Zeravan A. Asaad
Amjad S. Al-Delawi
Omed R. Fatah

International Collaborations of Universities in Kurdistan Region, Iraq

Insights and Opportunities

DeepScience

International Collaborations of Universities in Kurdistan Region, Iraq: Insights and Opportunities

Zeravan A. Asaad

Department of Business Administration, Cihan University-Duhok, Kurdistan Region, Iraq

Amjad S. Al-Delawi

Department of Accounting, Cihan University-Erbil, Kurdistan Region, Iraq

Omed R. Fatah

Department of Law, Cihan University-Sulaimaniya, Kurdistan Region, Iraq

DeepScience

Dedication

Dedicated to all those whose contributions have shaped our lives.

Authors

About the Authors

Zeravan Abdulmuhsen Asaad (Orcid-0000-0003-2779-8297), Professor in the Department of Business Administration, Cihan University-Duhok, Kurdistan Region, Iraq. He obtained a PhD in Business Administration from Universiti Utara Malaysia, Malaysia (October 2012), and an MSc in Business Administration (January 2006) from the University of Duhok, Kurdistan Region, Iraq. He has published more than twenty academic papers in local and international journals. His research interests are Financial Management and Investments.

Amjad Saber Al-Delawi (Orcid-0000-0003-1527-1674), Professor in the Department of Accounting, Cihan University-Erbil, Kurdistan Region, Iraq. He obtained a PhD in Accounting from the Kiev University of Economic Sciences, Kiev, Ukraine (1990), and an MSc in Accounting (1987) from the Azerbaijan State Economic University, Baku, Azerbaijan. He has published more than twenty academic papers in local and international journals and three books. His research interests are Accounting, Accounting Analysis, and Money Markets.

Omed Rafiq Fatah (Orcid-0000-0002-2408-825X), Professor in the Department of Law, Cihan University-Sulaimaniya. Kurdistan Region, Iraq. He earned a PhD in Political Science from the University of Sulaimani (2012) and a Master's degree in Political Science from Al-Nahrain University (2006). He is a researcher at the Centre for Future Studies (CFS). His research interests span political science, security studies, international relations, authority and authoritarianism, political security, and public policy-making.

Preface

The book helps to fill a serious gap in the literature by categorically examining the aspects of scientific collaboration and research performance within the framework of the Kurdistan Region of Iraq by providing an analysis of scientific collaboration and research performance among the private universities. Using the information provided in the Scopus database, it analyses the research productivity, visibility, efficiency and patterns of collaboration both nationally, regionally and internationally, with comparative reflection on the countries on the periphery. The dataset consists of Scopus-indexed articles associated with 13 privately-owned universities, and has the date of the first publication in 2009 up to December 2024. The data were collected by hand in April-May 2025 to guarantee accuracy and consistency of the institutions. One of the quantitative methods of analysis is the use of bibliometric indicators such as the total documents, number of citations per document, h-index, productivity index, the efficiency ratio, and the measures of the international collaboration. The analysis shows that the research output has grown significantly since the introduction of the National University Ranking (NUR) Project in 2015, and the publication volume has grown over three times in 2 years. Nevertheless, scientific collaboration continues to be largely limited to the major institutions of higher learning where there is an insignificant participation of industry, government agencies, and foreign partners. In addition, collaboration patterns are similar between the private universities and the public institutions, and the participation of local researchers is constrained and collaborative networks are not diversified. Although the number of publications in the case of the private universities is lower compared to the public universities, the research impact and efficiency are relatively higher in the former as shown in terms of citation measures. The book highlights how vital strategic policy interventions are to ensure international cooperation, build better university-industry-government connections, and improve research capacity development. The findings can be helpful to policy makers, university administrators and other stakeholders to design specific initiatives to enhance the quality of research, internationalization, and sustainable scientific cooperation in the higher education system in the Kurdistan Region.

Keywords: Scientific Research, International Collaborations, Scopus Database, Kurdistan Region - Iraq

Zeravan A. Asaad
Amjad S. Al-Delawi
Omed R. Fatah

Table of Contents

Chapter1: Background of Study

1.1. Introduction

The research aims to highlight and discover new challenges, analyzes of environmental data and information to arrive at certain findings through an advanced knowledge system (Ismail & Hussain, 2023). Most studies are based on research evaluation metrics, which are built on journal or author contributions and reviews, while analyses of how large numbers of researchers or institutions collaborate are lacking. The existing scenario demands systematic measures to achieve improvements across various fields of study, despite the scientific collaboration involved among the institutions (1). Researchers and institutions can make collective progress in collaboration by emphasizing their role in solving scientific, social, and technical issues on specific topics and increasing the knowledge (2). Scientific networks lead to joint work among scholars by exchanging knowledge, expertise, and skills, thereby encouraging the shift of the science concentration from the national to the global level (3). The core aspect for the development of scientific research within institutions would be international collaborations for a meaningful relationship among institutions (4,5). The researchers, along with the internal and external partners of their collaborative work, with their limited financial resources identifies and encourage the researchers to build new collaborations with individuals or institutions (2). One of the most reliable databases across countries among researchers and institutions for evaluating institutions' scientific performance and collaborative work is Scopus, published by Elsevier (6). A review of universities' profiles in the Scopus database in the Kurdistan Region shows

that 16 of 19 public universities and 13 of 17 private universities have publication records since their establishment. However, the absence of strategic planning or targets for publishing specific numbers of documents within set timeframes can concern policymakers and administrators, underscoring the need for a more proactive approach to enhance research visibility and impact.

Furthermore, reviewing and analyzing the private universities' research performance in the Kurdistan Region using the Scopus database, a second, prestigious, and globally recognized bibliometric database. It is challenging to find either old or recent studies when browsing the literature on universities' research performance in Iraq or the Kurdistan Region, their positions, local rankings, or comparisons with their counterparts at the regional or even global level. Therefore, this study presents a method to address a gap in the literature on the systematic analysis of scientific collaborations among published documents affiliated with private universities in the Kurdistan Region and their comparison with universities in other countries. It also collects insights from the Scopus database on its documents, authors, and collaborations with partner institutions at national, regional, and global levels. This type of research has never been conducted for higher education institutions in Iraq and the Kurdistan Region. Thus, this study aims to provide important insights for further discussion among universities, stakeholders, and policymakers to implement these collaborations in research domains.

The research work comprises five chapters following the introduction. The first chapter addresses the problem statements and the general methodology employed. The second chapter covers the theoretical framework and literature reviews. In contrast, the third chapter focuses on the practical

aspects of country ranking in research productivity based on the Scopus database and SCImago Country Rank in Arab countries, using indicators such as Total Documents, Citable Documents, Total Citations, Self-Citations, Citations per Document, and H index. The fourth chapter concentrates on the higher education sector in the Kurdistan Region, based on its research visibility in the Scopus database from the date of establishment of public and private universities. In addition, the fifth chapter reviews the research visibility of private universities in the Kurdistan Region using the Scopus database. The sixth chapter highlights the scientific collaboration of private universities in the Kurdistan Region at the national, regional, and global levels, based on the mutual documents recorded in the Scopus database with partner institutions. The seventh chapter is dedicated to the scientific collaboration of private universities in the Kurdistan Region at a national level, based on the mutual documents recorded in the Scopus database with local partners, with Private or Public institutions in the Kurdistan Region, or with institutions from the rest of Iraq. The last, eighth chapter, presents a set of suggestions based on the research conclusions, proposals, and future research proposals from the researchers' perspective.

1.2. Problem Statement

Several studies have acknowledged the role of scientific collaboration among institutions in developing the economy (7). The review of institutional collaboration trends can be set up by using scientometric methods or techniques (8). Usually, determining research performance involves assessing scientific collaboration by comparing authors' documents, institutions, or even countries (9).

The significance of scientific collaboration is reflected in the entity's partnership activities and connections with other institutions (1). Therefore,

institutional collaboration has been a topic of extensive studies in literature review, particularly in the context of higher education entities like universities, to discover the institutions' collaborations with partner entities at the national or regional level in emerging or developed countries (10). The major reasons that prevent conducting productive research in Arab countries would be the limited funding, inadequate infrastructure, and restricted international collaborations (11). The course of analysis reveals that there are no studies that mention the university's collaboration level with partner institutions at the national or international level, either in Iraq or the Kurdistan region (12).

As a result, addressing the gap identified in the literature, especially the insufficient attention to the current topic in developing countries such as Iraq and other Middle Eastern countries is taken into study. The study aims to assess the level of collaboration between private universities in the Kurdistan region and partner institutions through mutual documents in the Scopus database from the year of each university's establishment to 2024. Based on that, the following are the study questions;

1. How does the university perform in terms of research productivity, visibility, and efficiency in the Kurdistan Region?
2. How do the private universities in the Kurdistan Region rank with respect to their research output and scholarly performance?
3. What is the extent and nature of private universities' scientific collaboration at a national, regional, and global level?
4. To what extent does the university engage in research collaboration with local partner institutions?

1.3. Objectives

The study's main objective is to answer the study questions as follows:

1. To investigate the research productivity, visibility, and efficiency of the universities in the Kurdistan Region.
2. To determine the ranking of the private universities' research outputs in the Kurdistan Region.
3. To identify the scientific collaboration of private universities in the Kurdistan Region at a national, regional, and global level.
4. To identify the scientific collaboration of private universities in the Kurdistan Region with the local partner institutions.

1.4. Significance

This study contributes to the existing literature by providing empirical evidence on international collaboration of private universities in the Kurdistan Region, Iraq. Despite the limited data availability, the study highlights the following significant points:

1. To improve research performance, certain planning and strategic measures are formulated by supporting the institutional decision-makers, which include concerned authorities, related directorates in the universities, the Ministry of Higher Education and Scientific Research.

2. To encourage private universities to enhance their research performance through efficient collaborations with universities at the local, regional, and global levels, maintaining transparency and sharing mechanisms.

3. To set a platform and be a foundation for further studies related to the university's research productivity and efficiency in scientific collaborations with other partner institutions locally and globally.

1.5. Contribution

The main contribution of this research is to measure private universities' scientific collaboration with partner institutions at national, regional, and global levels. In a bid to get the gist of the research, the documents and their coordination efforts across the institutions within the Kurdistan Region, Iraq, should be studied.

In accordance with the review of the former studies, it could be observed that there is a significant gap in the research concerning the scientific cooperation of the institutions in Iraq and the Kurdistan Region. Specifically, there has been no systematic or general research done to investigate research collaboration by specifically choosing surveys of scholars or universities, either in the private or public sector in Iraq or the Kurdistan Region. The patterns, scope, and dynamics of scientific collaboration between these institutions, therefore, are mostly unexplored in the literature.

Thus, it is crucial to examine the various degrees of collaboration between institutions of higher learning in the Kurdistan Region that have been publishing academic literature listed in internationally acclaimed databases e.g. Scopus since they were formed.

1.6. Sample

This study period includes 16 years between the first document which was registered in 2009 and December 2024. In addition, the research data were gathered manually in Scopus between 8th April and 14th May 2025. The Scopus data could vary with time as new publications are entered, more citations are created, or the information on the authors is modified.

The data were retrieved from secondary sources in the Scopus database, owned by Elsevier, which is recognized globally as a second-prestige,

credible database after the Clarivate Analytics database (13,14). While the study focuses on 13 of 17 private universities in the Kurdistan region, the four universities (American University of Iraq in Sulaimani, Tishik University-Sulaimani, Qala University College, and University College of Goizha) are excluded because they have not yet been recorded in the Scopus database. Table (1.1) presents the background of the study's Private Universities. Thus, it was also identified that the two universities American University of Iraq-Sulaimani and American University of Kurdistan do not have profile records in Scopus database, which also came as a surprise. The American University of Iraq-Baghdad however has a profile with the Scopus database which was created after the above two universities.

Table (1.1) Private Universities Publications in Scopus

No	Public University	Code	Period	Documents	Authors
1	Tishk International University	TIU	2011-2024	1693	347
2	Cihan University-Erbil	CUE	2009-2024	1342	170
3	University of Human Development	UHD	2011-2024	849	108
4	Lebanese French University	LFU	2012-2024	742	104
5	Komar University	KUST	2012-2024	721	104
6	Knowledge University	KU	2017-2024	611	98
7	Nawroz University	NU	2014-2024	467	65
8	Cihan University-Sulaimani	CUS	2014-2024	332	48
9	Cihan University-Duhok	CUD	2018-2024	138	26
10	Bayan University	BU	2016-2024	109	25
11	Catholic University	CUiE	2019-2024	101	18
12	Qaiwan International University	QIU	2019-2024	44	17
13	International University of Erbil	IUE	2015-2024	30	7
14	American University in Sulaimani	AUIS	*	*	*
15	Tishik University- Sulaimani	TUS	*	*	*
16	Qala University College	QUC	*	*	*
17	University College of Goizha	UCG	*	*	*
	Total			7179	1137

Authors' compilation based on: (15,16); Scopus database (Elsevier). Accessed from 8 April to 14 May 2025, n.d.-a)

1.7. Methods

A quantitative analytical approach was adopted, using statistical methods, namely sector averages, various percentage measures, to compare and review data using bibliometric patterns across private universities during the study

period. To identify the differences among the universities in terms of research productivity of the total number of documents using the Elsevier Scopus database from the university establishment up to December 2024.

Microsoft Excel 2024 was used to analyse the bibliometric parameters of all university documents using various performance indicators. After standardizing and classifying thousands of records of university collaborations with partner institutions, a list of institutions and the number of collaborated documents was exchanged and for consistency in metrics, the SCImago country rank indicators were reviewed. Hence, the study involves several indicators to rank private universities' collaboration levels with partner institutions, such as H-index, total documents, total citations, citations per document, citable documents, external citations, and self-citations (17). The visual inspection of the private universities' research performance in the Kurdistan Region in Scopus for the period 2009-2024 is also analyzed using various methods.

1.8. University Collaboration Categories

The level of university collaboration with other partner institutions was classified into three categories, as follows:

1. The national level consists of the collaborative documents with the affiliated Iraqi institutions.
2. The regional level consists of the collaborative documents with partner institutions from 22 Arab countries, Iran, and Turkey.
3. The global level consists of the collaborative documents with partner institutions from all other countries except the countries in the national and regional levels.

1.9. Operational Definitions

Several metrics are used to calculate the SCImago Journal's rank and country. Certain indicators are used to classify, compare, and rank private universities in the Kurdistan Region accordingly.

1. Authors

   The total number of publications, including at least one document publication by the academic staff with the university affiliation in Scopus during the study period.

2. Total Documents (TD)

   The total number of all types of documents published by a university, including both citable and non-citable documents, during the period 2000–2024.

3. Total Citations (TC)

   The total number of citations to documents published by a university during the period (2000-2024).

4. Citable Documents (CD)

   The ratio of the documents published by a university that cited at least one document per year to the total number of records during the period of study 2000-2024.

   Number of documents cited at least once per year

5. Self-Citations (SC)

   The ratio of the total number of self-citations received by the university documents published by a university, divided by the total citations during the period 2000-2024.

6. Citations Per Document (CPD)

   The total number of citations received for the total documents published by a university, during the period 2000–2024 as citations per document.

7. H-index

The index consists of the number of articles (h) that have received at least H-index citations (Hirsch, 2005).

8. International Collaboration (IC)

The number of documents whose affiliations include more than one country address per year with foreign institutions, to find out how many publications are released in collaboration with other universities or countries.

9. Productivity Index (PI)

The productivity index is based on the average number of documents each author produces in Scopus to evaluate an author's or a university's performance.

Productivity = Publications / Authors or Universities.

10. Efficiency Index (EI)

The efficiency index is based on the average number of documents each author produces in Scopus, compared with the optimal, planned or expected output (the university's average peer comparison), to evaluate the university's efficiency.

Efficiency % = University Productivity / Region Productivity Average*100

Note: The University's research productivity and efficiency index measures the output of authors registered only in Scopus, but it does not capture the university's overall performance because it lacks each university's total number of authors.

Chapter 2: Background of Study

2.1. Higher Education in Kurdistan Region

Over the last three decades following the Second Gulf War, Iraq, including the Kurdistan Region, faced risks and poor governance in various fields, such as political instability, economic sanctions, a weak currency, and non-democratic practices (18). As the nation was going through this phase of obstacles and difficulties, once after the Third Gulf War in 2003, the situation changed, though the challenges persist, now the challenges took many new forms, like increased violence, internal conflict, damaged infrastructure and industry, and financial problems (Asaad, 2014; Brihi & Fadil, 2018). Adding to the challenges was the volatility of oil prices, which forced the government to adopt austerity policies without any other option. (21).

The government took ample measures to stabilize the economy and come out of the situation. The challenges not only affected the economy and national sectors but also the education system and its institutions. The war affected the country's economic environment, resulting in insufficient funds to support the budget, which educational institutions play a vital role in. These conditions created a fragile national environment that constrained public investments and national development.

After the Second Gulf War, all the national sectors were critical to long-term development. To be more precise sectors like education, agriculture and industry. All these sectors suffered from chronic underfunding and weakened institutional capacity (22). The higher education and scientific research system was especially affected, with limited resources restricting research productivity, innovation, and

strategic planning (23). Although certain technology-related activities showed modest progress, gaps remained in areas such as electronic marketing and knowledge commercialization (24). These limitations constrained the Ministry of Higher Education and Scientific Research's ability to implement a coherent national strategy for science, technology, and innovation, including the long-delayed establishment of a National Council for Scientific Research (23,25).

As a result, the decline in research output in Arab countries was evident; as the study focuses on Iraq, the Kurdistan Region faces several challenges, including limited funding, inadequate infrastructure, and restricted international collaboration. Consequently, the productivity and impact of Arabic research in international journals and databases remain low (12). Through various means and ideas, initiatives were taken to support scholars and institutions, but due to the critical and sensitive issues that were happening, addressing the challenges they face was far beyond comprehension (11).

According to the World Bank International Databases, data on education expenditure are unavailable; for instance, the ratio of total expenditure in primary, secondary, or tertiary public institutions is unavailable, even though data for less important sectors are available. While research and development expenditure (% of GDP) does not exceed 0.05 for the period 2007 to 2021 (26). The under-rated or unclear ratio of spending on higher education and scientific research in Iraq reflects outdated views among political leaders, who see education spending as an unnecessary cost rather than a long-term investment. It is an overlooked reality that education and research are the two pillars of nation-building, growth, and progress. This sector, a necessary step in rebuilding infrastructure and establishing advanced educational and research projects, serves as a vehicle for reform, but unfortunately remains inefficient and ineffective without adequate funding. This is clear evidence that education and its funding are not a priority in Iraq, which may be attributed to the country's

political system. Rather, the nation and its government policies have been oriented toward war and internal conflict, and toward prolonged social and security instability for the last fifty years.

Over the last few years, Kurdistan Region institutions of higher education (Appendix 1, 2) were not able to implement evidence-based and internationally-oriented development strategies due to the lack of reliable institutional data and performance indicators. The services of higher education in Iraq compared to those in the neighboring countries and developed world were still underdeveloped. Realising this gap has been a significant move towards developing institutional accountability and encouraging stakeholders to seek systematic improvement.

In turn, the Ministry of Higher Education and Scientific Research in the Kurdistan Region launched a set of reform initiatives to improve the quality assurance and the performance of the universities. One of them is the National University Ranking (NUR) Project, which is one of the policy interventions that are implemented in the framework of the larger National University Classification System. Since its introduction in 2015, the NUR project has focused on research productivity as a primary metric of institutional quality, where research publications have been used as 40 percent of the total set of evaluation criteria. Through the application of research output within national ranking processes, the initiative has aimed at fostering scholarly performance, transparency and competitiveness among the region universities.

Later, the publications, both published and those found in the international databases such as Scopus, increased. During the period between 1972 and 2012 in the Kurdistan Region, the number of published research documents was limited, with fewer than 450 articles (27). However, within two years of announcing the NUR project, the number of publications increased drastically to

more than 300%. As a result, the university has provided numerous incentives to increase research and publications in Scopus. For example, as of 2024, the total number of publications was approximately 28710 documents indexed only in the Scopus database (Elsevier, n.d.). This progress has come after 2018. The Ministry of Higher Education and Scientific Research now requires postgraduate candidates to obtain their degrees, and academic staff who are promoting academic titles must publish documents in journals indexed in Scopus or Web of Science. Recently, it was noted that the university's research performance remains weaker than that of regional institutions despite the ministry's procedures and policies (12).

2.2. Underpinning Theory

2.2.1. Triple Helix Model

The Triple Helix Model is a systemic framework of innovations dynamics based on the mutually dependent relationships between universities, industry and government; it focuses on the joint effect of these three structures on the development of the economy and the transformation of society (28). Instead of existing as strictly defined and closed spheres, such three spheres are jointly becoming more overlapping, creating hybrid institutional organizations and innovation ecosystems. This convergence is an indication of how boundaries between the public and the private sector are slowly being eroded, and between knowledge production and the technological application (29).

In this model, universities are at the centre of the table as the main knowledge and innovations creators. In addition to their traditional roles of teaching and research, modern day universities play an active role in technology transfer, consultancy, entrepreneurial activities and joint research projects. Universities help to shift to knowledge based society by generating a large number of skilled

graduates, as well as by being directly involved in the innovation process (30). Over the last few years, colleges and universities have been under increased pressure to build their role in society by ensuring greater contribution to economic growth, regional competitiveness and social innovations (31).

The second pillar of the Triple Helix is industry, which is instrumental in the transformation of academic knowledge into commercial products and services as well as the technology solutions that are commercially viable. Industry is the source of innovation-based growth and job creation through systems like applied research, commercialization, and strategic partnership with universities. The ability of firms to absorb scientific knowledge and turn it into marketable results allows firms to reinforce national and regional systems of innovation (32).

Third part of the Triple Helix is government, which defines the regulatory, financial, and policy frameworks that realize and support interaction between universities and industry. Governments enable co-operation through strategic planning, funding instruments, intention policy, and incentive schemes and align innovation actions with more prolonged socio-economic goals. There is an ongoing trend in which governments are asking universities to act more entrepreneurially to facilitate the transfer of knowledge to commercialization and generate wealth in addition to education and research.

Empirical research proves that the explanatory powers of the Triple Helix Model is greatly boosted with the addition of interdisciplinary views based on the social sciences. Institutional logics, organizational entrepreneurship, communication networks, and governance structures are some of the concepts that enhance the analytical capacity of the model (33). In turn, recent research has broadened the concepts of the Triple Helix framework with the incorporation of the knowledge of organizational culture, the behavioural management, ethics, artificial

intelligence, and the education studies, therefore, capturing the increasing complexity of modern innovation systems.

2.2.2. Knowledge Capabilities Theory

Knowledge Capabilities Theory (KCP) builds on the knowledge-based perspective (KBV) of the enterprise (Grant, 1996), which is developed with the help of absorptive, and dynamic capabilities (35). Whereas Knowledge Creation Theory (KCT) focuses on adaptive processes through which organizations react to environmental change, the Knowledge-Based View (KBV) places special consideration on knowledge as a strategic and resource worth having in its own right. Building on this school of thought, the Knowledge Creation Process (KCP) model suggests that organizational performance is not only determined by the knowledge that a certain institution holds, but by the dynamic ability of a particular institution to create, use, combine, evolve, and utilize the knowledge in reaction to the changing market conditions (36).

Within the context of higher education institutions, performance outcomes vary considerably according to their capacity to transform theoretical knowledge inputs into empirically grounded research outputs, underscoring the role of knowledge orchestration and capability deployment (37). Patterns of national and international mutual work can reflect the best way for universities to survive and retain their position in the academic sector, using the knowledge capabilities theory (38). Recently, some studies have used this theory to develop strategies for academic institutions (39), whereas previously it was applied in enterprises. The capacity of private universities to strategically reconfigure and redeploy resources through adaptive strategies has enabled them to sustain research competitiveness, consistent with the principles of dynamic capabilities theory (40).

Previous studies provide evidence that universities with higher absorptive capacity gain unequally greater benefits from international collaboration than less capable institutions (41,42). Academic institutions may benefit from collaborating with partners (39), particularly when their internal knowledge capabilities, such as research infrastructure and faculty competencies, are strong, as this joint work assembles diverse expertise and global research networks, leveraging advanced methodologies (43).

In conclusion, Knowledge Capabilities Theory and the Triple Helix Model together provide a robust and complementary theoretical framework for examining collaborative research performance and innovation outcomes within higher education systems. These frameworks offer valuable analytical lenses for understanding how academic institutions navigate complex, uncertain, and rapidly evolving environments through strategic knowledge deployment and multi-actor collaboration. Consequently, both theories have been widely adopted in empirical research to analyze university partnerships with industry and governmental actors, particularly to explain variations in knowledge transfer effectiveness, research productivity, and innovation capacity across institutional and sectoral contexts. Moreover, empirical evidence consistently indicates that strong alignment among university research outputs, market demands, and public policy objectives fosters more sustainable, impactful, and mutually beneficial collaborative arrangements.

2.3. Previous Studies

Scientific networks facilitate collaborative scholarship by enabling the exchange of knowledge, expertise, and skills, thereby accelerating the transition of scientific activity from predominantly national frameworks to increasingly globalized research systems. Despite this shift, policy responses have not always been consistent in recognizing the strategic importance of global scientific

networks, particularly as established scholars engage in both physical and virtual mobility to pursue novel ideas and collaborative opportunities (3).

Recently, it was noted that public and private research funding agencies are increasingly focusing on interdisciplinary research and collaboration with international partners (7). Scientific collaboration is increasingly conceptualized not only as an indicator of research performance but also as a reflection of an institution's external engagement and connectivity within broader academic networks. Accordingly, numerous studies employ bibliometric and research evaluation methods using international databases such as Scopus to conduct comparative analyses at the levels of individual researchers, disciplinary fields, institutions, and countries. These comparative assessments contribute to evidence-based national research policy development by ranking entities according to indicators such as author productivity, publication output, citation impact, and the extent of co-authored publications with partner institutions (1,6).

At the author and disciplinary levels, previous research has examined patterns of international collaboration in Scopus-indexed publications authored by Korean researchers between 2006 and 2015. The findings identified approximately 2,000 co-authored publications involving collaborators from 22 countries, with particularly strong collaborative intensity in physics and astronomy. Moreover, collaboration was found to be especially prominent with Southeast Asian countries, indicating regionally concentrated international research partnerships (44).

Complementing this line of inquiry, another study introduced an advanced analytical framework for examining both group-based and individual-level research collaborations by integrating graph visualisation techniques with statistical analysis. Using bibliographic data automatically retrieved via the Scopus Database API, the study analyzed collaboration networks among 2,717

researchers who collectively produced 7,174 publications. The results demonstrated that the proposed methodological approach is highly effective in evaluating relational structures among individual researchers, research groups, and research institutions (2).

A related study conducted in Vietnam examined university co-authored publications indexed in Scopus between 1996 and 2013 to assess patterns of international collaboration. During the initial five-year period, annual output remained low, averaging 16 publications per year. However, a rapid growth phase followed, with international collaborations-particularly with Japan, the United States, France, South Korea, and the United Kingdom-accounting for more than 80% of total research output in the biological, agricultural, and medical sciences. In contrast, mathematical research exhibited a predominantly domestic orientation, indicating disciplinary variation in collaboration intensity and confirming a substantial acceleration in international collaborative output over time (45).

Supporting these findings, another study reported that approximately 77% of Vietnam's scientific production, comprising 18,044 Web of Science–indexed publications published between 2001 and 2015, involved international collaboration, predominantly with researchers from the United States and Japan (46).

Beyond the Vietnamese context, large-scale bibliometric analyses further highlight disciplinary and regional collaboration dynamics. For instance, an examination of 362,354 nursing publications across 40 countries during the period 2005–2020 revealed distinct collaboration patterns in Latin America. The region demonstrated higher publication output compared to others, largely attributable to the expansion of nursing schools and increased graduation rates,

addressing prior gaps in empirical evidence regarding collaboration effects in the field (47).

Likewise, 3,992 publications of 18 prominent journals in applied linguistics where the citation impact and collaboration tendencies were studied using a manual analysis of 3,992 publications published between 2009 and 2018. The results showed that there was no significant difference in the number of citations between the quantitative, qualitative and mixed-methods studies. Nevertheless, the level of international and interdisciplinary cooperation was significantly greater when the research was quantitatively oriented, and education and psychology became the most common collaborative disciplines with the scholars of the applied linguistics (48).

A bibliometric study of the Islamic University of Indonesia, utilizing Scopus-indexed publications during the period between 2005 and 2017, has looked into the indicators of publication output, authorship patterns and collaborative affiliations. The results have shown that there was a continuous increase in the number of research output in the course of the study, though collaborative activities were still within a few local partner institutions. Consequently, the university was also falling behind a number of other universities in Indonesia in terms of more comprehensive national and international research collaboration (6).

On the national level, patterns of scientific collaboration were evaluated in a comprehensive analysis of all publications that are indexed at Scopus and are related to over 1,500 institutions in New Zealand between 2010 and 2015. The findings revealed that only a comparatively small amount of institutions had a disproportionately large proportion of national collaborations, in terms of business enterprises and government entities.

The study also provided comparative insights across 15 universities and Crown Research Institutes, evaluating collaboration intensity across 27 disciplinary fields (1).

Institution-specific network analysis was further illustrated by a study of the National Institute of the Atlantic Forest (INMA), which examined co-authorship patterns using Scopus data to identify inter-institutional collaborations. Based on a corpus of 138 publications authored by 41 researchers between 1993 and 2019, representing 44% of the institute's total collaborators, the findings showed that eight of the ten most impactful publications significantly influenced the field of zoology. At the macro level, collaborative relations were particularly strong with institutions in the United States (5).

A case study of South Asia was carried out in Pakistan in which research productivity in the top universities was examined based on 118,560 articles indexed by Scopus and published since the institution was started. The results will be of great assistance to researchers, policymakers, and authorities in higher learning institutions since they will provide a map of the current research strengths and avenues through which research productivity can be improved in various fields (13).

In the same way, a bibliometric study of Maharshi Dayanand University has been conducted at an institutional level to study 1,247 publications published between 2000 and 2013. The findings depicted a steady growth in the publication output and citation impact with time. The patterns of collaboration showed that two local universities were the key domestic collaborators with 111 co-authored publications, and two South Korean universities became the key international collaborators with 39 joint publications (49)..

At the country level, the study found that Western countries at the core of the map are extensively cooperating across fields and countries, and that high-ranking institutions are more collaborative than others (9). A study investigated the impact of the levels of international collaboration on the citation impact of 33 countries based on Scopus data for the period (1996-2017), the results show international collaboration level is higher when associated with increased citation impact across quantiles especially in fields Medicine, Physics, Engineering, and Computer Science, authors offer actionable insights for evidence-based science and innovation policymaking (4). In a separate study about the research performance (publication output and scientific collaboration) of research-active private universities compared to public ones in the five countries (Albania, Bosnia and Herzegovina, Georgia, North Macedonia, and Serbia) to determine the patterns of national and international co-authorship of private universities and their position academically in their countries covering data from Scopus for the period (2010-2022), the results revealed that private and public universities demonstrate no differences characteristics in publication output and scientific collaboration, also found that private universities almost do not collaborate inside the country but tend towards one or two public universities, because of that position of private universities within the national academic network is often peripheral and they tend to mimic existing public universities by adopting similar research activities (Dmitrienko et al., 2025) in a separate study, based on Web of Science, examining only 2014 mutual publications between China and Korea, and using collaboration networks to analyze individual institutions and countries (50).

Recently, as shown in Figure (2.1), the level of international collaboration among authors, institutions, and countries for 2,940 documents on chronic spontaneous urticaria (CSU) from 77 countries was analyzed using bibliometric methods across two periods. It was noted that the country collaboration is weak, covering

the period from 1977 to 2010. While it is growing rapidly in the international collaborations among authors, institutions, and countries, covering the period from 2011 to 2023 (51).
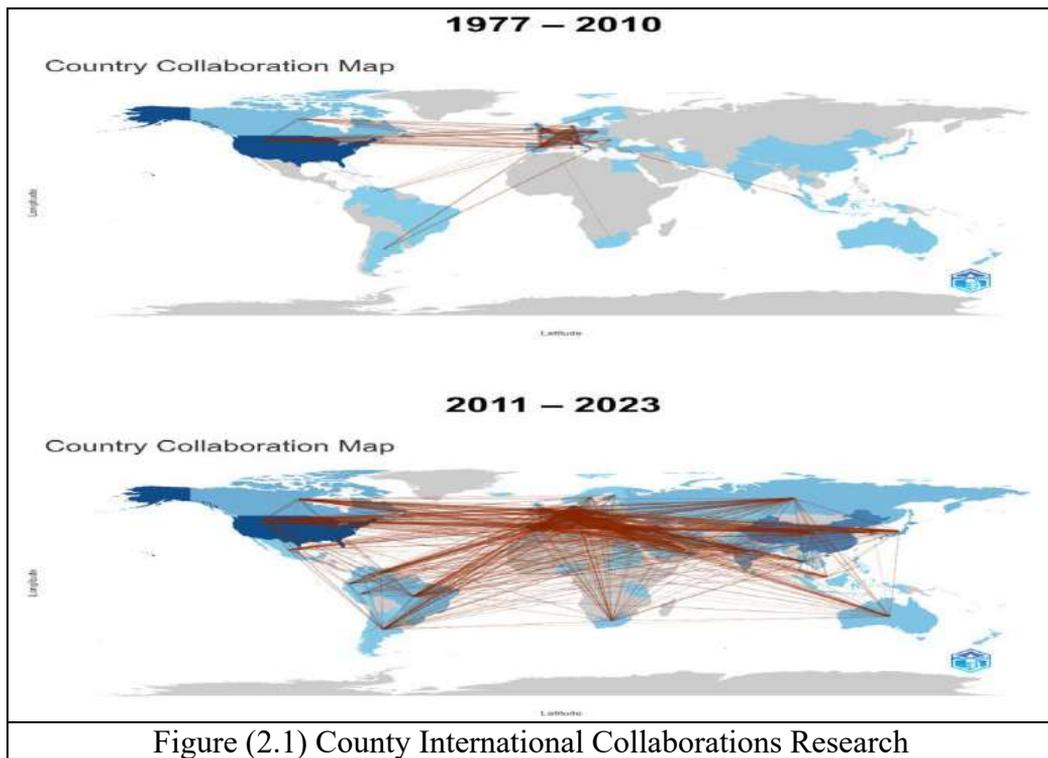

Figure (2.1) County International Collaborations Research

The current study differs from others in that the experience of private universities in Iraq, including the Kurdistan Region, is relatively new, with no more than two decades. There are no previous studies that have analyzed university research productivity or scientific collaboration with partner institutions at the national, regional, or global levels using the mutual documents in the Scopus database for the period from their establishment to 2024 of 13 of the 17 private universities' research output based on a total of 7179 documents authored by 1137 researchers.

2.4. Limitations

There are some limitations in the study as follows:

1. The study focuses only on cooperation among private universities in the Kurdistan Region that have publications in a scientific database such as Scopus within a specified time range.

2. The study did not examine the extent to which similar characteristics in the research output and the scientific collaboration patterns of private universities differ from those of public universities, and why?

3. The study did not conduct a subject- or discipline-specific analysis of the university's scientific output. Consequently, it also failed to examine the current patterns of research collaboration across different fields with partner institutions, despite the availability of comprehensive, field-level data in Scopus, the largest database of peer-reviewed literature across scientific domains. As a result, the study is limited in its ability to provide strategic guidance to researchers in the Kurdistan Region on priority disciplines and emerging fields warranting further investigation and scholarly development.

4. The analysis ignored the concept of triple helix to determine the definite ratio or degree of university cooperation with business, government, and higher education (Appendix 3), and the leading collaborating countries to science co-authorship (Appendix 4). Consequently, the findings of the study cannot inform the researchers, universities, and decision-makers with the necessary information on which area they should consider in their future research.

5. The study fails to evaluate similar authorship in co-authored articles to find out whether international collaborators are the most common in such research partnerships or it also measures the amount of scholarly input

provided by the researchers working in the Kurdistan Region in any of the privately owned universities.

6. The main limitation is the unavailability of the data on public and private universities, which did not allow measuring the indices of particular productivity and efficiency. Particularly, it was not possible to compute the visibility index, which is the ratio of Scopus publications to the total publications by academic faculty at each university due to the inaccessibility or nonexistence of the required data.

Chapter 3: SCImago Country Rank Background

This chapter explores core elements of the country rankings, particularly research productivity, using the Scopus database and the SCImago Country Rank for Arab countries. It also covers indicators, advantages, and disadvantages derived from various comparisons of these countries' research outputs. The following are the divisions of the major elements:

3.1. Introduction

This chapter reviews and analyzes the core elements of the country profiles ranking especially for the 22 Arab countries in terms of productivity, visibility, and the impact of their research outputs from the period (1996-2024). This was derived with the assistance of the Scopus database and the SCImago Country Rank for these countries. Furthermore, before analyzing, it is necessary to understand the Scopus Database and SCImago Journal and Country Rank, which are indicators for evaluation.

3.2. Scopus Database

Elsevier, one of the largest and most important databases of abstracts and references from research, books, and conference proceedings, launched Scopus in 2004. Scopus has become a subject of interest for researchers, governments, and many other institutions worldwide (6). This database covers nearly 24,000 titles from more than 5,000 publishers in 105 countries, providing a comprehensive overview of global scientific research output across fields such as science, technology, medicine, the social sciences, the arts, and the humanities. It contains 10.6 million articles and 230,000 books distributed across 38,401 journals (12,52).

3.3. SCImago Journal & Country Rank

The SCImago Journal & Country Rank (SJR) is a portal accessible to the public that uses various measures to evaluate the quality of scientific journals from scientific periodicals (all journals are indexed in Elsevier/Scopus) and country scientific indicators based on information from the Scopus database since 1996. These indices can be used to evaluate and analyze scientific domains; moreover, they can be compared with journals or countries or analyzed individually, whether for journals or countries. In addition, the reference title counts 34,100, with over 5,000 international publishers covering the performance metrics for

239 countries worldwide (SCImago Journal & Country Rank: Country Rankings, 2025). The current chapter focuses only on the classification of countries' ranks and does not include the journal ranking.

3.4. SCImago Country Rank

The SCImago Country Rank is divided into 15 major regions worldwide. Each country each year, is analyzed separately through individual profiles that evaluate the country's performance across varied subjects, either collectively or by specific subject. Several indicators are uses to rank the country's research output such as Total Documents, Citable Documents, Total Citations, Self-Citations, Citation per Document, H-Index, Citable Documents and their Ratio, External Citation and their Ratio, Total Output and its percentage by the region and worldwide, Cited Documents and Uncited Documents, Documents by Subject area, Ratio of International Collaboration, External Citations and Self- citations. Indicator data on the country's performance is available from 1996 to date. Table (3.1) shows the ranking of 22 Arab countries based on six indicators for the period 1996-2024.

Table (3.1) SCImago Country Ranking of Arab Countries for the period (1996-2024)

Rank	Country	Total Documents	Citable Documents	Total Citations	Self-Citations	Citations per Document	H index
1	Saudi Arabia	491154	470933	9340350	1547751	19.02	618
2	Egypt	434888	417316	7143380	1478079	16.43	452
3	Iraq	157259	153587	1254189	330174	7.98	231
4	UAE	148306	134889	2357590	237631	15.9	371
5	Tunisia	145978	137767	2017232	326694	13.82	292
6	Morocco	140603	131495	1680934	363544	11.96	286
7	Algeria	129640	125681	1520543	303074	11.73	263
8	Jordan	97108	92869	1383840	200884	14.25	281
9	Lebanon	64889	58940	1257139	103396	19.37	322
10	Qatar	63379	57642	1441825	118411	22.75	340
11	Kuwait	44845	42171	744259	61710	16.6	240
12	Oman	43560	39195	706747	59655	16.22	243
13	Sudan	19160	17799	302594	23313	15.79	155
14	Palestine	17885	16654	322040	31113	18.01	165
15	Bahrain	17414	15384	237909	14099	13.66	145
16	Syria	14119	13335	229788	16094	16.28	156
17	Yemen	13466	12926	224519	21778	16.67	137
18	Libya	11754	11216	168702	7855	14.35	129

19	Somalia	1702	1563	14111	1319	8.29	45
20	Mauritania	1393	1312	18362	1459	13.18	62
21	Djibouti	573	545	7428	639	12.96	44
22	Comoros	327	302	5457	340	16.69	31

Source: (17)

3.5. Research Outputs in Arab Countries

The SCImago country rank of all disciplines in 22 Arab countries within the period 1996-2024 has been calculated using the research productivity indicators such as the number of published documents, as shown in Figure (3.1) and the number of citable documents, as shown in Figure (3.2) and the self-citations ratio is presented in Figure (3.3). The Saudi Arabia and Egypt countries have the highest ranking with more than 40,000 documents each. Iraq, the United Arab Emirates, Tunisia, Morocco, and Algeria are ranked within the top ten lists and each has over 10,000 documents. The other Arab countries, approximately 15 countries, were ranked lower, and had less than 10,000 documents. Moreover, Figure (3.2) demonstrates that the proportion of documents that had to be cited was more than 90% in all Arabic countries with exceptions of such countries as Oman and Bahrain. At the same time, the self-citation rates in Iraq, Egypt, and Morocco were the highest, and each one was above 20%. Countries with a self-citation rate of over 10. followed with countries, namely Algeria, Saudi Arabia, Tunisia and the United Arab Emirates, in that order. Other 14 Arab countries had less than 10 percent self-citation.
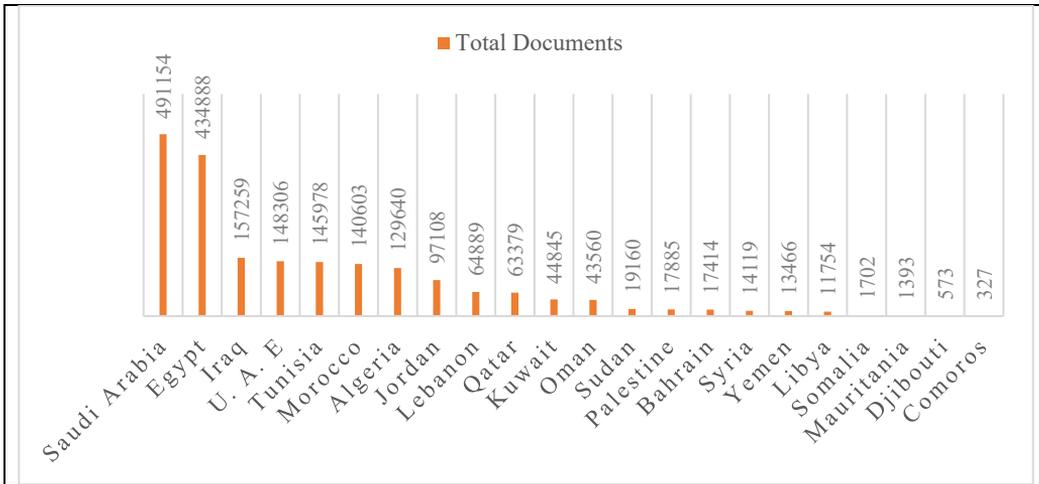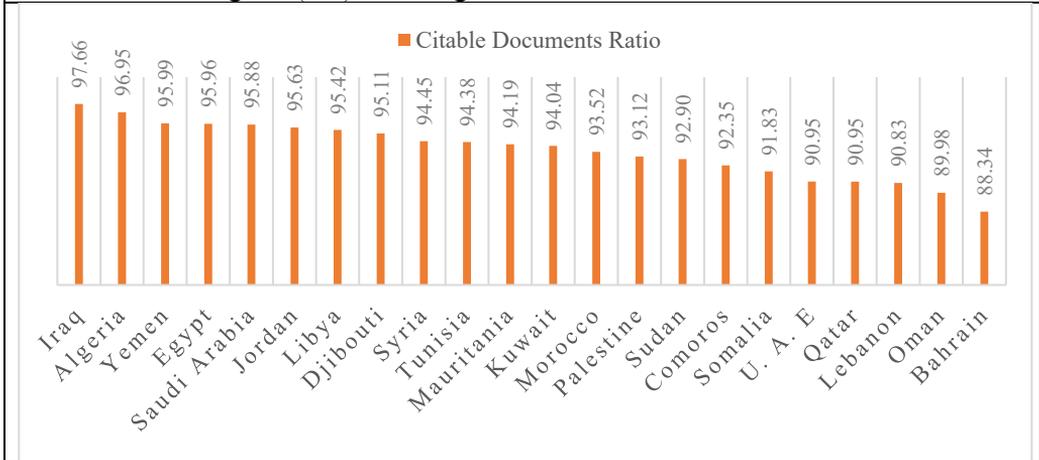
Figure (3.1) SCImago Arab Countries Documents

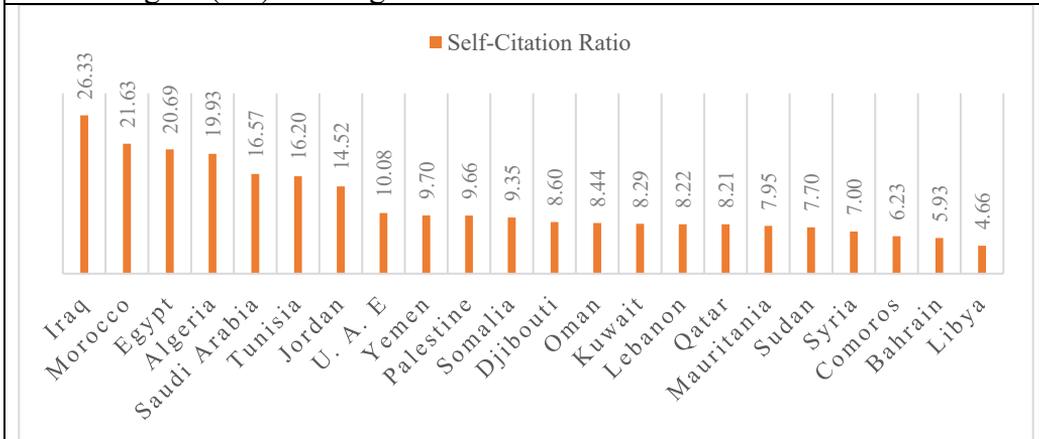Figure (3.2) SCImago Arab Countries Citable Document Ratio

Figure (3.3) SCImago Arab Countries Self-Citations Ratio

Sources: (17)

3.6. Research Quality and Impact in Arab Countries

The SCImago country rank of all disciplines of the 22 Arab countries between 1996 and 2024 is based on the research impact indicators, such as the number of published citations, as shown in Figure (3.4), and citations per document, as shown in Figure (3.5), whilst the H-index is shown in Figure (3.6). Saudi Arabia is ranked top with close to one million citations and then there is Egypt, the United Arab Emirates, and Tunisia with more than 200,000 citations each. The next countries that follow are Morocco, Algeria, Qatar, Jordan, Lebanon, and Iraq in that order, with over 100, 000 citations. The other 12 Arab nations ranked as lower ranking, and less than 100,000 citations. Moreover, Qatar is the most frequent in terms of citations per document with over 20 citations per document, with other Arab nations coming in with over 10 citations each document except Iraq and Somalia which have very low proportions. In the meantime, the leading country on the list of the H-index indicator is Saudi Arabia with the H-index of over 600, then Egypt, the United Arab Emirates, Qatar, Lebanon, Tunisia, Morocco, Jordan, Algeria, Oman, Kuwait, and Iraq. These were followed by Mauritania, Somalia, Djibouti and the Comoros that had H-index that was below 100.
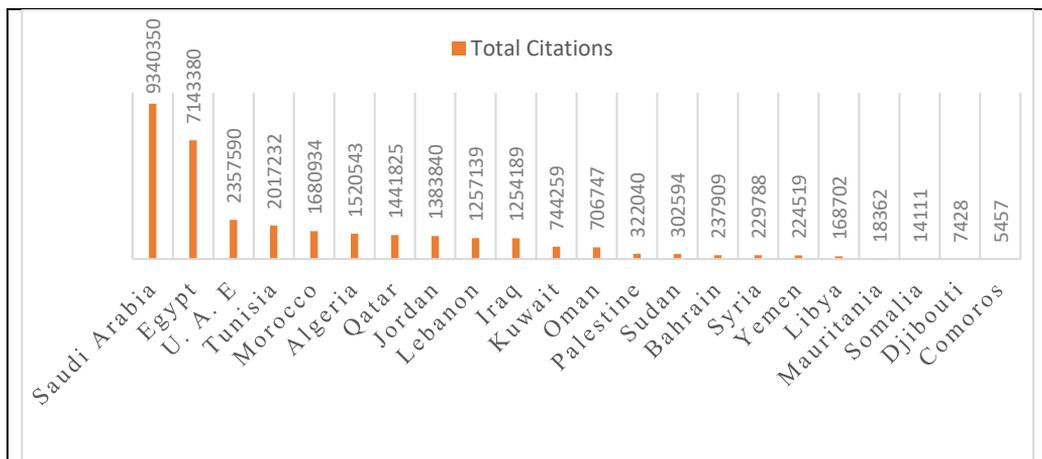

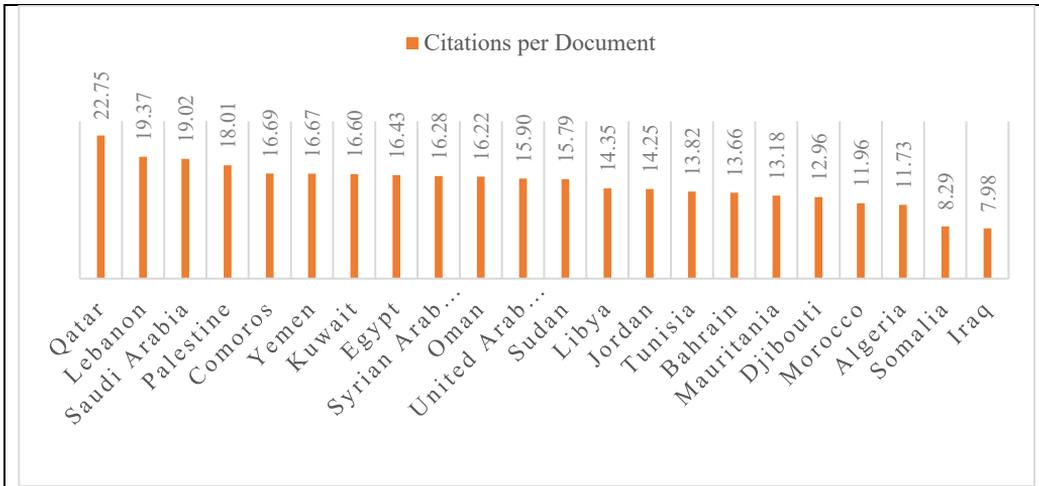Figure (3.4) SCImago Arab Countries Citations

Figure (3.5) SCImago Arab Countries Citations per Document

Figure (3.6) SCImago Arab Countries H-index

Source: (17)

3.7. Summary

The whole chapter is devoted to the ranking of the country in relation to 22 Arab countries according to the SCImago Country Rank. These six indicators were used to rank a given indicator: Total Documents, Citable Documents Ratio, Self-Citations Ratio, Total Citations, Citations per Document, and H-index since the year 1996 and towards the year 2024. The findings revealed that Saudi Arabia was leading followed by Egypt regarding total publications on Scopus. Citable Documents were also high in both the countries. The rate of Self-citation was highest in Iraq where there is a repetition of citations of its own studies. Morocco and Egypt were at the second and third ranks respectively in self-citation. Although Iraq comes in the third position in the Total Documents indexed in Scopus, after Saudi Arabia and Egypt, it is also taking the first position in the Citable Document ratio measure.

The research outputs of different countries are investigated with the help of the Scopus database and the SCImago Country Rank of Arab countries as the main research outcomes. The indicators demonstrate that Saudi Arabia was at the top of all Arab Countries, next came Egypt and the United Arab Emirates in Total Citations and H-index. Under Citations per Document Lebanon and Saudi Arabia came second and third behind Qatar.

In summary, this chapter shows that Saudi Arabia was leading among Arab nations in terms of the research productivity, impact and quality indicators. Iraq had the third place in Total Documents, but it was far below other Arabian countries in terms of the quality of research and its impact. In this way, the Arab Countries ranking of the quality and the impact of researches is considered through the Scopus database, and the SCImago Country Rank.

Chapter 4: Analyzing the Research Visibility of Higher Education Institutions in Scopus in the Kurdistan Region

This chapter focuses on the higher education sector in the Kurdistan Region, assessing each institution's research visibility in the Scopus database from the date of its establishment. The analysis categorizes institutions into public and private universities, followed by a comparative evaluation using multiple indicators, including University Authors, Total Documents, Total Citations, Citations per Document, and others. Subsequently, a benchmarking comparison is performed with the top-ranked universities in Iraq and the research productivity index and efficiency ratio of neighbouring countries. Therefore, the contents of the chapter are centred as follows:

4.1. Introduction
4.2. Public University Profiles in Scopus
    4.2.1.   University Total Authors
    4.2.2.   University Total Documents
    4.2.3.   University Size Classification
4.3. Private University Profiles in Scopus
    4.3.1.   University Total Authors
    4.3.2.   University Total Documents
    4.3.3.   University Size Classification
4.4. University Sector Comparison in Kurdistan Region
4.5. Top University Productivity-Efficiency in Iraq and Neighbouring Countries
4.6. Top Universities' Profile in Scopus in Iraq and Neighbouring Countries
4.7. Summary

4.1. Introduction

This chapter examines and evaluates the university profiles in Scopus of the Kurdistan region. The analyses incorporate 16 of the 19 public universities in the first segment and 13 of the 17 private universities in the second segment. The investigation period commences with the year of the inaugural Scopus-indexed publication for each university from its establishment. Both chapters employ the count of authors affiliated with each university and their publication records in Scopus.

4.2. Public University Profiles in Scopus

The study analysed and ranked the 16 public universities in the Kurdistan region by reviewing their individual Scopus profiles, starting with the first listed publication. The assessment employed such important metrics as the number of University Authors, Author Ratios, Total Documents, Total Document Ratios, and University Size Classification. Aggregation of the ranking is done in all academic fields, not in subject areas.

4.2.1. University Total Authors

The overall count of authors of the public universities according to the Scopus is at Figure (4.1) whereas Figure (4.2) represents the proportions of the university authors. In the attempt to further explain the ranking, the best of the universities, i.e. University of Sulaimani, Salahaddin University, and University of Duhok, are shown, and each has over 1000 authors. These universities represented 22, 19 and 13 percent of the total number of authors in that order. Thereafter, Hawler Medical University and Sulaimani Polytechnic University had over 400 authors respectively, 8 and 5 percent of the total respectively. Otherwise, the other 11 state universities were ranked below, all providing less than 5 percent.
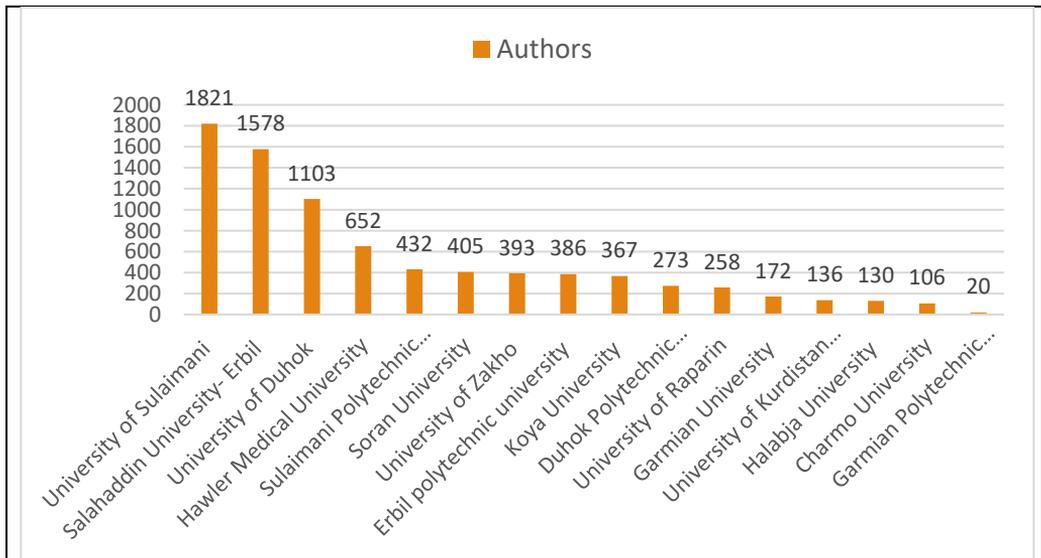
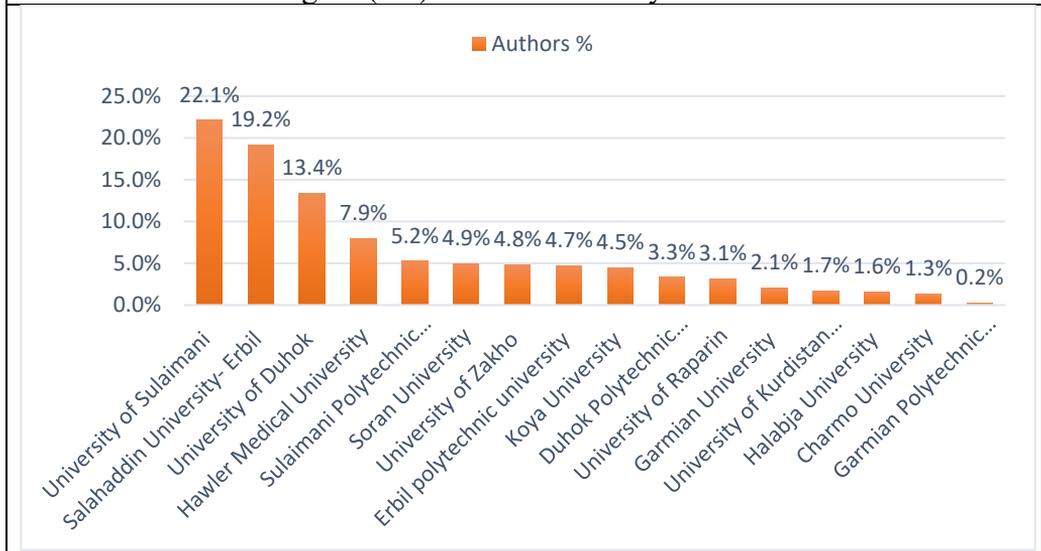Figure (4.1) Public University Authors

Figure (4.2) Public University Authors Ratio

Source: Developed by the authors based on (53)

4.2.2. University Total Documents

The number of documents produced by public universities indexed in Scopus is illustrated in Figure (4.3), whereas the document ratios of these universities are displayed in Figure (4.4). The top-ranked universities are the University of

Sulaimani and Salahaddin University, each with more than 3,800 Scopus-indexed documents. Accordingly, these universities contribute 20% and 17% of the Total Document, while the remaining public universities occupy lower positions, with fewer than 2500 documents each.
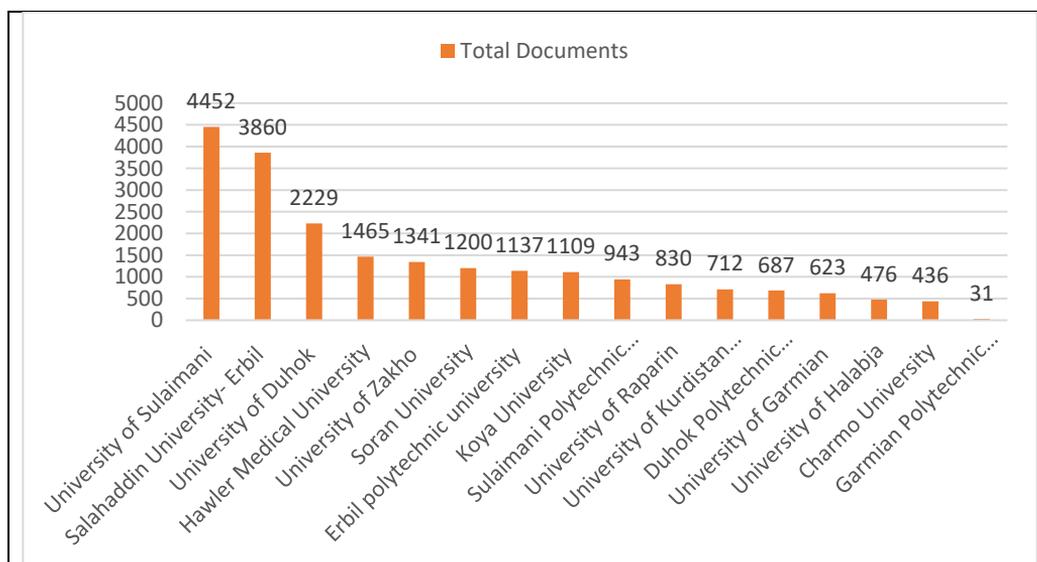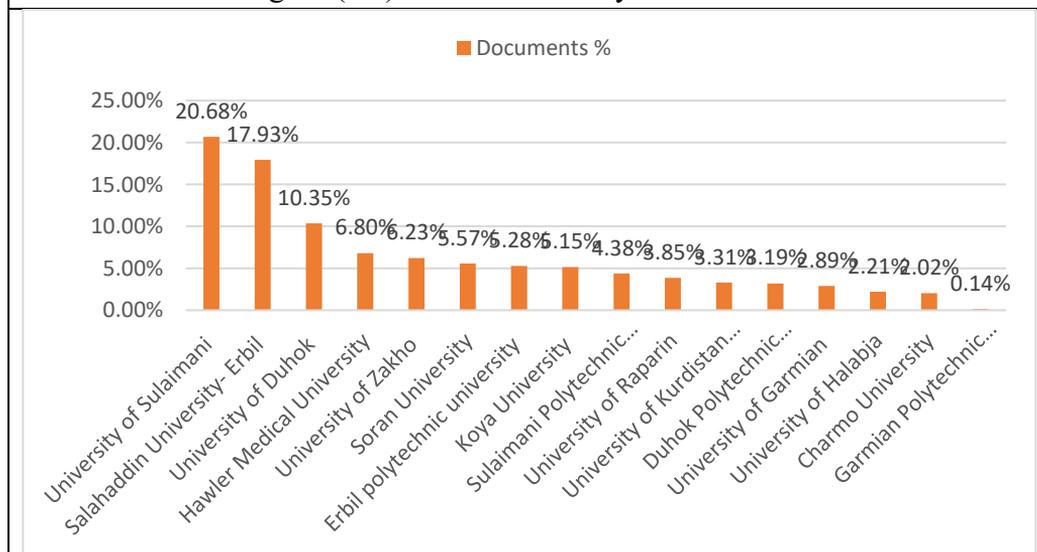

Figure (4.3) Public University Total Documents

Figure (4.4) Public University Total Documents Ratio

Source: Developed by the authors based on (53)

4.2.3. University Size Classification

Public universities are classified by year of establishment and research output. As shown in Figure (4.5) the three oldest universities dominate the public university sector, representing approximately 49% of the Total Documents and 55% of the Total Authors. In contrast, the four technical universities collectively contribute about 13% to both metrics, while the remaining 9 universities account for less than 40% in each metric.
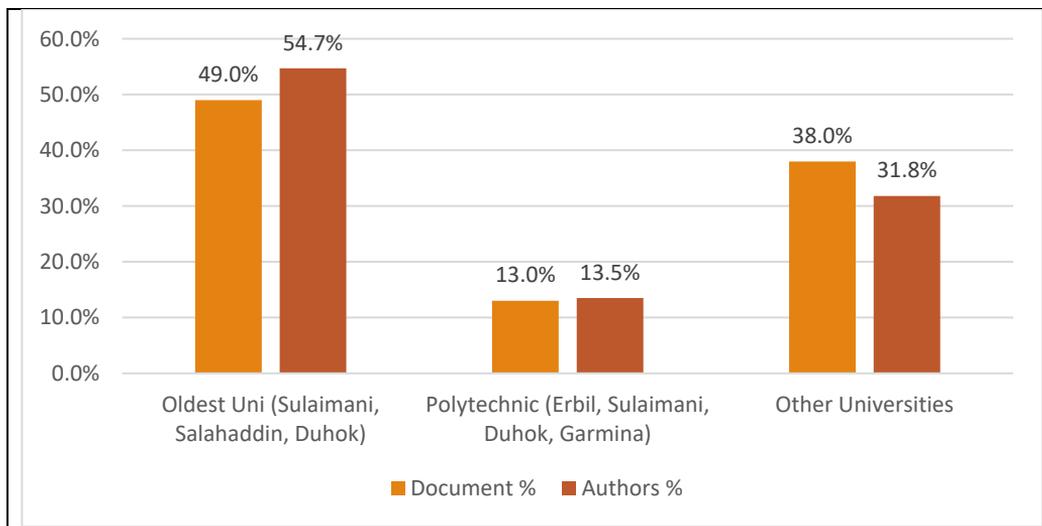
Figure (4.5) Public University Size Classification

Source: Developed by the authors based on (53)

4.3. Private University Profiles in Scopus

This section examines the profiles of the 13 private universities in the Kurdistan region as indexed in the Scopus database. The investigation begins with a review of each individual Scopus profile, starting from the earliest listed publication. Key indicators, including the number of University Authors, Author Ratios, Total Documents, Total Document Ratios, and University Size Classification, are used to rank the universities. The ranking analyses all the required disciplines together rather than assisting them individually.

4.3.1. University Total Authors

The distribution of authors affiliated with private universities indexed in Scopus is presented in Figure (4.6), while the university author ratios are displayed in Figure (4.7). Based on the classification, Tishk International University emerges as the leading university, contributing more than 300 authors and accounting for 30% or higher of the total. This is followed by Cihan University - Erbil, with 170 authors representing a 15% contribution. The remaining 11 Private universities occupy lower positions, each contributing less than 10% of the Total Author.
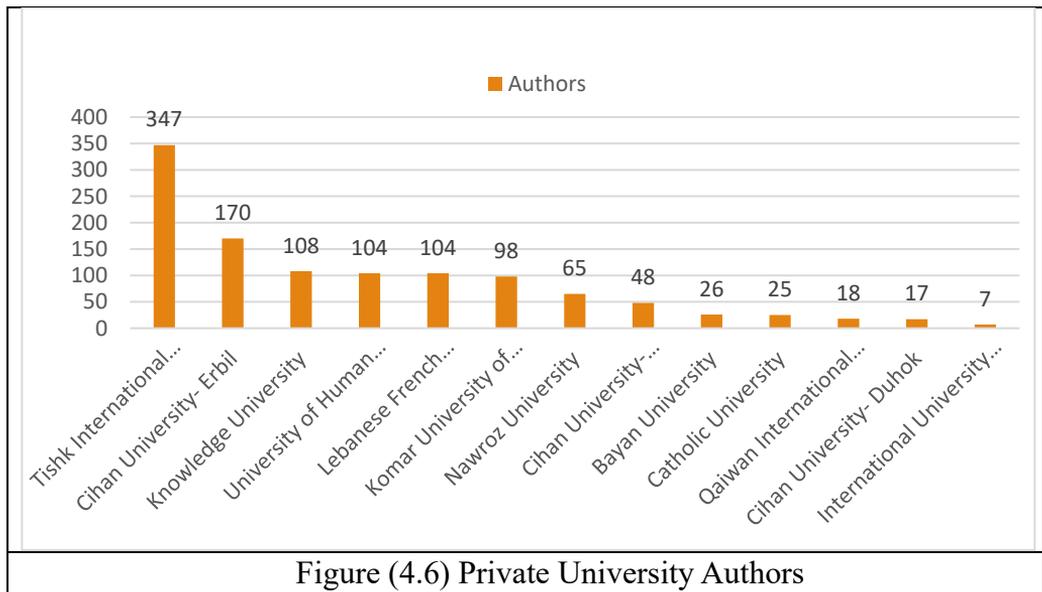
Figure (4.6) Private University Authors
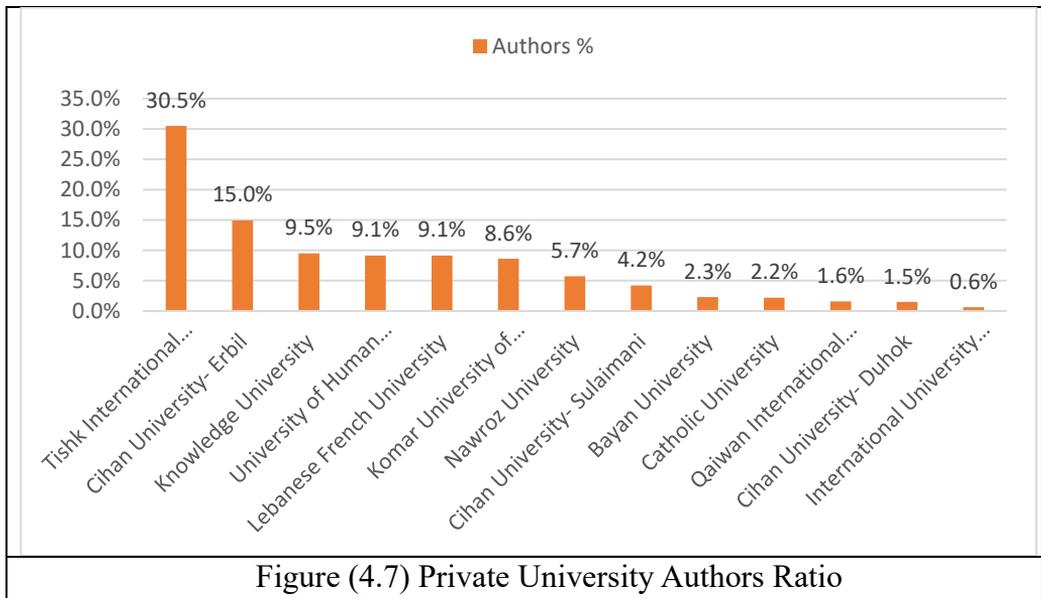
Figure (4.7) Private University Authors Ratio

4.3.2. University Total Documents

The number of documents from private universities recorded in Scopus is shown in Figure (4.8), whereas the document ratios among universities are displayed in Figure (4.9). According to the classification, the highest-ranked university is Tishk International University, with nearly 1700 documents, accounting for more than 23% of the total. This is followed by Cihan University - Erbil, with more than 1300 documents and an 18% contribution. The remaining 11 private universities occupy lower positions, with fewer than 850 documents, or less than 11% of the total.
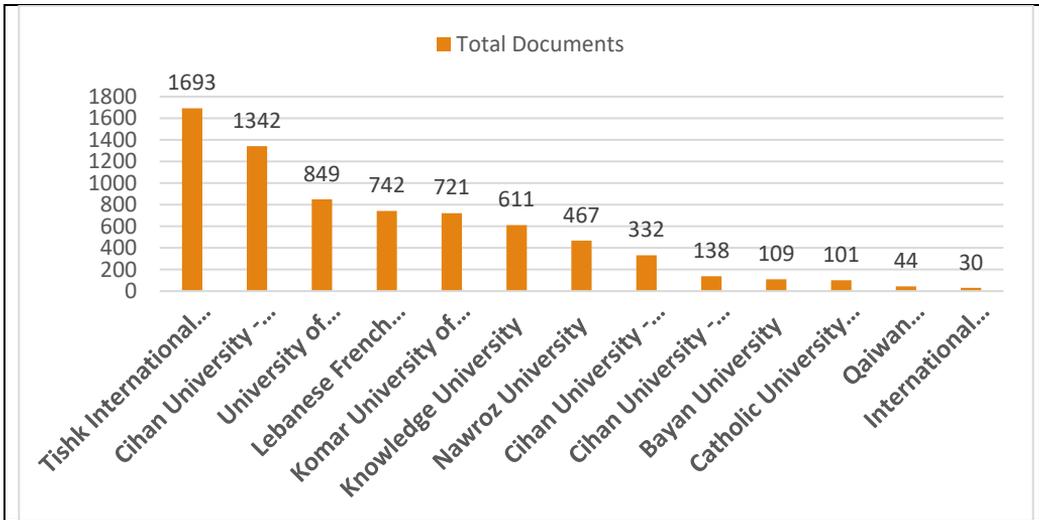
Figure (4.8) Private University Total Documents
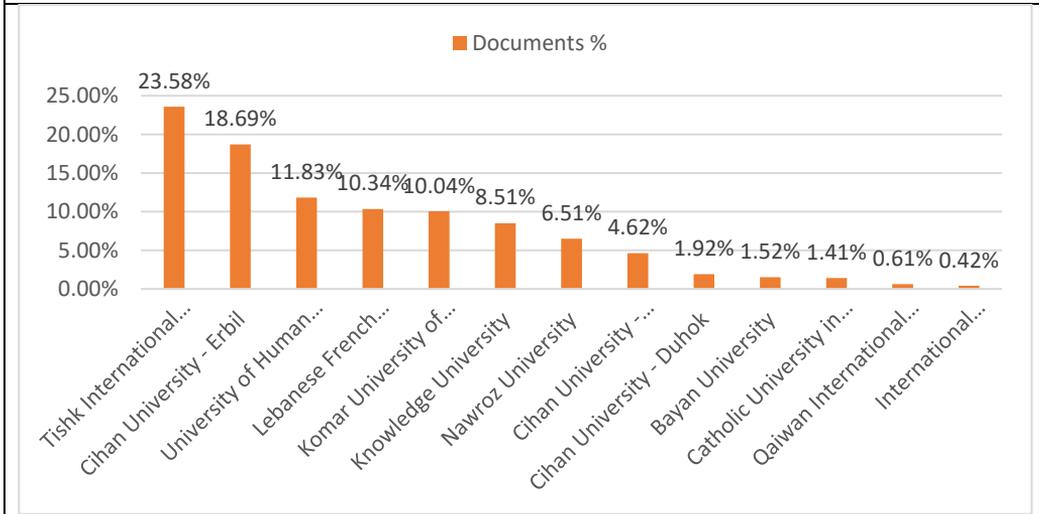
Figure (4.9) Private University Total Documents Ratio

Source: Developed by the authors based on (53)

4.3.3. University Size Classification

The private universities were categorised by seniority and research output. Figure (4.10) indicates that the three largest and oldest universities-Tishk International University, Cihan University-Erbil, and Human Development University-dominate the sector, accounting for about 54% of both Total Documents and Authors. The other 10 universities together account for about 46% of the total.

Figure (4.10) Private University Size Classification
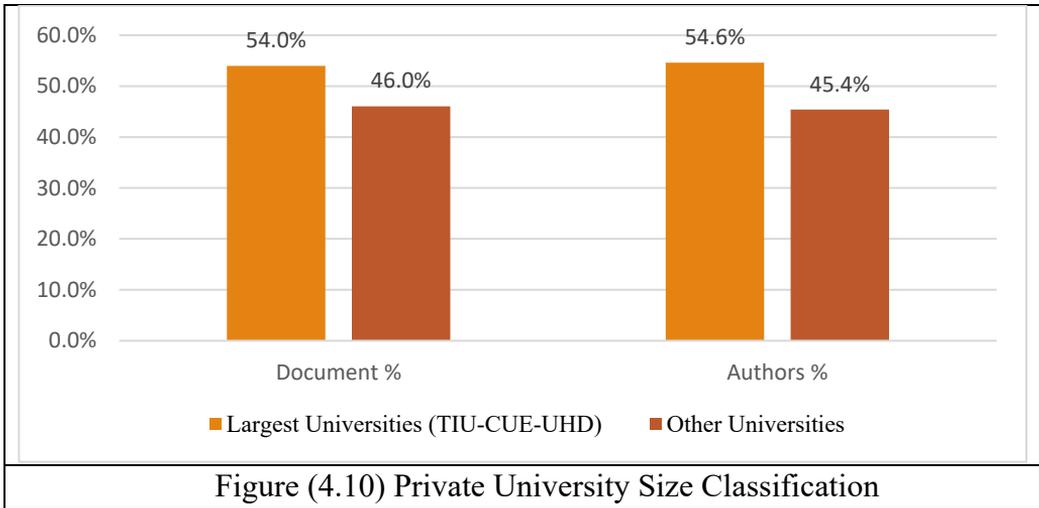
Source: Developed by the authors based on (53)

4.4. University Sector Comparison in Kurdistan Region

After presenting the indicators for public and private universities in the Kurdistan region, it is possible to compare these institutions specifically by the number of registered authors and the number of associated documents in Scopus. As shown in Figure (4.11), public universities consist of about 8232 researchers registered in Scopus out of a total of 9369 authors, representing approximately 88% of all registered authors, as shown in Figure (4.12). In contrast, private universities represent only 12% of all universities. This comparison highlights the dominance of public universities in author registration within the region.

Figure (4.11) University Sector Authors
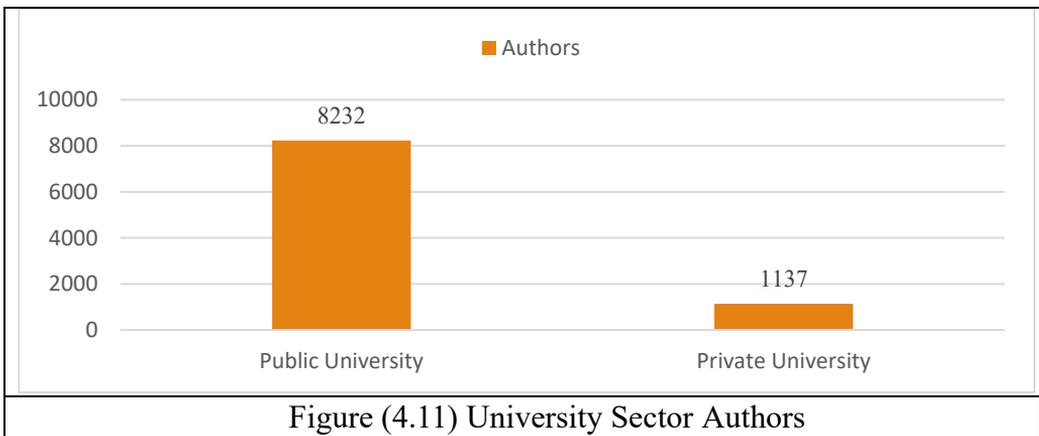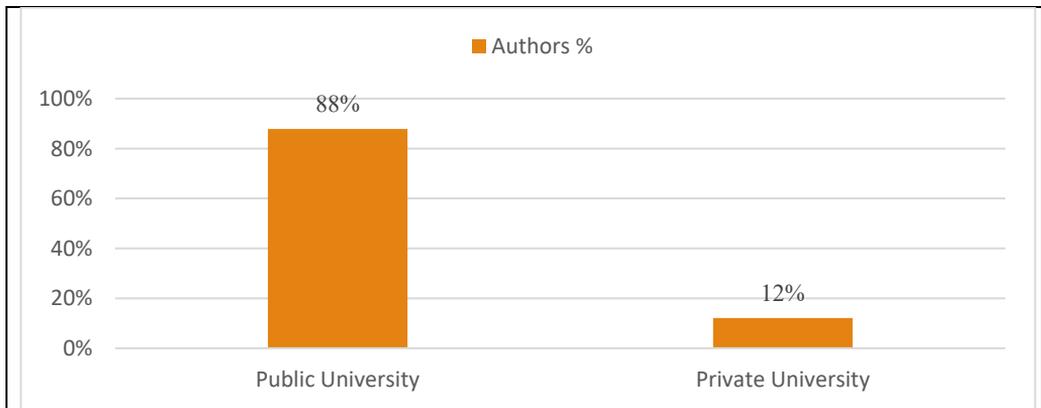
Figure (4.12) University Sector Authors Ratio

Source: Developed by the authors based on (53)

In addition, after presenting the indicators of public and private universities in the Kurdistan region, it is possible to compare them in terms of research output and their impact indicators in Scopus. Public universities dominate the university sector in terms of Total Documents and Total Citations, as shown in Table (4.1) and Figure (4.13). While private universities have an advantage over public universities in the Kurdistan region in terms of research impact indicators such as Citable Documents, Non-citable Documents, External Citations, Self-citation Ratio, and Citations per Document, both with and without Self-citations, as shown in Figure (4.14). As a result, this indicates the impact and superiority of private universities in quality and output compared to public universities, although the latter have higher research output in terms of quantity.

Table (4.1) University Sector Indicators

Indicators	Public Uni.	Private Uni.	KR Uni.	Public %	Private %
Total Documents	21531	7179	28710	75%	25%
Total Citations	539265	295390	834655	65%	35%
Citable Documents	16544	6033	22577	77%	84%
Non-Citable Documents	4987	1146	6133	23%	16%
External Citations	456636	254064	710700	85%	86%
Self-Citations	82629	40765	123394	15%	14%
Citations Per Document	25	41	29		
Citations Per Document (Exclude Self-Citation)	21	35	25		
University Number	16	13	29		

Source: Developed by the authors based on (53)

43
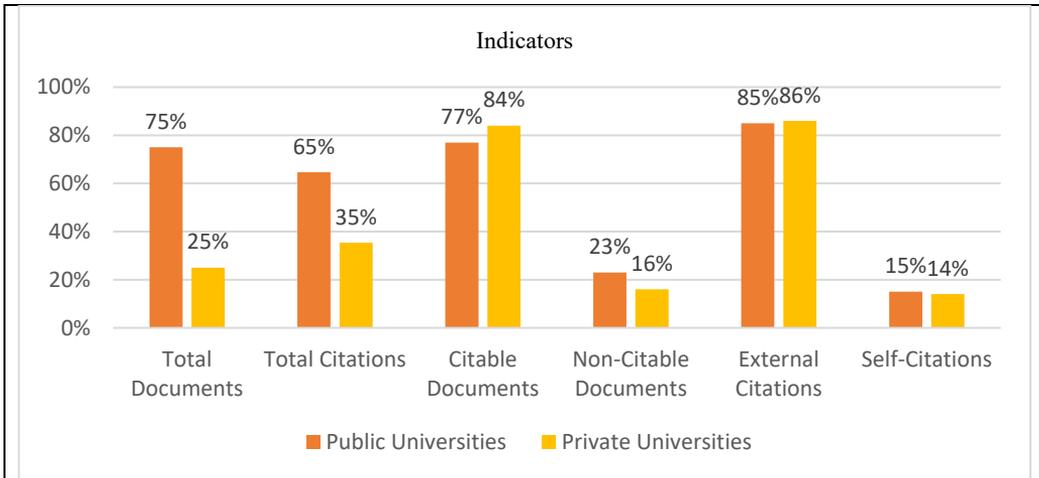
Figure (4.13) University Sector Ratio
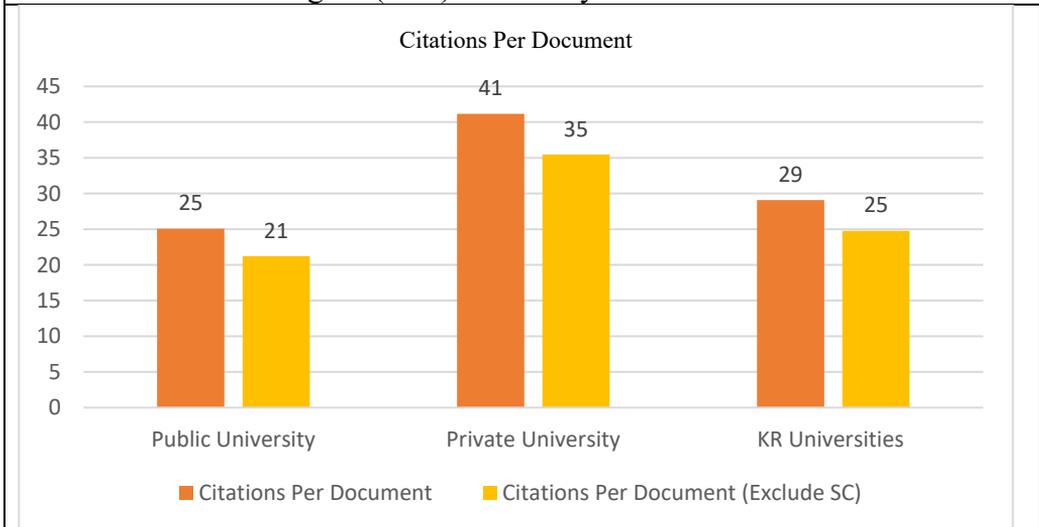
Figure (4.14) Citations Per Document

Source: Developed by the authors based on (53)

4.5. Top University Productivity-Efficiency in Iraq and Neighbouring Countries

This section compares the top public and private universities in the Kurdistan region to the leading universities in Iraq and the top universities in Saudi Arabia, Iran, Turkey, Kuwait, and Jordan. The comparison focuses on the number of authors and research documents listed for each institution in Scopus, as detailed in Table (4.2).

Table (4.2) Top Universities in Iraq and Neighboring Countries

No	University	Country	Documents	Doc. %	Authors	Auth. %	Productivity	Efficiency %
1	King Saud University	Saudi Arabia	121029	33.81%	10531	16.48%	11.5	205%
2	Tehran Uni of Medical Sciences	Iran	86487	24.16%	9889	15.47%	8.7	s156%
3	Haccttepe University	Turkey	60760	16.97%	12881	20.15%	4.7	84%
4	Kuwait University	Kuwait	25114	7.01%	6407	10.02%	3.9	70%
5	University of Jordan	Jordan	26960	7.53%	7254	11.35%	3.7	66%
6	University of Baghdad	Iraq	31383	8.77%	14783	23.13%	2.1	38%
7	University of Sulaimani	Kurdistan	4433	1.24%	1821	2.85%	2.4	43%
8	Tishk International University	Kurdistan	1854	0.52%	347	0.54%	5.3	95%
	Total		358020	100.00%	63913	100.00%	5.6	95%
	Regional Average						5.8	116%

Source: (53)

As shown in Figure (4.16), among the neighbouring countries of Iraq, King Saud University in Saudi Arabia ranked first in the number of publications, accounting for 33% of the total of 358,020. In contrast, Figure (4.18) shows that the University of Baghdad in Iraq had 23% of the 63,913 authors, which makes it the highest percentage of registered authors in the database among these countries.
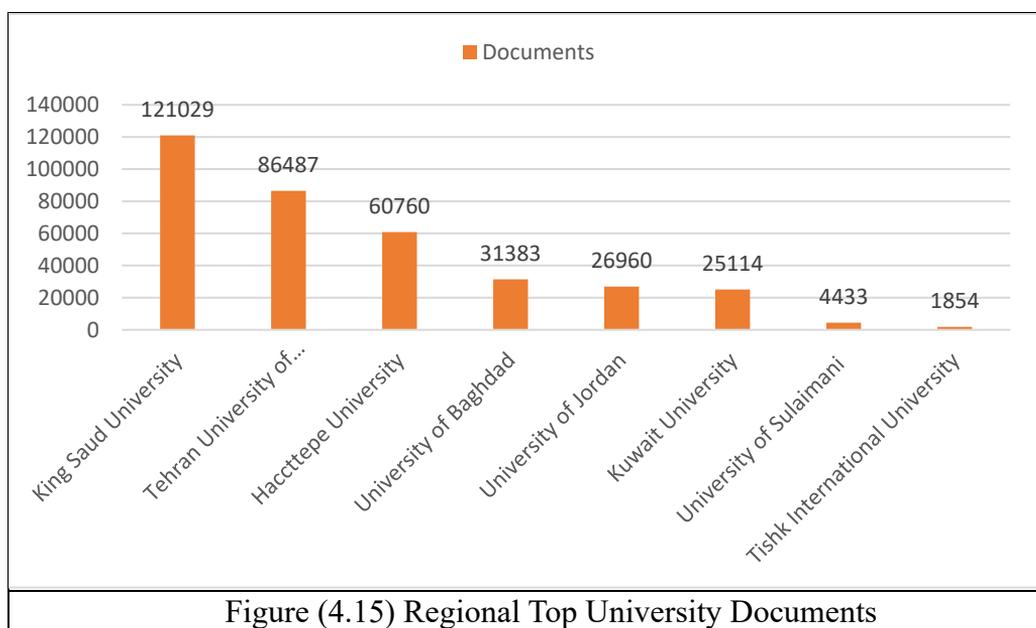
Figure (4.15) Regional Top University Documents
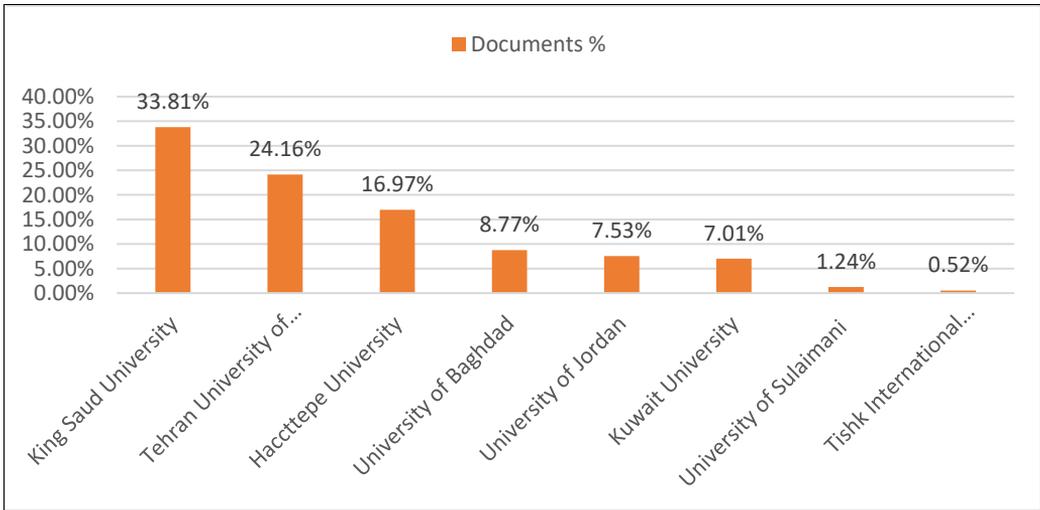
Figure (4.16) Regional Top University Documents Ratio
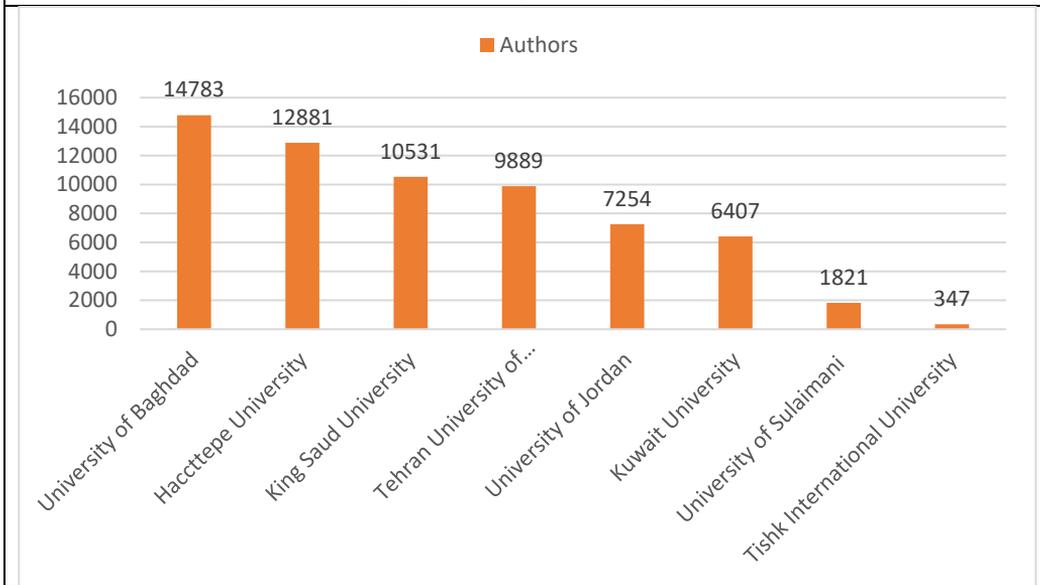
Figure (4.17) Regional Top University Authors
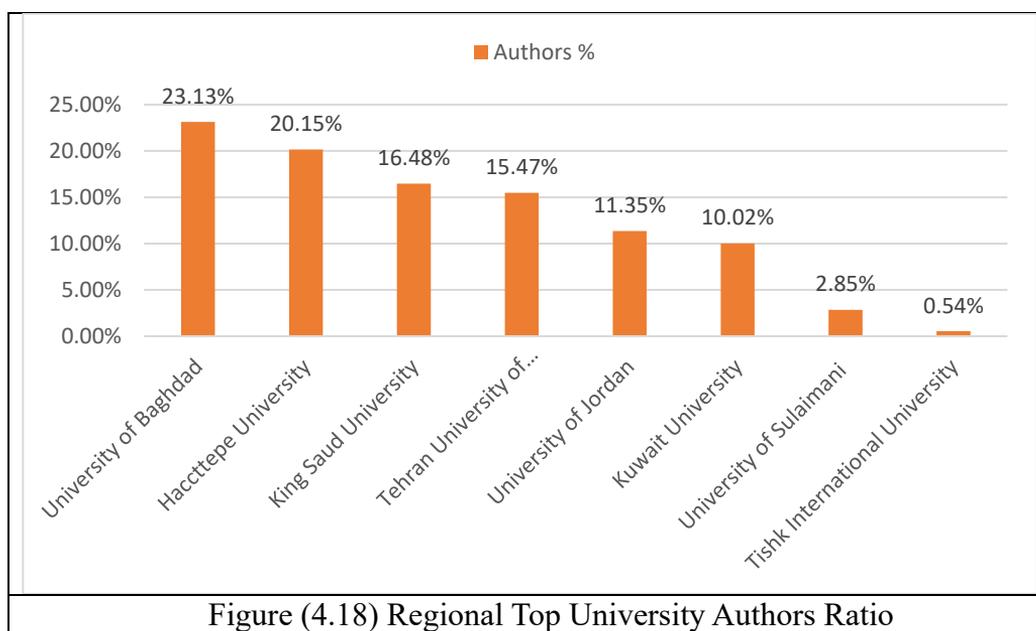
Figure (4.18) Regional Top University Authors Ratio

Source: Developed by the authors based on (53)

Among the neighbouring countries in Iraq, King Saud University in Saudi Arabia ranks the highest in research productivity among the other top universities, with over 10 research documents per registered author in Scopus, whereas Tehran University of Medical Sciences, with over 8 documents, is presented in Figure (4.19). In contrast, the University of Baghdad ranked last, despite possessing the most registered authors.

Apart from the above-mentioned universities, the third-ranked university is Tishk International University, a leading private institution in the Kurdistan region. This university has the highest average number of research documents per registered author among top universities in the neighbouring countries of Iraq, with over 5 research documents per author in Scopus, presented in Figure (4.19). Conversely, the University of Sulaimani, a top public university, and the University of Baghdad both had only 2 research documents per registered author, ranking them last among the compared institutions and below the regional average of 5.8 documents per author.
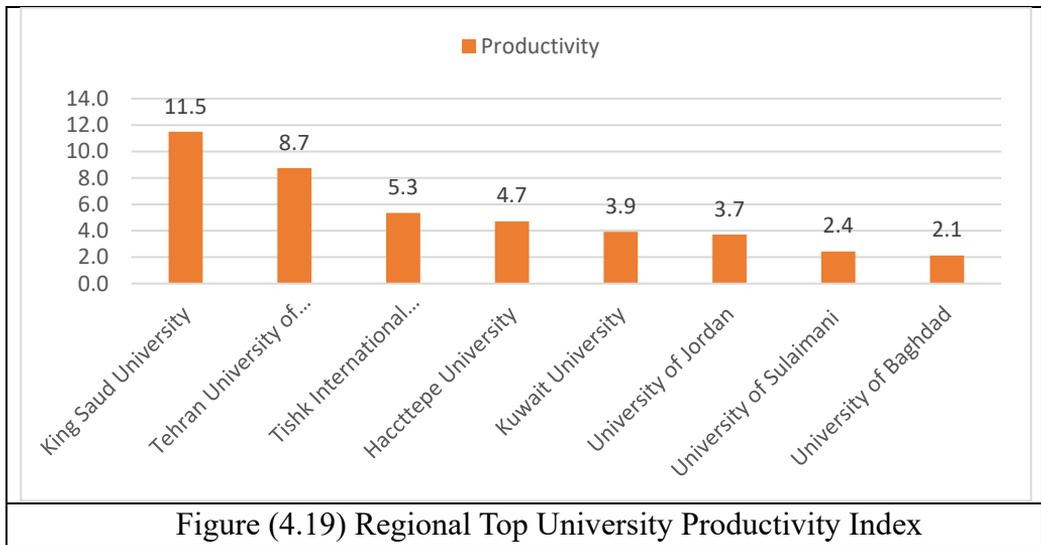
Figure (4.19) Regional Top University Productivity Index

Source: Developed by the authors based on (53)

The Figure (4.20) represents the efficiency ratio of an individual university's research performance against the top ranked universities of the neighbouring countries of Iraq. It has been known that King Saud University in Saudi Arabia was most efficient in terms of researcher efficiency of above 200 and then Tehran University of Medical Sciences in Iran with efficiency ratio of above 150 and the other universities had efficiency ratio of below 100. University of Baghdad in Iraq was the least efficient with a ratio of less than 40 despite its number of registered authors being the highest amongst the universities in the region.

The efficiency ratios of two universities in the Kurdistan Region were contrasted with the average ratio of efficiency in research in terms of the number of published papers by the authors in universities in the neighbouring countries in Iraq. The highest researcher efficiency at the Tishk international university was compared with other universities in the Kurdistan region and it was found to be 95, preceded by the best universities in Saudi Arabia and Iran, as presented in Figure (4.20). University of Sulaimani and University of Baghdad however, registered the lowest ratios of efficiency as they were lower than 45% in comparison with the peer universities in nearby countries. Finally, the efficiency

ratios of both universities in the Kurdistan region are lower than the regional mean of 116 as witnessed in the neighbouring countries of Iraq..
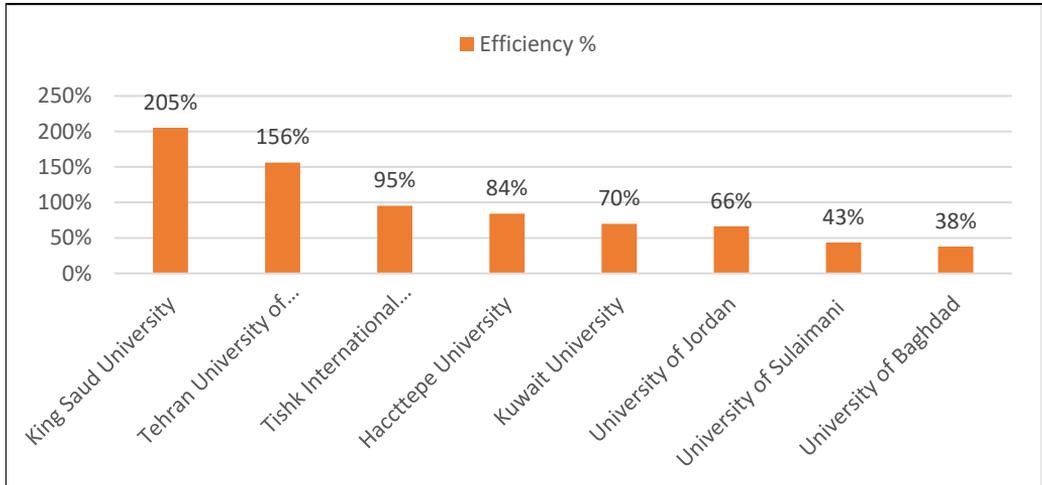
Figure (4.20) Regional Top University Efficiency Ratio Index

Sources: Developed by the authors based on (53)

4.6. Top University Profiles in Scopus in Iraq and Neighbouring Countries

The Figure (4.21) presents the details of the top university profiles in the Scopus of Iraq, including universities in the Kurdistan region and its neighbouring countries. The contents of each university, including the Total Number of Documents published by authors with university affiliation and other indicators reflecting the research productivity, quality, and visibility of each university, are presented.
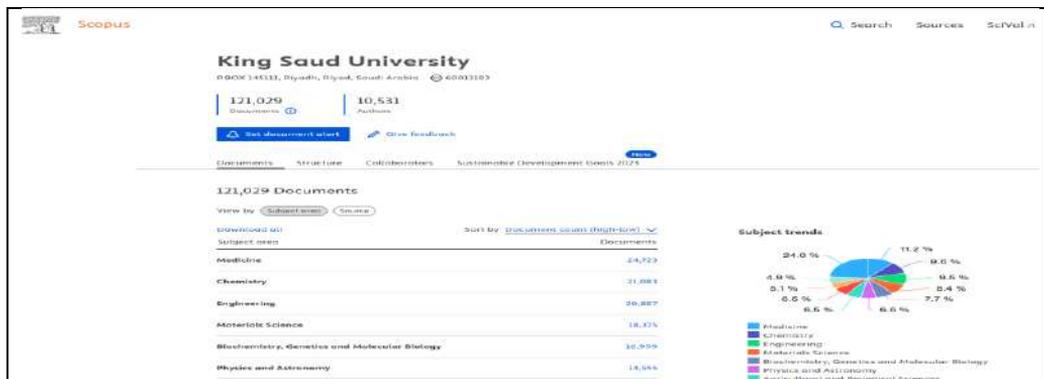
Tehran University of Medical Sciences

Number 21, Damashgh St., Vali-e Asr Ave, Tehran, Tehran, Iran   60027708

86,487	9,889
Documents	Authors

Set document alert   Give feedback

Documents   Structure   Collaborators   Sustainable Development Goals 2023

86,487 Documents

View by Subject area   Source

Download all   Sort by Document count [high-low]

Subject area	Documents
Medicine	55,883
Biochemistry, Genetics and Molecular Biology	12,320
Pharmacology, Toxicology and Pharmaceutics	8,074
Immunology and Microbiology	6,286
Chemistry	4,078
Nursing	3,864

Subject trends

- 15.1 %
- 45.8 %
- 6.1 %
- 6.6 %
- 10.3 %

Legend:
- Medicine
- Biochemistry, Genetics and Molecular Biology
- Pharmacology, Toxicology and Pharmaceutics
- Immunology and Microbiology
- Chemistry
- Nursing
- Neuroscience

Hacettepe Üniversitesi

Ankara, Turkey   60020484

60,760	12,881
Documents	Authors

Set document alert   Give feedback

Documents   Structure   Collaborators   Sustainable Development Goals 2023

60,760 Documents

View by Subject area   Source

Download all   Sort by Document count [high-low]

Subject area	Documents
Medicine	12,899
Biochemistry, Genetics and Molecular Biology	7,094
Chemistry	5,193
Engineering	4,674
Social Sciences	4,334
Physics and Astronomy	3,948

Subject trends

- 23.9 %
- 35.2 %
- 4.7 %
- 4.9 %
- 5.6 %
- 8.0 %

Legend:
- Medicine
- Biochemistry, Genetics and Molecular Biology
- Chemistry
- Engineering
- Social Sciences
- Physics and Astronomy
- Materials Science
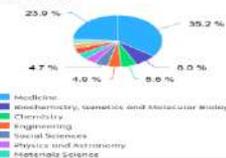
Kuwait University

Khaldiya Campus, Building no 119, 3rd Floor, Above Al Ahli Bank, Block 3, Al Firdous Street Presidential Complex, Kuwait City, Safat, Kuwait   60038812

25,114	6,407
Documents	Authors

Set document alert   Give feedback

Documents   Structure   Collaborators   Sustainable Development Goals 2023

25,114 Documents

View by Subject area   Source

Download all   Sort by Document count [high-low]

Subject area	Documents
Medicine	7,847
Engineering	4,826
Computer Science	3,360
Mathematics	2,706
Biochemistry, Genetics and Molecular Biology	2,508
Chemistry	2,204

Subject trends

- 28.0 %
- 18.2 %
- 11.5 %
- 8.0 %
- 6.4 %
- 5.6 %
- 5.3 %
- 4.6 %

Legend:
- Medicine
- Engineering
- Computer Science
- Mathematics
- Biochemistry, Genetics and Molecular Biology
- Chemistry
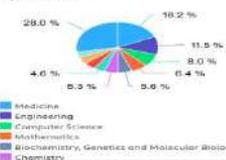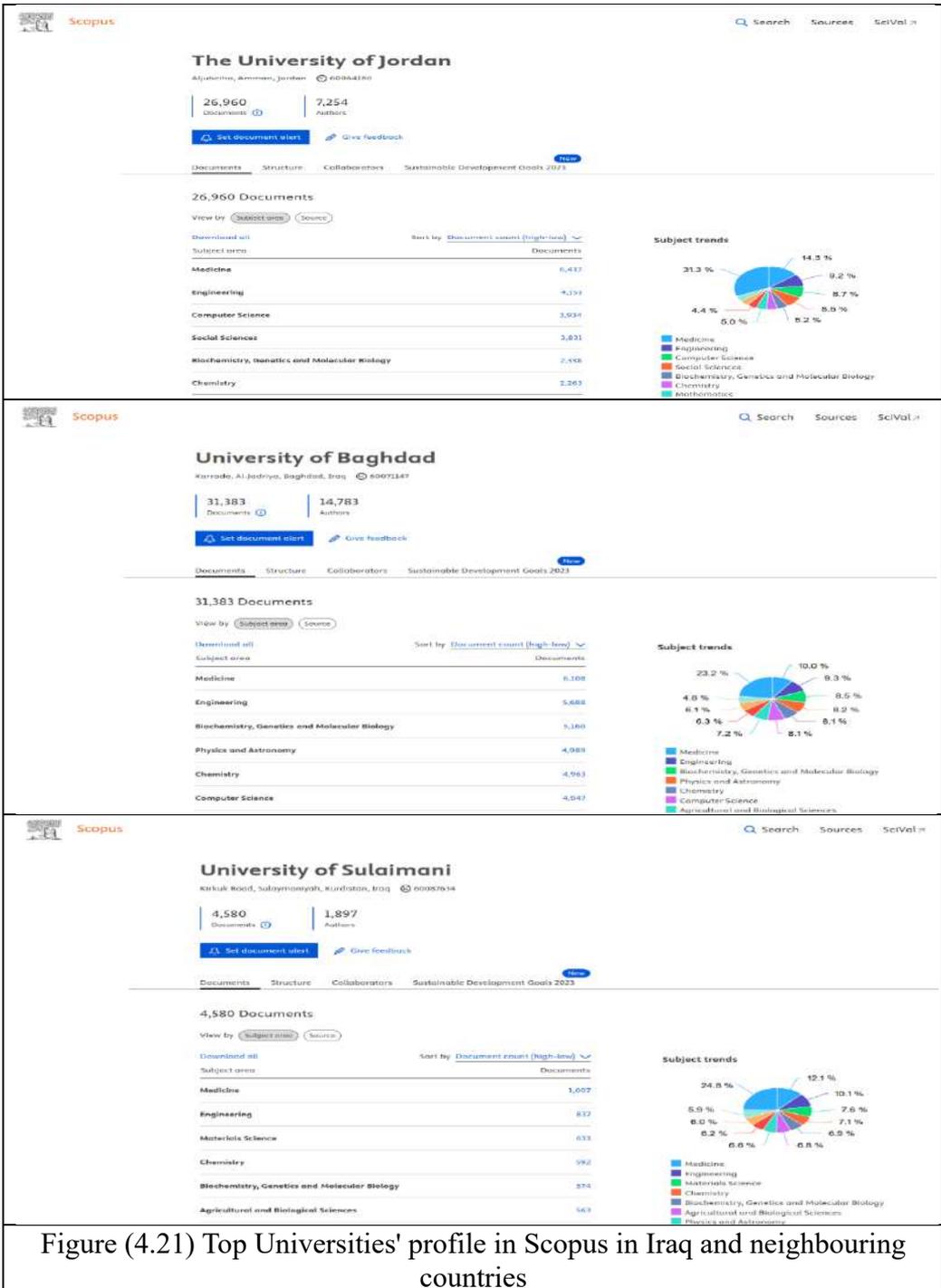
Figure (4.21) Top Universities' profile in Scopus in Iraq and neighbouring countries

4.7. Summary

The current research is analyzing the publication and author visibility of the 16 of 19 public and 13 of 17 private universities in Kurdistan Region, based on the date of inception of the institutions and 2024. Its results show that the proportion of the public universities within all Scopus-registered authors by their institutional affiliation in the Kurdistan Region is about 88%. Furthermore, the three oldest publicly operated universities do prevail in the field providing approximately 49 percent of the documents and 55 percent of the contributors. On the contrary, it seems that the sector is controlled by the three largest private universities, which represent approximately 54 percent of documents and authors. Generally, the public universities have a competitive edge over the private universities with regards to Total Documents and Total Citations. Nonetheless, the research impact indicators, such as the number of citable documents, non-citable documents, external citations, and self-citation ratio, and citations per document, are better in private universities, indicating that the research quality and efficiency in generating research are higher. With regard to volume, research output is higher in the case of a public university.

Also, The Tishk International University which is based in the Kurdistan region is ranked in the third place among the best universities in the neighbouring countries of Iraq in terms of research productivity and efficiency index. On the contrary, the University of Sulaimani, which ranks second in the region, is the last among the other universities.

Chapter 5: Analyzing Research Visibility of the Private Universities in Scopus in the Kurdistan Region

This chapter demonstrates research visibility in Scopus for private universities in the Kurdistan Region, from each institution's establishment date. This review categorizes the private university sector, followed by other indicators, including Total Documents, Total Citations, Citations per Document, and others. Therefore, the contents of the chapter are centred as follows:

5.1. Introduction

5.2. Sector Annual Documents

5.3. University Annual Documents

5.4. University Documents Size Classification

5.5. University Citable Documents

5.6. Sector Annual Citations

5.7. University Annual Citations

5.8. Sector Annual External Citations

5.9. University Annual External Citations

5.10. University Citations Size Classification

5.11. University Self-citations

5.12. Citations per document

5.13. H-index indicator

5.14. University Profiles in Scopus (Kurdistan Region)

5.15. Summary

5.1. Introduction

Prior to 2003, higher education, especially research, in Iraq was centred on public universities, with only a few private institutions. Although the late 1980s witnessed the establishment of its first private university, namely, Al Turath University College in 1988 in Baghdad, it has gained recognition over the years. The emergence of modern, well-known private higher education institutions in the Kurdistan Region effectively began after 2003, with further growth beyond 2007. This period marked a qualitative beginning of private higher education in the region, supported relative stability and economic expansion, which facilitated investment in the establishment of private universities and institutions, either through locally developed models or international branch campuses.

In conclusion, the phase of expansion and institutional growth of private higher education in the Kurdistan region dates back to 2007, with the emergence of leading institutions that continue to operate to this day, including American University in Sulaymaniyah and Cihan University - Erbil.

Table (5.1) presents that the earliest document indexed in Scopus is less than two decades old, reflecting the recent establishment of private universities in the Kurdistan Region and the limited duration of their institutional experience. This document was registered under the affiliation of Cihan University - Erbil, one of the first private universities established in the Kurdistan Region.

Table (5.1) First Document Record of Private Universities

No	Private Universities	First Record
2	Cihan University- Erbil	2009
1	Tishk International University	2011
3	University of Human Development	2011
4	Lebanese French University	2012
5	Komar University of Science and Technology	2012
7	Nawroz University	2014
8	Cihan University- Sulaimani	2014
10	International University of Erbil	2015
6	Bayan University	2016
9	Knowledge University	2017
11	Cihan University- Duhok	2018
12	Catholic University	2019
13	Qaiwan International University	2019
14	American University of Iraq in Sulaimani	None
15	Tishik University- Sulaimani	None
16	Qala University College	None
17	University College of Goizha	None

Source: Developed by the authors based on (53)

5.2. Sector Annual Documents

Table (5.2) lists the documents recorded annually for each private university's affiliation in the Kurdistan region since the first document was recorded in 2009. Figure (5.1) illustrates the total number of published documents each year, showing an upward trend that commenced in 2017, rising from 2% of total annual documents to surpassing 1,000 published studies annually from 2022 onwards. Thereafter, each year accounted for more than 20% of the sector's Total Documents.

Table (5.2) Sector Annual Documents

No	Private Universities	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Tishk International University	*	*	1	5	2	11	12	6	20	31	128	192	230	295	331	429	1693
2	Cihan University-Erbil	1	4	0	2	3	1	1	5	13	39	84	82	80	230	369	428	1342
3	University of Human Development	*	*	1	0	0	2	5	9	66	118	99	85	90	164	126	84	849
4	Lebanese French University	*	*	*	1	1	0	0	2	0	16	99	75	76	239	142	91	742
5	Komar University	*	*	*	1	0	0	5	5	10	37	69	91	109	155	119	120	721
6	Knowledge University	*	*	*	*	*	*	*	*	*	3	1	49	63	44	103	126	222	611
7	Nawroz University	*	*	*	*	*	1	6	1	13	22	27	32	65	91	113	96	467
8	Cihan University-Sulaimani	*	*	*	*	*	1	4	1	9	13	40	41	12	52	47	112	332
9	Cihan University-Duhok	*	*	*	*	*	*	*	*	*	*	9	19	24	11	38	18	19	138
10	Bayan University	*	*	*	*	*	*	*	1	2	0	1	16	4	6	21	58	109
11	Catholic University	*	*	*	*	*	*	*	*	*	*	*	1	4	8	25	30	33	101
12	Qaiwan International University	*	*	*	*	*	*	*	*	*	*	*	1	5	2	10	9	17	44
13	International University of Erbil	*	*	*	*	*	*	1	*	*	1	1	4	20	2	1	0	30
14	American University-Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	Tishik University-Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	Qala University College	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	University College of Goizha	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Total	1	4	2	9	6	16	34	30	136	287	618	714	751	1410	1452	1709	7179

Source: (53)

* No recorded document yet
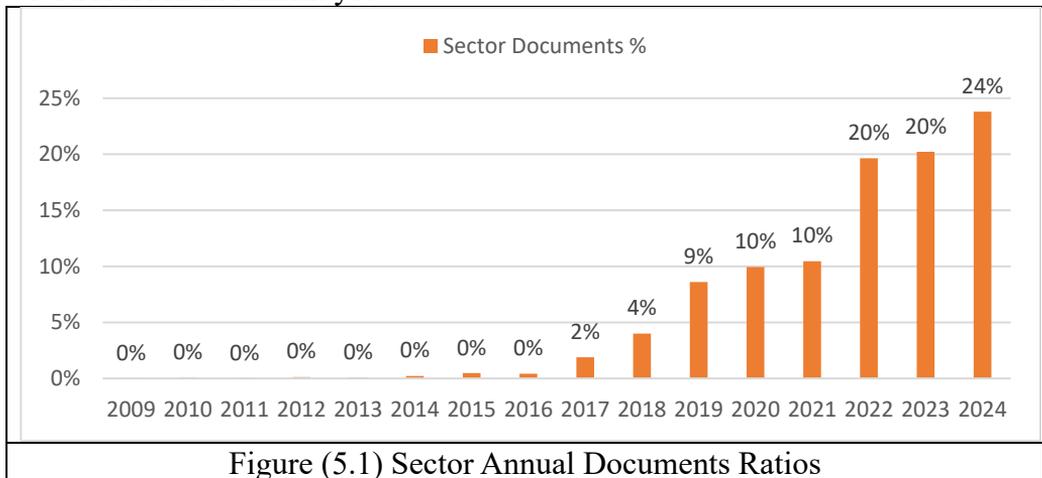
Figure (5.1) Sector Annual Documents Ratios

Source: Developed by the authors based on (53)

5.3. University Annual Documents

The number of private university documents recorded in Scopus is shown in Table (5.2), while the number of university document ratios is displayed in Figure (5.2). The first university to be ranked under the classification is Tishk International University which provides close to 1700 documents and this is close

to 24 percent of the contributions. Next comes the Cihan University - Erbil, having over 1300 documents and 19 percent of the total. The rest of the 11 private universities hold lower ranks with less than 850 documents and less than 12 percent of total.
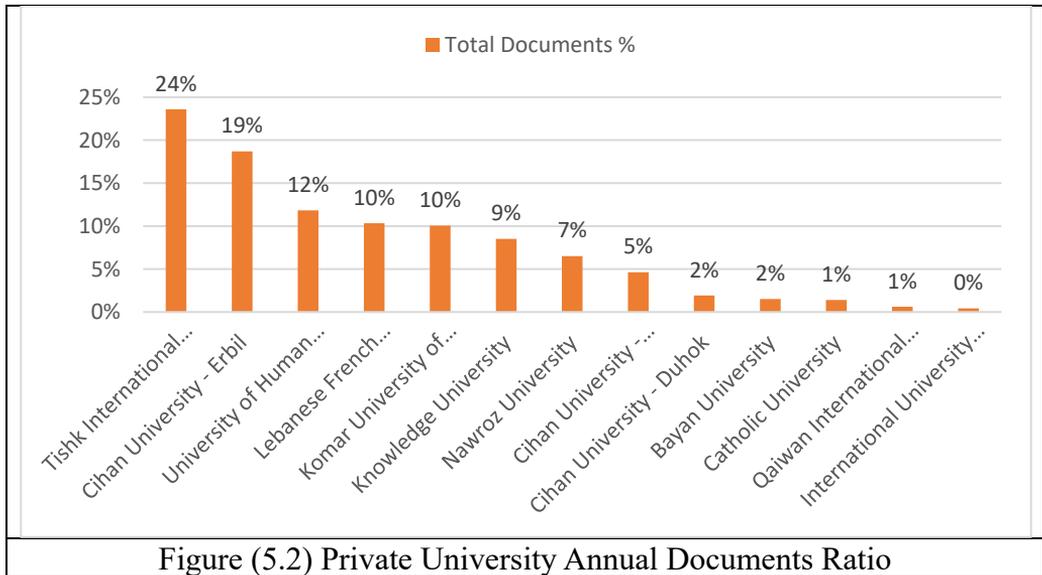
Figure (5.2) Private University Annual Documents Ratio

Source: Developed by the authors based on (53)

5.4. University Documents Size Classification

Private universities were categorised by seniority. As illustrated in Figure (5.3) three prominent universities, namely Tishk International University, Cihan University – Erbil, and Human Development University, dominate the sector, contributing about 54% Total Documents and Authors. In contrast, the remaining 10 universities together account for about 46% of the total.
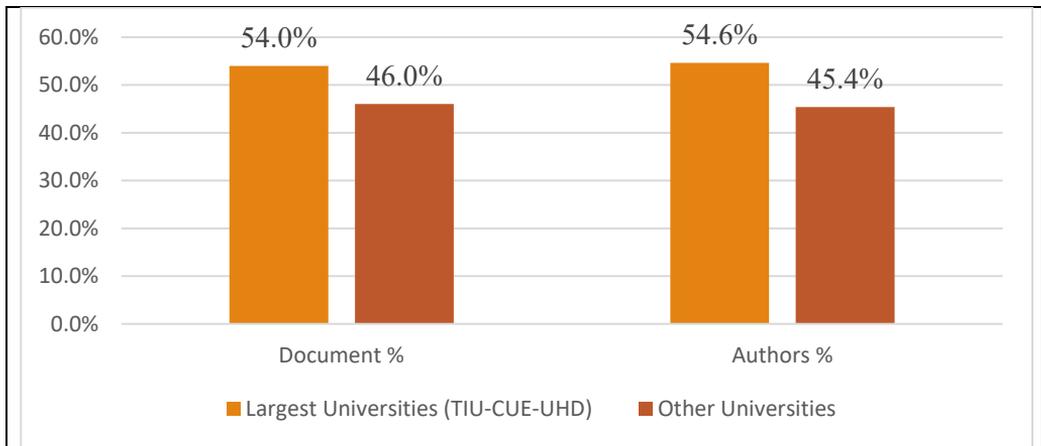
Figure (5.3) Private University Documents Size Classification Ratio

Source: Developed by the authors based on (53)

5.5. University Citable Documents

Private universities have an advantage in research impact indicators, such as the Citable Documents Ratio: almost 9 out of 13 universities have research outputs cited by others, and more than 80% of their documents can be cited, as shown in Figure (5.4).
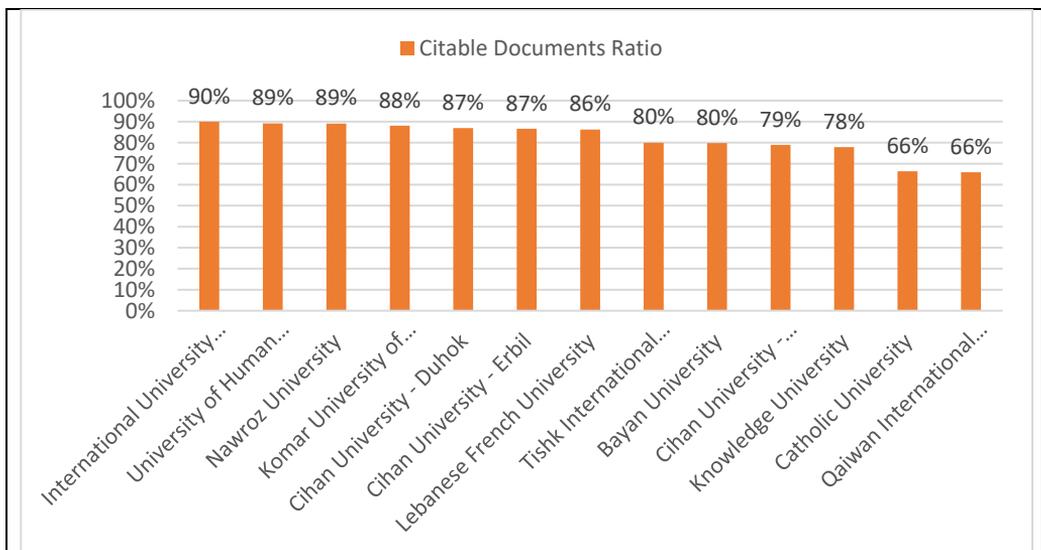
Figure (5.4) Private University Citable Documents Ratio

Source: Developed by the authors based on (53)

5.6. Sector Annual Citations

The number of citations recorded annually under the affiliation of each private university in the Kurdistan region since the first recorded citation in 2009 is shown in Table (5.3). The Figure (5.5) indicates that the increase commenced in 2018 at 1% of total annual citations and continued to rise, surpassing nearly 30,000 citations annually after 2021, accounting for more than 18% of the sector's Total Citations.

Table (5.3) Sector Annual Citations

| No	University	<2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Tishk International University	*	1	0	1	4	0	9	10	275	2395	5402	9211	12455	13415	14078	16414	73670
2	University of Human Development	1	0	0	0	0	0	2	16	117	514	2015	5300	9605	13973	16869	22306	70718
3	Cihan University- Erbil	1	0	0	1	0	2	1	7	14	54	159	552	2980	7555	11279	18256	40861
4	Komar University	*	*	*	*	1	1	3	17	25	104	477	1500	1973	3247	4020	5020	16388
5	Lebanese French University	*	*	*	*	*	*	*	*	2	5	124	164	512	1843	4287	6363	13300
6	Nawroz University	*	*	*	*	*	*	2	7	8	21	125	242	738	1249	2261	3695	8348
7	Knowledge University	*	*	*	*	*	*	0	0	0	0	57	447	733	947	1350	2361	5895
8	Cihan University- Sulaimani	*	*	*	*	*	2	0	1	4	8	49	261	451	744	1020	3347	5887
9	Cihan University- Duhok	*	*	*	*	*	*	*	*	*	2	42	47	91	296	290	344	1112
10	International University Erbil	*	*	*	*	*	*	*	*	*	*	*	12	89	336	394	221	1052
11	Bayan University	*	*	*	*	*	1	0	1	0	1	5	23	32	65	176	486	790
12	Catholic University	*	*	*	*	*	*	*	*	*	*	*	1	9	79	158	224	471
13	Qaiwan International University	*	*	*	*	*	*	*	*	*	*	*	2	11	31	36	68	148
14	American University - Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
15	Tishik University- Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
16	Qala University College	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
17	University College of Goizha	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0
	Total	2	1	0	2	5	6	17	59	445	3104	8455	17762	29679	43780	56218	79105	238640

Source: (53)
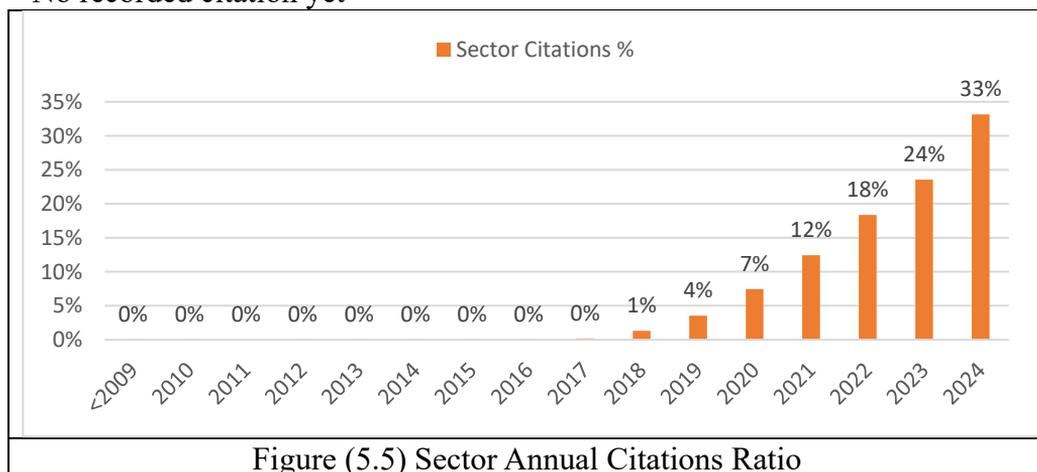
* No recorded citation yet

Figure (5.5) Sector Annual Citations Ratio

Source: Developed by the authors based on (53)

59

5.7. University Annual Citations

The number of private university citations recorded in Scopus is shown in Table (5.3), while the number of university citation ratios is displayed in Figure (5.6). The ranking places the highest recognitions on the Tishk International University and the University of Human Development with over 70,000 citations each with nearly 30 percent of the total citations. Cihan University-Erbil follows the universities above and has over 40,000 citations and is sharing 17 percent of the total. The rest of 10 private universities are ranked lower, with lesser citations and have less than 7% of the total..
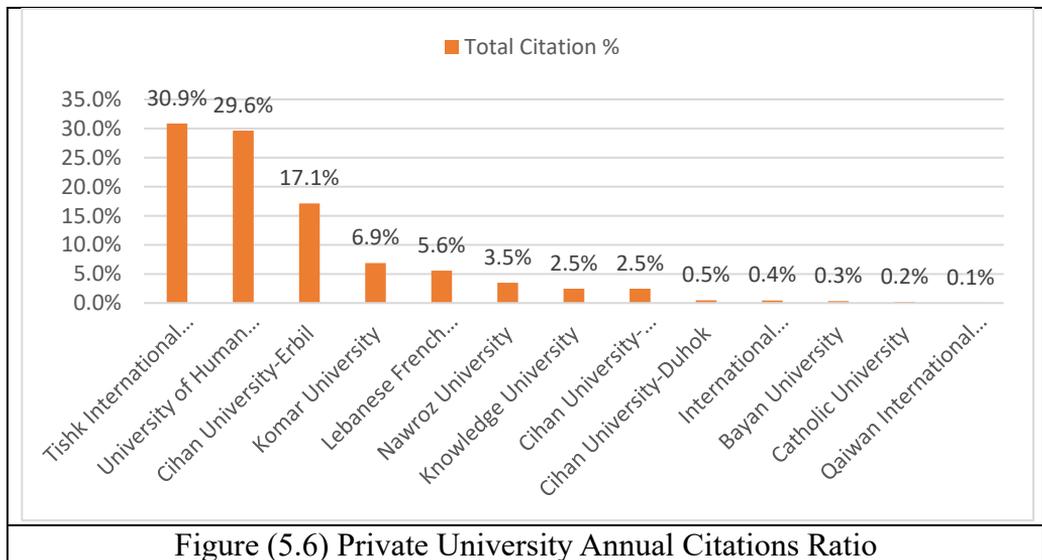
Figure (5.6) Private University Annual Citations Ratio

Source: Developed by the authors based on (53)

The Table (5.4) presents the total number of External Citations (excluding Self-citations), recorded annually by affiliation for each private university in the Kurdistan region since the first citation in 2009. Figure (5.7) indicates a constant upward trend in External Citations, emerging in 2018, increasing from 1% of total annual external citations and continuing to rise, surpassing nearly 10,000 external citations annually from 2020. The growth accounts for more than 7% of the sector's total external citations.

Table (5.4) Sector Annual External Citations

No	University	<2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Tishk International University	0	1	0	1	3	0	4	8	224	1,816	4,469	7,721	10,981	11,877	12,649	14,826	64,580
2	University of Human Development	1	0	0	0	0	0	1	9	26	254	1,361	4,054	8,109	12,139	15,176	20,400	61,530
3	Cihan University- Erbil	1	0	0	1	0	2	0	5	11	28	96	382	2,338	6,220	9,579	16,063	34,726
4	Komar University	*	*	*	*	1	1	3	4	22	48	227	664	1,245	2,229	3,239	4,322	12,005
5	Lebanese French University	*	*	*	*	*	*	*	*	1	2	102	117	407	1,501	3,740	5,718	11,588
6	Nawroz University	*	*	*	*	*	*	1	3	5	9	74	169	463	970	1,920	3,344	6,958
7	Cihan University- Sulaimani	*	*	*	*	*	2	0	1	1	3	12	176	383	647	948	2,868	5,041
8	Knowledge University	*	*	*	*	*	*	*	*	*	*	29	275	523	778	1,057	1,906	4,568
9	International University Erbil	*	*	*	*	*	*	*	*	*	*	*	8	66	285	378	202	939
10	Cihan University- Duhok	*	*	*	*	*	*	*	*	*	*	31	19	69	198	191	250	758
11	Bayan University	*	*	*	*	*	1	0	1	0	0	3	5	25	48	129	269	481
12	Catholic University	*	*	*	*	*	*	*	*	*	*	*	*	7	50	120	162	339
13	Qaiwan International University	*	*	*	*	*	*	*	*	*	*	*	2	10	19	27	52	110
14	American University in Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	Tishik University- Sulaimani	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	Qala University College	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	University College of Goizha	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Total	2	1	0	2	4	6	9	31	290	2160	6404	13592	24626	36961	49153	70382	203623

Source: (53)

* No recorded external citation yet
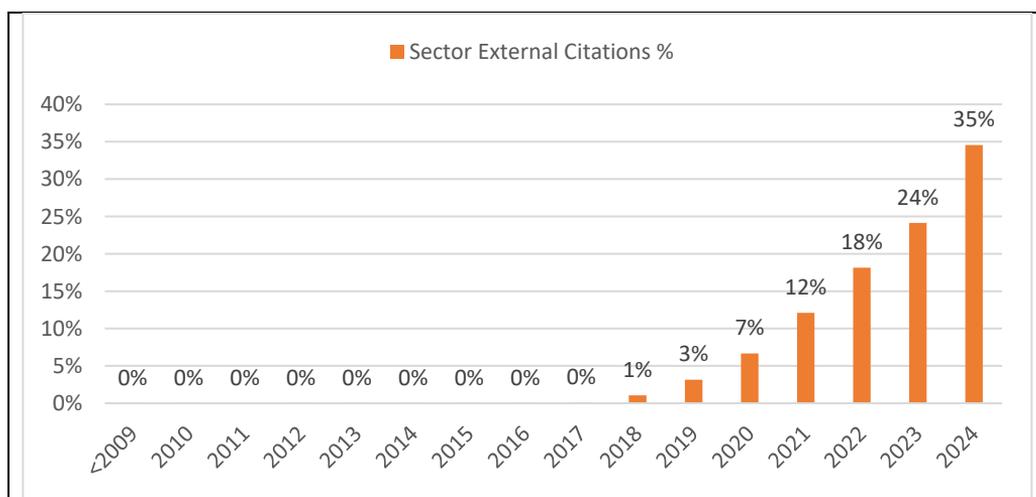

Figure (5.7) Sector Annual External Citations Ratios

Source: Developed by the authors based on (53)

5.9. University Annual External Citations

Table (5.4) demonstrates the number of external citation of the university of privity by the Scopus database without including self-citations and Figure (5.8) illustrates the number of university ratios of external citations. The Tishk International University and the University of Human Development are the highest ranked universities with over 60,000 external citations, and each occupying over 30% of the total. The next universities after the above are Cihan University-Erbil, which has over 34,000 external citations and share is 17%. The

rest of the 10 private universities are ranked lower down the ladder where they get lesser external citations and have less than 6 percent of the total..
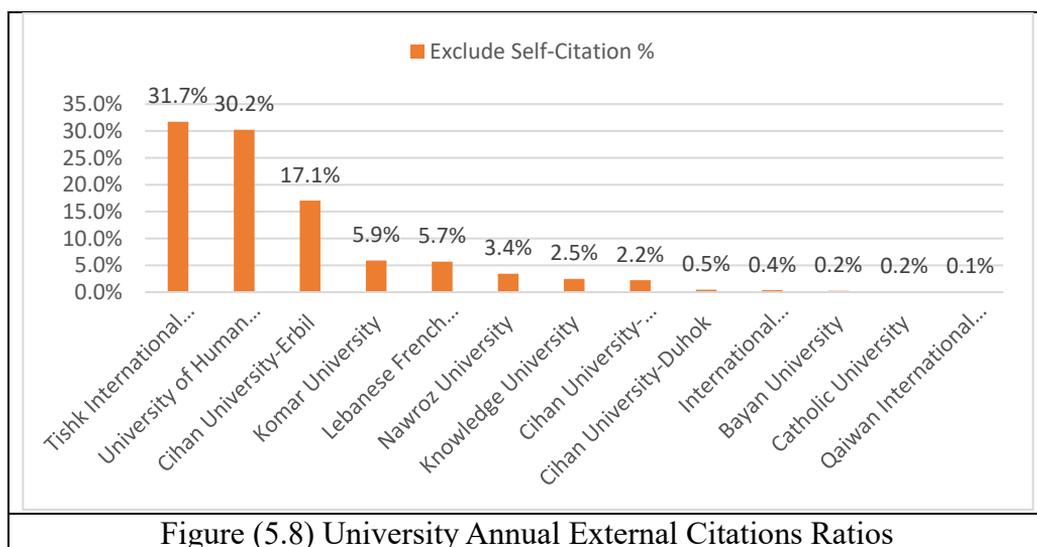
Figure (5.8) University Annual External Citations Ratios

Source: Developed by the authors based on (53)

5.10. University Citations Size Classification

The Private universities were grouped by seniority and research impact. Figure (5.9) indicates that the three prominent universities, namely Tishk International University, University of Human Development, and Cihan University – Erbil, dominate the sector's total and external citations, accounting for more than 78% of both. The other 10 universities together account for less than 22%.
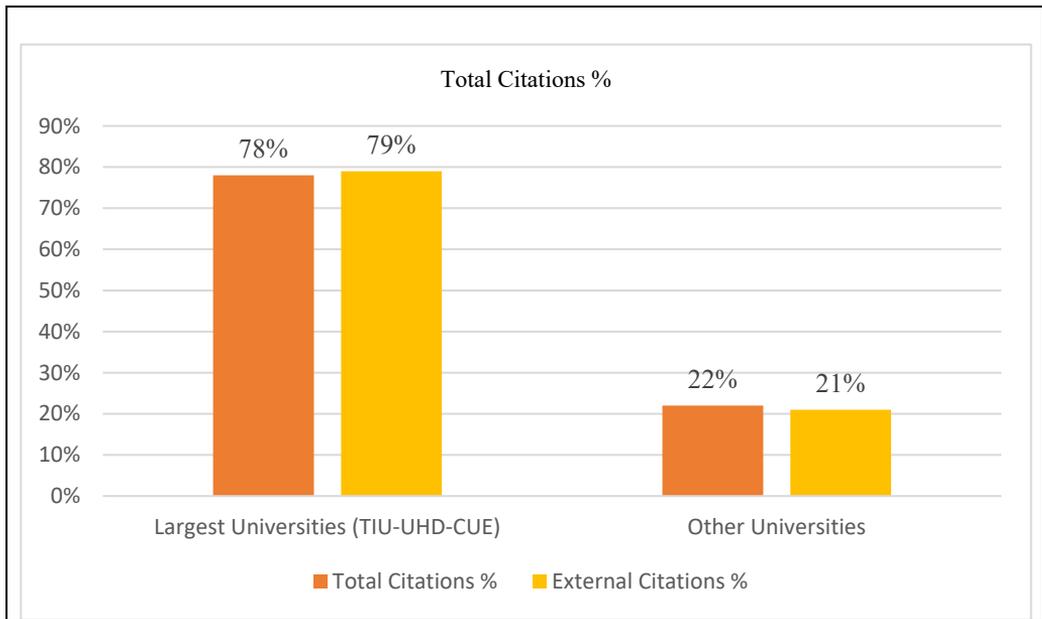
Figure (5.9) Private University Citations Size Classification

Source: Developed by the authors based on (53)

5.11. University Self-Citations

The Self-citation ratio is displayed in Figure (5.10). According to the classification, the top-ranked universities are Bayan University and Cihan University – Duhok, each with a ratio of more than 30%. The following universities are Catholic University, Komar University, Qaiwan International University, and Knowledge University, each with more than 20%. The other remaining universities occupy lower positions, with fewer than 15%.
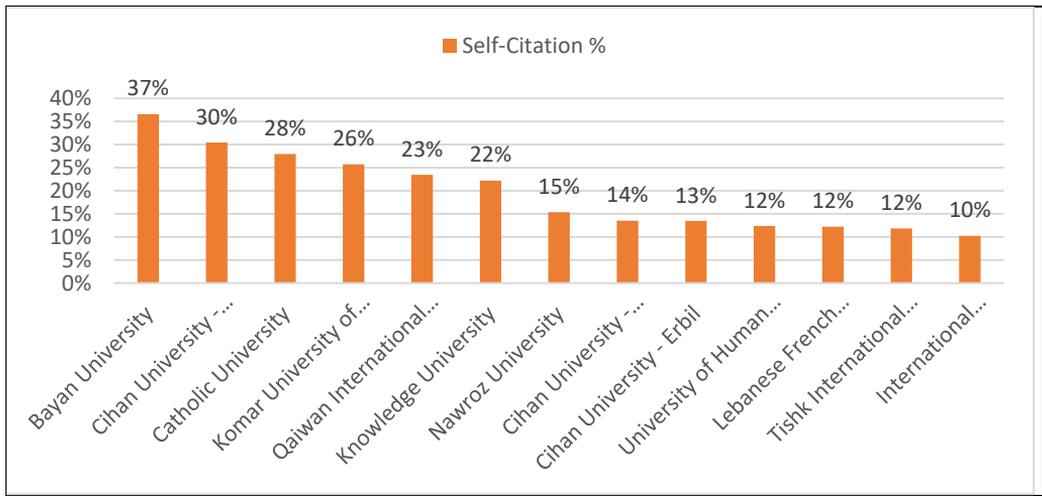
Figure (5.10) University Self-Citations Ratio

Source: Developed by the authors based on (53)

5.12. University Citations per Documents

The University of Human Development ranks highest in Citations per Document, with more than 96, followed by Tishk International University, with more than 50. In comparison, the last 4 universities have fewer than 10 citations per document, as shown in Figure (5.11).
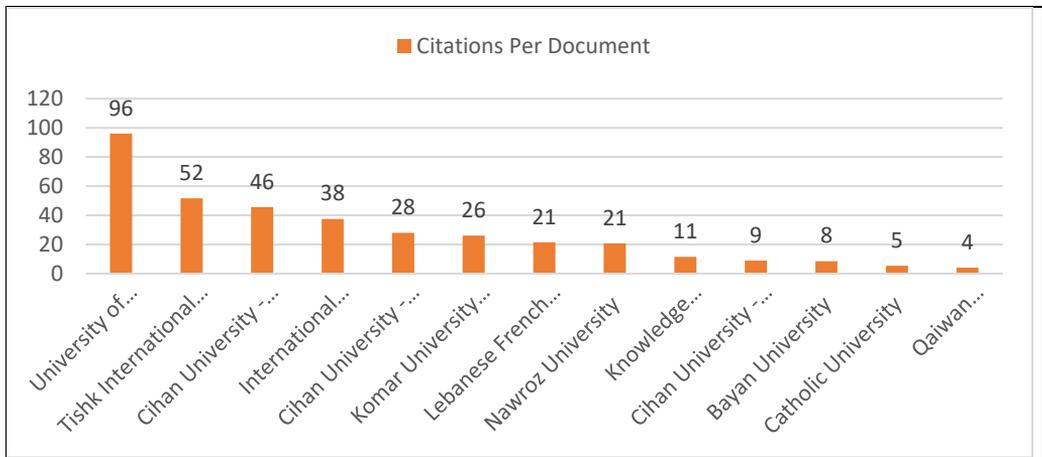
Figure (5.11) University Citations Per Document

Source: Developed by the authors based on (53)

5.13. University H-index

The University of Human Development ranks highest in H-index, with an H-index exceeding 94, followed by Tishk International University, with an H-index exceeding 80. At the same time, the last five universities have fewer than 20, as shown in Figure (5.12).
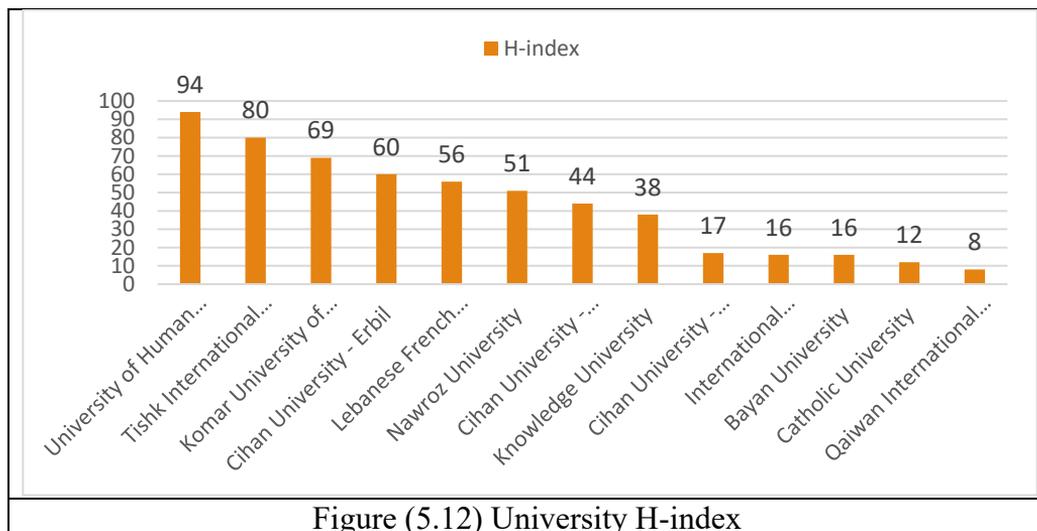
Figure (5.12) University H-index

Source: Developed by the authors based on (53)

5.14. Private University Profiles in Scopus (Kurdistan Region)

The Figure (5.13) portrays some examples of the homepage profiles of Cihan University - Sulaymania as a private university in the Kurdistan Region in Scopus. It also presents the university's content in terms of Total Documents published by authors, total citations, and other indicators that reflect the research productivity, quality, and visibility of each university, as well as chapters that fall outside the scope of this chapter.
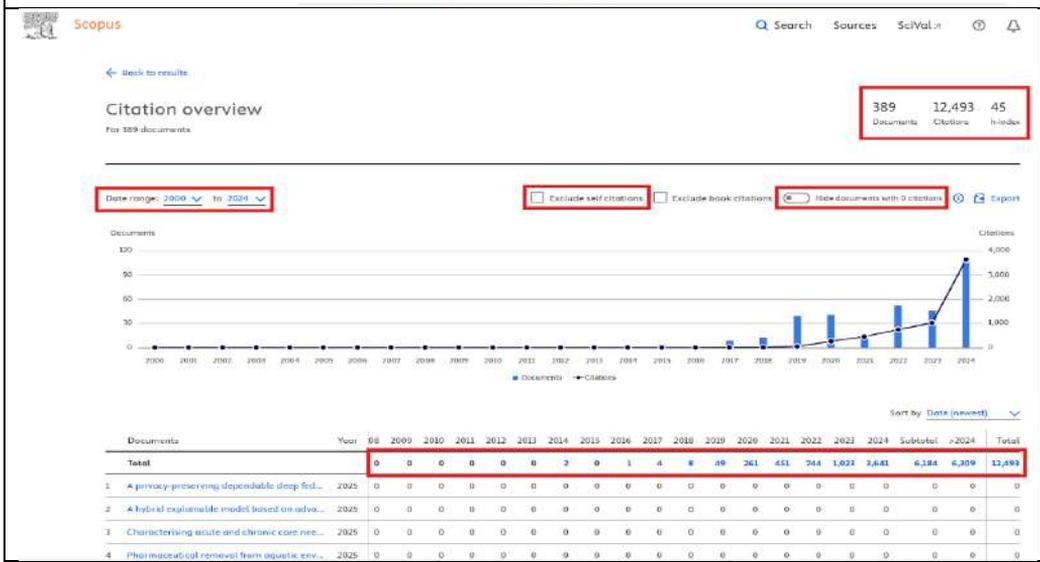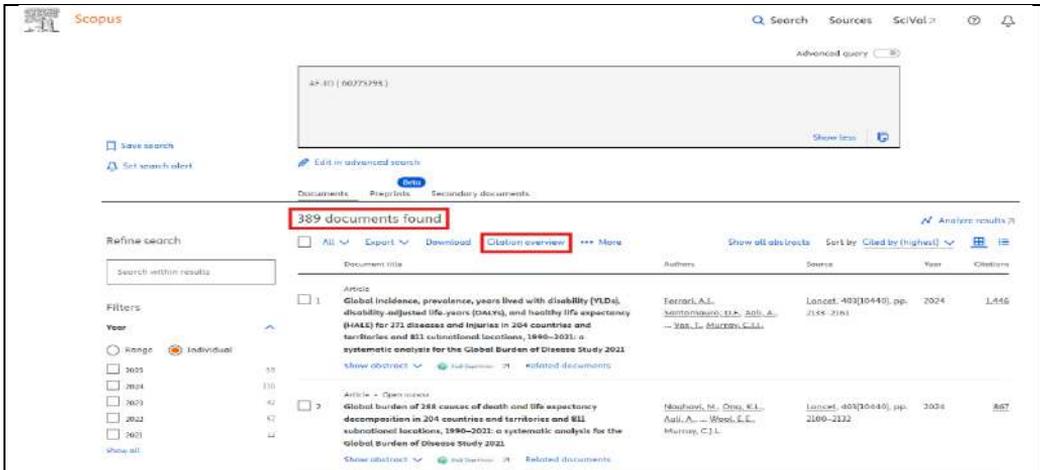
Figure (5.13) Cihan University - Sulaymania Profile in Scopus

Source: (Scopus database (Elsevier). Accessed in 1 July 2025, n.d.)

5.15. Summary

This entire chapter focuses on 13 of 17 private universities in the Kurdistan Region, based on their research visibility in Scopus from the date of each institution's establishment until 2024. The results showed that private universities have experienced an upward trend since 2017. It is also evident to note that three universities, namely Tishk International University, Cihan University–Erbil, and Human Development University, dominated the sector, which together accounted for about 54% of both Total Documents and authors. Also, the trend began in 2018 at 1% of total annual citations and continued to rise, with these three universities accounting for around 78% of the total. Finally, the study and analysis highlight the rankings that differed among universities in other indicators, specifically in the Self-citation ratio, Citations per Document, and H-index.

Chapter 6: Analyzing the International Collaboration of Private Universities in the Kurdistan Region

This chapter presents the International collaboration of private universities in the Kurdistan Region at the national, regional, and global levels, based on mutual documents recorded in Scopus with the partner institutions. It also covers collaborative scientific work in the private sector and at individual universities. The chapter deals with certain major divisions as follows:

6.1. Introduction

To quantify research collaborations in the Kurdistan region, all private universities in the region that have published in Scopus from the year of their establishment to 2024. The collaboration among universities and other institutions is divided into three categories: local, regional, and global. After classifying thousands of collaboration records, a list of collaborating institutions and their publications was created.

The study used 13 of 17 private universities in the Kurdistan region, covering a substantial portion of the scientific publications in their Scopus-affiliated profiles. The data was manually compiled and mapped to group all affiliations' identities for each university, as shown in Table (6.1).

6.2. Sector Collaboration Institutions

The private university affiliations collaboration assigns a category at the local, regional, and global levels based on a top-ranked university's greater collaboration in its research activities compared to other universities. The number of private university affiliations in Scopus is recorded alongside the total number of university affiliations. Collaboration ratios are displayed in Figure (6.1).

Table (6.1) Private Universities Collaboration Institutions

No.	University	Code	Country	Local		Regional		Global		Total		%
				Partner	Mutual	Partner	Mutual	Partner	Mutual	Partner	Mutual	
1	University of Human Development	UHD	42	5	484	39	2946	106	6985	150	10415	26.0%
2	Tishk International University	TIU	37	15	1493	37	1757	98	4203	150	7453	18.6%
3	Cihan University- Erbil	CUE	38	18	1644	47	2436	85	3332	150	7411	18.5%
4	Lebanese French University	LFU	38	17	784	54	1385	79	1415	150	3584	9.0%
5	Cihan University- Sulaimani	CUS	39	11	399	36	850	103	2266	150	3515	8.8%
6	Komar University	KUST	34	40	1028	36	355	74	898	150	2281	5.7%
7	Knowledge University	KU	32	42	1097	55	638	53	536	150	2271	5.7%
8	Nawroz University	NU	34	47	760	31	179	72	540	150	1479	3.7%
9	Bayan University	BU	25	54	377	44	103	52	125	150	605	1.5%
10	Cihan University- Duhok	CUD	30	14	124	38	93	98	165	150	382	1.0%
11	Catholic University in Erbil	CUiE	34	49	155	16	19	85	99	150	273	0.7%
12	International University of Erbil	IUE	36	9	39	19	39	122	125	150	203	0.5%
13	Qaiwan International University	QIU	20	33	80	14	15	30	41	77	136	0.3%
	Total			354	8464	466	10815	1057	20730	1877	40008	100.00%

Source: Developed by the authors based on (53)

Across 40 countries, the top-ranked university for research collaboration is the University of Human Development, with 26% of total affiliations in the Kurdistan Region. Following the above-mentioned universities are Tishk International University and Cihan University – Erbil, with more than 18% of their affiliations' collaborations in the Kurdistan Region. At the same time, all the remaining 10 private universities occupy lower positions, below 10% of the total.
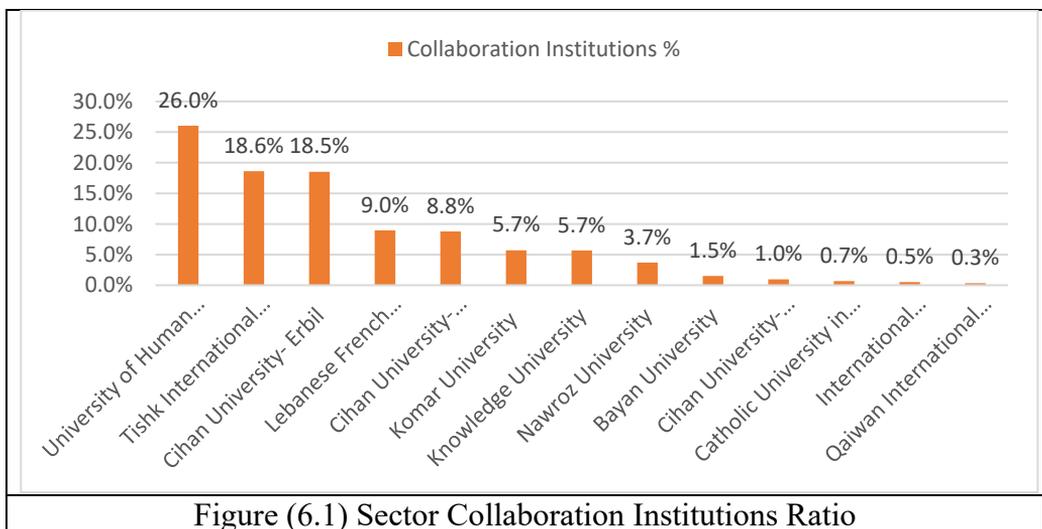
Figure (6.1) Sector Collaboration Institutions Ratio

Source: Developed by the authors based on (53)

6.3. Sector Collaboration Size Classification

The percentage of the affiliated institutions classifies the private universities' contributions in the Kurdistan Region. The Figure (6.2) indicates that the three prominent universities, University of Human Development, Tishk International University, and Cihan University - Erbil, dominate the sector, contributing about 63% of mutual works with partners. In contrast, the other 10 universities together account for only 37% of the universities' affiliated collaborations with the private sector in the Kurdistan Region.
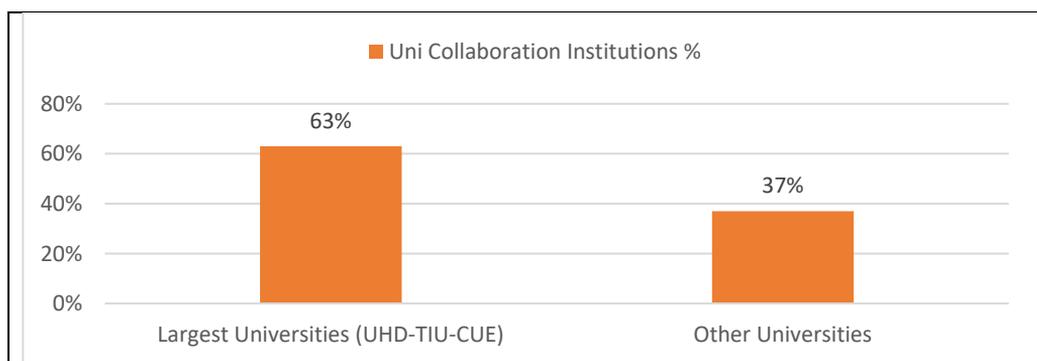
Figure (6.2) Sector Collaboration Institutions Size Classification Ratio
Source: Developed by the authors based on (53)

6.4. University Collaboration Institutions

Each private university's affiliation collaboration is assigned to determine the university's research networking, as recorded in Scopus. The analysis shows whether the mutual works are more closely aligned with local partners, with partner institutions from neighboring countries (regional), or with international partners (global). Table (6.2) shows the contribution of each university's collaborative activities with its partners at the local, regional and global levels.

Table (6.2) Private Universities Collaboration Institutions Ratio

No.	University	Code	Iraq (Local)	Regional	Global	Total
1	Tishk International University	TIU	20%	24%	56%	100%
2	Cihan University- Erbil	CUE	22%	33%	45%	100%
3	University of Human Development	UHD	5%	28%	67%	100%
4	Lebanese French University	LFU	22%	39%	39%	100%
5	Komar University	KUST	45%	16%	39%	100%
6	Knowledge University	KU	48%	28%	24%	100%
7	Nawroz University	NU	51%	12%	37%	100%
8	Cihan University- Sulaimani	CUS	11%	24%	64%	100%
9	Cihan University- Duhok	CUD	32%	24%	43%	100%
10	Bayan University	BU	62%	17%	21%	100%
11	Catholic University in Erbil	CUiE	57%	7%	36%	100%
12	Qaiwan International University	QIU	59%	11%	30%	100%
13	International University of Erbil	IUE	19%	19%	62%	100%

Source: Developed by the authors based on (53)

6.4.1. University Collaboration at Local Level

In Figure (6.3), it is vividly presented that university collaboration with local institutions in the Kurdistan region and Iraq reflects a document indicating a high contribution of works with its local partners. Universities with a broader scope of scientific activities and national recognition establish more collaborative relationships. For instance, it is observed that the local collaboration of private universities in the Kurdistan Region is led by Cihan University-Erbil (19%), Tishk International University (17%), Knowledge University (13%), and Komar University (12%). The other 9 universities have less than 10% of their mutual works with national partners.

Figure (6.3) University Collaboration at Local Ratio

Source: Developed by the authors based on (53)

6.4.2. University Collaboration at the Regional Level

In the Kurdistan Region, the partner institutions collaborating with private universities include documents from 22 Arab countries, Iran, and Turkey. These collaborations are analyzed to show the collaboration with partners from these countries at the regional level, as shown in Figure (6.4).

Conversely, the larger the realm of the scientific activity of the university and its institutional identity in the region, the higher may be the prospects of developing the collaboration relations in the regional level. As an example, the analysis shows that the level of regional cooperation in the Kurdistan Region is different in the case of the private universities. More than 27 percent of collaborations are recorded by University of Human Development, second is Cihan University-Erbil with a figure of 22, third is Tishk International University with 16, and last is Lebanese French University with over 12. All the other 9 universities share less than 8% of their mutual works with regional partners..
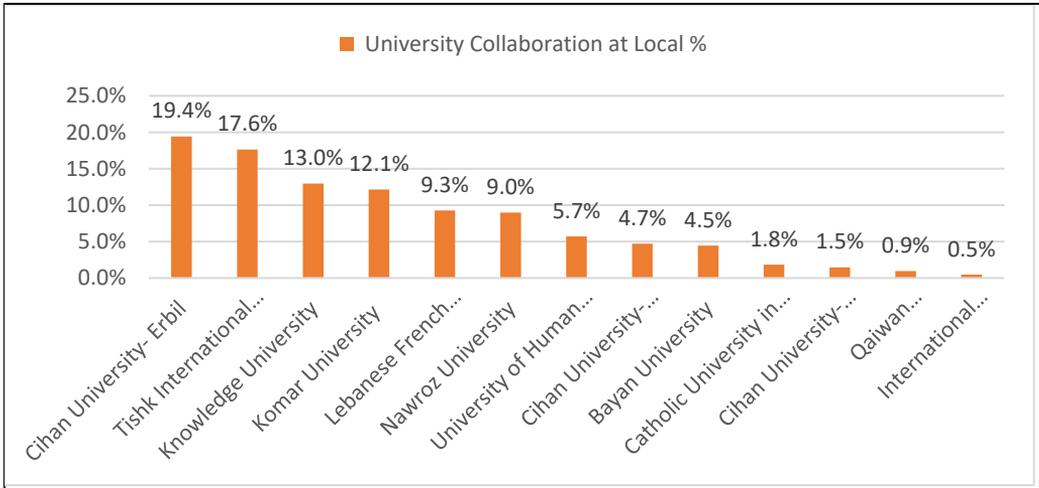
Figure (6.4) University Collaboration at Regional Ratio

Source: Developed by the authors based on (53)

6.4.3. University Collaboration at the Global Level

At the global level, the analysis indicates that partner institutions collaborating with private universities in the Kurdistan region, based on mutual documents with institutions from other countries, excluding those limited to local and regional collaborations, reflect a high level of international activities. This broader scope of collaboration demonstrates the universities' participation in global scientific activities and their recognition within the international domain. Such collaborations are expected to encourage academic partnerships worldwide. Figure (6.5) reflects that the global collaboration among private universities in the Kurdistan Region is led by the University of Human Development, with more than 33%, followed by Tishk International University with 20%, and Cihan University – Erbil with 16%, along with the other 10 universities reporting less than 11% of their collaborative work with global partners.
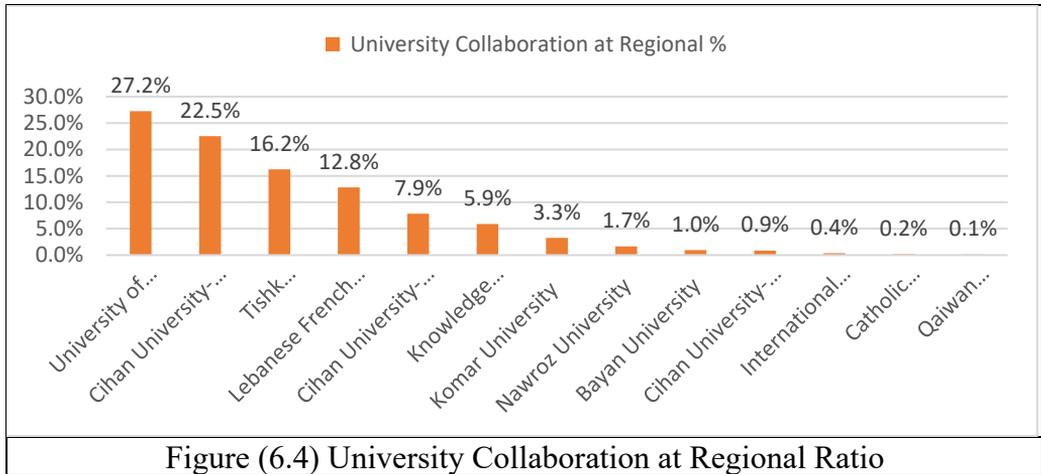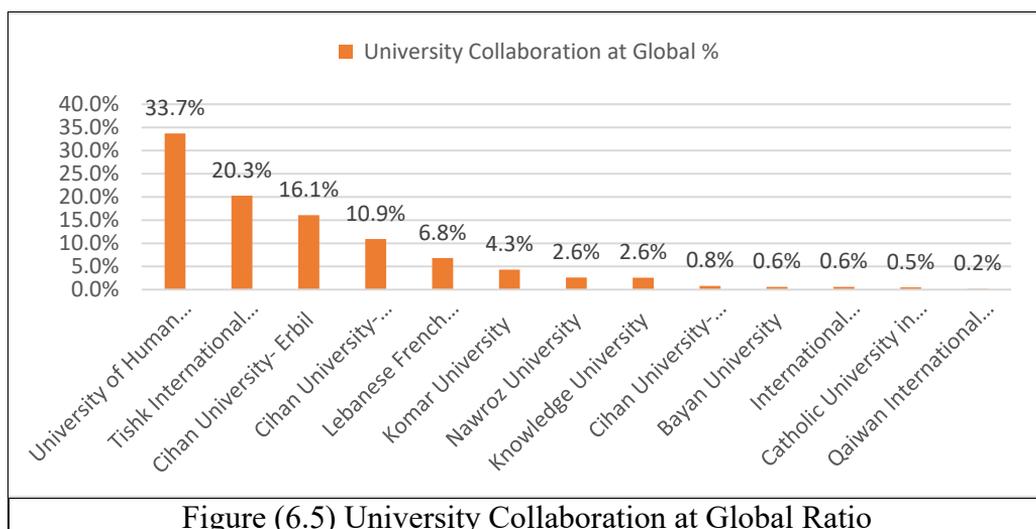
Figure (6.5) University Collaboration at Global Ratio

Source: Developed by the authors based on (53)

6.5. University Collaboration Size Classification

The private universities' contributions to their affiliated institutions are classified with appropriate percentages to better understand. Figure (6.6) shows that University of Human Development, Tishk International University, and Cihan University - Erbil are ranked as the top three among all the other private universities sector except (knowledge University which is taking the place of University of Human Development at local level), with 50 percent of the collaborative work with the respective partner at local level, 66 percent of collaborative works with the respective partner at regional level, and 70 percent of collaborative works with their respective partner at global level. But at all the levels, 63% were occupied by these three universities and the remaining 10 universities occupied the remaining 37% of the universities in the Kurdistan Region, which are involved in the universities themselves.
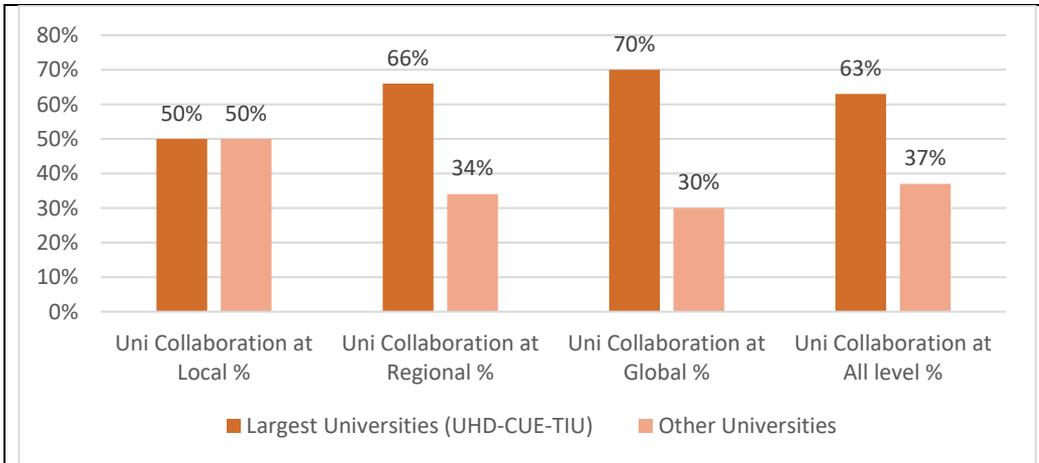
Figure (6.6) University Collaboration Ratio

Source: Developed by the authors based on (53)

6.6. Private University Collaborators in Scopus

Figure (6.7) shows examples of the homepage profiles of two private universities in the Kurdistan Region from the Scopus database. These contents highlight the contributions of individual universities, including the names and numbers of their collaborating institutions. The exact number of collaborative research documents recorded in Scopus reflects the university's collaboration network with other institutions
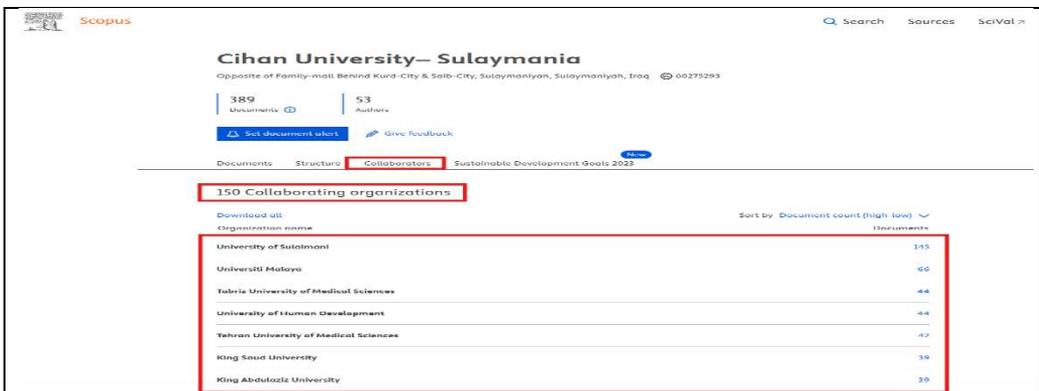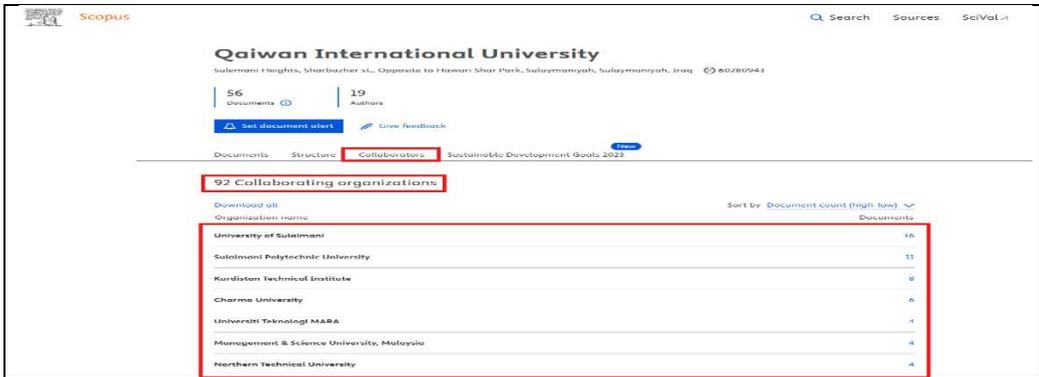
Figure (6.7) Collaboration institutions within the University Profile in Scopus

Source: (53)

6.7. Summary

This chapter reviews the research output profile of 13 of 17 private universities in the Kurdistan Region, published in Scopus from the year of each university's establishment to 2024. The main objective of this chapter is to explore the private universities' collaborating network with the respective partner institutions at the local, regional, and global levels. The analysis finds that the three prominent universities, namely, the University of Human Development, Tishk International University, and Cihan University - Erbil, are contributing to the major international collaborative work, which accounts for about 63% of the total collaborative work with partner institutions in the Kurdistan Region. At the local level, these three universities account for about 50% of collaborative work with partner institutions, about 66% at the regional level, and about 70% at the global level.

Chapter 7: Analyzing the National Collaboration of Private Universities in the Kurdistan Region

This chapter presents national-level scientific collaboration among private universities in the Kurdistan Region, with private or public institutions in the Kurdistan Region, and with institutions from the rest of Iraq, based on the mutual documents recorded in the Scopus database. Also, this chapter covers collaborative scientific work in the private sector and at individual universities. This chapter is divided into the following major parts:

7.1. Introduction

To evaluate the level of local research collaboration of private universities in the Kurdistan Region through an analysis of co-authored publications with partner institutions indexed in the Scopus database from their establishment until 2024, they were classified into: public and private partners in the Kurdistan Region and local partners from the rest of Iraq except Kurdistan Region–based institutions, based on documents indexed in the Scopus database from 13 of the 17 private universities in the region.

7.2. Sector Collaboration Institutions

The private university affiliations collaborate with local institutions to assign three categories: public and private institutions in the Kurdistan region, and institutions from the rest of Iraq, to determine a top-ranked university based on greater collaboration in its research activities compared to other universities. The number of private universities and local collaborations recorded in the Scopus database is shown in Table (7.1). The number of universities with local affiliations and the collaboration ratios are displayed in Figure (7.1).

Table (7.1) Private Universities Collaboration with Local Institutions

No	University	Partner Institutions				Mutual Documents Count			Total	%
		KR Public	KR Private	Iraq	Total	KR Public	KR Private	Iraq		
1	Cihan University- Erbil	8	3	7	18	848	300	496	1644	19.4%
2	Tishk International University	8	5	2	15	1084	333	76	1493	17.6%
3	Knowledge University	14	5	23	42	556	169	372	1097	13.0%
4	Komar University	15	8	17	40	815	79	134	1028	12.1%
5	Lebanese French University	7	4	6	17	433	223	128	784	9.3%
6	Nawroz University	11	9	27	47	483	48	229	760	9.0%
7	University of Human Development	3	2	0	5	363	121	0	484	5.7%
8	Cihan University- Sulaimani	5	3	3	11	233	89	77	399	4.7%
9	Bayan University	8	5	41	54	36	19	322	377	4.5%
10	Catholic University in Erbil	18	8	21	47	85	27	53	165	1.8%
11	Cihan University- Duhok	4	5	5	14	76	40	8	124	1.5%
12	Qaiwan International University	17	8	8	33	49	19	12	80	0.9%
13	International University of Erbil	5	1	3	9	30	4	5	39	0.5%
	Total	123	66	163	352	5091	1471	1912	8474	100%

Source: Developed by the authors based on (53)
* Iraq: Include the institutions from the rest of Iraq outside the Kurdistan Region.

The top-ranked universities in term of having greater collaboration at local level in its research activities compared to other private universities is Cihan University – Erbil with 19% of the total affiliations' collaboration in Kurdistan Region across the 18 local institutions, followed by Tishk International University with a percentage of more than 17%, and Knowledge University with a percentage of 13% affiliations collaboration in Kurdistan region. At the same time, all remaining 10 private universities occupied lower positions, with a rate of less than 12%.
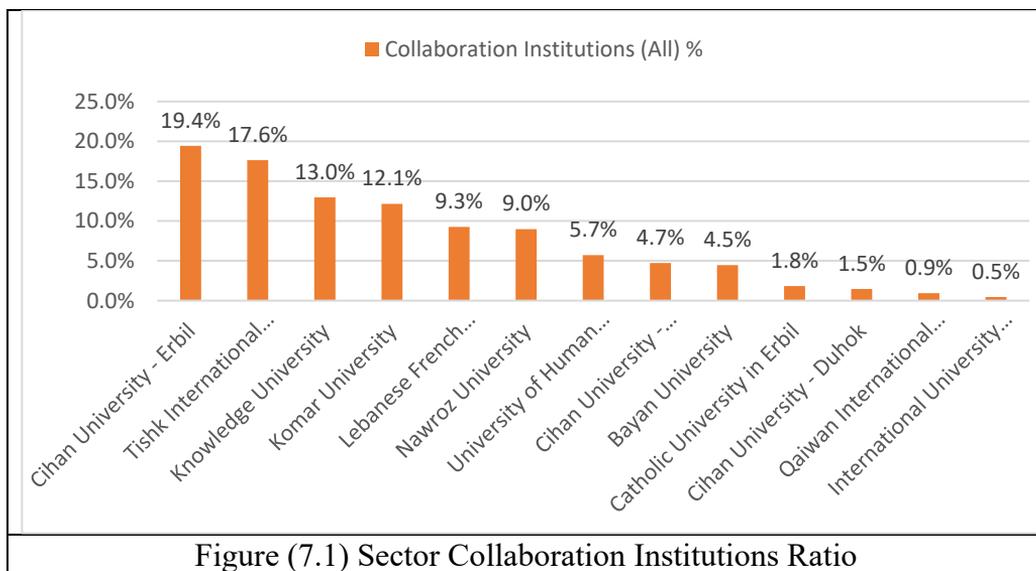
Figure (7.1) Sector Collaboration Institutions Ratio

Source: Developed by the authors based on (53)

7.3. Sector Collaboration Size Classification

The private universities' contributions are classified by the percentage of their affiliated institutions at the local level. Figure (7.2) indicates that the three most prominent universities, Cihan University - Erbil, Tishk International University, and Knowledge University, dominate the sector, contributing about 50% of mutual works with local partners. In comparison, the other 10 universities together account for only 50% of local affiliation and collaboration with the private sector of universities in the Kurdistan region.
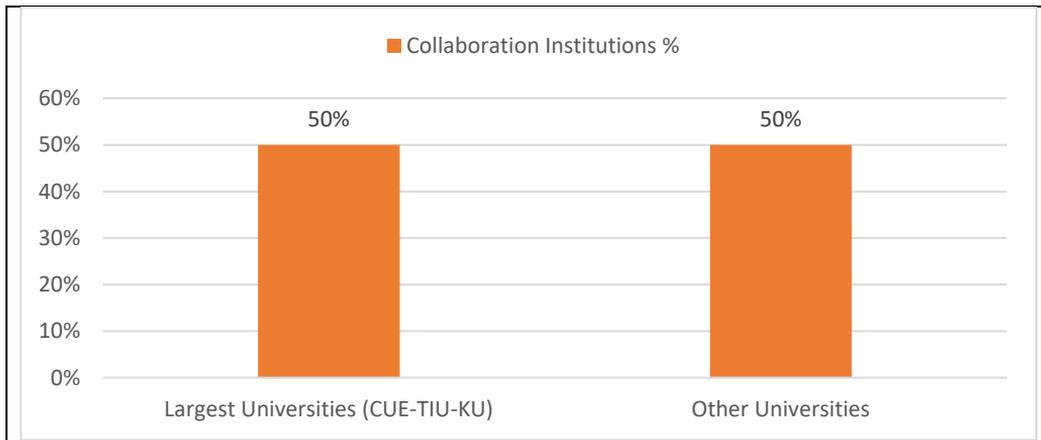
Figure (7.2) Sector Collaboration Institutions Size Classification Ratio

Source: Developed by the authors based on (53)

7.4. University Collaboration Institutions

Each private university's affiliations collaboration at the local level is assigned to determine the university's networking with other local institutions on the basis of its research recorded in the Scopus database, collaborating, whether its mutual works shares more with local private partners or local public partners in Kurdistan region, or partner institutions from the rest of Iraq (excluding institutions from Kurdistan Region). Table (7.2) shows the share of each university's collaborations with local partners.

Table (7.2) Private University Collaboration Institutions

No.	University	KR Public	KR Private	Iraq	Total
1	Cihan University - Erbil	51.6%	18.2%	30.2%	100%
2	Tishk International University	72.6%	22.3%	5.1%	100%
3	Knowledge University	50.7%	15.4%	33.9%	100%
4	Komar University	79.3%	7.7%	13.0%	100%
5	Lebanese French University	55.2%	28.4%	16.3%	100%
6	Nawroz University	63.6%	6.3%	30.1%	100%
7	University of Human Development	75.0%	25.0%	0.0%	100%
8	Cihan University - Sulaimani	58.4%	22.3%	19.3%	100%
9	Bayan University	9.5%	5.0%	85.4%	100%
10	Catholic University in Erbil	51.5%	16.4%	32.1%	100%
11	Cihan University - Duhok	61.3%	32.3%	6.5%	100%
12	Qaiwan International University	61.3%	23.8%	15.0%	100%
13	International University of Erbil	76.9%	10.3%	12.8%	100%

Source: Developed by the authors based on (53)
* Iraq: Include the institutions from the rest of Iraq outside the Kurdistan Region.

7.4.1. University Collaboration within the KR Public Sector

The university's collaboration with local public institutions in the Kurdistan region through mutual documents was analyzed and presented in Figure (7.3), which shows a high ratio of works with these partners. The extent of scientific activity and national institutional recognition appears to influence collaboration intensity. Local public institutions collaborate with private universities in the Kurdistan Region at a rate exceeding 21%, with Tishk International University accounting for the largest share, followed by Cihan University-Erbil and Komar University (16% each). By contrast, the remaining 10 private universities exhibit limited engagement, with less than 10% of their Scopus-indexed publications involving public national partners.

Figure (7.3) University Collaboration (KR Public Sector) Ratio

Source: Developed by the authors based on (53)

7.4.2. University Collaboration within the KR Private Sector

The private partner institutions collaborating in the Kurdistan region were reviewed through mutual documents, as shown in Figure (7.4), indicating a high level of collaboration between them. In addition, the broader the scope of a university's scientific activity and the higher its national institutional recognition, the greater the expectation that it will establish collaborative relationships with other institutions. For instance, it is observed that collaborations involving private universities in the Kurdistan Region, with privates institutions occupied more than 22% come from Tishk International University, followed by Cihan University - Erbil with more than 20%, and Lebanese French University with 15%, and Knowledge University with more than 11%, furthermore the other 9 universities have less than 9% of its mutual works with each other.
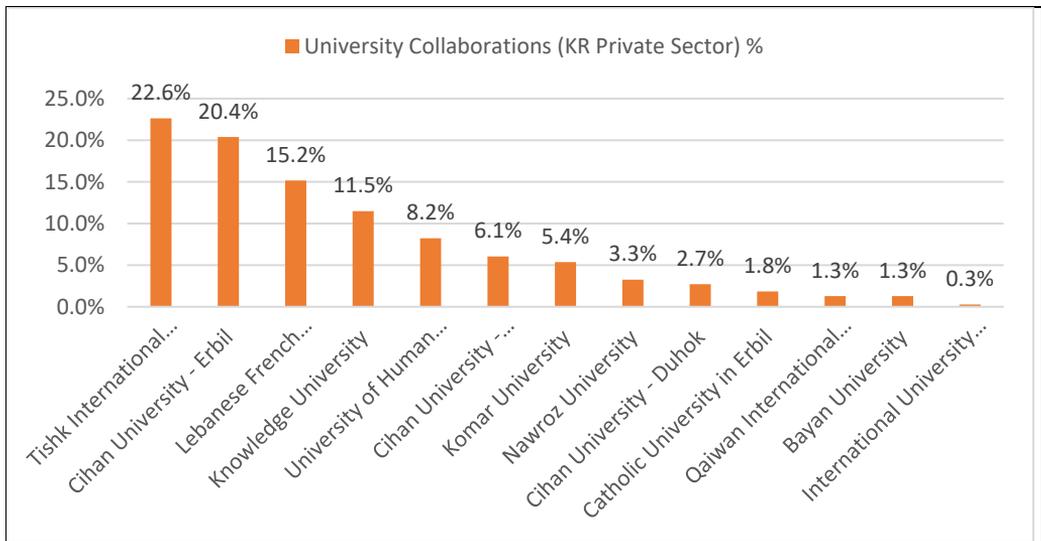
Figure (7.4) University Collaboration (KR Private Sector) Ratio

Source: Developed by the authors based on (53)

7.4.3. University collaboration within Iraq (except KR Institutions)

The private partner institutions collaborating with the rest of Iraq exclude institutions in the Kurdistan region, as shown in Figure (7.5), indicating a high level of collaboration with institutions from the rest of Iraq. Furthermore, the broader the scope of the university scientific activity and recognition of an institutional domain at national, the more it will be expected that it establishes collaborative between them, for instance it is observed that the collaboration of private universities in Kurdistan Region with institutions with rest of Iraq occupied more than 25% come from Cihan University - Erbil, followed by knowledge University with more than 19%, Bayan University with 16%, and Nawroz University with more than 12%. In comparison, the other 9 universities have fewer than 7% of their mutual works with institutions in Iraq, excluding the KR institutions.
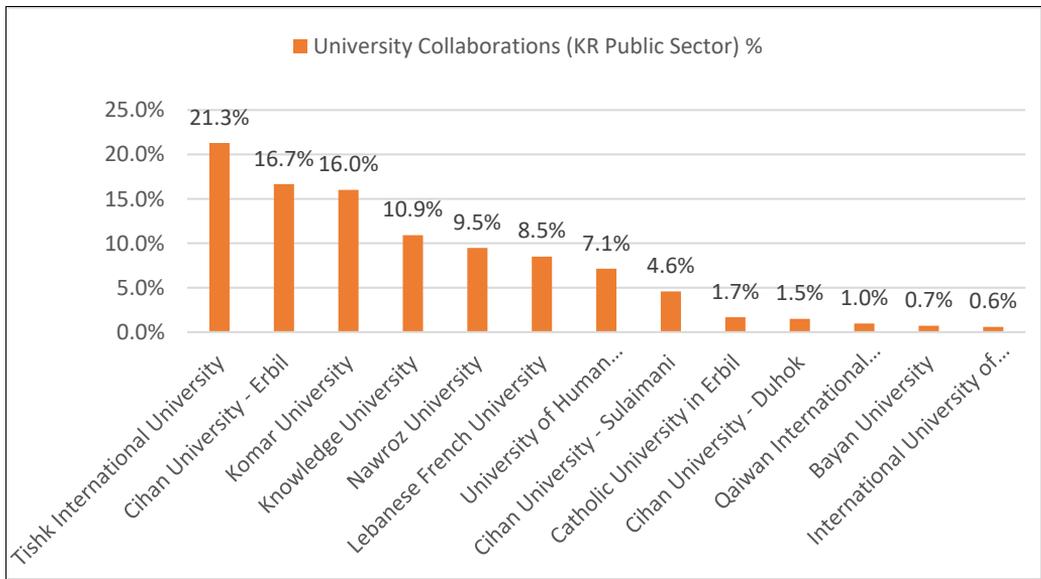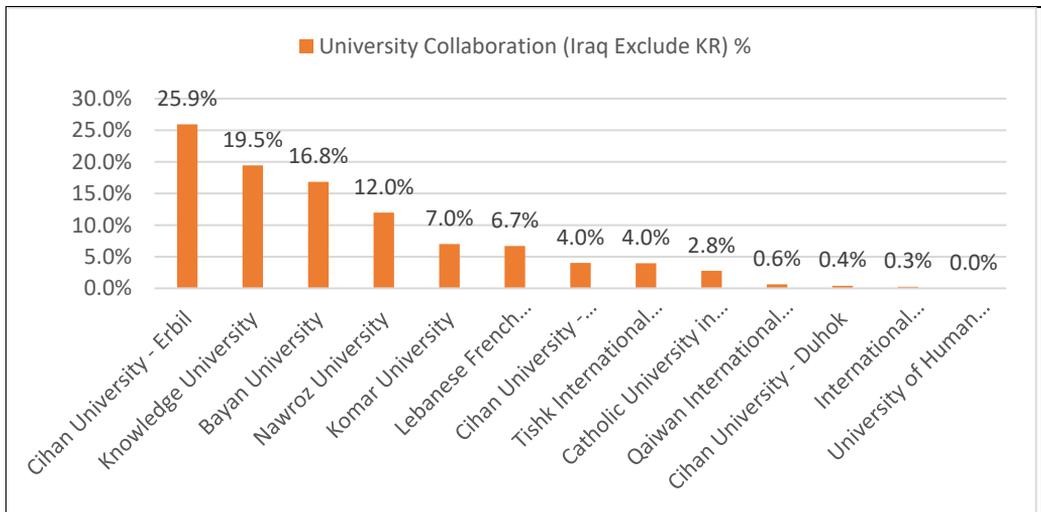
Figure (7.5) University Collaboration (Iraq excluding KR) Ratio
Source: Developed by the authors based on (53)

7.5. University Collaboration Size Classification

The private universities collaboration at local level classified according to the percentage of its collaborating affiliation institutions as shown on Figure (7.6) that the top three largest universities dominate the private universities sector, contributing about 54% of mutual works with partner from local public institutions in Kurdistan Region, 58% of mutual works with partner at private institutions in Kurdistan Region, and 62% of mutual works with partner institutions from the rest of Iraq except the Kurdistan Region institutions. However, the overall ranking across all levels of these three universities reaches 50%. Cihan University – Erbil is the only stable university across all classifications, while several others are unstable and their rankings change by category, including Tishk International University, Knowledge University, Lebanese French University, Komar University, and Bayar University.
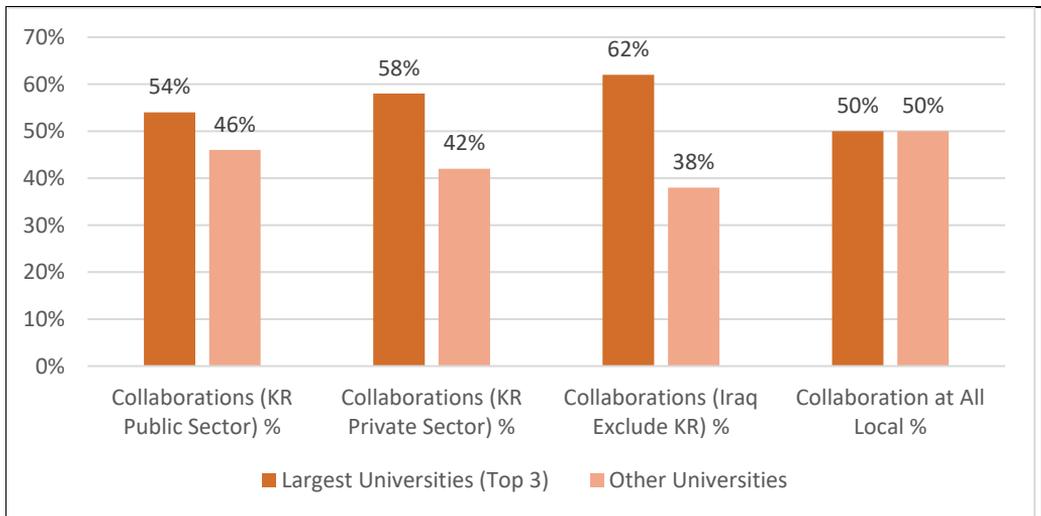
Figure (7.6) University Collaboration Size Classification Ratio

Source: Developed by the authors based on (53)

7.6. Summary

This chapter reviews the local collaboration patterns of private universities in the Kurdistan Region with partner institutions, including both private and public institutions within the Kurdistan Region and institutions from the rest of Iraq. The analysis is based on co-authored documents indexed in the Scopus database from the year of each university's establishment up to 2024. The results indicate that the three largest private universities account for approximately 54% of collaborative publications with public institutions in the Kurdistan Region, 58% with private institutions within the region, and 62% with institutions from the rest of Iraq, excluding Kurdistan Region–based institutions. Notably, Cihan University-Erbil is the only institution that consistently appears across all collaboration categories.

This chapter presents the conclusions drawn from the study's findings on the scientific collaboration of private universities in the Kurdistan Region at the national, regional, and global levels, based on co-authored documents indexed in the Scopus database, and offers recommendations for relevant stakeholders. In addition, several proposal directions for further studies are presented as follows:

Chapter 8: Conclusions & Suggestions

8.1. Conclusion

The study's conclusions from analyzing the 22 Arab countries ranking based on the SCImago Country Rank covering the period from 1996 to 2024 are as follows:

1. Saudi Arabia ranked first, followed by Egypt, in terms of total Scopus publications. Both countries also had a high ratio of citable documents.
2. Iraq recorded the highest rate of self-citation, followed by Morocco and Egypt, which is not a positive indicator as it reflects repeated citations of its own studies.
3. Iraq ranked first in the citable document ratio indicator in the Arab Region.
4. Iraq ranked third after Saudi Arabia and Egypt in the number of documents listed in the Scopus database; its research quality and effects were much lower than those of other Arab countries.
5.
6. is is clearly evidenced by its first rank in self-citation, last rank in citations per document, and a low h-index ranking.
7. Saudi Arabia ranked first, followed by Egypt and the United Arab Emirates, in the research quality and impact indicators like total citations and h-index.
8. Qatar ranked first, followed by Lebanon and Saudi Arabia, in the research quality and impact indicators like citations per document.

9. The study indicated that Saudi Arabia ranked first across most indicators of research productivity, impact, and quality in Arab countries.

The study summarizes by analyzing the research visibility of Higher Education institutions in the Kurdistan Region using the number of authors affiliated and publications recorded in the Scopus database, including 16 of the 19 public universities and 13 of the 17 private universities, from the date of each institution's establishment to 2024, as follows.

10. The three oldest and biggest universities dominate the public university sector, representing approximately 49% of the total Scopus-indexed documents and 55% of the total authors. In contrast, the four technical universities collectively account for about 13% of both metrics. The remaining 9 universities together account for less than 38% of the output.

11. The three largest universities dominate the private sector, accounting for about 54% of both total documents and authors. The other 10 universities together account for about 46%.

12. The public universities possess nearly 8232 researchers in Scopus out of 9369 authors, which is approximately 88% of the total number of authors registered. This analogy displays the preeminence of state universities in registering the authors in the Kurdistan region.

13. The higher education sector is dominated by a number of public universities with the highest number of publications and citations. Compared to that, the situation differs in the Kurdistan Region, with the indicators of research impact showing a relative advantage in the private universities, such as citable documents, non-citable documents, external citation, self-citation ratio, and citations per document with and without self-citation. These results imply that despite the fact that the volume of research produced by the public universities is more than the volume of research produced by the private universities, the impact of research is

higher in the latter, which means that the research quality and effectiveness is stronger.

14. And the ranking of the best universities in the region of the Kurdish and the Republic of Iraq which is the competition with the best universities in the neighbouring countries indicates that King Saud University in Saudi Arabia topped in the number of documents published, which is 33% of the sum of 358020. Conversely, the University of Baghdad, Iraq, registered the highest percentage of authors in the database of the aforementioned countries with a percentage of 23 of the 63,913.

15. King Saud University (Saudi Arabia) exhibited the highest research productivity among Iraq's neighbouring countries, with more than 10 Scopus-indexed documents per registered author, whereas the University of Baghdad ranked lowest in productivity despite having the largest number of registered authors.

16. Tishk International University, a leading private institution in the Kurdistan region, had the highest average number of research documents per registered author among Iraq's neighbouring countries, except for top universities in Saudi Arabia and Iran, with over 5 research documents per author in Scopus. On the other hand, the University of Sulaimani, which is the topmost public university, and the University of Baghdad both had 2 Scopus-indexed documents per registered author, the lowest among the considered institutions.

17. The researcher efficiency was found to be highest in King Saud University in Saudi Arabia with a percentage of over 200. The Iranian Tehran University of Medical Sciences came in next with a ratio of efficiency of more than 150 percent. The efficiency ratios of the other universities were below 100. The lowest ratio of efficiency was 40 or less

in the University of Baghdad in Iraq despite it having the highest number of registered authors in the region.

18. The efficiency of researchers at Tishk International University among all universities in Kurdistan was the highest as it was ranked second after the top university of Saudi Arabia and Iran at 95. But the University of Sulaimani as well as University of Baghdad registered the lowest efficiency ratios. In short, the efficiency ratios of both the universities in the Kurdistan area are lower than the regional efficiency ratio of 116% in the adjacent countries in Iraq.

The study concludes by focusing specifically on profiles of 13 of 17 private universities in the Kurdistan Region, based on their research visibility in the Scopus database from the date of each institution's establishment to 2024, as follows:

19. Private universities exhibited a clear upward trend in research output beginning in 2017, when they accounted for only 2% of total annual publications. This share increased steadily from 2022 onward and exceeded 20% of the sector's total documents each year. The majority of this output originated from three institutions-Tishk International University, Cihan University-Erbil, and Human Development University, which together accounted for approximately 54% of both total documents and total authors.

20. Private universities show that the upward trend began in 2018 at 1% of total annual citations and continued to rise, surpassing citations annually after 2021, accounting for more than 18% of the sector's total citations. Approximately 78 percent of all citations were found in 3 universities, including Tishk International University, the University of Human Development, and Cihan University-Erbil.

21. Bayan University and Cihan University - Duhok are ranked the highest with the self-citation ratio of more than 30. Moreover, University of Human Development has the highest citation per document, and it has over 96 articles, then Tishk International University with over 50 articles. Further, the University of Human Development has the highest H-index with H-index of more than 94 and Tishk International University with a H-index of more than 80.

The study concludes by analyzing the research output on the private universities in the Kurdistan region that have publications in the Scopus database from the year of university establishment to 2024, as follows:

22. The results showed that the three most prominent universities, the University of Human Development, Tishk International University, and Cihan University - Erbil, have a lion's share of international collaborative work, accounting for about 63% of the total mutual work with partner institutions in the Kurdistan Region. At the local level, these three universities contribute about 50% of mutual works with partner institutions, about 66% at the regional level, and about 70% at the global level.

23. The results exhibited that the top three largest universities (Cihan University – Erbil is the only stable and exist in all classification), they contribute about 54% of mutual works with partner from local public institutions in Kurdistan Region, 58% of mutual works with partner at local private institutions in Kurdistan Region, and 62% of mutual works with local partner institutions from the rest of Iraq (except the Kurdistan Region) institutions.

The study concludes some other general conclusions based on the research output of private universities in the Kurdistan region in Scopus, as follows:

24. The study helps the researchers, universities, stakeholders, and the Ministry of Higher Education and Scientific Research in the Kurdistan Region to know what research has been done to inform them of the practical decisions and policies. In addition, a documented ranking of private universities' research performance in the Kurdistan region is based on Scopus indicators.

25. The joint work of the Kurdistan Region in research by the private universities is excessively limited to inter-university cooperation, and there is little participation of industry or government in this process. This is a manifestation of unbalanced innovation system according to Triple Helix perspective, whereby the university-industry-government linkage required to support sustainable knowledge-based development is not yet developed.

26. In the Kurdistan Region, most of the private universities do not collaborate with the rest although in a few situations they are more likely to collaborate with one or two state universities..

27. The private universities tend to mimic public universities because they follow the same style in their research activities, meaning they adopt similar research practices.

28. The private universities' collaborations almost came from Iraq and regional countries, except for the University of Human Development, with 67% collaborations outside Iraq and regional countries. In addition, most mutual documents between private universities and partner institutions have foreign corresponding authors, indicating low participation by local researchers.

8.2. Suggestions

The study suggestions based on the results are as follows:

1. Research infrastructure in the Kurdistan Region should be strengthened by providing universities with comprehensive subscriptions to global scientific databases and analytics platforms, such as SciVal - an advanced web-based research performance tool developed by Elsevier to benchmark entities. Such access would enhance researchers' ability to retrieve and analyze scholarly information, improve research quality, and facilitate systematic monitoring of institutional research output and development over time.

2. A research funding program to support scientific research in private universities in the Kurdistan Region, with funding directed toward joint research projects with international institutions as well as local and global enterprises, to finance empirical research that serves market needs.

3. Periodic assessment of research performance is essential, and academic promotion policies should be revised to emphasize equity over equality, using research visibility indicators from global databases such as Scopus and Clarivate as benchmarks for promotion and support.

4. Universities' human resources should be developed through the organization of specialized training programs focused on research skills, scientific writing, and research project management. In addition, academic staff exchange programs with leading international universities should be established to enhance knowledge transfer and capacity building. Furthermore, institutional and governmental support is needed for organizing international conferences and forums in the Kurdistan Region to attract global experts and foster international research collaboration.

5. The ministry should follow up on the weaknesses or reasons behind the low performance of the universities in the Kurdistan Region compared to the neighbouring countries based on the study results.

6. Directing universities in Iraq, including the Kurdistan Region, to avoid excessive self-citation because they recorded the highest rate of self-citation among 22 Arab countries, indicating the negative image of excessive citations of their own studies.

7. Steering universities in Iraq and the Kurdistan Region to increase attention to the research quality and effects because they ranked last in citations per document, total citations and a low h-index among 22 Arab countries, despite their high number of documents listed in the Scopus database during 1996-2024.

8. Encouraging universities in Iraq and the Kurdistan Region's research efficiency and productivity (documents per registered author in Scopus), for instance, the University of Baghdad, as a top university in Iraq, despite having the most registered authors, is still behind and ranked last among leading universities in Iraq's neighboring countries, the same case with the University of Sulaimani, as a top university in the Kurdistan Region.

9. Establish a directorate or department at the Ministry of Higher Education in Iraq and the Kurdistan Region to supervise the university visibility and research performance in global databases like Scopus or Clarivate Analytics, and play a monitoring role, such as following up on universities in global ranking classifications like QS, Times or others.

10. The Ministry of Higher Education in Iraq and the Kurdistan Region should actively encourage and present exceptional support to Tishk International University due to its positive research productivity and efficiency indicators compared to leading universities in Iraq's neighbouring countries.

11. It is recommended that the Ministry of Higher Education analyze and promote the best practices and experience of the University of Human Development to be generalized to other universities' benefits, in terms of research collaboration with partner institutions.

12. It is suggested that the Ministry of Higher Education analyze the stability of Cihan University-Erbil, as the only university that always exists in all collaboration classifications with the local partner institutions.

13. It is necessary to analyze why the majority of university research collaborations in the Kurdistan Region are with universities and mimic each other, not with business, industry, or government agencies, meaning the universities' research output cannot serve society by solving problems or supporting economic developments.

14. Need to study why the impact of private universities' superior quality compared to public universities, despite public universities dominating researchers registered in Scopus, representing 88% of all registered authors, with only 12% for private universities.

15. This study helps identify performance gaps among universities and the underlying factors contributing to these disparities, thereby informing strategies to reduce performance differentials among private universities. Moreover, it provides a foundation for practical proposals for ministries and universities, offering a roadmap to enhance research performance and strengthen collaboration at local, regional, and international levels.

8.3. Future Studies

There are some proposal directions for further studies based on the results and conclusions as follows:

1. Future studies should place greater emphasis on research quality and impact rather than publication volume, employing quality-oriented

indicators such as journal quartiles, highly cited papers, and field-weighted citation impact (FWCI). This approach would enable a more robust assessment of collaborative research excellence across universities in Iraq and the Kurdistan Region.

2. This study provides a foundation for extending analysis to public universities**.** Accordingly, future research should examine similarities and differences between private and public universities in the Kurdistan Region and Iraq with respect to collaboration patterns, research characteristics, and performance indicators, in order to identify factors influencing collaborative efficiency.

3. Need to explore the state of university research collaboration patterns with partner institutions based on various fields or disciplines like STEM (Science, Technology, Engineering, and Mathematics) or even Social Science, to set directions of impact of research performance by field characteristics or variety.

4. Further studies must investigate the efficiency and effectiveness of the role of the innovation connection according to the Triple Helix concept (University, Industry, and Government Collaboration) of university research collaboration in the Kurdistan Region and Iraq.

5. Need to explore the capability of the private universities in the Kurdistan Region to create, practice, integrate, adapt, and effectively utilize knowledge in response to fluctuating market conditions by converting theoretical knowledge inputs into empirical research outputs, according to the Knowledge Capabilities Theory.

6. It is essential to take into account ,for further studies ,the visibility index, which measures the efficiency of a university existing in the global database by calculating the share of Scopus publications to the total publications produced by academic staff at each university.

7. Further studies have to explore the level of foreign corresponding authors in joint works with local universities in the Kurdistan Region or Iraq to understand the international collaboration benefits to build the local faculty capability and skill development through the transfer of new knowledge, and update technology within these universities.

8. Finally, future studies should examine barriers to effective collaboration, including limited funding, restricted access to data, bureaucratic constraints, and insufficient exposure to international research environments. Addressing these institutional and cultural obstacles is essential for strengthening university collaboration in the Kurdistan Region and Iraq.

References

1. Aref S, Friggens D, Hendy S. Analysing scientific collaborations of New Zealand institutions using Scopus bibliometric data. In: ACM International Conference Proceeding Series. Association for Computing Machinery; 2018. doi:10.1145/3167918.3167920

2. Montoya FG, Alcayde A, Baños R, Manzano-Agugliaro F. A fast method for identifying worldwide scientific collaborations using the Scopus database. Telematics and Informatics. 2018 Apr 1;35(1):168–85. doi:10.1016/j.tele.2017.10.010

3. Royal Society. Knowledge, networks and nations : global scientific collaboration in the 21st century. London: Royal Society Science Policy Centre; 2011.

4. Farias Borges LF, Fischer B, Mazoni A, Bascur JP. The complex interplay between international collaboration and scientific impact: evidence from the Scopus database. Cogent Education. 2025;12(1). doi:10.1080/2331186X.2025.2563708

5. Freitas JL, Rosas FS. Scientific Collaboration at National Institute of the Atlantic Forest (Brazil) on Scopus Database: Analysis of Institutional Domain. Front Res Metr Anal. 2020;5. doi:10.3389/frma.2020.601442

6. Darmadji A, Prasojo LD, Riyanto Y, Kusumaningrum FA, Andriansyah Y. Publications of Islamic University of Indonesia in Scopus Database: A bibliometric assessment. COLLNET Journal of Scientometrics and Information Management. 2018 Jan 2;12(1):109–31. doi:10.1080/09737766.2017.1400754

7. Sonnenwald DH. Scientific Collaboration. Annual Review of Information Science and Technology. 2007;643–81. doi:https://doi.org/10.1002/aris.2007.1440410121

8. Fung HN, Wong CY. Scientific collaboration in indigenous knowledge in context: Insights from publication and co-publication network analysis. Technol Forecast Soc Change. 2017 Apr 1;117:57–69. doi:10.1016/j.techfore.2017.01.009

9. Gazni A, Sugimoto CR, Didegah F. Mapping world scientific collaboration: Authors, institutions, and countries. Journal of the American Society for Information Science and Technology. 2012;63(2):323–35. doi:10.1002/asi.21688

10. Nguyen T V., Ho-Le TP, Le U V. International collaboration in scientific research in Vietnam: an analysis of patterns and impact. Scientometrics. 2017 Feb 1;110(2):1035–51. doi:10.1007/s11192-016-2201-1

11. Masri HM. Investigating the Research Challenges in the Arab World [Internet]. Vol. 2. 2024;2(3):100–7. Available from: https://gaspublishers.com/gasjahss/

12. Asaad Z, Marane B. Evaluation of Research, Journals, and Universities in Iraq and the Kurdistan Region According to the Scimago Classification of Administration and Economics Specializations: A Comparative Study with Neighboring Countries. TANMIYAT AL-RAFIDAIN. 2021 Jan 9;40(132):445–84. doi:10.33899/tanra.2021.131769.01148

13. Ismail et al. Research Contributions of Top-Ranking Universities of Pakistan in SCOPUS Database: A Bibliometric Analysis. Journal of Information Management and Library Studies [Internet]. 2023 Feb 26;6(1):14–23. Available from: https://www.researchgate.net/publication/379244888

14. Kanmodi KK, Nwafor JN, Salami AA, Egbedina EA, Nnyanzi LA, Ojo TO, et al. A Scopus-Based Bibliometric Analysis of Global Research Contributions on Milk Fluoridation. Int J Environ Res Public Health. 2022 Jul 6;19(14):8233. doi:10.3390/ijerph19148233

15. Ministry of Higher Education and Scientific Research [Internet]. [cited 2025 Jul 8]. Available from: https://gov.krd/mohe-en/publications/universities/

16. https://www.nur-krg.net/universities. NUR-MHE KRG-IRAQNUR-MHE KRG-IRAQ. doi:https://www.nur-krg.net/universities

17. SCImago Journal & Country Rank. Retrieved from October 18 2025. Country Rankings. https://www.scimagojr.com/countryrank.php?region=ARAB%20COUNTRIES. 2025.

18. Asaad ZA, Marane BM. Corruption, Terrorism and the Stock Market: The Evidence from Iraq. The Journal of Asian Finance, Economics and Business. 2020;7(10). doi:10.13106/jafeb.2020.vol7.no10.629

19. Brihi FK, Fadil. T.A. The role of market Iraq Securities in activation Industrial sector Special. Journal of Economics and Administrative Sciences. 2018;24(107):396–414.

20. Asaad Z. The Economics Determinants of Foreign Direct Investment Inflow in Iraq for the Period (2004-2011). SSRN Electronic Journal. 2014. doi:10.2139/ssrn.3072682

21. Asaad ZA, Al-Delawi AS, Fatah OR, Saleem AM. Oil Exports, Political Issues, and Stock Market Nexus. International Journal of Energy Economics and Policy. 2023;13(1). doi:10.32479/ijeep.13867

22. World Bank. Iraq Economic Monitor: From War to Reconstruction and Economic Recovery, With a Special Focus on Energy Subsidy Reform. Washington, DC. Washington, DC; 2018. Report.

23. UNESCO. UNESCO Science Report: the Race Against Time for Smarter Development [Internet]. Schneegans. S, Straza. T, Lewis. J, editors. Paris: UNESCO Publishing; 2021. Available from: https://en.unesco.

24. IOM. Technology and Innovation in Iraq: A Market Assessment of Tech Sector Businesses in Iraq. International Organization for Migration. Grand-Saconnex, Switzerland. 2019. Report.

25. Bizri O. Science Technology, Innovation and Development in the Arab Countries. Massachusetts, USA.: Academic Press Cambridge; 2018.

26. World Bank Database [Internet]. [cited 2025 Dec 5]. Available from: https://data.worldbank.org/country/IQ

27. Goran Y. Berhemî Kar . Erbil: Ministry of Higher Education and Scientific Research – Kurdistan Regional Government.; 2018. 1–160 p.

28. Etzkowitz H;, Leydesdorff L. The Triple Helix: University-industry-government relations: A laboratory for knowledge based economic development. EASST Review. 1995;14(1):14–9.

29. Leydesdorff L. The triple helix: An evolutionary model of innovations. Res Policy. 2000;29(2):243–55. doi:10.1016/S0048-7333(99)00063-3

30. Cai Y, Etzkowitz H. Theorizing the Triple Helix model: Past, present, and future. Triple Helix. 2020;7(2–3):189–226. doi:10.1163/21971927-bja10003

31. Sengupta A, Rossi F. The relationship between universities' funding portfolios and their knowledge exchange profiles: A dynamic capabilities view. Technovation. 2023;121:102686. doi:10.1016/j.technovation.2022.102686

32. Kogut B, Zander U. Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. Organization Science. 1992;3(3):383–97.

33. Etzkowitz H, Leydesdorff L. Universities and the global knowledge economy : a triple helix of university-industry-government relations. Continuum, London Science, Technology and the International Political Economy Series. 1997.

34. Grant RM. Toward a knowledge-based theory of the firm. Strategic Management Journal. 1996;17(S2):109–22. doi:10.1002/smj.4250171110

35. Zahra SA, George G. Absorptive capacity: A review, reconceptualization, and extension. Academy of Management Review. 2002. doi:10.5465/AMR.2002.6587995

36. Ruba RM, Chiloane-Tsoka GE, Van der Westhuizen T. Moderating Effect of Business Environmental Dynamism in the Innovativeness—Company Performance Relationship of Congolese Manufacturing Companies. Economies. 2023;11(7):191. doi:10.3390/economies11070191

37. Teece DJ. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal. 2007;28(13):1319–50. doi:10.1002/smj.640

38. Dmitrienko A, Matveeva N, Yudkevich M. Exploring Research Collaboration of Private Universities in Emerging EU Countries: A Comparison with Public Sector. In. 2025. Available from: https://issi2025.iiap.sci.am/wp-content/uploads/2025/07/22%e2%80%a4-YudkevichMatveevaDmitrienko_rp_issi2025_155.pdf doi:10.51408/issi2025_141

39. Huang JS. Building Research Collaboration Networks - An Interpersonal Perspective for Research Capacity Building. Journal of Research Administration. 2014;45(2):89–112.

40. Bejinaru R. Dynamic Capabilities of Universities in the Knowledge Economy. Management Dynamics in the Knowledge Economy. 2017;5(4):577–95. doi:10.25019/mdke/5.4.07

41. Cohen WM, Levinthal DA. Absorptive Capacity: A New Perspective on Learning and Innovation. Adm Sci Q. 1990;35(1):128–52. doi:10.2307/2393553

42. Grant RM. The Development of Knowledge Management in the Oil and Gas Industry. Universia Business Review. 2013;1(40):92–125.

43. Teece DJ, Pisano G, Shuen A. Dynamic capabilities and strategic management. Strategic Management Journal. 1997;18(7):509–33. doi:10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

44. Chung Y, Kim K. Rapid growth of international collaboration from articles indexed in Scopus database by researchers in Korea from 2006 to 2015. Science Editing. 2017 Feb 1;4(1):18–23. doi:10.6087/kcse.84

45. Manh HD. Scientific publications in Vietnam as seen from Scopus during 1996–2013. Scientometrics. 2015 Oct 1;105(1):83–95. doi:10.1007/s11192-015-1655-x

46. Nguyen T V., Ho-Le TP, Le U V. International collaboration in scientific research in Vietnam: an analysis of patterns and impact. Scientometrics. 2017 Feb 1;110(2):1035–51. doi:10.1007/s11192-016-2201-1

47. Achury-Saldaña DM, Castañeda-Rodriguez LA, Perianes-Rodriguez A. Differences in scientific collaboration and their effects on research influence: A quantitative analysis of nursing publications in Latin America (Scopus, 2005–2020). Heliyon. 2022 Oct 1;8(10). doi:10.1016/j.heliyon.2022.e11047

48. Farsani MA, Jamali HR, Beikmohammadi M, Ghorbani BD, Soleimani L. Methodological orientations, academic citations, and scientific collaboration in applied linguistics: What do research synthesis and bibliometrics indicate? System. 2021 Aug 1;100. doi:10.1016/j.system.2021.102547

49. Siwach AK, Kumar S. Bibliometric analysis of research publications of Maharshi Dayanand University (Rohtak) during 2000-2013. DESIDOC Journal of Library and Information Technology. 2015;35(1):17–24. doi:10.14429/djlit.35.1.7789

50. Park HW, Yoon J, Leydesdorff L. The normalization of co-authorship networks in the bibliometric evaluation: the government stimulation programs of China and Korea. Scientometrics. 2016 Nov 1;109(2):1017–36. doi:10.1007/s11192-016-1978-2

51. Mak HWF, Chung FKL, Li PH, Maurer M. Global productivity, international collaborations, and research trends in chronic spontaneous urticaria: A bibliometric overview. Journal of Allergy and Clinical Immunology: Global. 2025 May 1;4(2). doi:10.1016/j.jacig.2025.100455

52. Aleen. Scopus roadmap: What's coming up in 2020 & 2021? Scopus Blog. https://blog.scopus.com/posts/scopus-roadmap-whats-coming-up-in-2020-2021. 2020.

53. Scopus database (Elsevier). Accessed from 8 April to 14 May 2025. https:/www.Scopus.com. Scopus data on the research output of private and public universities in Iraq.

54. Scopus. (n.d.). Screen capture of the top universities' profiles in Scopus in Iraq and neighboring countries. Elsevier. Data collected from 4 July 2025, from https://www.scopus.com.

55. https://www.nur-krg.net/universities. The National University Ranking (NUR) of KRG-Iraq.

56. https://gov.krd/mohe-en/publications/universities/. Kurdistan Regional Government .

Appendix (1)
Universities in the Kurdistan Region (English)

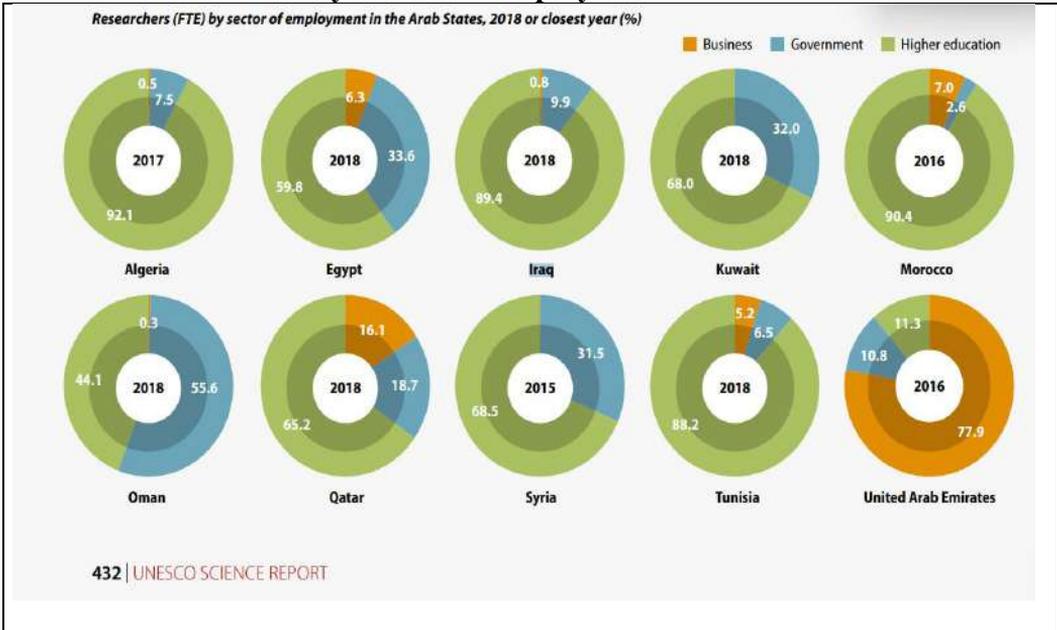| No	Public Universities	No	Private Universities
1	Salahaddin University- Erbil	1	American University of Iraq in Sulaimani
2	University of Sulaimani	2	University of Human Development
3	University of Duhok	3	Nawroz University
4	Hawler Medical University	4	Knowledge University
5	Koya University	5	Lebanese French University
6	Soran University	6	Cihan University- Erbil
7	University of Zakho	7	Cihan University- Sulaimani
8	University of Raparin	8	Cihan University- Duhok
9	Halabja University	9	International University Erbil
10	Garmian University	10	Komar University of Science and Technology
11	Charmo University	11	Bayan University
12	Erbil Polytechnic University	12	Tishk International University
13	Sulaimani Polytechnic University	13	Tishik University- Sulaimani
14	Duhok Polytechnic University	14	Catholic University
15	University of Kurdistan Hawler	15	Qala University College
16	Garmian Polytechnic University	16	University College of Goizha
17	The American University of Kurdistan	17	Qaiwan International University
18	Kurdistan Institution for Strategic Studies and Scientific Research		
19	Kurdistan Board for Medical Specialities		

Source: (55,56)

Appendix (2)
Universities in the Kurdistan Region (Arabic)

الجامعات الأهلية	ت	الجامعات الحكومية	ت
الجامعة الأمريكية في العراق – السليمانية	1	جامعة صلاح الدين ـ أربيل	1
جامعة التنمية البشرية	2	جامعة السليمانية	2
جامعة نوروز	3	جامعة دهوك	3
جامعة نولج	4	جامعة هولير الطبية	4
الجامعة اللبنانية الفرنسية	5	جامعة كوية	5
جامعة جيهان – أربيل	6	جامعة سوران	6
جامعة جيهان – السليمانية	7	جامعة زاخو	7
جامعة جيهان – دهوك	8	جامعة رابرين	8
جامعة أربيل الدولية	9	جامعة حلبجة	9
جامعة كومار للعلوم والتكنولوجيا	10	جامعة گرميان	10
جامعة بيان	11	جامعة جَرمو	11
جامعة تيشك الدولية	12	جامعة أربيل التقنية	12
جامعة تيشك – السليمانية	13	جامعة السليمانية التقنية	13
الجامعة الكاثوليكية في اربيل	14	جامعة دهوك التقنية	14
كلية القلعة الجامعة	15	جامعة كوردستان ـ هولير	15
كلية گويزة الجامعة	16	جامعة گرميان التقنية	16
جامعة قيوان الدولية	17	الجامعة الأمريكية في كوردستان	17
		مؤسسة كوردستان للدراسات الاستراتيجية والبحث العلمي	18
		مجلس كوردستان للاختصاصات الطبية	19

Source: (55,56)

Appendix 3
Researcher by Sector of Employment in the Arab States

Researchers (FTE) by sector of employment in the Arab States, 2018 or closest year (%)

■ Business ■ Government ■ Higher education

Algeria (2017) — 0.5, 7.5, 92.1	Egypt (2018) — 6.3, 33.6, 59.8	Iraq (2018) — 0.8, 9.9, 89.4	Kuwait (2018) — 32.0, 68.0	Morocco (2016) — 7.0, 2.6, 90.4
Oman (2018) — 0.3, 55.6, 44.1	Qatar (2018) — 16.1, 18.7, 65.2	Syria (2015) — 31.5, 68.5	Tunisia (2018) — 5.2, 6.5, 88.2	United Arab Emirates (2016) — 11.3, 10.8, 77.9

432 | UNESCO SCIENCE REPORT

Source: (23)

Appendix 4
The Top Collaborating Countries for Scientific Co-authorship

s

	1st collaborator	2nd collaborator	3rd collaborator	4th collaborator	5th collaborator
Algeria	France (5 153)	Saudi Arabia (980)	Spain (870)	Italy (678)	USA (578)
Bahrain	Saudi Arabia (241)	Egypt (171)	USA (169)	UK (123)	India (119)
Egypt	Saudi Arabia (11 523)	USA (6 151)	Germany (3 193)	China (3 074)	UK (2 865)
Iraq	Malaysia (2 116)	UK (1 812)	USA (1 174)	Australia (785)	Iran (717)
Jordan	USA (1 549)	Saudi Arabia (1 025)	UK (664)	UAE (617)	Germany (539)
Kuwait	USA (890)	Egypt (465)	Saudi Arabia (435)	UK (407)	Iran (273)
Lebanon	France (2 476)	USA (1 773)	UK (574)	Canada (519)	Italy (496)
Libya	UK (236)	Malaysia (216)	Egypt (185)	USA (123)	Saudi Arabia (100)
Mauritania	France (68)	Senegal (51)	Morocco (37)	Tunisia (25)	UK (24)
Morocco	France (3 388)	Spain (1 133)	USA (1 059)	Italy (756)	Canada (746)
Oman	India (733)	UK (473)	Pakistan (444)	USA (438)	Saudi Arabia (410)
Palestine	USA (329)	Turkey (285)	Malaysia (270)	UK (265)	Germany (256)
Qatar	USA (2 895)	UK (1 627)	China (1 195)	Australia (828)	Italy (822)
Saudi Arabia	Egypt (11 523)	USA (9 023)	China (6 118)	India (5 856)	Pakistan (5 691)
Sudan	Saudi Arabia (609)	China (454)	UK (236)	Malaysia (216)	USA (215)
Syria	USA (105)	France (85)	Germany (77)	UK (72)	China (63)
Tunisia	France (5 701)	Saudi Arabia (2 358)	Spain (1 074)	Italy (912)	USA (658)
UAE	USA (3 451)	UK (1 782)	Canada (1 421)	Saudi Arabia (1 253)	China (1 161)
Yemen	Saudi Arabia (505)	Egypt (410)	Malaysia (353)	India (132)	USA (113)

Source: (23)