efficacy and efficiency. The diverse range of contributors highlights the collaborative spirit of the area and suggests different approaches to methodology and their potential practical applications in fields including technology, education, healthcare and business. In sum, the number highlights a well-rounded academic engagement, pointing to chances for up-and-coming scholars to make significant contributions to the growing corpus of books.

Documents by author

Compare the document counts for up to 15 authors.

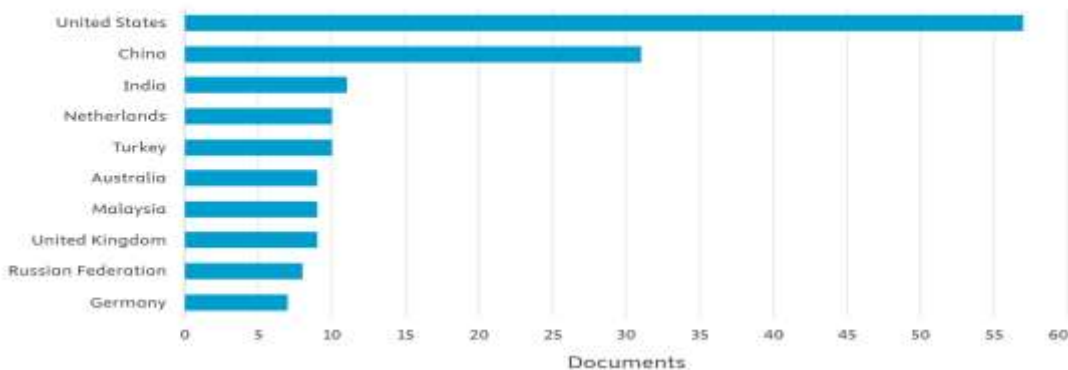


Documents by Country

"Documents by Country or Territory" is a comparison chart that shows where training, effectiveness and efficiency-related research has been published. It ranks the nations with the most publications in this field and emphasises the top eleven. With over 60 papers, the US takes the lead, a reflection of its robust research infrastructure and the persistent academic involvement with performance optimisation and training. China comes in second with over 30 publications, highlighting its increasing focus on educational innovation and labour development. With more than ten publications, India is the third most prolific country when it comes to academic interest in training efficacy and efficiency, which is especially noteworthy given the country's rapidly developing educational and industrial sectors. The frequent appearance of European countries such as the Netherlands, Germany and the United Kingdom suggests that this topic is highly valued in established economies. Emerging powers like Russia, Turkey and Malaysia are only a few examples of the growing involvement of non-Western countries. The widespread interest in training and performance enhancement, as well as the possibility of cross-cultural and cross-economic collaborations, are reflected in the geographical spread of research. The graphic highlights the need of international research projects to increase our knowledge and the real-world effects of training efficacy in a dynamic global context.

Documents by country or territory

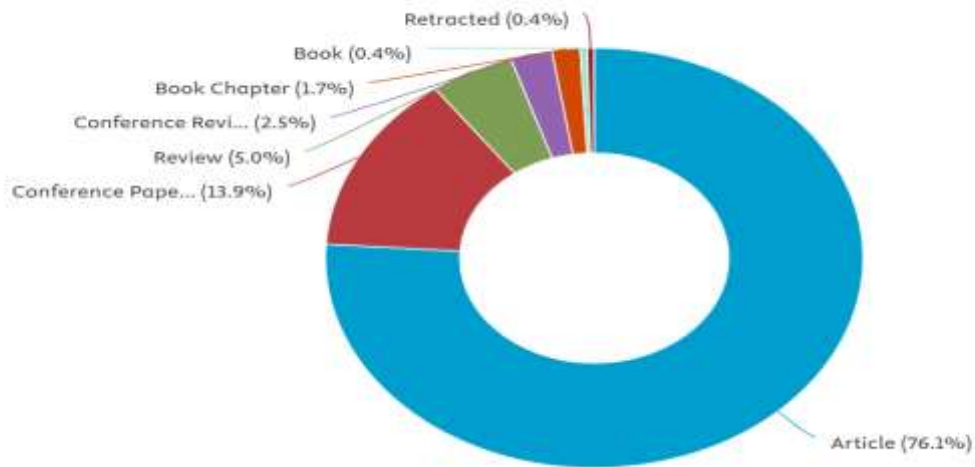
Compare the document counts for up to 15 countries/territories.



Document by Type

When it comes to training, efficiency and effectiveness, the figure labelled "Documents by Type" shows the distribution of various publishing forms. Journal articles make up the vast majority of academic production, comprising 76.1% of all texts. Researchers clearly choose publishing in peer-reviewed academic journals because of the high respect in which their work is held by their peers and the influence it has on the field. Conference papers make up 13.9% of all articles, demonstrating the significance of academic conferences as venues for the dissemination of new research and the promotion of intellectual discourse. Review papers constitute 5.0% of the total, indicating a small but significant effort to compile current research and provide thorough summaries of the topic. Book chapters(1.7%), conference reviews(2.5%) and books (0.4%) make up the remaining document genres, suggesting that the issue has been extensively and interdisciplinarily studied. Retraction of a negligible percentage of papers (0.4%) may indicate infrequent but insignificant problems with research integrity. The wide range of publishing forms, with articles being the most common, shows that the issue is being discussed extensively across many academic communication channels. This diversity shows that the profession is developing and that there are many approaches to training, which improves the conversation about efficiency and effectiveness.

Documents by type



Conclusion

The academic environment around training, efficacy and efficiency is surveyed in this bibliometric study. From 2020 onwards, there is a noticeable surge in publications, indicating a rising academic interest in this topic. Journal articles are the most common form of academic communication, according to the document types study, which shows that research in this field is quite rigorous. Additional important contributions come from conference papers and review articles, which represent both the current state of discussion and the body of established knowledge in the topic.

The research production ranking of the United States, China and India shows how training and performance-related studies are relevant globally. Health Sport Rehabilitation and Sustainability Switzerland are only two of the many publications that have published articles on the subject, indicating that it is of interest to researchers from many other fields, including organisational studies, behavioural sciences, education and health. The existence of several authors who have contributed equally highlights the scattered and collaborative nature of the research environment.

All things considered, this analysis does more than just plot out the geographical distribution and conceptual framework of research; it also draws attention to important tendencies and potential avenues for further investigation. This study identifies the major publishing channels, prolific authors and contributing countries, which is beneficial for academics, practitioners and policymakers that seek to increase the effectiveness and efficiency of teaching in their professions. Future study in this important area would benefit from focusing on understudied regions, state-of-the-art training technologies and longitudinal outcomes in order to make conclusions more relevant and applicable.

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