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Graduate employment in higher education: applying bibliometrics to world-system theory

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ABSTRACT

As massification of higher education developed, employment challenges in changing labour markets aroused the attention of scholars globally. An interdisciplinary approach called world-system theory is applied by scholars from the social sciences, history, anthropology and cultural studies. This study applied the theory in a bibliometric analysis of graduate employment research using R and CiteSpace. It identified the main characteristics (e.g. authors and countries) of relevant research, investigated the social and economic context of certain milestone publications and visualised research hot spots. World-system theory, as a macrosociological approach to describing the world economy and social system, is innovatively applied in illustrating the findings of the current work. Results indicate that core countries not only are economically influential but also dominating the academic research. Scholars in semi-peripheral and peripheral countries are encouraged to establish transnational networks and foster academic collaborations.

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world-system

Introduction

Graduate employment has become a global concern due to the massification of higher education that began in the 1960s. The vast economic development and political changes after World War II (WWII) contributed to an increasing demand for a highly educated workforce in Europe and America (Trow 2005). These demands led to the rapid expansion of higher education systems in Western countries in 1960s, which spread to the rest of the world in the 1990s. As the labour market expanded, about 172 million people worldwide were unemployed in 2018, corresponding to an unemployment rate of 5.0%. This number of jobless individuals will increase to 174 million in 2020 as labour force growth outpaces employment creation, according to the annual report *World Employment and Social Outlook* released by the International Labour Organisation (ILO) for the year 2019.

Unemployment is also a critical concern in Asia, and the highest unemployment rate among all subregions in 2018 (4.2%) was recorded in East Asia (ILO 2019, 44). As Mok (2017, 16) argued, the massive expansion of higher education 'unquestionably creates pressure' on graduate employment in East Asia. Employment challenges in the changing labour market aroused the attention of scholars worldwide.

Bibliometrics, a field of information science which is applied to many areas, may be used to gain a comprehensive understanding of this development. As of July 2019, no bibliometric analysis of graduate employment had been published in the Google Scholar or Social Sciences Citation Index

(SSCI) databases (search term 'graduate employment bibliometric' were used). Therefore, the current work aimed to conduct a bibliometric analysis of the graduate employment literature published between 1900 and 2019, with special attention on relevant research about East Asian countries. To provide an overview of international studies on graduate employment, the study identified main characteristics (e.g. authors, countries, annual production and collaborations), investigated the social and economic contexts of two milestone publications which were published in 1934 and 1992, marking the beginning of graduate employment research in the US and in East Asia, respectively.

Selected East Asian countries include China, Japan, Taiwan, Hongkong, Macau, North Korea, South Korea and Mongolia. However, no employment research about North Korea or Mongolia had been collected by July 2019. Therefore, 'East Asia' in the present study mainly refers to China, Japan, Taiwan, Hongkong, Macau and South Korea due to the absence of data.

Literature review

World-system theory

World-system analysis is a multidisciplinary approach to world history and social change that originated in 1970s (Wallerstein 2004). It is widely used to illustrate development dynamics and relationships between developed and developing countries. It divides the world into core, semi-periphery and periphery countries. The core consists of the 'advanced' or 'developed' core states, which focus on higher skill and capital-intensive production; periphery countries, or third world countries, focus on low-skill, labour-intensive production and the extraction of raw materials, and they are often dominated and exploited by core regions. Semi-peripheral countries are positioned between the core and peripheral countries economically. They are important loci of forces that transform world systems because they mediate the economic, political, and social activities that link core and peripheral areas (Chase-Dunn and Hall 1997). Semi-periphery is generally industrialised, as exemplified by some Asian countries such as India and China (Wallerstein 2004). This hierarchy is a fundamental structure of modern world-system that is reproduced over time. All countries 'develop' over time, but the relative gap between core and periphery is reproduced (Chase-Dunn and Hall 1997).

Core countries play a dominant role not only economically but also academically. Power and knowledge seem to be intertwined, which are 'directly imply one another'. In other words, power works through institutions and practices that are productive of power effects (Foucault 1977, 27). The imbalance in scholarly publishing has been a matter of interest particularly since the 2002 book *The Geopolitics of Academic Writing* was published in which Canagarajah highlighted the material shortages and institutional constraints affecting researchers in economically disadvantaged parts of the globe. The matter was later developed and extended by authors such as Lillis and Curry (2010), who examined the impact of the growing dominance of English on academic writing for global publication and addressed the pressure on academics worldwide to publish their research in English. Under the threat posed by globalisation, which has resulted in part in English being attributed greater value, academics from non-Anglophone countries, particularly those in the semi-periphery, are encouraged to conquer the language barrier and publish in English to make their research relevant to the international community.

The mediating role of the semi-periphery and its academic culture are further discussed by Bennett (2014). The semi-periphery's mediating role is observed in the production and transmission of knowledge in the modern world. Institutions located in semi-peripheral countries are likely to act as 'conduits for knowledge flows emanating from the centre' by establishing transnational collaborations, attending international conferences and being visiting scholars in core countries, all before conveying knowledge to 'the outer rim of the system through their own publications' (Bennett 2014, 3). As a consequence of this mediating role, the authors in semi-peripheral countries

are more likely to replicate accepted models and techniques than to generate new knowledge and thus criticised for being unoriginal (Bennett 2014).

To be shielded from this criticism and to enhance their academic performance, scholars in non-Anglophone communities build transnational networks. Lillis and Curry (2010) explored scholars' participation in local and transnational collaborations, focusing on how the resources available differ depending on the type and strength of the network they participate in. The maintenance of networks, particularly transnational networks, is fundamentally vital, as the availability of resources depends on them. Although transnational networks are 'less intense and durable than local networks', they provide opportunities for constructive feedback on research; valuable assistance in publishing articles, books and conference papers; and language assistance (Lillis and Curry 2010, 86).

Massification of higher education and employment as emerging issues

WWII was the 'watershed event' for higher education in modern societies (Trow 2005). Great social and political change after WWII led to the expansion of higher education globally. Trow (1974) described three phases of higher education transition, from elite to mass and subsequently to universal higher education in certain industrialised nations. East Asia was highly affected by the expansion of higher education, spurring debates over the past decade on the academic standards and quality of universities (Mok 2013).

With the acceleration of globalisation and the evolution of a knowledge-based economy, many emerging economies expand their higher education systems to improve their global competitiveness (Mok 2016). However, the negative impacts of massification, such as growing unemployment problems for university graduates caused by higher rates of enrolment in education and the decreasing value of academic degrees, cause concerns. Several researchers argue that the expansion of higher education significantly affects graduate employment (Tomlinson 2008; Mok and Wu 2016; Mok and Jiang 2018). As the number of graduates increases, the value of their degrees diminishes. Graduates are often frustrated in the pursuit of a career and even struggle to find a job. Although the global unemployment rate decreases, more than 170 million people remain unemployed (International Labour Office (ILO) 2019, 3), and graduates may be 'employable but not employed' (Brown, Hesketh, and Williams 2003). Moreover, underemployment is a growing concern and exacerbated by the current coronavirus recession.

The mission of the university is transformed as labour markets evolve, and as the demand for education rises. In addition, traditional universities cannot meet the demands and requirements of a global knowledge society. To meet these new demands, the 'multiversity', which is central to society, serves as a prime instrument of national purpose (Kerr 1995). When Clark Kerr initially set forth the idea of the 'multiversity' in 1963, the university was in its golden age, and the post-war economy was at its height. The 'multiversity' which combined the British and German models placed a new emphasis on public service. They were funded by the US government to serve agriculture, industry and the general public (Kerr 1995).

Shift from employment to employability

Graduate employment, an interdisciplinary area of research that concerns the labour market and higher education, becomes a means of assessing the value of educational outcomes and a key indicator for university rankings (Uvalic-Trumbic 2016). Its importance is also reflected by the establishment of labour market observatories worldwide operated by institutions, regions and countries (e.g. European Union Employment Observatory). Some countries such as Chile even rank programmes and universities yearly on the basis of the employment of their graduates (Uvalic-Trumbic 2016).

With an unprecedented number of graduates swarming into the labour market, topics associated with higher education such as overeducation and overqualification are brought into sharp

focus. 'Employability' becomes a performance indicator of an institution, measuring the effectiveness of a university in nurturing employable graduates (Harvey 2001). A university education is reconsidered as a skill mismatch problem that frequently appears in a changing labour market (Mok and Jiang 2018). The demands placed on institutions of higher education to prepare students for work readiness result in reforms. In some industrialised countries, vocationally relevant courses are prioritised over liberal and nonvocational studies, preparing students for increasingly complex jobs.

Cultivating employability becomes critical not only for institutions but also for personal development. 'Employability' becomes a key 'benchmark' for career success (Carbery and Garavan 2005). Employees are encouraged to continually develop their competitiveness or 'advanced general skills' even when they are in employment (Garavan 1999). The shift from employment security to employability is reflected in the reformulation of the 'psychological contract' in employment relationships. The psychological contract was a concept developed by Denise Rousseau (1989). It refers to a set of mutual 'promises' or 'expectations' between an employee and an employer, emphasising the quality of emotional and interpersonal relationships between two parties and reflecting an assumption of relatively 'permanent' employment. However, because of a changing career pattern and the erosion of job security, psychological contracts are being reformulated to highlight 'employability' rather than 'employment security' (Garavan 1999). New psychological contracts are essentially unsteady because they are temporary, the shift towards more flexible employment contract has placed more emphasis on employees' employability rather than loyalty (Clarke and Patrickson 2008).

Gender inequality in the labour market is also a global phenomenon. According to the ILO report (2019), women have a much lower labour force participation rate at 48% compared with 75% for men. Thus, men comprise nearly three-fifths of the global labour force International Labour Office (ILO) (2019). Gender disparities, among other labour market challenges, have been a longstanding problem in employment. Above all, graduate employment has been a global concern and it is critical to gain a holistic view of these trends. An effective way to comprehensively review relevant literature from various viewpoints and cover a knowledge gap is bibliometric analysis.

By applying a combination of the open-source software programs R and CiteSpace, this study applies a bibliometric analysis of graduate employment research in light of world-system theory. The research questions this study seeks to engage with are as follows:

- (1) What are the main publication characteristics (i.e. authors, countries, annual production and author collaborations) of graduate employment research, and specifically the studies related to East Asian context?
- (2) To what extent can publication characteristics in core, semi-peripheral and peripheral countries be explained by world-system theory?

Methodology

Data sources

The data analysed in the study were extracted from the Web of Science (WoS) Core Collection, which consists of six online databases, such as Science Citation Index Expanded, SSCI and Arts & Humanities Citation Index. To gather referential information from the system, 'graduate employment' was selected as the topic, 'coverage' as from 1900 to 30 July 2019 (i.e. when this study was conducted), and 'article' as the document type (i.e. the most common format of published material) (Lin, Hsu, and Chiang 2016). A total of 1,984 papers were exported in the plaintext format before they were converted to a data frame through a function in bibliometrix. The data frame was filtered to exclude proceedings, book reviews, anonymous documents and other such documents. Consequently, 1,913 articles indexed in SSCI were chosen as the final data for the study. In addition, 143 studies related to East Asia were extracted for further analysis.

Software

The data were analysed by using R (version 3.5.2) and CiteSpace (version 5.5). Bibliometrix R package, an R-tool for comprehensive science mapping analysis, is an open-source tool for quantitative research in scientometrics and bibliometrics that includes the main bibliometric methods of analysis (Aria and Cuccurullo 2017).

CiteSpace is another widely used tool for visual exploration of scientific literature. It has a multitude of functions, such as network analyses as well as providing geographical distribution maps of authors (Chen 2006). In the present study, top keywords with the strongest citation burst were obtained using CiteSpace (version 5.5).

This study is the first bibliometric analysis of graduate employment research. It creatively compared the global literature with the relevant studies on East Asia to capture similarities and varieties in research development from a macrosociological approach. This study comprised only reviewed articles classified by the WoS, and it does not represent employment literature such as books and dissertations. However, the selection of sources seems reasonable and reliable given that it covers the vast majority of papers published since 1900.

Results

An overview of graduate employment research

As presented in Table 1, of the 1,913 articles on graduate employment published in 841 SSCI-indexed journals, 143 of the articles focus on East Asia. The first paper on the topic of 'graduate employment' was published in 1934, whereas research about East Asia was initiated more than half a century later in 1992. Global documents are more frequently cited than those of East Asia, with average citations of 13.72 and 9.31 times per document, respectively. The average number of co-authors per document is 2.7 and 2.65, respectively, and most of the articles are multiple authored.

Annual production of graduate employment research

In terms of annual production, the overall trend of studies about East Asia corroborates global research. Figure 1 depicts the number of graduate employment research reports in the world. Few publications on graduate employment were published before 1992, when 30 papers were produced. Nevertheless, in subsequent years, the number of publications steadily increased.

The annual production of the studies on East Asia developed in line with that of the global research. This is illustrated by surges they shared in years such as 2010 and 2018. In 2010, the total number of global annual publications on the topic of employment increased to 93 then grew dramatically over the next decade, peaking in 2018 at 166. Similarly, the annual production of employment studies about East Asia fluctuated from 1992 to 2009, followed by a steep growth in 2010 and reaching a peak in 2016 with 17 papers.

The first paper on the topic of graduate employment was published by an American author, Leslie Higginbotham, titled 'Employment of recent graduates in journalism'. It was published in 1934, after

Table 1. An overview of graduate employment research papers.

Scope	East Asia	Global
Documents	143	1913
Period	1992–2019	1934–2019
Average citations per document	9.31	13.72
Sources	95	841
Authors	339	4623
Co-Authors per document	2.65	2.70
Single-authored documents (%)	29%	27%

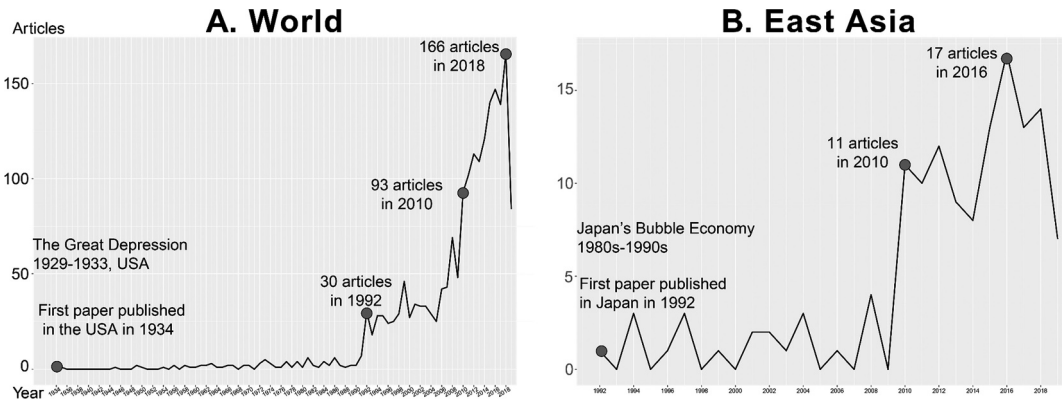


Figure 1. Annual production of graduate employment research (world and East Asia).

the Great Depression in the US. The earliest graduate employment research on East Asia was initiated by Japanese scholars Yamamoto et al. (1992), published after the bursting of Japan’s asset price bubble, investigating the transition from the university to the workplace.

Top authors of graduate employment research

Figure 2 illustrates top authors’ production over time. A line represents an author’s timeline, bubble size is proportional to the number of documents, and colour intensity is proportional to total citations per year. Most graduate employment research has been conducted since 2006. Relevant studies about East Asia have been most intensively produced in the past five years. This finding indicates a growing trend for graduate employment research across the world.

As can be observed in Figure 2, Chan has the longest timeline, from 2004 to 2017, followed by McCann from 2006 to 2016. The documents of McCann and Faggian in 2009 each collected the highest total citations (20.09) for a year. Jackson and Mok were the most productive authors in 2016, when they each authored three documents.

The dotted line in Figure 3 describes the frequency of publication by authors in the field under study according to Lotka’s law (Qiu et al. 2017). The horizontal axis is the number of publications and

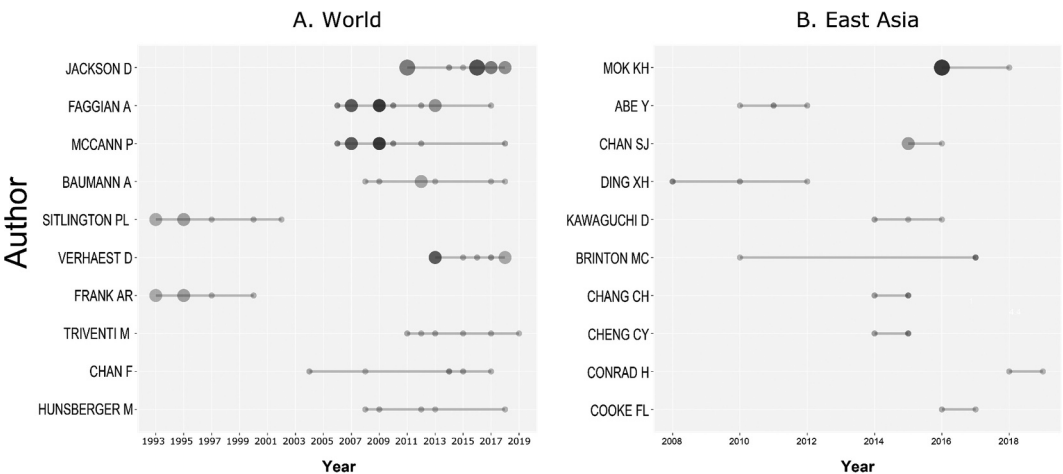


Figure 2. Top authors’ production over time.

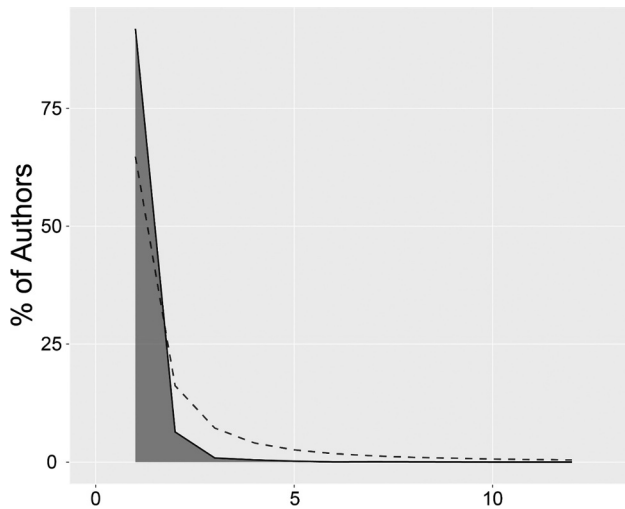


Figure 3. Author productivity through Lotka's law.

the vertical is the proportion of authors who published x papers to the total number of authors. Lotka's law affirms that as the number of articles increases, the number of authors proportionally decreases. Among all authors, most seem to be 'occasional', contributing only one document to this field. As the figure indicates, 4,118 authors (91.9%) have published only one document. This percentage of 'occasional authors' is much higher than Lotka's law predicted. The wide variety of authors implies an interdisciplinary approach to the topic.

The relationship among top authors, corresponding authors' affiliations, and countries is summarised by a Sankey plot (Figure 4). This three-field plot demonstrates that most affiliations are prestigious and represent the world's top universities. US universities maintained the most contributions to the field of graduate employment research. Among the top 10 countries, China is the only developing country.

Top countries for graduate employment research

Graduate employment appears to be a global issue, as corresponding authors were located in 68 countries and territories. The US played a predominant role in scientific production on this topic with 1,362 papers. Developed countries tend to perform better in research than developing countries, and many developing countries do not publish research on this topic. One of the causes would likely be the database selected focusing on the journals indexed by SSCI.

Table 2 reveals a positive relationship between multi-country production (MCP) ratio and total citations. MCP refers to publications contributed by authors from different countries, a country's MCP ratio stands for the possibility of cross-country collaboration in research. The US is an exception, likely a result of its large number of publications. A high MCP ratio is almost always accompanied with a high number of citations. Some relatively less productive countries such as the Netherlands have a high MCP ratio and high citation count, whereas some more productive countries such as Spain have a low MCP ratio and few citations. Collaboration with scholars from different countries increases the number of citations (Figure 5).

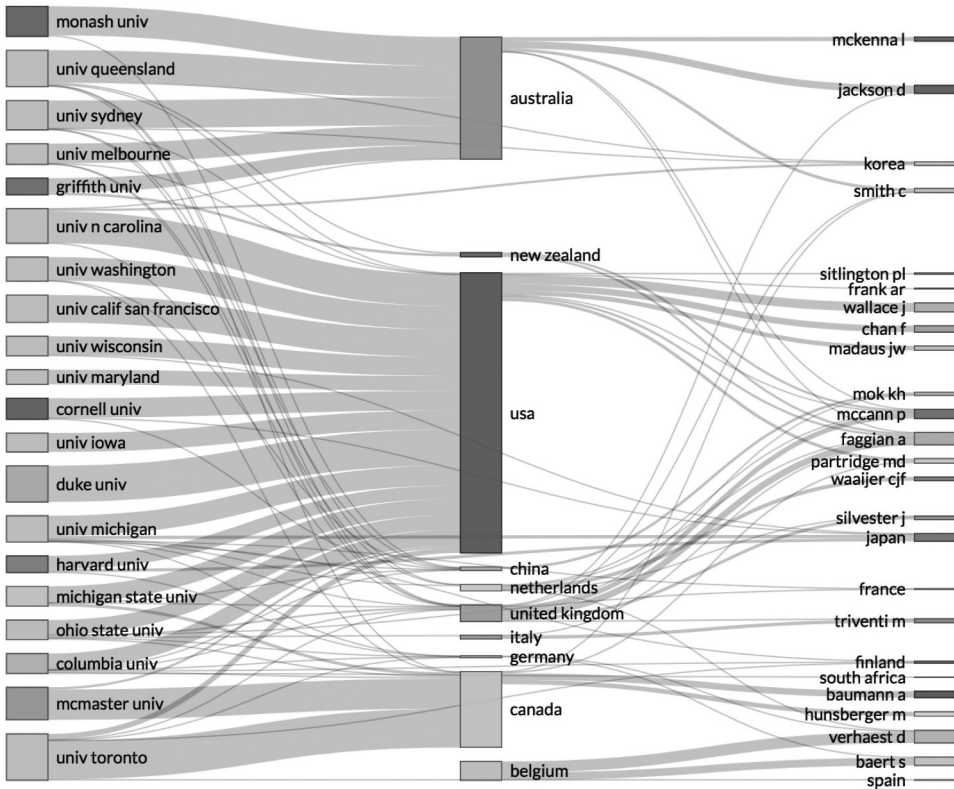


Figure 4. Three-fields plot of top affiliations, countries, and authors. Note: A few countries appear in the right field possibly as a result of the absence of author names during data collection.

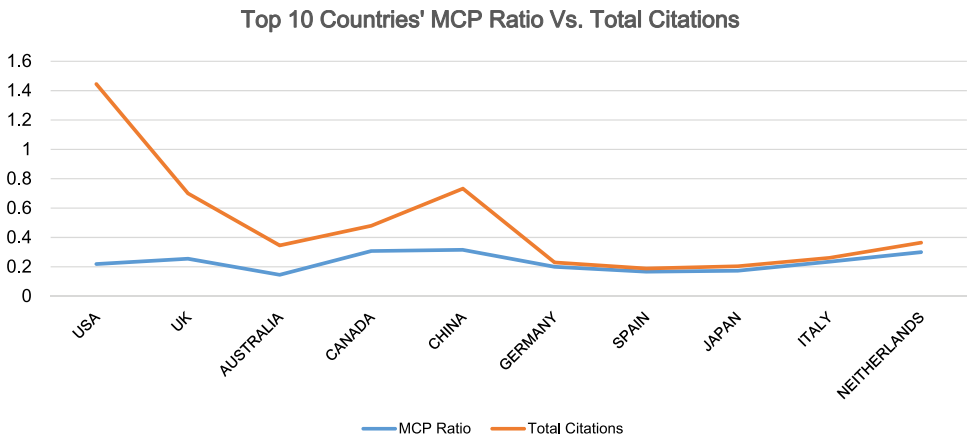


Figure 5. Top countries' MCP ratio and total citations. Note: Value of total citations divided by 10,000.

Most cited documents in graduate employment research

Global citations exemplify the impact of a document. This analysis could indicate what are the most important research directions or focuses.

Table 2. Top countries' MCP ratio and total citations.

Country	Articles	SCP	MCP	MCP ratio	Total citations
US	688	537	151	0.2195	12,252
UK	235	175	60	0.2553	4451
AUSTRALIA	171	146	25	0.1462	1995
CANADA	91	63	28	0.3077	1722
CHINA	57	39	18	0.3158	417
GERMANY	55	44	11	0.2	304
SPAIN	48	40	8	0.1667	223
JAPAN	46	38	8	0.1739	303
ITALY	34	26	8	0.2353	264
NETHERLANDS	30	21	9	0.3	651

Table 3. Most cited articles by total citations and total citations per year (world).

Authors	Title	Total citations	TC per year
Robinson and Rousseau 1994	Violating the Psychological Contract – Not the Exception But the Norm	887	34.115
Shapiro 2006	Smart Cities: Quality of Life, Productivity, and The Growth Effects of Human Capital	357	25.5
Eraut 2007	Learning from Other People in the Workplace	276	21.231
Duchscher 2008	A Process of Becoming: The Stages of New Nursing Graduate Professional Role Transition	194	16.167
Tomlinson 2008	'The Degree is Not Enough': Students' Perceptions of the Role of Higher Education Credentials for Graduate Work and Employability	193	16.083
Sarkar et al. 2011	Social Disparities in Internet Patient Portal Use in Diabetes: Evidence That the Digital Divide Extends Beyond Access	186	20.667
Ong et al. 2011	Inside the Double Bind: A Synthesis of Empirical Research on Undergraduate and Graduate Women of Colour in Science, Technology, Engineering, and Mathematics	155	17.222
Oreopoulos, Till, and Heisz 2012	The Short- and Long-term Career Effects of Graduating in A Recession	168	21
Tymon 2013	The Student Perspective on Employability	118	16.857
Ceci et al. 2014	Women in Academic Science: A Changing Landscape	203	33.833

The most cited articles and the total citations per year are summarised in Tables 3 and 4 in chronological order. The shift in research focus over the past two decades may be seen through the titles. The prospects of 'stable employment' has faded over the years. Instead, the perception of employability, especially from students' perspective, were brought into sharp focus by Tomlinson (2008) and Tymon (2013). The process of massification rapidly developed in 1990s, and with the accumulation of graduates, 'employability' was unavoidably vital in employment research. 'Employability' is increasingly emphasised over the past two decades, partially a result of an erosion of employment security. Robinson and Rousseau (1994) pioneering research has stood the tests of time. The shift in research focus moving from employment to employability can also be observed in Figure 7.

Among studies on East Asia, the two most cited documents examined the challenges brought by massification of higher education in China. The studies were conducted by Bai (2006) and Mok (2016). They had 99 and 28 citations in total respectively. On average, they received 7.62 and 9.33 per year.

Gender is repeatedly discussed in graduate employment research. Many believe that women are underrepresented in fields that are mathematically intensive, such as geosciences, engineering and economics. They tend to engage in scientific fields such as psychology and other social sciences (Ceci et al. 2014).

Table 4. Most cited articles by total citations and total citations per year (East Asia).

Authors	Title	Total citations	TC per year
Ishida, Spilerman, and Kuo-Hsien 1997	Educational Credentials and Promotion Chances in Japanese and American Organisations	58	2.522
Nishi et al. 2004	Effects of Socioeconomic Indicators on Coronary Risk Factors, Self-rated Health and Psychological Well-being Among Urban Japanese Civil Servants	50	3.125
Bai 2006	Graduate Unemployment : Dilemmas and Challenges In China’s Move to Mass Higher Education	99	7.615
Li, Morgan, and Ding 2008	The Expansion of Higher Education, Employment And Over-education in China	42	3.5
Pieke 2012	Immigrant China	38	4.75
Verhaest and Rolf 2013	Cross-country Differences in Graduate Overeducation	50	8.333
Geddie 2013	The Transnational Ties That Bind: Relationship Considerations for Graduating International Science And Engineering Research Students	37	6.167
Waters and Leung 2013	A Colourful University Life? Transnational Higher Education and The Spatial Dimensions of Institutional Social Capital in Hong Kong	34	4.857
Mok 2016	Massification of Higher Education, Graduate Employment and Social Mobility in the Greater China Region	28	9.333
Nagase and Brinton 2017	The Gender Division of Labour and Second Births: Labour Market Institutions and Fertility in Japan	15	7.5

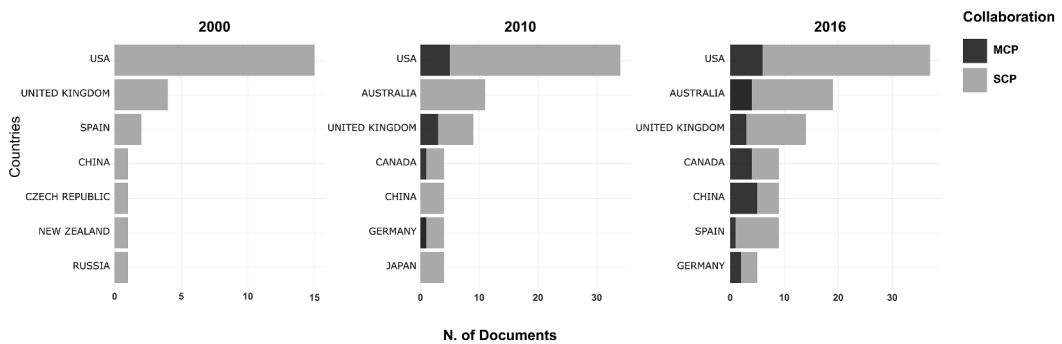


Figure 6. Top countries’ productivity in 2000, 2010, and 2016. Note: single-country production (SCP), multicountry production (MCP).

Transnational coauthorship in graduate employment research

This study reveals that most graduate employment research is single-country production (SCP) rather than MCP. That means cross-country collaboration is not prevalent globally, moreover, most studies were conducted by authors within the same country. However, a gradual shift from SCP to MCP has occurred over the past two decades. The trends in transnational co-authorship is seen in Figure 6 to rise over time. US publications were always dominant in this field, but the gap is slowly narrowing. In 2000, 15 of 25 articles were produced in the US, and no cross-country collaborations appeared. In 2010, with an increasing number of countries engaged in employment research, transnational collaborations appeared in a few countries. With the acceleration of globalisation, this pattern was strengthened by 2016. Although most of countries’ publications remained SCP, China is an exception. Judging from authors affiliated with Chinese institutions, its transnational coauthorship outnumbered the single-country coauthorship. Cross-country collaborations remained relatively prevalent in China.

Analysis of keywords

Forty-five keywords with the strongest citation bursts over the period between 1990 and 2019 were identified using CiteSpace (version 5.5), the software used to predict research frontiers. Burst detection was based on the frequency that words appeared in the articles under study. The red lines in the figure represent the period of citation bursts, whereas the blue lines represent the time interval.

As [Figure 7](#) reveals, the keyword with the strongest citation burst is 'employment', and its burst lasted from 1991 to 1998 with a burst strength of 18.702. The second strongest burst is 'women' with a burst strength of 9.576. Its burst lasted for 15 years, along with other gender keywords such as 'gender' and 'men'. Gender has long been of interest in employment research. Three countries appear in the figure: the US (2001–2005), the UK (2010–2014), and China (2016–2019). The US led the expansion of higher education after the Second World War, followed by European countries and subsequently Asian countries. Although China is not as developed as the US or the UK, it is certainly engaged in an expansion programme.

[Figure 7](#) displays the society's gradual shift in research focus at different periods of the past three decades. At the beginning of 1990s, the centre of research was on 'employment' and 'high school', before gradually turning to 'market' and 'college', and eventually moving to 'employability' and 'overeducation'. The frontier of research has shifted from 'employment' to 'employability' (2016–2019). For the most recent decade, the word with the strongest citation burst is 'employability' with a burst strength of 8.671, along with keywords such as 'overeducation', 'mismatch', 'skill', 'challenge' and 'stress'. Research focus appears to simultaneously change with society, reflecting changing political, economic, and social realities.

Discussion

Mass higher education expands globally, and graduate employment is a growing concern worldwide. It is an interdisciplinary issue that involves global scholars in various disciplines. Scholars across nearly every continent have contributed to its development. The world-system approach was adopted to elaborate on these comprehensive science mapping analyses of graduate employment research for the major findings of this study.

Dominance of core countries in graduate employment research

Core countries are not only economically influential; they also dominate academic research. Graduate employment research seems to fluctuate with core countries' economic climate, as many surges in annual production were accompanied by a national economic crisis. In other words, graduate employment research seems more likely to be conducted when core countries' economies are unstable, as indicated in [Figure 1](#). In the world-system, both the US and Japan are developed countries whose dominant roles are not only reflected by their economic status but also in scientific publications. A few surges in scientific production were associated with a US or Japanese economic crisis. For example, 1934 and 1992 were defining moments which saw the start of graduate employment research in the US and in East Asia, respectively. The first article about graduate employment was published by a US author in 1934 immediately following the Great Depression (1929–1933). Graduate employment research in East Asia was initiated by Japanese authors in 1992, after the Japanese asset price bubble (1986–1991) burst and Japan's economy stagnated. Furthermore, publications surged in 2007–2008, when a global financial crisis was evoked by a crisis in the subprime mortgage market in the US. It was a severe crisis considered by many economists the most serious since the Great Depression, and it led to the Great Recession of 2008–2012 and contributed to the European sovereign-debt crisis. The ILO report ([2019](#))

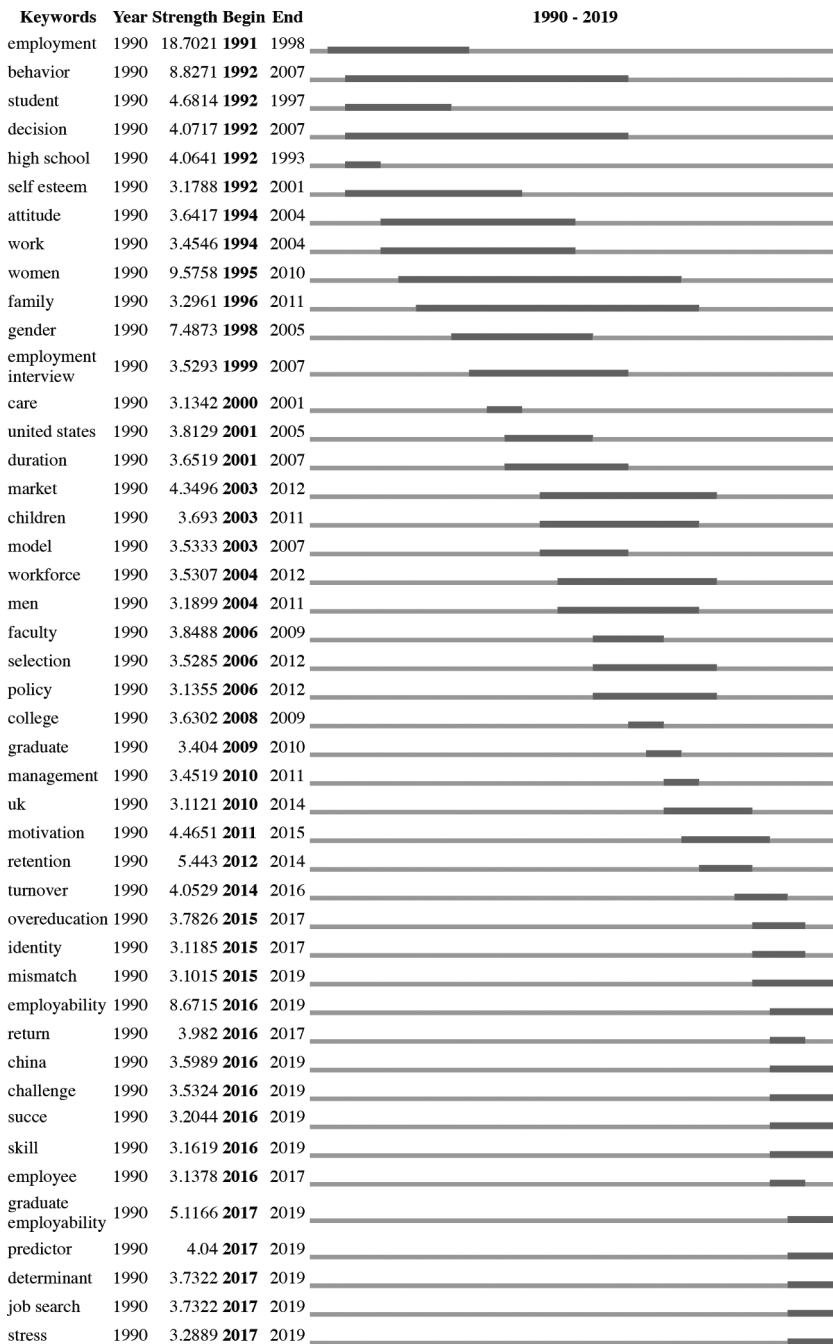


Figure 7. Keywords with the strongest citation bursts.

lamented the fact that it had taken 9 years for the world’s employment rates to recover from the shock of the crisis.

Core countries tend to perform better in research productivity and in pioneering frontier research. Academic research on employment was initiated by core countries such as the US and Japan before emerging in other countries. The US has always played a predominant role in production on the

topic. The correlation between a country's wealth and its scientific achievement has been consistently supported by various bibliometric studies (e.g. Lee et al. 2011). Moreover, with the acceleration of globalisation, the growing dominance of English as the global medium of academic publications (Lillis and Curry 2010) has partially facilitated the dominant role of Anglophone countries in academic publications.

The mediating role of semi-peripheral countries

Societies in the semi-periphery stand between the core and periphery in terms of economic power (Chirot and Hall 1982). A semi-periphery country, China, is the only developing country among 10 most productive countries. In China, university enrolments have increased rapidly since the government accelerated the pace of expansion in 1999 (Bai 2006). Consequently, with the accumulating influence accompanying this expansion and the largest number of graduates in the world, China is now influential in employment research.

The semi-periphery's mediating role is observed in academic production and the transmission of knowledge through transnational collaborations, international conferences, and so on. (Bennett 2014). China, as the only country whose MCP outnumbers its SCP in Figure 6, appears to excel in establishing transnational networks and foster academic collaborations.

Although the connections between a country's economic status and its academic production are well known, transnational collaboration in academic production appears to be largely neglected, because most reports were produced within a single country. This study examined the coauthorship of the graduate employment research by comparing authorship patterns in 2000, 2010, and 2016. Corresponding to previous research (e.g. Glänzel 2001; Mihăilă 2018), the results revealed a rising trend for transnational partnerships. Authors from 'peripheral' countries are strongly motivated to work jointly with scholars in developed countries to be assimilated into a 'world-system of science' (Leydesdorff and Zhou 2005; Wagner and Leydesdorff 2003). This might be one incentive for transnational partnership in academic research.

Another motivator for the semi-periphery to foster transnational collaboration is that scholars must create 'powerful coauthorship networks' to have 'a high scientific impact' (Mihăilă 2018). International papers which involve transnational co-authorship are cited more highly than others (Glänzel 2001; Glänzel and Schubert 2001). Glänzel (2001) confirmed that international coauthorship has greatly intensified in 1990s, and coauthorship helps improve the number of citations an author receives. This study provides additional evidence for Glänzel (2001) by revealing a positive relationship between multicountry collaboration ratio and total citations. As demonstrated effectively by countries such as Spain and Netherlands in Table 2, high productivity in a country does not contribute to more citations, but a high MCP ratio seems always accompanied with a total of high citations.

Although transnational networks are not easier to establish than local networks, they offer an effective way of cross-country collaborations and enhance the academic performance of scholars in non-Anglophone communities, who can receive constructive feedback on research, valuable assistance in publishing articles and books, as well as language help (Lillis and Curry 2010).

Vulnerability of peripheral countries

As Chirot and Hall (1982, 101) wrote, 'the capitalist core's ability to exploit weak peripheries was neither a new nor an unusual phenomenon'. Peripheral countries are dependent on core countries for capital. Their economic vulnerability subsequently leads to poor performance in academic publication. On the specific topic of graduate employment, the first research on East Asia was conducted half a century later than it was in Western countries. Many countries such as Mongolia and North Korea do not engage in any graduate employment research.

Inequalities in the world of scholarly publishing were described by Canagarajah (2002). Moreover, the growing dominance of English in academic writing (Lillis and Curry 2010) strengthened the language barrier to international publication. In short, the economic disadvantage of third world countries and the linguistic constraints faced by non-native English speakers have impeded academic publication from peripheral countries.

To support scholars in peripheral countries, Lillis and Curry (2010) advocated for local publications and local languages and appealed for a shift to judging journals from 'international' towards 'internationality', where non-centre contributions and collaboration should be included and encouraged. Furthermore, open access networks and journals should be encouraged to facilitate peripheral countries' global participation in academics.

Challenges for higher education

As the massification of higher education developed, the frontier of graduate employment research shifted from 'employment' to 'employability', which was frequently associated with other keywords such as 'turnover', 'overeducation', 'mismatch', 'challenge', and 'stress' in the past 5 years. These keywords also reveal challenges for higher education, and institutions are urged to reconsider how to enhance students' employability, 'a key objective for government and a performance indicator for higher education institutions' (Tyman 2013, 847).

A closer relationship between universities and industry is emphasised to ensure that the skills needed by industry are incorporated into the curriculum so as to meet the demands of the changing workplace and support students' employability. In some countries, such as Sweden, industry representatives have been included in universities' governing councils. In China, entrepreneurship education is increasingly invested in and promoted by governments to advance technology, research, and innovation (Mok and Kan 2013). However, higher education institutions should cope with the pressure to serve the immediate needs of industry appropriately and strike a balance between industry and liberal education. As Kerr (1995) suggested, leaders of higher education institutions can be either 'hedgehogs' or 'foxes' in the new age. A few 'hedgehogs' need to be around to protect university autonomy and public good. Universities should provide students with broad-based education and promote whole-person development, avoiding overemphasis on vocation driven courses. Universities' responsibility lies not only in questing for entrepreneurship for economic growth, social progress, and cultural enrichment but also in nurturing critical minds and global citizens and providing 'services out of classes' (Mok et al. 2018), thereby bringing the value of human betterment back to education.

Conclusion

This study applied world-system theory in a bibliometric analysis of graduate employment research and thus provided insights into the geographical distribution of countries, institutions, and authors as well as the most cited documents and shifts of research focus. Graduate employment is an interdisciplinary and worldwide issue. Core countries are not only economically influential but also dominate in academic research. The number of academic publications in graduate employment research considerably fluctuated with economic climate. Furthermore, the focus of academic research seems to simultaneously develop with changes in society, reflecting changing political, economic, and social issues. Academics worldwide, particularly those in semi-peripheral and peripheral countries, should be encouraged to create sustainable and effective transnational networks with international scholars. This could improve authors' productivity, global citations, and scientific impact also nurture knowledge capital in their own contexts.

The growth of graduate employment research has accelerated in the past decade, and its influence is increasing. With the global financial crisis in 2008, research on graduate employment entered a phase of rapid development. This study provides scholars in higher education with a better understanding of trends, provides guidance for future work, and aims to inspire further research on

the combination of various fields and bibliometrics as well as mixed applications of bibliometrics tools. However, the study has some limitations such as the linguistic barriers (as it merely focuses on the anglosphere), search engines used and the cut-off for journals' quality, key words used. This may likely lead to the dominance of Anglophone countries in the literature and ignorance of other core and periphery countries such as Francophone or Hispanophone countries. In addition, other avenues of knowledge generation and discourses such as conferences are not included in the current study, further research may overcome these obstacles and expand the literature to a larger extent.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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