Investing in Human Capital: The Contribution of Libyan Scholars Educated Abroad to Academic Institutions and Non-Academic Organisations

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INVESTING IN HUMAN CAPITAL: THE CONTRIBUTION OF LIBYAN SCHOLARS EDUCATED ABROAD TO ACADEMIC INSTITUTIONS AND NON-ACADEMIC ORGANISATIONS

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Abstract

This study aims to investigate the impact of human capital investment in Libya's HE sector by focusing on the academic achievement and contribution of returning foreign-educated scholars. This achievement is assessed in the three dimensions of knowledge transmission (KT), knowledge dissemination (KD) and knowledge exchange (KE). The level of investment in knowledge has historically been extremely low in Libya, and the country's economy remains heavily dependent upon non-renewable resources such as gas and oil. In recent decades, however, the government has sought to raise investment in Libya's human capital by sponsoring scholars to study in foreign HEIs, but little is known about the return it is getting on this investment. No study has so far explored the contribution of returning scholars across all three dimensions of knowledge.

The study employed a sequential mixed method design comprising two phases. In the first phase, a questionnaire survey was used first, to compare the performance of foreign- and home-educated scholars, and second, to compare the performance of scholars educated in developing and developed countries by gender, academic rank and discipline. This analysis was supplemented by the analysis of secondary data sources. In the second phase, semi-structured interviews were conducted to identify and further explore the factors affecting the contribution of the various scholar groups.

The findings suggest that scholars educated in Libya and other developing countries contribute more in terms of KT and less in terms of KD, while those educated in developed countries contribute more in KD and KE. The findings suggest that the return on investment in the study abroad programme is greater when the knowledge gap between the home (Libya) and the host country is big. They also indicate that academic engagement with external stakeholders (e.g. through consultancy activities or holding temporary posts in industry) has much greater potential to impact on non-academic organisations than scholarly publication, which is seen more as the prerequisite for academic promotion than as a tool for driving socioeconomic progress. The study identifies several barriers to academic achievement that affect all scholars regardless of where they do their postgraduate study. These include the lack of educational infrastructure, sociocultural and political factors, differences in culture between academia and non-academic organisations and lack of funding. Women and social scientists, especially those educated in Libya and other developing countries, face additional barriers.

Without changes in the educational infrastructure, scholarship programmes such as this are unlikely to achieve their goal of enhancing Libya's human capital. The evidence in this study offers an empirical foundation for the necessary policy reform in the HE sector.

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Table of Contents

Figures

Tables

Abbreviations

CPD	Continuing professional development
EGT	Endogenous growth theory
GDP	Gross domestic product
HCT	Human capital theory
HDI	Human Development Index
HEIs	Higher education institutions
ICT	Information and communication technology
IP	Intellectual property
KBE	Knowledge-based economy
KD	Knowledge dissemination
KE	Knowledge exchange
KT	Knowledge transmission
MENA	Middle East and North African
MHE	Ministry of Higher Education
NASR	National Agency for Scientific Research
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
SME	Small and medium-sized enterprise

Chapter 1 : Introduction

1.1 Introduction

Universities have long been known as institutions in which new and advanced knowledge is created and transmitted to new generations of students, but in recent decades, higher education institutions (HEIs) in many developed countries have also become increasingly important for their work with non-academic communities in industry and elsewhere (Fullwood, Rowley and Delbridge, 2013). Developing countries, too, are now coming to realise that HEIs can play a central role in economic development (Altbach, 2013; Asongu, Tchamyou and Acha-Anyi, 2017; Ramesh, 2013), but this is contingent upon the quality of their staff. Investing in this human capital is therefore vital (Perna, Orosz and Jumakulov, 2015; Němečková and Krylova, 2014), especially if the academic performance of faculty members is low, as is the case in Libya (Tamtam *et al.*, 2011).

Investing in human capital has become a key strategy for enhancing economic development (Fitzsimons, 2015). This is a much broader concept than economic growth, which is understood primarily in material terms as the total output (goods and services) produced annually within or outside a country (GDP) (Van den Berg, 2011). In contrast, economic development encompasses

> "goals such as economic and social equality, the elimination of poverty, universal education, rising levels of living national independence, modernization of institutions, political and economic participation, democracy, self-reliance, and personal fulfilment." (Todaro and Smith, 2011, p. 12)

Economic development is measured using the Human Development Index (HDI), which takes into account per capita income, life expectancy and education (Cypher, 2014; Ul Haq, 1995). The current study focuses on education – particularly HE, investigating the extent to which the experience of studying at foreign universities affects the academic achievement and contribution of Libyan scholars upon their return home.

Sending students to study in developed countries where they will have the opportunity to acquire more advanced knowledge (Kim, 1998) is one way in which developing countries can invest in and enhance their human capital. The advanced knowledge imported by returning scholars can be "re-invested" in several ways: returnees may transmit it to undergraduate and postgraduate students through their teaching activities (knowledge transmission or KT), they may disseminate it through scholarly publication (Gagnon, 2011; Ion, Stîngu and Marin, 2018) (knowledge dissemination or KD), or they may exchange it with external stakeholders in the public or private sectors (Tan, 2016) (knowledge exchange or KE). Spread through these channels, it has the potential to ripple out across society and catalyse further development; as Schuh (2009, p. 74) puts it: "Investment in human capital, and especially in the production of knowledge, is…not subject to diminishing returns".

Previous researchers (Hassan, Tymms and Ismail, 2008; Landry *et al.*, 2010; Celik, 2012b; Torrisi, 2014) have investigated and measured the output of faculty members in only one or two knowledge dimensions and have generally adopted either a quantitative or qualitative methodology. Few studies have investigated academic engagement in developing countries (Kruss and Visser, 2017; Giuliani *et al.*, 2010) or considered the role of foreign-educated scholars and their contribution to HEIs in these countries, and there have been no studies at all investigating the academic achievement and contribution of returning scholars in the Libyan context.

The remainder of this chapter is divided into two sections. The first section introduces the research context, including the key features of human development in Libya, the expansion of the HE sector, the composition of the public university population, the challenges facing HE in Libya and the study abroad programme. The second section describes the background to the study; it offers a statement of the research problem, explains the significance of the research, and presents the aims, objectives and research questions.

1.2 The context of higher education in Libya

As in many other countries, the education system in Libya has been largely influenced by political and socioeconomic factors (Clark, 2004). The following sections provide a brief introduction to human development in Libya, the expansion of the country's HE sector, the composition of the public university population, the challenges faced by faculty members and the study abroad programme.

1.2.1 Human development in Libya

In 2015, Libya had a population of 6.3 million with a median age of 27.5 years (United Nations Development Programme, 2016). Literacy among adults (aged 15 and older) stood at 91%, while labour force participation was 78.7% among men and 27.8% among women. Women held 16% of the seats in parliament, and 19% of the population were internet users. As shown in Table 1.1, Libya's Human Development Index (HDI) score climbed significantly between 1990 and 2015 – from 0.681 in 1990 to 0.716 in 2015; however, while life expectancy at birth and mean years of schooling increased slightly over the period, expected years of schooling and Gross National Income (GNI) per capita decreased. The decline in GNI between 2011 and 2015 was mainly due to the 2011 revolution, which caused significant disruption to Libya's oil and gas exporting activities. As a result, it dropped from 50th in the index (out of 188 countries) to 55th in 2014 and 102nd in 2015.

Table 1.1: Breakdown of Libya's HDI score by indicator (1990-2015)

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP$)	HDI value
1990	68.5	14	3.8	22,856	0.681
1995	69.9	14.8	4.7	22,233	0.709
2000	70.5	15.7	5.6	21,652	0.732
2005	71.4	15.4	6.4	25,776	0.752
2010	71.6	14	7.3	29,143	0.756
2011	71.6	13.7	7.3	11,041	0.706
2012	71.6	13.4	7.3	21,688	0.735
2013	71.6	13.4	7.3	19,354	0.730
2014	71.6	13.4	7.3	15,360	0.719
2015	71.8	13.4	7.3	14,303	0.716

Source: United Nations Development Programme (2016)

Libya's relatively high ranking on the list prior to 2014 was based on a purely quantitative assessment of HDI. In 2013, the World Bank ranked Libya 81st and 110th out of 144 Global Competiveness Index for infrastructure and technological readiness respectively, and 142nd for education quality (World Bank, 2013). In 2008, education accounted for the largest proportion of Libya's public sector, employing 485,000 teachers, nearly half of whom did not teach at all (Taghavi, 2013; Rose, 2015). At LYD 6,800 annually, salaries in the sector were less than half the average of other public sector workers (LYD 14,600) (Rose, 2015). Taghavi (2013, p. 12) comments that "Years of under-resourcing and poor management have now left the Libyan education sector in a dire position. Coupled with corruption and injustice, the overall quality of education provision is now severely questioned". As a result, the educational needs of the labour market are not being met (Hamdy, 2007).

1.2.2 The expansion of the HE sector

A strong HE system is a key factor in promoting development in any society. Strengthening this system involves increasing the number of universities, the number of students enrolled and the number of graduates (Elzalitni, 2008). In the case of Libya, the re-structuring and expansion of the HE sector began in the early 1980s, prompted partly by population growth and partly by an increase in oil revenues (Tamtam *et al.*, 2011). The rise in student numbers in Libya is highlighted by El-Hawat (2003), who reveals that the number of students in higher and vocational education went up from 13,418 in 1975/76 to 16,544 in 1989/99. By 2004, the number of students studying at Libyan public universities had reached 200,000, with another 70,000 students attending higher technical and vocational training colleges (Clark, 2004). In 2014, there were twelve public universities, five private universities, sixteen state technical faculties and 91 higher technical and vocational institutes operating in the country. Half a million students were enrolled in the HE system, 59% of whom were female. The vast majority of these students (around 90%) were enrolled in public universities (Law, 2014).

The continuing growth in the education sector has massively increased the demand for qualified staff, but the number of new appointments has not kept pace with this demand (El-Hawat, 2003). The shortage of qualified staff is arguably having a negative impact on students' attainment, to the long-term detriment of both their productivity and national economic growth (Kimenyi, 2011). Economic growth is also being held back by poor quality teaching and the lack of a connection between the type of HE being offered and the demand raised by the market (Elzalitni and Lees, 2007).

1.2.3 Composition of the public university population

Table 1.2 shows the numbers of faculty members and students who were working in each of Libya's twelve public universities in 2012. It also shows what percentage of faculty members were non-Libyan, Libyan full-time and Libyan part-time. Overall, Benghazi

University had the highest student enrolment (84,026), followed by Tripoli University (83,855).

Table 1.2: Breakdown of faculty members and students at Libyan public universities (2012)

University	Percentage of faculty members				No. of students
	Libyan part-time	Non-Libyan	Libyan full-time	**Total**	
Tripoli	25.08	3.31	71.60	**3624**	83,855
Sirte	25.84	27.09	47.05	**561**	10,811
Omar Al-Mukhtar	11.82	40.26	47.90	**1716**	33,035
Sabha	20.47	13.97	65.55	**1045**	15,945
Al-Asmarya	64.43	6.16	29.40	**568**	4,112
Al-Zutonah	31.90	2.39	65.69	**1169**	10,626
Al-Jabal Al-Garbi	55.81	3.58	40.59	**1478**	17,649
Misurata	34.83	7.48	57.68	**1002**	16,206
Benghazi	30.29	8.99	61.45	**2667**	84,026
Al-Mergab	42.97	8.32	48.69	**1538**	31,030
Al-Zawia	32.23	5.57	62.19	**1058**	35,500
Open University	-	-	100	**14**	3,876

Source: Ministry of Higher Education (2012)

Tripoli and Benghazi universities accounted for approximately 50% of the 342,795 students at Libya's twelve public universities in 2012. Approximately 29% were studying at the universities of Omar Al-Mukhtar, Al-Mergab and Al-Zawia, with the remaining 21% being spread across the other seven universities. There were 9,525 full-time Libyan faculty members in 2012, 5,194 part-time Libyan faculty members and 1,727 non-Libyan staff (MHE, 2012).

Faculty members are required to hold a Master's degree or a Doctorate of Philosophy (PhD) from an institution recognised by the General Peoples' Committee for Education & Scientific Research (GPCE&SR). In the late 1980s, a shortage of Libyan nationals with advanced degrees meant that most faculty members were foreign. In response, the Ministry of Higher Education (MHE) launched its study abroad programme to give more students and faculty members the opportunity to gain advanced degrees, and the percentage of Libyan academic staff rose – from 54.5% in 2002 to 75.68% in 2008. The number of foreign academic staff in Libyan universities declined accordingly, though it is interesting to note that the proportion of non-Libyan faculty members employed by Omar Al-Mukhtar University in 2012 remained quite high (40.62%), compared with the number of academics originating from Libya (see Table 1.2). Increasing the number of academic staff was necessary to cover the growth in student enrolment; what is less clear is whether this increase in staff numbers was accompanied by a similar increase in academic achievement and contribution.

Table 1.3: shows how Libyan postgraduate students (master and doctoral) in different disciplines were distributed across eight of the twelve public universities operating in 2012 (no data was available for the Al-Mergab, Al-Zutonah, Al-Zawia and Open universities). The table shows that the only university offering a doctoral programme was Tripoli University, with 401 students. One of the country's biggest universities, Tripoli University is located in the capital city and has the highest proportion of foreign-educated scholars. Not all universities provided taught master's studies in all disciplines, possibly because of the lack of infrastructure and qualified supervisors, which Taghavi (2013) attributes to low levels of investment in HE during the Gaddafi years.

Table 1.3: Distribution of postgraduate students at Libyan universities by faculty (2012)

Specialisation	University Tripoli %	Benghazi %	Sabha %	Misurata %	Sirte %	Omar Al-Mukhtar %	Al-Asmarya %	Al-Jabel Al-Garbi %	Total
Pharmacology	100	0	0	0	0	0	0	0	48
Physical Education	87.75	0	0	0	0	0	0	12.24	294
Arts	25.86	2.41	7.69	9.08	2.88	1.90	2.61	26.10	3364
Languages	100	0	0	0	0	0	0	0	243
Science	28.19	18.71	7.52	16.31	0	3.73	0	25.54	1582
Agriculture	75.60	0	0	0	0	24.40	0	0	541
Engineering	66.30	12.10	8.22	10.71	0.09	0	0	2.59	1083
Economics & Social Science	26.33	48.23	0	3.95	5.10	0	0	16.38	1215
Medicine	0	96.18	0	3.18	0	0	0	0	551
Veterinary Science	100	0	0	0	0	0	0	0	55
Media	74.57	17.77	0	0	0	0	0	0	232
Law	54.36	22.96	0	4.36	2.88	0	0	15.43	1354
Natural Sciences	0	0	0	0	0	100	0	0	48
Islamic Studies	0	0	0	0	0	0	100	0	47
Theology	0	0	0	0	0	0	100	0	83
Information Technology	0	100	0	0	0	0	0	0	48
Doctoral	100	0	0	0	0	0	0	0	401

Source: Ministry of Higher Education (2012)

1.2.4 The challenges facing higher education in Libya

Under the Gaddafi regime, the education system was unable to provide the intellectual and managerial tools the Libyan economy needed to develop (El-Kikhia, 2012). HE policy was disconnected from market demand, with the result that the sector failed to provide a job-ready workforce (Porter and Yegin, 2006; Elaokali, 2012). Attempts were made in the 1990s to improve education in Libya, but as these efforts were directed more towards expanding student numbers than raising quality, standards in both general and technical education remained very low (El-Hawat, 2007; Elaokali, 2012).

The most comprehensive analyses of the challenges facing Libya's HE system have been conducted by Tamtam *et al.* (2011), who identify the main issues as being:

- A lack of suitably qualified academic policymakers;
- Poor performance by faculty members, which they ascribe to poor training;
- Constant changes in the rules and regulations underpinning HE, which make it difficult to draw up any effective long-term plans;
- A shortage of research facilities and resources such as laboratories and libraries, which makes it hard for universities to improve their research and development (R&D) performance;
- A lack of modern teaching approaches/methodologies promoting self-learning skills such as analytical thinking, innovation and problem solving which, in combination with underdeveloped learning strategies, can seriously affect the quality of the education offered.

An additional challenge facing many Libyan academics and students is a lack of proficiency in European languages (especially English and French) (Aloreibi and Carey, 2017), which makes it harder for them to participate internationally and to access new knowledge. During the 1980s, the state curriculum was Arabised as part of a plan to change social attitudes and encourage the rejection of western ideologies such as capitalism (St John, 1983). Government officials burned the English and French textbooks being used in schools and universities (Linvill, 2013), and both were banned as languages of instruction for the next ten years. The use of English and French was also prohibited in newspapers and on TV, and anyone who continued to write in English was prosecuted (El-Hawat, 2003).

1.2.5 The study abroad programme

Since the 1970s, the government's study abroad programme has been sending students and faculty members to study for postgraduate degrees at HEIs overseas. The rules and regulations for the programme are set by the MHE, which also selects suitable candidates (Hamdy, 2007). Table 1.3 shows the number of students that were sent to study abroad between 1972 and 2005.

Table 1.4: Number of Libyan students sent overseas (1972-2005)

Period	Total number of students
1972 – 1980	5,000
1981 – 2004	7,287
2005	645
Total	**12,932**

Source: Libya Ministry of Higher Education (2006)

Table 1.4 shows that while 5,000 students attended foreign HEIs in the eight years between 1972 and 1980, only 7,287 did the same in the 23 years between 1981 and 2004. This decline in numbers is mainly attributable to the Gaddafi regime's fallout with western (particularly the USA) governments in the early 1980s, but with the restoration of diplomatic relations with the USA in 2004, the decline was reversed and by 2005, the number of students going abroad had risen again, to 645. This trend continued in the following years, with 2,427 students going to the UK alone in the period 2005-2011 (see Table 1.3).

Table 1.3: Number of students attending English-speaking HEIs (2005-2011)

Country	Number of students in Master's programmes	Number of students in PhD programmes	Total
UK	1,408	1,019	2,427
USA	959	485	1,444
Australia	438	112	550
Canada	197	106	303
New Zealand	0	2	2
Total	**3,002**	**1,724**	**4,726**

Source: Libya Ministry of Higher Education (2011)

As Table 1.3 shows, in all cases, the number of students enrolled on postgraduate taught courses was higher than the number enrolled on postgraduate research courses (PhD). As the International College of Economics and Finance ICEF (2012) puts it, the point of the foreign scholarships is "to put more Libyan scholars into lecturing positions in Libyan universities".

As of 2016, 11,458 Libyan scholars were studying overseas (MHE, 2016), most in developing Arab and Asian countries. In the first quarter of 2017, the Libyan government spent LYD 96,578,519 on 9,862 scholars studying abroad in 50 countries, excluding the USA and Canada (Ministry of Finance, 2017) (see Appendix C). The return on this investment may be assessed in terms of the benefits it brings not just to the degree holders themselves (e.g. higher income, less time in unemployment and greater career mobility (Dwyer, 2004)), but also to their place of work and the wider community (Segalowitz *et al.*, 2004). Surprisingly, however, the effect of foreign education on returning scholars' achievement has not been comprehensively investigated in Libya.

1.3 Background to the study

This section explains the research problem and its significance before setting out the research aim, main objectives and questions.

1.3.1 Statement of the problem

One of the most critical issues facing the Libyan government is how to develop the country's human capital (Taghavi, 2013). Khan (2015, p. 2) argues that

> "For developing countries today, the implications are that costly investments in specialized human capital resources might be less important than incentives for creativity, flexibility, and the ability to make incremental adjustments that can transform existing technologies into inventions that are appropriate for prevailing domestic conditions."

Improving the ability of those who are responsible for creating knowledge (academics) seems to be a better investment than investing in physical capital. Rose (2015) claims that the best way to achieve rapid improvement in Libyan HEIs is to send scholars to be educated abroad, and this has indeed been the policy of the Libyan government, which has been sponsoring full-time faculty members to study overseas since the 1970s.

However, no one has yet investigated the return the government is getting on its investment in knowledge across the three dimensions of academic achievement (KT, KD and KE).

Such an investigation is important, not least because of the wide variation in the quality of HEIs around the world. The main way of evaluating the academic performance of HEIs is the ranking system (Rauhvargers, 2013). Altbach *et al.* (2011) argue that highly ranked universities tend to have high-quality academic staff, excellent research results, academic freedom, good facilities for administration, teaching and research, and funding from government and non-government sources. Regel *et al.* (2007), meanwhile, assert that the highest ranked HEIs are those that contribute to innovation and the advancement of knowledge. The fact that the top 100 of the world's 16,000 universities are all located in developed countries such as the USA, the UK, Switzerland, Japan, Canada, Australia, France, Germany, Denmark, Belgium, Netherland and Finland (Liu and Liu, 2016) suggest that there is a significant disparity – a knowledge gap – between developed and developing countries in this regard. If the Libyan government is to achieve its aim of improving the academic achievement and contribution of Libyan scholars, it needs to take this disparity into account when deciding how best to direct its investment.

The potential returns on this investment in human capital are significant and far-reaching. For example, returning Libyan scholars can introduce vital new technology, techniques and methods/approaches in a range of professional fields (e.g. medicine, engineering, economics and management). Those that remain in HE can play a crucial role in developing Libya's human capital by facilitating the exchange of knowledge and promoting interaction between universities and external stakeholders. Finally, they can play a key role in helping the government address two key challenges: ensuring that there are sufficient qualified staff to deal with a rapidly expanding HE sector (Elzalitni and Lees, 2007); and mitigating the adverse impact of declining oil and gas prices.

1.3.2 Significance

Government revenues in Libya are completely dependent on the export of crude oil and natural gas (Moussa, 2009; Ali and Harvie, 2013). Libya is the ninth largest oil producer in the world, holding 3.4% of total international reserves (Etelawi, Blatner and McCluskey, 2017), but since the removal of the Gaddafi regime, oil production in the country has been unstable. In October 2012, Libya produced 1.5 million barrels per day. By 2016, production had dropped to 330,000 barrels per day, rising again to 890,000 barrels per day by August 2017 (Ycharts, 2017). The uncertainty is compounded by fluctuating oil prices, and the fact that these resources are finite.

Fluctuations in the production and price of natural resources, along with inadequate investment in human capital, are the key factors hampering the development of Libya's public sector, particularly HE (El-Kikhia, 2012). However, as the main sector responsible for producing new knowledge, investment in HE's human capital is especially important if Libya is to find alternatives to its current reliance on non-renewable resources. The Libyan government needs to identify the best way to exploit current oil revenues to aid sustainable growth and development; as Ali (2011, p. 92) puts it:

> "The spending of oil revenue, in particular development expenditure in the form of government investment spending upon infrastructure, human capital formation and technology acquisition, is a key policy issue which has important implications for the development of the Libyan economy."

If we accept Weil's (2005) argument that human capital is a far more important determinant of individual productivity than physical capital, then it becomes vitally important to invest in this human capital by raising the quality of academic achievement of full-time scholars currently working in HEIs and enhancing their capacity to contribute to knowledge production and engage with external stakeholders.

1.3.3 The aim of the study

The main aims of this research are:

i. To investigate the academic achievement and contribution of foreign-educated scholars currently working full time in HEIs in Libya; and

ii. To identify and explore the factors that may hinder or enhance this contribution.

To this end, a comparison was conducted across three dimensions of knowledge (KT, KD and KE) between scholars who had completed their postgraduate studies: (1) in a developed country; (2) in a developing country; and (3) in their home country (in this case, Libya). Group 3 was added to the comparison to improve the reliability of the results since it can be used to account for the knowledge gap between countries.

The research focuses on scholars who have successfully completed the study abroad scholarship programme and now hold academic posts in Libya's HE sector in order to assess the extent to which the government's investment in this human capital maximisation programme has been worthwhile. A secondary aim of the study is to examine the extent to which the academic achievement and contribution of these scholars may be affected by gender, academic discipline and rank. The objectives that were developed to achieve these aims are presented below.

1.3.4 Research objectives

- To give a concrete picture of human capital development in Libyan HE in terms of KT, KD and KE.
- To investigate whether investing in human capital by providing scholarship programmes to full-time academics is a worthwhile investment.
- To explore the importance of investing in education, particularly HE, as a key factor in engagement with external stakeholders, alongside investment in physical capital.
- To identify the factors that appear to enhance or inhibit the academic achievement and contribution of scholars.
- To provide recommendations and information to HE policy makers and managers that might enhance the academic output of scholars.
- To introduce the concept of knowledge exchange into the body of Libya-based literature.

1.3.5 Research questions

A number of research questions were formulated to address the aims and objectives stated above. The study seeks to answer these questions and fill the knowledge gaps identified in the literature. The overarching research question is:

What (if any) association is there between the study abroad experience and scholars' academic achievement and contribution to knowledge (KT, KD and KE)?

This question was broken down into several sub-questions, as follows:

I. To what extent do scholars with foreign postgraduate qualifications have a distinct advantage over those holding equivalent domestic postgraduate qualifications in terms of:

    i. Knowledge transmission (KT) activities?

    ii. Knowledge dissemination (KD) activities?

    iii. Knowledge exchange (KE) activities?

II. What are the factors that might affect the academic achievement and contribution of foreign-educated (in developing and developed countries) scholars compared to their home-educated peers?

III. What (if any) differences are there in the academic achievement and contribution of foreign-educated scholars of different genders, academic disciplines and academic ranks?

IV. What factors might affect the academic achievement and contribution of foreign-educated scholars of different genders, academic disciplines and academic ranks?

1.4 Thesis structure

The thesis is split into seven chapters, including this introductory chapter. The introductory chapter gives a brief overview of the HE context in Libya, including the major challenges facing the sector and the government's study abroad programme, before explaining the research problem and rationale for the research and setting out the aim, objectives and research questions.

Chapter 2 discusses the existing literature on study abroad programmes as a form of human capital investment and identifies the knowledge gap that is addressed in this study. It explores the theories that underpin investment in knowledge and shows the association between investing in human capital and economic development before discussing the three main dimensions of knowledge, focusing particularly on the academic achievement and contribution of foreign-educated scholars. The KT-related literature examines scholars' educational and administrative duties and how these affect their research activities, the KD-related literature explores scholarly publication productivity and the challenges developing countries face in terms of R&D, while the KE-related literature focuses on the co-operation between academics and external stakeholders and how this engagement benefits both sides. The chapter ends by presenting the study's conceptual framework and explaining how the study aims to address the identified knowledge gap.

Chapter 3 discusses the methodology used for this study. It justifies the choice of the sequential mixed methods approach (questionnaire survey followed by semi-structured interviews) and describes how the sample was selected and the quantitative and qualitative data was collected and analysed. It explains how the trustworthiness, reliability and validity of the findings were ensured before finally describing the steps taken to ensure the research complies with accepted ethical standards.

Chapter 4 presents and discusses the findings regarding the KT dimension. The quantitative findings from the survey are presented alongside the qualitative findings from the interviews, after which the two are brought together with the findings from the literature review in a discussion section. The analysis concludes by reviewing the main barriers to contribution identified in the qualitative interviews and summarising the statistical findings in a matrix table.

Chapter 5 follows the same pattern in its analysis of scholars' achievement and contribution in the KD dimension. The chapter describes the differences in academic achievement and contribution across the items within the KD dimension, as identified in the questionnaire results, while drawing on the findings from the interviews to explain why these differences exist. This is followed by a discussion section which brings together the empirical findings with those from the literature review. The chapter concludes by summarising the main quantitative and qualitative findings.

Chapter 6 discusses the findings regarding the KE dimension. It presents evidence relating to academia-external stakeholder collaboration and outlines the major barriers that scholars encounter in these collaborations. The chapter provides an empirical explanation of how investing in human capital can affect economic development and shows how the three dimensions impact on each other: high productivity in KD increases the likelihood of collaboration with external stakeholders (KE), which, in turn, has a positive effect on KT. Again, the findings are compared with those identified in the literature.

Chapter 7 concludes the thesis by drawing together the study's findings and highlighting its main contributions to knowledge. The achievement and contribution of the various scholar groups (country of study, rank, gender and discipline) across the three knowledge dimensions are summarised in a figure, while a table summarises the barriers to contribution that were identified by the study respondents. The chapter goes on to discuss the limitations of the research and its implications for HE policy makers and university managers before finally offering suggestions for further study.

Chapter 2 : Literature Review and Theoretical Framework

2.1 Introduction

This chapter presents a review of the literature relating to investment in knowledge. It starts with a discussion of the theories underpinning knowledge, including human capital theory (HCT), endogenous growth theory (EGT) and the knowledge-based economy (KBE) concept. A number of emerging and developing economies have made the decision to invest in knowledge (and thus their human capital) by offering scholarships to talented academics to pursue postgraduate study outside their own country. As this review indicates, however, there has been relatively little investigation of the results of this investment. Empirical evidence is scarce, with most of the literature considering only one or two dimensions of returning academics' achievement and contribution to their home country's human capital. This chapter seeks to address this gap by starts with reviewing the existing evidence regarding academic achievement and contribution across the KT, KD and KE dimensions and the barriers that may be affecting Libyan academics' contribution in particular. It concludes by presenting the conceptual framework of the study, identifying the knowledge gap and explaining how the study aims to address this gap, within the context of what is already known about investment in knowledge.

2.2 Theories that underpin knowledge

In his book, *An Essay on the Nature and Significance of Economic Science* (1932), economist Lionel Robbins defines the fundamental problem of economics as being that while human wants are unlimited, economic resources are not. It might be argued, however, that limited economic resources can be stretched significantly by expanding human knowledge so as to ensure that what is available can be used more efficiently. In other words, the main limitation lies in human knowledge rather than economic resources. One of the chief aims of human capital investment is to overcome this limitation by increasing knowledge, and one of the main ways this is achieved is by investing in education.

A number of economists have sought to explain the impact of human capital on economic growth and development. Becker (1993), for example, points to the vital role education plays in raising productivity (he uses it as a proxy to HCT), while Romer (1990b) perceives technological change and knowledge as endogenous to the economic system (unlike Solow's (1956) model, which assumed that technological development, while a key factor in economic growth, is exogenous to the economic system). Romer's argument that more technologically advanced countries develop their economies faster than their less technologically advanced counterparts is now persuading many developing countries to invest in their human capital as a way of ensuring progress. These countries are increasingly coming to realise that the development of human capital through training and education is vital to foster productivity and growth within an increasingly knowledge-based global economy, the bedrock of which is technical know-how – indeed, EGT suggests that economic growth is largely dependent on the number of people working in the knowledge sector (Romer, 1990a). The following sub-sections discuss human capital, its associated theory and its role in economic growth and development and the KBE concept in more detail.

2.2.1 Defining human capital

Several attempts have been made at defining human capital (see Table 2.1). The Organisation for Economic Co-operation and Development (OECD), for example, defines human capital as "productive wealth embodied in labour, skills and knowledge" (OECD, 2001). General human capital consists of the generic knowledge and skills that are obtained through education and experience (Kai Ming Au, Altman and Roussel, 2008). Such skills are usually transferable and are what make an individual employable (ibid). This form of human capital makes individuals more attractive to a wider range of employers, opening up more opportunities, both nationally and internationally, to those with a higher level of education (Joarder, Subhan and Islam, 2015). Gibbons and Waldman (2004) distinguish between general, firm-specific and task-specific forms of human capital. Where human capital is firm-specific or task-specific, the individual has most likely received in house (on the job) training aimed at developing a very particular set of skills. This renders them more productive within the confines of that specific job or organisation, but makes them less attractive to other employers. According to Becker (1967), firm-specific skills are not transferable, but if they are used to build capacity within associated communities, this form of human capital can add value and enhance productivity across the sector as a whole (Hawkins, Shapiro and Fagan, 2010).

Table 2.1: Definitions of human capital

Article	Definition
Becker (1960, p. 354)	"An improvement in the quality of college students may well be an effective way to raise the contribution of college education to progress."
Becker (1962, p. 49)	"Investment in human capital is a pervasive phenomenon and a valuable concept."
Giarini (1980, p. 171)	"*Human capital* includes a wide range of human capabilities: productive resources such as skills and tools; social or organizational resources for governance, commerce, production, and education; mental-intellectual resources such as ideas, knowledge, science, technology, and information; cultural and psychological resources including values, customs, ways of life, character formation, personality development and individuality."
Romer (1990, p. 10)	"*Human Capital* is distinct measure of the cumulative effect of activities like formal education and on-the-job training."
Hitt *et al.* (2001, p. 14)	"*Human capital* attributes (including education, experience, and skills) … of top managers affect firm outcomes."
Becker (2002, p. 3)	"*Human capital* refers to the knowledge, information, ideas, skill, and health of individuals."
Youndt and Snell (2004, p. 338)	"*Human capital* simply refers to individuals' knowledge, skills and expertise."
Somaya, Williamson and Lorinkova (2008, p. 936)	"The cumulative knowledge, skills, talent, and know-how of a firm's employees."
Acemoglu and Autor (2011, p. 3)	"*Human capital* corresponds to any stock of knowledge or characteristics that worker has (either innate or acquired) that contributes to his or her 'productivity'."
Crook *et al.* (2011, p. 444)	"The term *human capital* refers to the knowledge, skills and abilities (KSAs) embodied in people."
Ployhart and Moliterno (2011, pp. 127-128)	"A unit level resource that is created from the emergence of individuals' knowledge, skills, abilities and other characteristics."
Coff and Kryscynski (2011, p. 1430)	"An individual's stock of knowledge, skills and abilities."

Source: Adapted from Ployhart *et al.* (2014) and modified with additional definitions

2.2.2 Human capital theory

Human capital theory (HCT), which was proposed by economists Theodore Schultz and Gary Becker in the 1960s, seeks to provide a concrete explanation of the economic benefits that accrue when countries invest in their human capital. As noted earlier, education is frequently perceived to be instrumental in providing the skills and knowledge for individuals to become productive; a central premise of HCT is that education should be seen not as a consumable commodity but as an investment whose returns include increased productivity and higher wages (Schultz, 1961; Nafukho, Hairston and Brooks, 2004). This is probably why publicly-financed education continues to be a high priority for governments, who realise that well-educated individuals can create benefits for others (Lange and Topel, 2006). University-educated individuals can help raise national productivity, but at the very least, their higher earning potential means they can contribute more to the economy in tax revenues (Brewer, Hentschke and Eide, 2010; Lange and Topel, 2006). This was confirmed in a recent Australian study, which found that government revenues increase with the number of graduates entering the workforce (Cadence Economics, 2016).

Education and training are widely seen as vital to exploit human capital and produce optimal individual productivity; they inculcate knowledge and skills (Sleezer, Conti and Nolan, 2004) which may be used to add value and create competitive advantage in the workplace (Lepak and Snell, 1999; Griliches and Regev, 1995). The investment may have an even greater impact on firms' economic value when combined with R&D, physical capital and advertising (Riley, Michael and Mahoney, 2017). In the case of developing countries such as Libya, giving students the opportunity to study in a foreign country may also help improve the overall academic performance of domestic HE as returnees pass on the knowledge they have acquired. As Benhabib and Spiegel (1994, p. 154) explain, "we assume that the ability of a nation to adopt and implement new technology from abroad is a function of its domestic human capital stock".

However, while it is widely recognised that human capital represents the wealth of a nation, there is some debate about how this capital should be shaped into a productive work force (Khan, 2015). Many questions whether education is the prerequisite for productivity, given the differences between individuals in terms of ability and motivation (Olaniyan and Okemakinde, 2008; Das, 2015; Holden and Biddle, 2017). It has been suggested that education policy too often focuses on certification and qualifications rather than on developing a workforce able to meet its country's economic requirements (Almendarez, 2013). The development of an individual from a child into a productive adult is shaped by early schooling and parenting, and interventions may be needed to propel a young person in the right direction (Cunha and Heckman, 2007), but there is no guarantee that any of these interventions (whether in the form of state-provided additional educational support or parent-provided private tutoring) will increase the productive output of the developing adult (Peers, 2015). Furthermore, although HE may be more widely available in Western societies, it is not always valued or encouraged by parents (Heckman and Masterov, 2007).

2.2.2.1 Human capital and economic growth

Becker (1964) points to the link between investment in education and economic growth, arguing that vocational education and job training are a form of human capital development. While the idea of placing an economic value on education has encouraged people to look at the contribution an educated workforce can make to society (Holden and Biddle, 2017), this education needs to be matched to the needs of the investing country, and emerging countries do not have the same needs as their more developed neighbours (Machlup, 1982). Easterlin (1981) and Lucas (1990) state that lack of human capital, particularly in terms of training and modern education, explains why developing countries have not attracted technology and foreign investment from their more developed counterparts. Both authors explain that economic development in these countries is slowed down by poor-quality education and limited access to technology, which make it difficult for them to adapt to technological change.

A number of models have been proposed over the years to explain how human capital investment and accumulation can lead to economic development. These include the neo-classical theory of growth and development introduced by Joseph Schumpeter, and the endogenous growth models of Romer and Lucas. Schumpeter (2000) has been widely credited as the originator of modern neo-classical growth theory, which regards human resources (human capital) as more important to economic development than natural resources, and which places emphasis on the role of businessmen and entrepreneurs in promoting this development (Hill and Pearce, 1990). EGT, developed by Romer (1990b), on the other hand, posits an association between economic growth and the number of people working in the knowledge sector (Morley, 2015). EGT assumes that economic growth is generated by enabling human capital to develop new forms of technology that facilitate R&D and innovation (Aghion and Howitt, 1998; Daniela, 2015). In this century, economic growth has been accelerated by the ICT revolution, with a 10% increase in broadband penetration raising GDP by 1.21% in developing countries and 1.38% in developed countries (Minges, 2015). Lucas (1988) argues that a country's economic output is dependent upon its stock of human capital, and that each generation of this capital is responsible for producing the next. In this model, higher investment in education can increase the marginal product of labour, which can, in turn, lead to higher wages and subsequently higher economic growth (Tehrani, 2014; Islam *et al.*, 2016).

2.2.2.2 Neo-classical vs endogenous growth theories

Both neo-classical theory and EGT regard human capital as one of the key drivers of economic growth because of its impact on productivity (De la Fuente and Doménech, 2006). However, there are some differences in the way that this impact is perceived. While neo-classical economic theory associates this impact with physical labour and the size of the workforce, EGT links growth to education and innovation; Bassanini and Scarpetta (2002), for example, maintain that for each extra year of schooling provided to individuals, GDP per capita increases by 6%, while Griliches (1977) argues that changes in the level of education offered to citizens in the USA over a 50-year period increased productivity in the country by 33%. (Several other studies have reported similar findings, e.g. Englander and Gurney, 1994; Jenkins, 1995). Finally, Easterlin (1981) suggests that modern economic growth is based on both the development of science and the qualitative and quantitative expansion of education.

According to Wiley (2017, p. 70),

> "EGT broadens the definition of capital to include human and knowledge capital and R&D. Investment in physical capital increases output, while investment in R&D results in ideas. The theory asserts that not only do these ideas have a positive impact on the company that comes up with them, but that they have positive externalities and spill over effects as they can be copied by competitors as well."

EGT posits that countries investing heavily in technology, R&D and human capital via education will develop faster. In other words, the theory can provide an explanation as to why some countries may grow quickly, while others may get stuck at low income levels. In contrast, neo-classical theory does not explain why education is a crucial determinant of economic growth beyond suggesting that high-quality labour is more likely to be productive. Benhabib (1994) explains that neo-classical theory measures the effect of human capital on economic growth by looking at the average years of schooling or school enrolment of individuals in the labour market. In contrast, EGT assumes that economic growth depends on education level; it posits that well-educated workers will be better at adopting and implementing new technology from abroad, which is one of the best ways to generate growth. Countries with a more highly educated workforce are thus more likely to reduce the technological knowledge gap than countries with a poorly educated workforce. Criaco *et al.* (2014) point to the particular value of university human capital (i.e. experience gained from researching and teaching at university level) in helping start-up companies to survive in the market.

Romer (2010, p. 2) claims that the trade in ideas has played a crucial role in enhancing economic development, citing the creation of a "large quantitative effect from the flow of ideas…in the second half of the twentieth century as the life expectancies in poor and rich countries began to converge". However, no one has yet investigated the effect this flow of ideas may be having on human capital reserves in Libya. The association of HE with human capital has encouraged many countries to focus more on their academic environment and how it prepares young people (Lanzi, 2007), so that universities are no longer seen as places for personal development and intellectual expansion but as training grounds for professional employment (Baker, 2011). However, this investment in human capital does not always yield a full return; graduates may be unable to find employment because supply exceeds demand, or because they have the wrong skill set. Others may be disadvantaged because they lack the right connections (Hennessy, 2014) or have graduated from lower-ranked universities (Piketty, 2014).

2.2.3 Human capital and economic growth – criticism

Despite the evidence supporting the notion that investment in human capital can lead to economic growth and development, there are still those who caution against providing the general population with opportunities for advanced education, arguing that neither the individual nor the social returns are high enough to justify the investment. These returns may be further diminished if there is an economic downturn (Hippe and Fouquet, 2015), in which case universal university education may simply become a way for individuals to boost their own capital in the job market (Brown and Lauder, 2006) rather than a way for the government to improve the quality of human capital as a whole. Critics argue that while qualifications may be an indication that young people have achieved a certain level of education, they do not provide any evidence of other aspects of human capital such as attitude or personal attributes (Becker, 2002). Gillies (2011) points out that economic crises in the Western economies, such as that in 2008, tend to be caused by the most highly qualified individuals in society, while at the opposite extreme, Mao (2018) notes the growing phenomenon of fake degrees.

It has been suggested that social capital can have as strong an effect on economic growth as human capital or education (Whiteley, 2000). As already mentioned, concerns have been raised that overemphasising education's role in enhancing productivity risks overlooking the other important benefits it may bring to individuals such as personal happiness and fulfilment, as well as broader social returns (Gillies, 2011). Although HCT does acknowledge the social returns stemming from investment in education (Schultz, 1960), these returns are difficult to quantify. There have been suggestions that investment in education may reduce criminal or anti-social behaviour (Lochner and Moretti, 2004), which may have an economic benefit in terms of lower judicial and prison costs and also benefit society in a more abstract way by making people feel safer. Education may also encourage greater political participation as individuals are more able to understand the issues involved (Friedman, 2009). The main social benefit, however, appears to be overall improved productivity and earnings, especially among underprivileged groups, with the returns being higher when investment is targeted at HE (Kimenyi, Mwabu and Manda, 2006).

Others, however, argue that education should be valued not solely for its role in fostering economic growth and development, but as an end in itself (Kruss *et al.*, 2015); Wolla (2013), for example, suggests that knowledge leads to creativity and innovation, and that both need to be incentivised by institutions. These authors see the role of HEIs as being to nurture creative minds, not simply to produce human capital for economic purposes (Kruss *et al.*, 2015). That said, current research places innovation at the forefront of economic growth. In a study conducted to explore how universities in Romania are responding to the challenges of a knowledge-based, globalised economy, Popescu and Crenicean (2012) highlight the internationalisation of educational policy and conclude that universities need to ensure that their graduates are prepared to deal with new opportunities and global issues.

2.2.4 Knowledge-based economy (KBE)

According to Powell and Snellman (2004), the key strength of the KBE is its focus on technical knowledge (intellectual property) rather than physical or natural resources. This has implications for the role of education in promoting economic development; in the UK, for example, government investment in HE is designed to produce skilled workers to service the KBE and boost economic success (Giddens, 2000). The result is an increasingly global environment in which developed and developing countries alike must compete for the human capital (talented young people) they need to support innovation, entrepreneurship and technological progress (Guruz, 2011; Schwalje, 2014).

The concept of KBE has become such an important part of the OECD's and World Bank's development programmes (World Bank, 2007; Tchamyou, 2017) that the latter has created a Knowledge Economic Index (KEI) to assess countries' overall level of development. The KEI measures four dimensions of the knowledge economy: education (human capital development); creation and innovation in universities and research centres; economic incentives and government institutions; and ICT. The dimensions confirm the importance attributed by the World Bank to government-supported, creativity- and innovation-based education, such as that offered in research universities, for economic development. Altbach (2013, p.1) defines research universities as

> "Academic institutions committed to the creation and dissemination of knowledge, in a range of disciplines and fields, and featuring the appropriate laboratories, libraries, and infrastructures that permit teaching and research at the highest possible level."

These institutions, which engage in multi-mission activities and perform a range of societal roles, are at the heart of the global KBE. There are wide variations in the number of such universities between the developed and developing world: many developing countries have none, whereas the UK, for example, has 24 (the so-called Russell Group) (Altbach, 2013). The Middle East and North African (MENA) countries have so far made very little investment in areas such as R&D, ICT and innovation, which form the foundation of KBE (Weber, 2011).

Romer (1993) explains that poverty persists in developing nations partly because of poor infrastructure (identified as the object gap) and partly because their low level of technical knowledge prevents them from generating economic value (identified as the idea gap). He states that

> "The notion of an object gap highlights saving and accumulation. The notion of an idea gap directs attention to the patterns of interaction and communication between a developing country and the rest of the world. In particular, it suggests that multinational corporations can play a special role as the conduits that let productive ideas flow across national borders." (p. 544)

Becker (1993) attributes the continued growth in the per capita income of European countries, Japan and the USA to the fact that these countries continue to invest heavily in human capital through the expansion of technological and scientific knowledge. This was echoed in a report commissioned by the European Union in 2002 (De la Fuente and Ciccone, 2003), which identified investment in human resources as a crucial factor in economic growth. This investment is especially important in light of the rapid pace of technological progress. De la Fuente and Ciccone (2003) recommended that productivity could be improved further by investing more in specialised HE and strengthening the link between tertiary education and research. Such an expansion of investment may, by giving more opportunities to those who demonstrate talent and creativity, also motivate others to be more productive, helping further raise the quality of human capital (Janosevic and Dženopoljac, 2013).

In most industrialised economies, according to Hamilton and Liu (2014), wealth is mainly contained in human capital. Investment in this capital should therefore be targeted to bring economic returns, which means putting it into education and ICT infrastructure to support a KBE (Hippe and Fouquet, 2015). This is straightforward where a country can see itself reaping direct benefits from the investment, but these benefits may be less evident in emerging economies, where investment in human capital is still fragile. Even in some developed nations, there is debate about the extent to which education drives economic development, as evidenced by the significant investments in tertiary education might not aligned in a time of economic downturn (Hippe and Fouquet, 2015). This raises questions about the extent to which studying abroad raises human capital in developing countries such as Libya.

2.3 Studying abroad

Inter-government organisations and national governments sponsor students, especially from developing countries, as a form of continuing professional development (Varghese, 2008) and to increase their national human capital (Guruz, 2011). In 2015, around 5 million students were studying in tertiary institutions outside their own country, a number which is expected to continue rising (OECD, 2012). Many of these students were PhD candidates; international students (especially from China and India) account for 24% of all doctoral candidates, with most opting to study in countries where English is the language of tuition (OECD, 2015, p. 352). Countries such as the USA, the UK and Australia have benefited from this trend, although there are signs that it may be changing. The enforcement of tighter visa restrictions in the UK, for example, is currently encouraging many Indian students to go to Germany instead (Yojana, 2016).

One might speculate that students go abroad in search of opportunities that are not available in their home country, but there are a range of benefits to be gained from the study abroad experience. Post-doctoral study abroad is becoming increasingly common (Melin, 2004) as graduates begin to realise that the experience not only enhances their knowledge but also facilitates their acceptance into the academic community (Sambunjak and Marušić, 2011). The opportunities for collaboration with international colleagues can also increase their productivity (Lee and Bozeman, 2005). At a more personal level, research indicates that being immersed in a foreign culture can boost creative thinking skills as postgraduate students are forced to find solutions to the challenges associated with living and studying in an unfamiliar environment (Lee, Therriault and Linderholm, 2012).

Several studies have investigated the motivations of those choosing to study abroad (Nyaupane, Paris and Teye, 2011; Griner and Sobol, 2014; Holtbrugge and Engelhard, 2016). Evidence from a survey of 511 European students in the UK showed that the most popular motivations for students to study abroad were the desire to broaden their horizons, experience other cultures and improve their employment prospects (West *et al.*, 2000). A similar survey of 100 foreign students studying in Cyprus revealed the chance to experience student life in another country to be the most popular draw for studying abroad (Safakli and Ihemehe, 2015), while Zeeshan (2013) identified low crime rates as another motivation. Nyaupane, Paris and Teye (2010), exploring the perceptions of 136 American university students studying in Europe and the South Pacific region, identified the desire for international travel and the need to experience new cultures as the most important motivations. Interestingly, the students involved in this study also reported that they wanted to be independent of their families and friends. This so-called escape motivation is more commonly observed in leisure travellers (ibid). In contrast, this was identified as the least important factor by Buesing (2004). The 33 international students in his research sample (who were studying in the USA) rated the chance to experience a new environment and the opportunity to study under experts as their top motivating factors. As far as the choice of country is concerned, university quality and tuition fees have been identified as the key factors shaping students' decision making (Ming, 2010; Polat, 2012). For example, Zeeshan *et al.* (2013) report that the participants in their study chose to study in Malaysia because of the low tuition fees required by the universities in that country.

The opportunity to gain cross-cultural experience thus seems to be a significant motivator for many international students, though the value of studying abroad and its relationship to intercultural competence (that is, how well prepared individuals may be to interact with other cultures following their study abroad experience) has generated much debate. Paige, Cohen and Shively (2004) indicate that studying in a foreign country can have a positive influence on individuals' intercultural skills. Similarly, Stebleton, Soria and Cherney (2013) observe that through their study abroad experience, students can gain a better understanding of global issues and are better able to work with people from other cultures. In contrast, however, it has also been suggested that international students may spend time in a country without developing any intercultural awareness, as they rarely interact with local communities (Van de Berg, Connor-Linton and Paige, 2009).

2.3.1 The impact of studying abroad

EGT regards the knowledge brought back from more advanced countries as a form of imported human capital (Romer, 1993). Returning students adopt this new knowledge and transfer it to others without direct cost, thereby contributing to development (Kim, 1998). Empirical research has focused on assessing the impact of studying abroad on a number of different aspects including language development (Perna, Orosz and Jumakulov, 2015; Kang, 2014; Savicki, 2011) and employment prospects (Mohajeri Norris and Gillespie, 2009; Wiers-Jenssen, 2008). As previously noted, 24% of the PhD candidates in universities across the globe are international students (OECD, 2015). This suggests a growing interest in research among countries keen to move towards a KBE. When international students return to their home country, they bring with them not just knowledge but also valuable research skills and expertise. They are also expected to have developed the psychosocial, cognitive, moral and identity dimensions which, as (Deardorff, 2004) argues, are vital for engaging with the global community, either through academic collaborations or broader collegiate relationships. Hoffa and DePaul (2010) maintain that the intercultural competence developed through studying abroad is a valuable asset in today's globally interconnected academic community, though Salisbury, P An and Pascarella (2013) caution that individuals will only get the full benefit from their time abroad if they actively pursue opportunities for intercultural interaction when they return to their own countries.

Empirical research has assessed the impact of study abroad on a number of individual aspects including language development (Perna, Orosz and Jumakulov, 2015; Kang, 2014; Savicki, 2011) and employment prospects (Mohajeri Norris and Gillespie, 2009; Wiers-Jenssen, 2008). However, according to Sweetland (1996, p. 341), "HCT suggests that individuals and society derive economic benefits from investment in people". Researchers investigating the broader economic benefits brought by returning students include Zhen (2002), who explores the contribution of returning students to the development of industrial technology and scientific research in Taiwan, and Ramesh (2013), who highlights the key role returning postgraduate students have played in facilitating China's transformation into a KBE. Ramesh argues that having been educated in foreign universities that prize innovation and creativity (unlike China's rigid and traditional education system), many returnees have been inspired to set up small enterprises or to work in the Higher Technology Development Zone. The main effect, according to Ramesh (2013), is that since 2008, the education and research sector has made the biggest contribution to China's GDP.

However, doubts have been raised that the scale of the economic contribution made by returning students is to some extent dependent on whether they have studied in a developed or a developing country. Kim (1998) claims that there is a significant association between the number of students educated in developed countries and the per capita GDP growth rate, but no such association for students attending HEIs in developing countries. This suggests that sponsors should take into account the knowledge gap that exists between the home (their own) and the host (the chosen destination) country when deciding where to send students. Scholars sent to study in a country where the knowledge gap is big are more likely to be able to make a significant contribution to HE and the economic development of their own country upon their return.

Many academics from developing or emerging economies choose to study at Western universities because they know they will be regarded as better trained, especially if they come back holding a doctorate degree (Shin *et al.*, 2014; Ramesh, 2013). Home universities seeking to appoint staff do indeed appear to give priority to candidates who have completed their studies at Western universities, partly because they assume that these candidates will have better foreign language skills (Finn, 2007), making it less necessary for them to employ native English speakers (Postiglione, 2013). Research also indicates that academics with limited foreign language skills find it difficult to use online databases (which tend to be in English) for research and teaching purposes (Elgllab and Shehata, 2017), though the extent to which returning scholars are more likely to use international sources in their teaching and research is yet to be determined. Nevertheless, the importance of language skills in building university human capital is highlighted by Ahmed (2015, p. 142), who states that

> "Some of the existing challenges of developing world-class university in Egypt are language, research, infrastructure, the absence of a national program for the development of top institutions…..lack of public investment in scientific research capacities."

It is also unclear whether holding a doctorate from a foreign university makes an academic more productive than their peers who hold an equivalent degree from a domestic university. In their study, Shin *et al.* (2014) found Malaysian returnees to be less productive than domestic doctorate holders, especially in the scientific disciplines. This could be attributed to a number of factors, including returnees' difficulty in readjusting to their home country environment, the challenge of establishing networking connections, and differences in academic culture (Vandermoere and Vanderstraeten, 2012). All this should be considered on top of other factors that can limit the productivity of all academics, whether home- or foreign-educated, such as bureaucratic rules, lack of research funding, political factors, a flawed academic environment, a heavy teaching load and poor HEI infrastructure. These were all identified as barriers inhibiting the contribution of returning scholars in Turkey (Celik, 2012a). Shin *et al.* (2014) argue that research productivity depends primarily on understanding the local context and that those who have studied abroad may need to be re-socialised into their domestic research environment before they can put what they have learned abroad into use. They argue that in fact, research productivity is becoming more important than having a foreign doctorate (Shin *et al.*, 2014). The issue of whether foreign-educated scholars are more productive than those holding domestic degrees demands further investigation, particularly from the perspective of HCT. Key to this investigation is understanding how returning academics contribute to their HEIs and non-academic organisations across the various knowledge dimensions.

2.4 Dimensions of knowledge

There have been numerous attempts to define the concept of knowledge. Bennet and Bennet (2008) define it simply as the creation of the human brain, but others have sought to differentiate between explicit and tacit knowledge. Explicit knowledge may be printed (e.g. in books, databases etc) (Godfroid, 2016; Addis, 2016) or verbal (Chuang, Jackson and Jiang, 2016), and its sharing and management have been made easier by advances in ICT (Panahi, Watson and Partridge, 2012). Tacit knowledge, on the other hand, has been defined as "personal know-how primarily acquired through education, training and experience" (Addis, 2016, p. 441). This kind of knowledge plays a key role in developing individual and institutional productivity, but its unstructured nature makes it harder to manage (Panahi, Watson and Partridge, 2012). The importance of tacit knowledge is highlighted by Rahman *et al.* (2018), who argue that a lack of tacit knowledge among university faculty members is likely to inhibit KE between academia and non-academic communities and lead to national resources being under-utilised.

Investment in knowledge can potentially impact on three areas of academic performance: knowledge transmission (that is, academics' teaching, research and administrative activities), knowledge dissemination (their scholarly publication productivity) and knowledge exchange (their collaboration with external stakeholders). These three dimensions collectively represent academics' achievement and contribution and provide a framework for assessing the extent to which the Libyan government's investment in the study abroad programme is enhancing human capital and knowledge in the country's

HEIs. A number of studies have sought to investigate the output of academics within a single dimension (Torrisi, 2014; Kwiek, 2016), but as these studies have been unable to capture the full range and complexity of academics' activities, their findings have been of limited use to policy makers. Exploring the role of returning scholars in Turkey's HE sector, for example, Celik (2012b) concludes that further investigation is needed "on a broader scale in order to inform the country's academic policy makers and educational planners of the most pervasive problems and identify the steps that are needed to bring about appropriate and practical solutions" (p. 68).

Despite this recognition that a more multidimensional exploration is necessary to provide policy makers with the information they need, only a few studies have adopted this approach. Landry *et al.* (2010), for example, looked at number of publications, teaching hours and academic engagement (i.e. patenting, spin-off and consulting activities) to explore how academics manage their portfolio of KT activities. In a survey of 1,554 researchers aimed at assessing the extent to which their teaching load, publication record and academic engagement activities were complementary, mutually exclusive or independent, the authors found that publication, consultancy, spin-off and patenting activities tended to be complementary and mutually supportive, whereas publication and teaching tended to be mutually exclusive. No association was observed between teaching and academic engagement. They note, however, that the study was inherently limited in its use of a single data-collection method (survey questionnaire) and suggest that multiple methods should be used in future studies. Further investigation of the experiences of academics from other disciplines such as biomedical and social sciences, and of the level to which academics engage formally (i.e. on behalf of their university) and informally (i.e. without telling their university) with non-academic organisations is also recommended.

In another study exploring different dimensions of knowledge, Hassan, Tymms and Ismail (2008) employed an online questionnaire survey to investigate the productivity of academics in six public universities in Malaysia. Productivity was assessed in terms of teaching (hours taught and number of undergraduate and postgraduate students taught and supervised), research (number of papers published) and administration (number of tasks assigned to the participant). The information gathered was then compared with the information provided in the self-assessment forms the respondents had completed reflecting on their own productivity. The results indicated that academics spent significantly more time on teaching than research or administration. This trend was even more marked among female academics, particularly those working in the social sciences. Like Landry *et al.* (2010), Hassan *et al.* (2008) used only a single, quantitative method, limiting the scope of their findings; unlike Landry *et al.* (2010), this study failed to account for academics' engagement with non-academic communities. Finally, Torrisi (2013) also employed a survey to assess academic productivity across a range of activities including publication, academic position, consultancy and teaching. In contrast to the previous studies, Torrisi concludes that academic productivity is a function of multiple dimensions, though he does not provide a clear explanation of how these dimensions are correlated. Once again, this might be attributed to the quantitative approach being the only method used for data collection and data analysis.

Notably, previous investigations have not considered faculty members' academic productivity (whether they have been educated domestically or overseas) from the perspective of HCT or knowledge investment. However, the growing importance of the KBE makes it even more important to understand the scope of this productivity and the factors affecting it. Accordingly, this study compares the productivity of academics who have been educated in Libya, in developing countries and developed countries[1] across three dimensions of knowledge (KT, KD and KE). In order to capture a more comprehensive picture, it also considers other variables that might have an impact on academic performance. Lee and Jung (2017), Jung (2012), Hemmings and Kay (2010) and Bland *et al.* (2006) examine a range of variables that may affect the productivity of academics including gender, discipline, experience, institution size, race, academic position and age. Hill *et al.* (2015) argue that academic productivity is affected by gender, academic rank, age, research experience and advanced degrees, workload, research collaboration, funding support, and institutional characteristics (Dundar and Lewis, 1998; Toutkoushian and Webber, 2011; Amory *et al.*, 2017). Academic training, especially that offered within doctoral programmes, can also be a key determinant of future academic activity (Enders, 2005), though this has not been fully investigated; Shin *et al.* (2014, p.

[1] The UN classifies countries as developed or developing (see Appendix D) according to a set of economic measures including GDP, GNP, standard of living, industrialisation and per capita income (Surbhi, 2015). Overall, developing countries lack technological infrastructure and have a low HDI score compared to developed countries.

470) observe that “the research training process is less well-known, and until now, researchers have considered it a black box”. This study addresses this limitation by investigating the impact that country of study or training, in conjunction with gender, academic discipline and academic rank, have on returning academics’ productivity in three dimensions of knowledge.

2.4.1 Knowledge transmission (KT)

In order to be able to make a contribution, academics must first of all be at the level where they are able to participate; they need to have the knowledge themselves before it can be passed on to others. While many academics choose to qualify and take up posts within universities in their home country, an increasing number seek to advance their studies in universities abroad. Academics from many developing countries in particular are eager to take advantage of the knowledge that the Western education system (that is considered to be better established) has to offer. When they return, these academics can transmit their knowledge and contribute to their HEIs through a range of educational activities including teaching, supervising students at different levels, and getting involved in administrative work.

2.4.1.1 Educational activities

In most instances, those who have recently graduated, whether at home or abroad, will find that their university employers require them to teach, supervise and do administrative work. This is, therefore, the first test of their achievement and contribution; they must transmit their knowledge to others. In the case of returning scholars, this is their opportunity to maximise the return on the government’s investment in their overseas education by passing on what they have learned to their students (Schultz, 1961).

If they are to carry out all their responsibilities and be productive, academics need to use their time wisely, especially given the increasing workloads in the HE sector (Tight, 2010); Vilkinas (2008) notes that the number of students enrolled in HE is growing and, as a result, academics are required to teach and supervise more students at both undergraduate and postgraduate levels. The heavy workload has been demonstrated by a number of researchers; data gathered in 13 countries reveals that, on average, academics spend 48.4 hours per week on educational activities (that is 19.6 hours on teaching, 15.7 on research, 7 hours on administration, 3.2 on service and 2.9 hours on other tasks)

(Bentley and Kyvik, 2012). McInnis (2000) found that 40% of the academics in Australia work more than 50 hours a week on average, while Botha and Swanepoel (2015) found that lecturers spend more hours in teaching (M=24.91, SD=5.82) than senior lecturers (M=22.43, SD=6.20) associate professors (M=16.91, SD=7.56) and professors (M=17.06, SD=6.91).

Hornibrook (2012) introduced the workload allocation model which he defined as "formal systems or schemes that seek to categorise, measure and allocate work to academics at the departmental level, in order to ensure transparency and equity" (p. 30). This was subsequently revised by Botha and Swanepoel (2015) to comprise four core elements: 1) teaching measured by time spent in lectures, number of students enrolled in the course; 2) administration duties (written reports, meeting attendance and external programme evaluation); 3) scholarly publications and supervision productivity (number of undergraduate and postgraduate students having successfully completed their course); and 4) community engagement (academics acting as editors, co-editors, external or internal examiners, number of research projects, grants and consultancy activities). However, a major criticism of this model is that it fails to consider a wide range of academic engagement (KE) being an important role in academia (this issue will be further discussed in the section KE i.e. the third dimension of knowledge identified). Also the authors used a single method – quantitative approach.

Although some theorists perceive teaching and research as interrelated, in the sense that teaching broadens the scope of an academic's focus (Jenkins, Breen and Lindsay, 2003), others maintain that they are separate activities, and that researchers and teachers need different attributes (Ramsden and Moses, 1992; Kwiek, 2015). Horta, Dautel and Veloso (2012) claim that the process of knowledge construction is enhanced by teaching activities, with classroom dynamics promoting enquiry and the exploration of ideas, while Walckiers (2004) and Colbeck (1998) suggest that research and teaching skills can be mutually supportive. However, Leisyte, Enders and De Boer (2009), in their study of English and Dutch academics, observed some tension between the two roles, with academics being keen to avoid teaching only positions. Status appeared to be a consideration, especially in the UK, where the view was that less productive researchers are often confined to teaching (ibid).

Teaching is regarded as one of the fundamental duties of an academic, but a heavy teaching load allows limited time for research. Female academics in particular are likely to have a workload that is heavily weighted towards pastoral care and teaching, leaving them fewer opportunities for research than their male colleagues (Barrett and Barrett, 2011; Marchant and Wallace, 2013). Link, Swann and Bozeman (2008) report that female faculty members appear to spend more time on administration and less time on research than male faculty members. They also identify a link between academic rank and the proportion of time spent on teaching, with associate professors spending most of their time on teaching at the expense of research, and professors spending more time on managerial issues than on either teaching or research (ibid; Kwiek, 2015). It should be noted that the above studies focus primarily on the impact of teaching activities, particularly a heavy teaching load, on research without considering other factors such as HE policy, postgraduate training and institutional factors (e.g. facilities and services).

Assessing the quality of academics' teaching output is difficult. A study aimed at exploring the educational commitment of 1,474 academics in Italian universities concluded that simply counting teaching hours does not provide a real picture of productivity since the data gives no indication of the quality of that teaching (Torrisi, 2013; Torrisi, 2014). The authors recommend that teaching productivity should be evaluated by qualitative methods, taking into account issues such as the level of internationalisation displayed or the academic's willingness to act on feedback from students. The validity of student evaluations, which are widely used as a measure of teaching effectiveness (Balam and Shannon, 2010), has been questioned on the grounds that students may not be best placed to judge whether the teaching session is giving them the knowledge they need (Spooren, Brockx and Mortelmans, 2013; Sulong and Hajazi, 2016). Their judgement and, in turn, their feedback may be influenced by the teacher-student relationship, which has been shown to be one of the main aspects rated in feedback questionnaires (Moreno-Murcia, Torregrosa and Pedreño, 2015). Finally, attendance rates may also serve as an indicator of productive teaching if we accept that poor quality teaching attracts fewer students to class (Torrisi, 2013). Hassan *et al.* (2008) and Dhillon, Ibrahim and Selamat (2015) use the number of students attending classes, along with the number of students supervised at undergraduate and postgraduate levels, to quantify the educational productivity of faculty members.

On the question of postgraduate supervision, Vilkinas (2008) found no significant difference between male and female academics, though Botha and Swanepoel (2015) argue that male scholars spend more time on supervision than their female peers. Wamala and Ssmbatya (2015) report that academics in developing countries appear to be highly productive in terms of teaching and student supervision; in Uganda, for example, all faculty members are required to perform both duties, with PhD holders and experienced staff in particular being given more supervisees and teaching hours. The corollary of this, however, is low scholarly output productivity. The situation in many developing countries is exacerbated by a shortage of academic staff for the number of students enrolled (Tettey, 2010); this shortage of faculty members increases staff teaching and supervision workload at the expense of scholarly productivity. Jung (2012), however, takes a more optimistic view, arguing that having a high number of postgraduate students can positively affect research activity and scholarly productivity by facilitating academic-postgraduate collaboration.

Academics' supervision skills play a key role in postgraduate students' success (Buttery, Richter and Leal Filho, 2005; Pearson and Brew, 2002; Latona and Browne, 2001; Vilkinas, 2008); as Pearson and Kayrooz (2004) point out, supervisors need to have a full understanding of research methodology, management and interpersonal skills and be able to collaborate with and mentor their students. Lack of experience on their part can affect the output of a student's project, but they may also have to deal with the student's own lack of research skills (Lee, 2008; Lumadi, 2008; Mutula, 2009). Boikhutso, Dinama and Kebabope (2013) therefore conclude that potential supervisors should have expertise in the relevant field, while Kincheloe (2001) and Franke and Arvidsson (2011) say they should be well-trained and hold academic qualifications from well-known institutions. Academics tend to supervise their students the same way they themselves were supervised (Lee, 2008). If this was in a well-established foreign HEI, they are more likely to approach the task with self-confidence when they return home (Boateng and Thompson, 2013). Academics' ability to supervise postgraduate students effectively can also be impacted by institutional factors such as the availability of equipment and facilities (Crosta and Packman (2005) explain that applied sciences need more equipment to run PhD programmes than social sciences), poor university infrastructure and complex bureaucracy (Boikhutso, Dinama and Kebabope, 2013).

Low-quality supervision, combined with poor research skills on the part of students, is likely to affect supervision productivity in the long term. Little is known, however, about the impact of studying abroad on this productivity. The current study seeks to obtain data which will help to address this gap in the literature, focusing specifically on academics in Libya. It takes into account the country in which academics completed their postgraduate study (be it their home country, a developing country or a developed country) alongside gender, academic discipline and academic rank in order to produce evidence for the guidance of university managers and HE policy makers.

2.4.2 Knowledge dissemination (KD)

Kingston (2012, p. 160) defines KD as “distributing knowledge to those who may need it – it is therefore a crucial part of knowledge management”. Knowledge management has, in turn, been defined as “a conscious strategy for moving the right knowledge to the right people at the right time, to …. improve organisational performance” (O'Dell, Grayson and Essaides, 1998, p. 6). Prinsloo, van Waveren and Chan (2017, p. 1) describe KD as “a part of the knowledge exchange process” in that it pertains to the production of scholarly publications that are designed to be utilised by others. Dhillon, Ibrahim and Selamat (2015) emphasise that these publications are important for creating new knowledge and promoting innovation, which can then be practically applied to make a difference to economic outputs. However, as publishing in reputable national and international peer-reviewed journals is also an indicator of the quality of academic staff, it is also good for the reputation of the university (ibid). In some countries, this form of KD is so important that publication in high-impact journals is one of the main criteria for acceptance into a research university (Nordin, Daud and Osman, 2012); along with attendance at national and international conferences, it is considered a key performance indicator of research capacity at individual, institutional and national levels (Wamala and Ssembatya, 2015).

Publication in peer reviewed journals and participating in conferences is a kind of knowledge dissemination (Gagnon, 2011). Chai and Shih (2016) argue that KD by academics to non-academic communities is commonplace in many countries (though as Ion, Stingu and Marin (2018) point out, it is the joint responsibility of researchers and external stakeholders to put this knowledge to good use). However, much of the knowledge produced by researchers is never shared with external stakeholders (Cain and

Allan, 2017). Rogers (2003) identifies a number of factors that influence the dissemination of knowledge and research including the nature of the researcher or organisation involved, the nature of the research itself and the nature of the communication between the researcher and non-academic organisations. It has been argued that academia's ability to play a role in economic development depends largely on how academics engage with KD (Brew, 2010). Since the first step in delivering knowledge to end users is usually scholarly publication (Vanderlinde and van Braak, 2010), investing in human capital to improve scholarly publication productivity might be an appropriate way to facilitate the process of KD.

2.4.2.1 Scholarly publication productivity

The literature review indicates that many researchers assess research productivity in terms of publication in high-impact journals and/or number of citations (Pendlebury, 2009); fewer researchers have looked at other forms of dissemination such as books, book chapters, technical reports and translations. This concentration on journal articles may reflect the fact that this particular form of productivity is more likely to influence decision making around promotions, grants and awards (Tien, 2007; Sabatier, 2012; Wamala and Ssembatya, 2015), but as Caminiti *et al.* (2015) point out, it fails to take into account other activities such as research-led teaching and peer reviewing (Smith, 2001). Wootton (2013) proposes that productivity should instead be assessed in terms of peer-reviewed publications, research funding and PhD supervision as all of these activities strengthen academics' research skills and foster their continuing professional development (CPD), which, in turn, improves the quality and acceptance rate of their research. Wamala and Ssembatya (2015), meanwhile, point out that the number of students that an academic supervises can have a direct impact on the number of co-authored publications they produce, but that those who spend most of their time teaching are likely to find it harder to produce any publications at all.

Analysis of publication patterns shows that a large proportion of scientific papers are in fact written by a small number of academics, and that the majority of researchers publish only once (Aksnes, 2012). There are several variables that can affect publication productivity rates. Aksnes *et al.* (2011) highlight the effect of academic rank on publication productivity, reporting that in their study, regardless of gender, professors were the most prolific writers and PhD students were the least. It has been suggested that this may be because the former have more time for research and find it easier to access funding (Kyvik, 1991). Omer (2015) notes that senior academics are more likely to publish in international high-impact journals as a kind of self-fulfilment, though Sabatier (2012) found that publication productivity among French academics declines when they reach the rank of professor, suggesting that the promotion system has a detrimental effect in this regard. Citation frequency does not appear to equate to the number of papers published, with post-doctoral academics being the most cited and associate professors being the least cited (Aksnes *et al.,* 2011). This is probably why post-doctoral candidates are more likely to have their research proposals carefully scrutinised. Admittedly, much uncertainty still persists about the extent to which publication productivity and promotion can be associated. The current study seeks to reduce this uncertainty by investigating the effect that academic rank has on the publication productivity of foreign-educated scholars returning to Libya.

Several studies have explored the link between publication and demographic variables such as age, academic experience, gender and family background. An association has been found between productivity and age, though results have been mixed; on one hand, Stephan and Levin (1992) suggest that younger academics are keener to publish because they see this as a way of proving themselves to colleagues and earning promotion, while on the other, Barjak (2006) and Gonzalez-Brambila and Veloso (2007) suggest that the number of publications tends to increase with age, reaching a peak around the age of 50-60 and then declining (Aksnes *et al.*, 2011). Results have also been mixed in terms of citation rates; Costas, Van Leeuwen and Bordons (2010) suggest that they seem to be higher for researchers under 40, but other studies have found that papers by older writers are just as frequently cited as those by their younger peers (Over, 1988). This suggests that other factors (e.g. rank, which may itself be linked to age) can have an impact on the number of citations.

In terms of gender, females have been found to publish up to 40% fewer papers than their male counterparts (Aksnes *et al.*, 2011). This has been attributed to women being given more teaching responsibilities, but it has also been suggested that they may be less inclined or able to devote time to research because of family responsibilities (Carr *et al.*, 1998). Their rank may also have an influence on their publication output; female academics in the early stage of their career publish less than their male peers, but this publication gap reduces at the higher ranks (Hill *et al.,* 2015). Although the evidence suggests that male academics are more engaged in KD than female academics, some signs of a potential change in gender-based publication trends have been identified by researchers. Bentley (2012), examining the publication productivity of academics in Australia over the periods 1991-1993 and 2005-2007, observed a statistically significant difference in 1991-1993, with male academics authoring and editing more books and publishing more articles than female academics, but no difference in the number of books authored and edited in 2005-2007 (though men still published more articles than women). Researchers investigating gender differences in research productivity have also noted the significance of academic discipline, though there appears to be no clear relationship between the three variables; Tao, Hong and Ma (2017) found that female scientists in the USA publish less than their male peers, while female engineers in China publish more than their male peers, and Mayer *et al.* (2017) found no statistically significant gender differences at all in the publication patterns of urologists at 124 academic institutions in the USA.

Research exploring the influence of educational background indicates that academics who have graduated from top universities are likely to be more productive (Buchmueller, Dominitz and Hansen, 1999; Turner and Mairesse, 2003) than those who have received poor or inadequate training. A lack of research skills may prevent academics from producing scholarly publications and participating in the KD process. This is an issue of concern in developing countries; Shirazi (2011) notes that it is the reason why academics in Saudi Arabia find it hard to publish in ISI journals, while Suwaed (2017) describes it as a major barrier to the production of real knowledge in Libya. Tashani (2009) claims that many faculty members in Libyan HEIs are not even aware of the national and international funding that is available for research.

The above studies highlight some of the difficulties involved in quantifying productivity. Rossi (2014) observes that universities with strong social science or humanities programmes may exhibit a range of KD activities that go beyond the accepted range of scholarly publications, conference participation and commercially productive activities such as the generation of patents and copyrights (D'Este and Patel, 2007). Furthermore, in many cases, activities such as technical reports and scholarly translation may not even be counted as examples of KD. It might also be argued that any comparison of publication data could be misleading unless the data is broken down by country of study. Further study is required to determine the extent to which country of postgraduate study affects KD, and whether this impact is associated with other variables such as gender, rank and academic discipline.

2.4.2.2 Challenges in developing economies

As developing or emerging economies become more dynamic, their tertiary systems are being forced to expand rapidly to meet the growing demands of industry; however, concerns have been raised about the extent to which these universities are actually preparing graduates for positions of responsibility (Din and Samsudin, 2004), and many continue to see them, and the graduates they produce, as second rate (Hassan, Tymms and Ismail, 2008).

If assessing academic productivity is complex in developed countries, it is even more so in developing economies (Sheikh and Mohamed, 2015). Empirical research has focused on comparing the publication productivity of academics holding foreign doctorates with those holding domestic doctorates (Shin *et al.,* 2014) and exploring the factors that influence this productivity, such as rewards (Braxton, Luckey and Helland, 2002), resources (Smeby and Try, 2005) and disciplinary field (Piro, Aksnes and Rørstad, 2013; Shin and Cummings, 2010). While Shin *et al.* (2014) found no difference in productivity between the two groups, others appear to suggest that academics holding foreign doctorates are more likely to develop collaborative connections with the international scientific community and thus become more productive (Horta, 2009; Jonkers and Tijssen, 2008). Al-Ohali and Shin (2013), for example, note that there has been a significant increase in the number of papers being jointly authored by foreign-educated academics in Saudi Arabia and their international peers, especially in fields such as oil and gas research. Alzuman (2015) also reports that foreign-educated Saudi academics produce more scholarly publications such as book chapters, books and translations than their domestically educated peers. In Arab countries, for example, research output is generally low (Zyoud and Fuchs-Hanusch, 2017; Sweileh *et al.,* 2014). This was confirmed by Abouchedid and Abdelnour (2015), who surveyed scholarly output across universities in six Arab countries, counting the number of articles published in Arab and foreign journals, the number of books and book chapters written in Arabic and other languages, and the number of conferences attended. Heavy teaching loads are partly to blame (a challenge that is exacerbated by the rapid expansion in student numbers and the shortage of qualified academic staff), along with the lack of an established research environment (Wamala *et al.,* 2015) and lack of strategic planning to secure research funding (Anderson, 2012; Dhillon, Ibrahim and Selamat, 2015).

The low level of R&D investment typically found in developing countries is another challenge to academics' research productivity. A positive correlation has been suggested between the level of investment in R&D activities and the number of articles published in international journals (Shin, 2009; Chang *et al.*, 2009). Research evidence points to an increase in R&D investment in Libya (though according to Tashani (2009), it remains low compared to other countries) and a parallel increase in publication output (Al-Ohali and Shin, 2013). The fact that no similar upturn has been observed in other Arab states suggests that the level of R&D investment in these countries is still too low to make a noticeable impact on scholarly contribution (El-Hawat, 2007). The suggestion of a recent change in scholarly output among Libyan academics makes the current investigation particularly timely, as it may offer insights into the ways in which the investment in sending scholars abroad is contributing to this change. Finally, a study conducted in Norway by Kyvik and Aksnes (2015) revealed that when the government reduced its funding for research, Norwegian academics had to go looking for alternative funding sources in industry. It is unclear whether the inability of scholars in developing countries like Libya to secure non-governmental sources of research funding is a reflection on their own academic performance or the industrial infrastructure of these countries.

2.4.2.3 Barriers associated with scholarly productivity

Numerous studies have attempted to examine the factors that affect the scholarly output of academics, exploring variables such as academic rank (Abramo, D'Angelo and Di Costa, 2011), gender (Fotaki, 2013), age (Hill, 2015), institutional size (Zhang *et al.*, 2017) and promotion (Sabatier, 2012). Dhillon, Ibrahim and Selamat, (2015) identify the factors having the strongest effect on scholarly publication among Malaysian academics as being research experience and academic position followed by research environment (particularly access to research funding) and internet connectivity. This last variable is particularly significant in developing countries; Okiki (2013) also found that publication productivity in these countries is higher in universities with internet access than in those without. Such findings signal to university managers the importance of improving HEI infrastructure to raise scholarly output and expand KD.

Another major obstacle facing academics who wish to publish in international journals is the language barrier; the requirement to publish in English can be a major challenge for academics with a different mother tongue (Flowerdew and Li, 2009; Jiang, 2014). This may be one reason why academics in developing economies such as Vietnam have very low productivity in terms of international publication compared to academics in other countries (Pho and Tran, 2016). This can be a major concern for universities in these countries, as their ranking in the global league tables (and thus their ability to attract new students) depends on research outputs (Davis, 2016). Academics who have not studied in an English-speaking environment are expected to master an advanced level of academic English, but many, particularly in MENA countries, may have few opportunities to engage with native speakers (Rababah, 2001). Even in English language classrooms, there is still a tendency in these countries to use Arabic for communication (Jdetawy, 2011). When Al-Khawaldeh, Bani-Khair and Al-Edwan (2016) interviewed 20 university lecturers in Jordan with postgraduate degrees in subject areas other than English, they found that these lecturers faced two major challenges when using English: i.) their limited vocabulary meant they lacked fluency and consequently the self-confidence to engage in conversation with English native speakers; and ii.) when writing, they tended to think in Arabic and translate into English. The differing grammar systems meant the results were often awkward or inaccurate.

Poor English proficiency can also deter academics from participating in conferences, many of which adopt this as the medium of communication (Almansour, 2016; Almansour and Kempner, 2015). Al-Khawaldeh, Bani-Khair and Al-Edwan (2016) suggest that Arabic speakers need to become more motivated to improve their English, and that the best way to do this is by joining the international academic community. This lack of motivation has long been seen as a major barrier to English language proficiency (ibid; Rababah, 2002), having, in turn, a significant impact on professional development. In an increasingly globalised world, academics need to be aware of the latest research, attend conferences, and read books and papers to keep up with the recent developments in their area of expertise. Given that all this requires a good command of English, it is clear that academics who are not confident enough to use English to communicate will fall behind in developing their professional competence. Acemoglu and Autor (2011, p. 3) define human capital as "any stock of knowledge or characteristics that a worker has (either innate or acquired) that contributes to his or her 'productivity'". Investing in helping academics to develop their language proficiency can only add to this productivity.

Female academics, regardless of where they study, face another barrier to their scholarly publication productivity: a heavier teaching load. Aiston and Jung (2015) point to a significant gap in research productivity between male and female academics in Japan, which they attribute to female academics being assigned more teaching hours than their male counterparts, leaving them less time to devote to research. This difference in workload may reflect a bias against women in terms of teaching duties and responsibilities (Kwiek, 2018). Similar findings were also reported by Gonzalez-Brambila and Veloso (2007), who note that female academics in Spain spend more time teaching than their male peers, who spend more time carrying out research activities. Publication productivity is a strong indicator for promotion to senior positions (Morley, 2015; Garwe, 2015), and scholarly publication (number of journal articles published) is the most visible expression of such productivity (Litwin, 2014). This could be a plausible explanation as to why fewer female academics reach the top ranks of the academic hierarchy. Interestingly, the significant difference in research productivity (male academics published more than their female peers) identified by Hedjazi and Behravan (2011) disappeared when the academic rank variable was controlled. In the MENA countries, female academics face additional religious and sociocultural barriers; for example, they may not travel abroad to participate in conferences without a male relative (Naser, Rashid Mohammed and Nuseibeh, 2009).

The bureaucracy and administrative duties imposed on academics have also been identified as stress factors which can significantly affect academic creativity and research productivity (Vella, 2016). In other words, it has been argued that the time spent completing paperwork can prevent academics from producing work intended for publication. Ramsden (1998) goes further, asserting that the increased administrative burden being placed on academics in UK universities appears to be having an adverse effect on the academic performance of students, despite the fact that much of this burden involves tasks such as student consultations and pastoral care. In a survey carried out by the University and College Union (2016), 83% of its UK members reported a marked increase in their workload over the previous three years. In terms of time, 13.4% of early career academics were found to be working more than 95 hours per week, while professors averaged 56.1 hours per week. Little difference was observed between genders (University and College Union, 2016). This means that academic staff are left with limited time for other activities such as conference attendance, networking and research, all of which foster productivity.

Lack of time is commonly cited as a possible explanation for low scholarly productivity. A survey of 148 academics in Vietnam revealed that while almost all perceived research and publication to be important (Pho and Tran, 2016) and were actively engaged in action research to improve their teaching practice, they found writing up (i.e. drafting papers for publication) to be too time-consuming. Those most interested in research and publishing were academics holding a PhD degree. Besides time constraints, lack of funding and difficulties in finding receptive journals were identified as the main obstacles to publication. The Vietnamese academics also explained that they often had trouble accessing journals for referencing purposes. The same finding was reported by Alzahrani (2011) in his study of academic staff in Saudi Arabia. This suggests that not all university libraries provide access to a wide range of scientific journals or electronic databases.

Frustration at having to confront these barriers discourages many academics from attempting to expand their research productivity by building networks and collaborations with external stakeholders. However, such networks and collaborations, and the exchange of knowledge that they facilitate, are becoming an increasingly important funding stream for universities. This dimension of academic contribution is discussed in the following sections.

2.4.3 Knowledge exchange (KE)

The exchange of knowledge between academic and non-academic communities, being of potential benefit to both sides, has attracted much attention from academic researchers and policy makers (Rothaermel, Agung and Jiang, 2007). Various terms have been employed over time to describe the collaboration between academics and partners from the non-academic community. Molas-Gallart *et al.* (2002) use the term "third stream activities" to describe these interactions, which may involve a wide range of activities from consultancy and student internships to joint development of IP or commercial ventures. Perkmann *et al*. (2013) explain that the term "academic engagement" is used to cover different levels of collaboration including formal activities such as contracted and collaborative research and consultancy, and informal activities such as networking with practitioners and providing ad hoc advice. Davies, Nutley and Walter (2008) suggest that the academic-non-academic relationship is best described simply as "knowledge interaction". Barker (2015) notes that, in Australian universities, the term "knowledge transfer" was in use until 2008, when it was replaced by "university engagement". He argues that

> "One of the biggest challenges in the engagement agenda has been winning understanding and acceptance of the vocabulary of engagement, both internally and externally, in what is still an emerging discourse." (p. 2)

That the discourse is still being shaped is reaffirmed by Watson and Hall (2015), whose interviews with academics and managers from five UK business schools revealed that there is no commonly accepted definition for "third stream". Their respondents saw this as both a source of confusion and a sign of a lack of academic commitment to addressing the issue. A commonly understood and accepted terminology is essential if the nature of the relationship between academic and non-academic parties is to be clearly understood by all involved. Knowledge transmission implies a one-way relationship in which knowledge is produced by academics and passed on to others; in the case of knowledge exchange, however, the relationship is reciprocal with ideas moving from academia to business or society and other kinds of knowledge (e.g. based on practical experience) or resources coming back in return. "Knowledge exchange" is the term used in the current study as this explicitly recognises the collaboration between academics and external stakeholders, and the engagement that is required from both sides.

Few universities offer incentives to faculty members to actively engage with the industrial sector (Kantor and Whalley, 2014; Youtie and Shapira, 2008; Bramwell and Wolfe, 2008; Yusuf, 2008) despite the fact that when they do (e.g. by providing training to company employees or collaborating on research projects), this engagement can also benefit their own students by enriching the teaching curriculum and affording new opportunities for PhD candidates (Wright *et al.*, 2008). Nilsson, Rickne and Bengtsson (2010) identify a number of factors that encourage academics to engage with non-academic organisations, including the chance to secure research funding, the prospect of private financial benefits, contractual requirements and personal connections. Ponomariov and Boardman (2008) report that these informal, personal connections are the main factor encouraging academics to work with researchers from the private sector. In a survey of 22,170 participants from UK universities, Abreu *et al.* (2009) found that the most powerful motivators were the opportunity to explore a new research area/project, to test theoretical research in a real-world organisational context, and to keep up to date with commercial/industrial practice; personal income was the lowest-ranked motivator. Engineers were the most enthusiastic about engaging, while academics from the arts, humanities and social sciences were the most likely to see it as having an impact on their teaching activities. It should be noted, however, that the study collected only quantitative data, which does not allow for more in-depth exploration.

In economic terms, there seems to be an explicit relationship between the research activity undertaken at university level and local industry. Research evidence suggests that the "knowledge spill over" from HE has a statistically significant effect on the local economy when academic research is technologically aligned with local firms (Kantor and Whalley, 2014). However, where research productivity is low, either because of R&D funding limitations or lack of competent researchers, there is less likely to be an association between HEI activity and local economic development (Gulbrandsen and Smeby, 2005). In their Kenya-based study, for example, Bailey, Cloete and Pillay (2013) report that the University of Nairobi has a very weak relationship with its external stakeholders (industry, small businesses and community).

Furman, Porter and Stern (2002) argue that two main factors affect the rate of innovation in a national economy: the accumulation of knowledge and the level of R&D targeted at ideas production. Investing in national innovation by improving the quality of domestic HE is a key factor in shaping human capital, but, while public funding for research can contribute to the general innovation infrastructure of the country, the private funding supplied by external stakeholders can have a direct impact on innovation in the industrial sector (ibid). Hence, the collaboration of HEIs with external stakeholders in the form of research funding, contracts and collaborative research agreements has the potential to contribute significantly to the economic development of the country. The importance of establishing and maintaining such external partnerships and funding sources is highlighted in the model of university R&D inputs and outputs introduced by Kopf (2007) (see Figure 2.1). The development of this model has been informed by EGT (Romer, 1990). It suggests that ideas and R&D are the result of investing in human capital (i.e. training researchers) and the intellectual activities performed at university level.

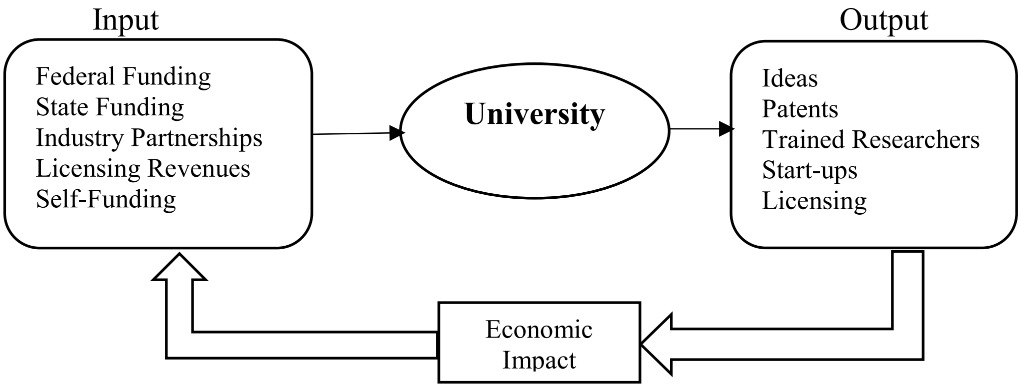

Figure 2.1: Model of university R&D input and output

Source: Adapted from Kopf (2007)

Figure 2.1 indicates how input sources such as funding (either federal or state) and industry partnerships can fuel university R&D, which can, in turn, drive economic development through outputs such as ideas, patents and trained researchers (Kopf, 2007). However, Kopf (2007) also notes that most of the knowledge produced by university scholars never leaves the library, suggesting that its impact on economic growth is far less than it could be. Therefore, money spent on R&D and technology by both private and public firms could be perceived as a clear indication that higher education is considered to be a key factor to increase economic development. This might be attributed to the fact that higher education plays a major role in the progress of research and the advancement of technological knowledge. If more of the knowledge produced in universities is to have an impact on society, it may be necessary for researchers to place less emphasis on their traditional roles of teaching and pure research and to engage more with external stakeholders in contracted or collaborative research activities (Cherednichenko *et al.*, 2001).

2.4.3.1 Academic involvement

As noted above, joint research projects with external stakeholders from either the private or the public sector can bring valuable funding into universities. Academics who wish to participate in such projects need to actively pursue potential opportunities through networking, but here too, female academics seem to be at a disadvantage. González

Ramos, Fernandez Palancin and Munoz Marquez (2015) suggest that female academics tend not to participate in activities that could help them develop new research projects, and that research groups led by male academics are much more likely to be successful in applying for research funding because of the male-dominated nature of the private sector. Perkmann *et al.* (2013) also found that high-ranking male academics find it easier to secure funding. As a result, they are able to publish more, which increases their chance of finding industry collaborators. Faulkner (2009) argues that women may be more interested in topics related to social development than technology, but this does not account for their lower academic profile in terms of research as a whole. A more plausible explanation is that many women find themselves in a cultural context which restricts their ambitions and opportunities, leading to a self-perpetuating cycle of low achievement and low self-confidence (González Ramos, Fernandez Palancin and Munoz Marquez, 2015). Whatever the causes of this gender gap might be, it is up to universities to make more effective use of their human resources by encouraging female academics to engage more with industry.

Most universities now engage in some sort of business partnership. These partnerships offer multiple benefits; not only do they provide vital economic support (Edmondson *et al.*, 2012) and foster innovation, but they also provide individual academics with opportunities to gain more practical and research experience (Watson *et al.,* 2014). For example, Rizzo (2015) reports that early career academics in Italy are more likely to create spin-off companies. Despite this, however, many academics seem to have little interest in collaborating with industry partners (Watson and Hall, 2014). Most tend to believe that their role as academics is to impart knowledge and to encourage young people to become independent thinkers – not to serve the interests of industry. Many academics, feeling that their role in knowledge production is being eroded (Gulbrandsen and Smeby, 2005), are uncomfortable with what they see as the commercialisation of their knowledge and refuse to work with industry despite the financial incentives being offered (Lach and Schankerman, 2008; Link and Siegel, 2005).

Perkmann *et al.* (2013) draw a distinction between commercialisation and academic engagement, arguing that while the former involves a form of academic entrepreneurship in the creation of intellectual property (IP) such as patents and licences, the latter is driven primarily by academic staff and their university or department. Commercialisation is usually profitable for universities (ibid), and they are under growing pressure to accept it as cash-strapped governments reduce funding for education and policy makers push for research to become more practically and socially oriented (Van Looy *et al.*, 2004). Even so, D'Este and Perkmann (2011) report that commercialisation remains the least likely driver for academics to engage with industry; most are more likely to be motivated by the opportunity to expand their academic profile in terms of research.

There is no doubt that, when it comes to research, academic-industry collaborations can benefit both sides (D'Este and Perkmann, 2011), for example by facilitating the transfer of technology, changing the role of academics (McKelvey and Holmén, 2010) and contributing to economic development (Etzkowitz and Leydesdorff, 2000). There is strong evidence that funding secured by academics from external stakeholders to conduct research has a positive effect on the development of local businesses (Kantor and Whalley, 2014), but the academic also benefits if their research produces technology that can be commercialised (Shane, 2004). The question of whether academic research should serve the purposes of commercial organisations or the public good is a one that universities still need to address (McKelvey and Holmen, 2010). Kantor and Whalley's (2014) findings are consistent with the argument that countries that invest heavily in developing research innovation and engagement with non-academic organisations in the HE sector can develop faster once complemented by investing heavily in physical capital (Riley, Michael and Mahoney, 2017).

Many universities seek to counterbalance the perceived evils of commercialisation by encouraging the pursuit of more socially-oriented goals, for example by establishing links with organisations to exchange knowledge that has social applications (Davies, Nutley and Walter, 2008; D'Este and Patel, 2007). By building networks with multiple organisations, universities avoid being manipulated into supporting a particular interest (Perkmann and Walsh, 2007; D'Este and Patel, 2007); they are able to work with partners but on their own terms (Davies *et al.,* 2008). They can also ensure the integrity of the resulting academic knowledge by not allowing it to be used solely for commercial purposes (which may benefit the business more than the university) but making it freely available to any practitioners who need it (Kingston, 2012).

Critics of the traditional view (that academic research is important for its own sake rather than any potential commercial application) argue that much of the research being conducted in universities is not relevant to business, and that some universities do not actually generate knowledge at all (Starkey and Madan, 2001). In other words, unless knowledge can be applied, it may not be seen as productive. This can be potentially problematic as it can have an impact on HE funding. However, as Weick (2001) points out, a lot of knowledge comes from research that seems to have no particular purpose at the time; it is only much later that its usefulness can be determined. The extent to which knowledge should be contextualised remains a matter of debate (Blackler, 1995). There is also disagreement over whether KE should be a one-way process, or whether it requires interaction to stimulate and create an exchange of ideas (Van de Ven, Andrew and Johnson, 2006). It can be argued that if no return is derived from the KE process, neither side has much incentive to collaborate.

A number of universities have policies and procedures in place to encourage academics to engage with industry (Perkmann and Walsh, 2007), though in some cases, the intention may simply be to ensure that they continue to update their knowledge and skills and avoid becoming too isolated in academia. It has been suggested, as already discussed, that most academics choose to collaborate with industry in order to pursue their research interests rather than financial gain (D' Este and Perkmann, 2010). That said, they, as much as the enterprise, are likely to benefit from the collaboration if the research project yields positive results (Shane, 2004). Where financial rewards are available, these are often split (through a royalty-sharing agreement) between the university and the individual academic (Bercovitz and Feldman, 2008). Some researchers have suggested that older academics are more likely than their younger peers to try and profit financially from their research activities (Owen-Smith and Powell, 2001; Stephan and Levin, 1992), though others argue that these academics are more likely to be motivated by the opportunity to enhance their reputation among their peers than by financial incentives (Göktepe-Hulten and Mahagaonkar, 2010). This seems to be true for academics in universities that are higher in the ranking tables (Lee, 1996), who perceive collaboration with industry as a way of obtaining funds for their chosen area of research, the results of which will be then made publicly available (Glaser and Bero, 2005). The opportunity to learn from the collaboration has been cited as another motivation for involvement with external partners. Rosenberg (1982) observes that academics who work with partners from industry often gain new insights from resolving the problems they encounter, or are able to access up-to-date resources that may not be available within the university (D'Este and Perkmann, 2010). Finally, some academics prefer to establish networks that will allow for collaborative partnerships with industry as this can provide them with opportunities to develop joint research activities (ibid).

The importance of KE to economic growth makes it vital that academics (no matter what their motivation for collaboration might be) approach external partners with the right attitude; this may necessitate them re-evaluating their role and the contribution they can make to society and the economic development of the country. It has been suggested, for example, that more focus needs to be placed on education for entrepreneurship (Kozlinska, 2012), and that university lecturers need to gain more industry experience if they are to properly prepare their students for the knowledge economy (Wilson, 2008). Saudi Arabia has been actively promoting HE-external partner research collaborations for a number of years, as this is perceived as the way forward for economic development (Al-Ohali and Shin, 2013). These collaborations, which focus mainly on geosciences, petroleum engineering and nanotechnology, involve Saudi universities working with international universities and industry partners (Al-Ohali and Shin, 2013). So far, however, there has been no investigation of the role foreign-educated scholars play in these kinds of collaborations in Saudi Arabia or any of the other MENA countries. The current study aims to obtain data for the Libyan context which will help to address this knowledge gap.

2.4.3.2 Stakeholder involvement

Stakeholders, for their part, may collaborate with academics for a range of reasons. If they are only seeking the solution to a particular problem, a simple transfer of knowledge from an academic may suffice, but if they wish to establish a more reciprocal relationship for the purpose of exchanging knowledge, they are more likely to pursue a longer-lasting partnership. They may also be encouraged to collaborate with an academic by his or her publication in high-impact journals (Olmos-Peñuela, Castro-Martínez and D'Este, 2014); Schartinger *et al.* (2002) report a positive association between international publication and consultancy activities.

This kind of knowledge exchange has long been encouraged in many countries, but it is only recently that researchers have begun to investigate the effectiveness of KE activities (Curi, Daraio and Llerena, 2012). Most studies have measured the productivity of these activities in terms of the IP created as a result of the knowledge exchange process (Rossi, 2014), though as Litan *et al.* (2007) point out, this measure is more relevant for the science-based disciplines. Siegel *et al*. (2003) argue that this approach may place universities with well-established hospitals or medical schools attached to them at an advantage, though others have refuted this argument (Curi, Daraio and Llerena, 2012). Nevertheless, there seems to be evidence (on the basis of this measure) that fields such as chemistry, biotechnology, information technology and engineering exhibit higher research productivity than other fields (Harabi, 1995). It is unclear whether the same holds true for developing countries; Zavale and Macamo (2016) report that in Mozambique, academic engagement with external stakeholders is weak and informal in both the social and pure sciences.

The fact that greater emphasis is placed on scholarly productivity in the physical and natural sciences may lead external stakeholders to believe that research in the social sciences and humanities is less valuable, though this is another question that has not been fully investigated. What is more, Robinson *et al.* (2016) claim that, even within the academic community, few researchers in the physical and natural sciences are aware of what their colleagues in the humanities could contribute, and that very often, opportunities for collaboration that could add value to research projects are missed. It could therefore be argued that greater interdisciplinary co-operation among academics would boost the benefits of academic engagement with external stakeholders for all parties.

That said, research evidence appears to suggest that different academic disciplines affect economic development to different degrees. For instance, Lin (2004) notes that engineering and the natural sciences seem to have a greater positive impact on economic growth in Taiwan than the humanities, with a slight increase in the number of graduates (1%) from social sciences, agriculture and engineering enhancing the economic growth of the country by 0.04%, 0.07% and 0.09% respectively. The study is unable to explain the reasons behind agriculture and engineering’s positive impact on economic growth because the methodology employed (econometrics) does not allow for an in-depth exploration of causality. The econometric model employs mathematical and statistical methods to determine whether there is a significant statistical relationship between variables without providing any explanation about the phenomena being assessed or the relationship that is identified. In contrast, the current study employs an explanatory, sequential, mixed methods design that goes beyond mere quantification of the association between the study abroad experience (as part of the investment in human capital) and returning academics' engagement with external stakeholders to explore the factors that may affect this association.

2.4.3.3 Barriers associated with academic collaboration

The consensus among researchers investigating academic collaboration with external business partners is that universities are key actors in economic and social development. Rosenberg and Nelson (1994) and Baldwin and Link (1998), for example, point out that firms seek opportunities to co-operate with academia as this can offer them early access to new technology and research as well as to highly skilled graduates. D'Este and Patel (2007) state that a healthy environment for engagement can be created if firms and policy makers understand the role of academics and the policies and procedures upon which HEIs operate. In the meantime, HEIs, especially those in countries with more advanced economies, are increasingly measuring their productivity in terms of KE activities rather than the traditional work of teaching and research (Pittayasophon and Intarakumnerd, 2017; Goel and Göktepe-Hultén, 2017; Branstetter and Ogura, 2005; Schibany *et al.*, 2000; Polt *et al.*, 2001). Notwithstanding this growing willingness to engage, however, academics and non-academic organisations can sometimes find the path to collaboration blocked by barriers. The current study aims to identify and explore some of these barriers.

Bradley *et al.* (2013) identify the most common barriers as being differences in background and culture, lack of incentives for faculty members, lack of qualified technology transfer office staff within universities, and high levels of bureaucracy. Ankrah *et al.* (2013) also point to the difference in culture, and more specifically the conflict between traditional university duties (i.e. teaching and research) and strict industry schedules, while Muscio (2010) notes that academics find it hard to build long-term relationships with industry because of the high personnel turnover rates and short-term approach to research planning displayed by the latter. Lambert (2003) echoes the findings of these authors in his conclusion that "Companies and universities are not natural partners: their cultures and their mission are different" (p. 14).

Exploring barriers to academic engagement in small and medium-sized enterprises, Karlsson, Booth and Odenrick (2007) point to cultural differences and the lack of incentives within universities, also highlighting the fact that co-operation outside the university does not count towards academic promotion. In a survey of academics working for Russell Group Universities, Watson and Hall (2015) found no evidence that these universities encourage their academics to participate in third stream activities; participants perceived their main role to be to produce publications for high-impact journals and felt that university managers provided little or no information or training about third stream activities. Furthermore, no link was identified between these activities and career progression. In the same study, academics at P92 universities cited the lack of appropriate infrastructure and heavy teaching and research commitments (seen as the main priority of academics) as barriers to engagement with external stakeholders. Arts and humanities faculty staff in Abreu *et al.*'s (2009) study also cited heavy involvement in teaching and administrative tasks as the reason why they had little time for academic engagement, while UK academics cited time constraints, the lack of rewards and the lack of recognition of the value of consultancy work in academic culture as reasons for not undertaking this kind of external engagement. In Arab countries, Satti (2014) found that the barriers preventing academics from engaging with external stakeholders to help build a KBE include lack of investment in human capital, lack of investment in R&D, and poor IT provision and innovation.

In a survey of 197 Italian academics working in engineering and the physical sciences, Muscio and Vallanti (2014) identified four main barriers affecting collaboration between academia and industry: the nature of research, conflict between industry and academic goals, academic network problems and conflicts with companies. All these barriers can be exacerbated by excessive bureaucracy and management interference within universities. Muscio and Vallanti (2014, p. 414) assert that

> "This is an important issue for policy, and its investigation should be informative for policy-makers and academic management interested in providing incentives to promote interaction between industry and academia."

When a collaboration succeeds to the point of yielding a commercially viable output, patents and IP rights can also become a major stumbling block (ibid). Any issues pertaining to such rights, therefore, need to be resolved before any commercialised research results are published, which can cause time delays for as long as academic and commercial interests are being negotiated (Blumenthal *et al.*, 1997). The registration of patents or the creation of new companies may be a new experience for individuals who have been immersed in academia and may lead these academics to reflect upon their role in commercialising academic knowledge. Gulbrandsen and Smeby (2005) note that academics from the sciences may perceive patents as a barrier restricting their ability to carry out further research in their area of interest. This is probably why many academics do not see collaboration in commercial ventures as a means to advance their academic profile; such ventures may not be seen as academic enough to warrant participation, and few are experienced enough to deal with the challenges involved (Geuna and Nesta, 2006). The fact that only a small proportion of professors produce entrepreneurial outputs (Gulbrandsen and Smeby, 2005) seems to suggest that they are less enthusiastic than early career academics about engaging with non-academic organisations on commercial activities (D'Este and Perkmann, 2011).

Gender also appears to be another factor affecting the collaboration between universities and external organisations. In a study conducted by Ding, Murray and Stuart (2006), female academics in the life sciences registered 40% fewer patents than their male peers and were half as likely to provide consultancy services to biotechnology companies. Similarly, in a sample of 4,500 academics drawn from eleven different disciplines in US universities, Thursby and Thursby (2005) found that female academics tended to produce fewer inventions than their male counterparts (though there was no statistical difference in publication outputs). Similar findings were reported by Colyvas *et al.* (2012), who, in their investigation of KE activities within one medical school, found that while female academics were equally able to commercialise inventions, they were less likely than their male peers to create them.

Little is known about the factors that hinder female academics from collaborating with external stakeholders. This is perhaps not surprising, given that KE itself is seen in academic circles as less important than teaching and research (the areas in which female academics are predominantly involved). Tartari and Salter (2015) suggest that the fact that female academics in science and engineering appear to be less productive can reduce their opportunities for engagement with non-academic organisations. This lower productivity can be attributed to three possible causes: the fact that female scientists work in a male-dominated environment; social factors such as lack of childcare; and the lack of personal contacts. Further research is, therefore, necessary to explore the engagement gap between genders, taking into account different types of universities, different national contexts and different disciplines. How this engagement gap operates in Libya's HEIs has not yet been adequately investigated.

Neither external organisations nor policy makers seem to understand the expectations placed upon academics within universities, or the factors that encourage or hinder them from engaging with the private and public sectors. The current study's original contribution is to investigate the main factors affecting the engagement with non-academic communities of both domestic and returning scholars in Libya's HEIs. KE appears to be a concept with which academics in Libya are not quite familiar, making the comprehensive assessment of the current state of formal and informal academic-external stakeholder engagement in the country a matter of urgency. Policy makers, university managers and non-academic communities (whether industry, business or any other private or public institution) need to have a better understanding of the benefits and challenges associated with establishing academic-external stakeholder links and networks of collaboration. In their review of university-industry engagement, Perkmann *et al.* (2013) note that most of the studies exploring this kind of collaboration were conducted in either the USA or Europe, and that evidence from developing countries is scarce (Kruss and Visser, 2017; Giuliani *et al.,* 2010). Furthermore, no one has yet explored the impact of academic engagement with non-academic communities on the educational activities performed at university level such as teaching (Kruss and Visser, 2017).

2.5 Conceptual framework

Education is one of the indicators in the HDI established by Mahbub UI Haq and used widely by the United Nations Development Programme (UNDP) to measure countries' economic development (Ul Haq, 1995; Anto, 2011; Cypher, 2014). The HCT literature distinguishes between primary, secondary and higher education (Cohn and Geske, 1990). Sweetland (1996) explains that research design in human capital research is affected by the level of education being investigated, but at all levels, the aim of this education is to improve and develop skills (Schultz, 1971). Education plays a key role in developing human capital, which is one of the main determinants of national living standards (Lucas, 1993). Investing in human capital is arguably more effective than investing in physical capital (Teal, 2011). In Africa, for example, investment in university human capital seems to have three times the impact on economic growth of investment in physical capital (Gyimah-Brempong, Paddison and Mitiku, 2006). As knowledge is acquired, this human capital becomes more productive; educated people are able to work more efficiently and adapt to technological change more quickly, enabling them to deliver better quality outcomes (ibid). This might be associated with the speed at which educated people can gain and adopt new technological knowledge compared to people with limited education. The economic importance of investing in knowledge is emphasised by de la Fuente and Ciccone (2003). Creativity and innovation are more likely to occur in HEIs where knowledge is being created, and this innovation and creativity can have a positive impact on economic development (Romer, 1990).

Figure 2.2 shows that investing in university human capital by sponsoring scholars to study abroad can potentially improve the academic achievement and contribution of these scholars across KT, KD and KE, though it is unclear to what extent the quality and scale of this contribution is affected by the country of study or by other variables such as gender, academic discipline and rank. Academics can transmit the knowledge they have gained through their study abroad experience to the next generation by teaching and supervising undergraduate and postgraduate students. They can disseminate it by attending conferences, publishing in local or international peer-reviewed journals or producing other forms of scholarly contribution (though their ability to do this depends on their access to research funding and sabbatical leaves). Finally, they can engage with external stakeholders by collaborating on the production of IP, acting as consultants, holding a temporary position in the public sector, providing training to private- or public-sector employees or simply by discussing their research findings with non-academic organisations. However, in every dimension, there are potential barriers which can block academics' achievement. These barriers can slow down economic development and make it harder for countries to become KBEs.

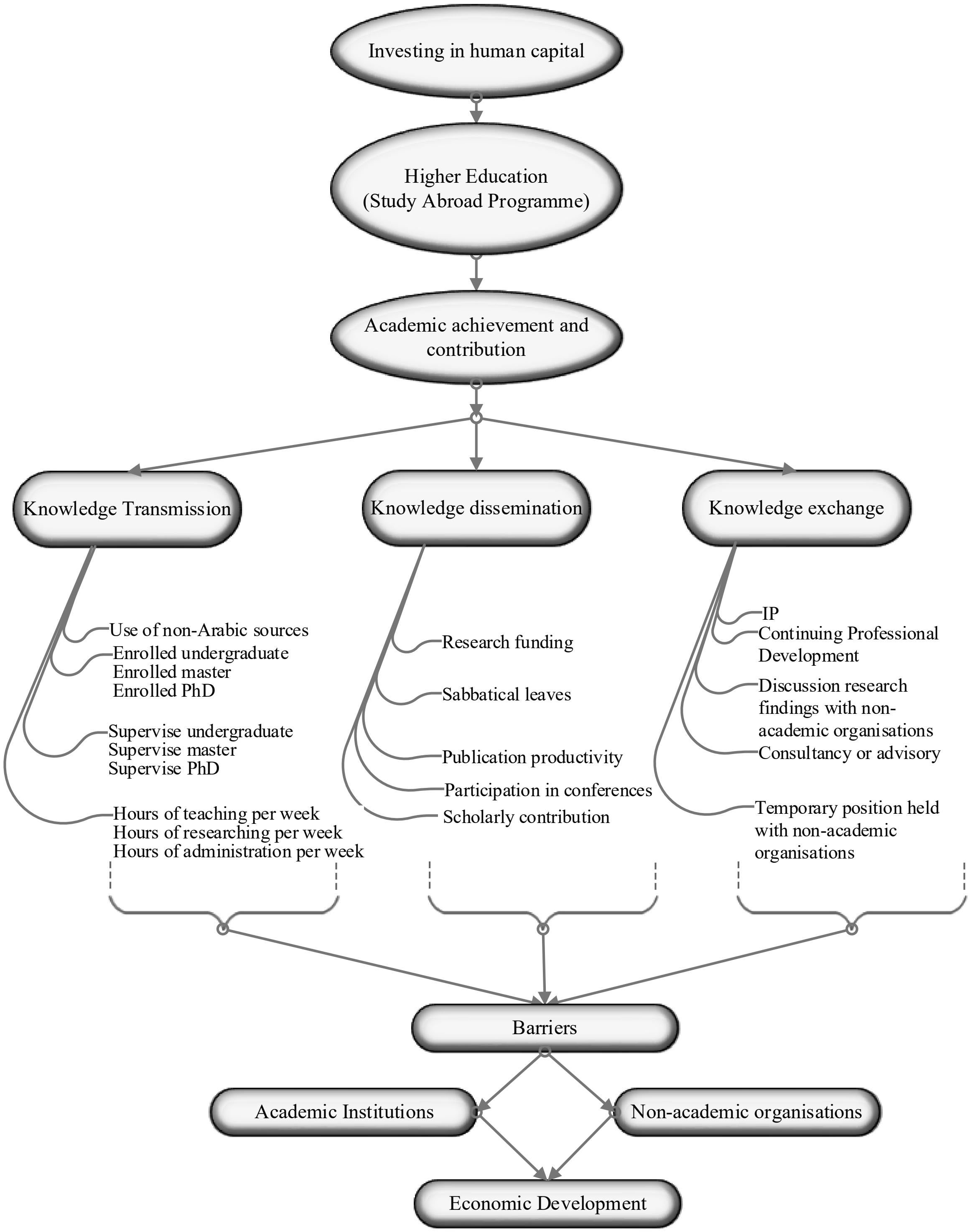

Figure 2.2: Conceptual framework

2.6 Synthesis of literature and knowledge gap

When it comes to the exploration of human capital investment in the context of Libyan HE, there is little research evidence relating to academics' achievement and contribution or their engagement with external stakeholders. It is therefore an area of research that would benefit from further exploration. As a country, Libya has experienced many challenges over the years, but through its scholarship programme, it has still been able to give scholars the opportunity to study in universities around the world. At present, however, little is known about the extent to which this study abroad experience affects the academic achievement and contribution of these scholars when they return home.

2.6.1 Knowledge gap

While some of the key issues surrounding human capital investment and the impact that studying abroad may have on KT, KD and KE have been explored, there are only a few empirical studies investigating the academic achievement and contribution of returning scholars and the challenges they face. The limitations of these studies have been taken into account in the development of the current research.

Firstly, there is no single, widely accepted definition of academic engagement in the literature. Various terms have been used to describe the concept over time, which has created confusion, but there has been a lack of academic commitment to resolving this confusion (Watson and Hall, 2015). There has been no discussion of the concept of KE at all in the Libyan literature. Clearly, research is needed to address this gap.

Secondly, investigations of the potential impact of study abroad on academic achievement and contribution have yielded mixed results, with some researchers identifying clear benefits (Tagg, 2014; Celik, 2012b; Hassan, Tymms and Ismail, 2008) and others observing no significant differences between the productivity of foreign- and home-educated academics (Shin *et al.*, 2014; Ren, 2013). There is therefore space for further investigation into the extent to which this type of investment in human capital offers value for money. As Libya places more focus on its human capital reserves, it is increasingly important that literature is developed investigating the contribution that the country's human capital could make to its efforts to become a KBE.

Thirdly, although a few studies have compared the performance of foreign- and home-educated academics, none have investigated the effect of the knowledge gap. The current research addresses this by dividing scholars into three groups: those who studied in developed countries, those who studied in developing countries, and those who studied in their home country (i.e. Libya). It compares the achievement and contribution of, and the challenges faced by, scholars in all three groups.

Fourthly, previous studies have evaluated academic performance in terms of research, teaching or administrative productivity (Torrisi, 2013), focusing on one or two dimensions of knowledge and producing evidence that can only provide a partial picture of academic achievement and contribution. The current study aims to fill this gap by investigating academic achievement and contribution across all three dimensions of knowledge: KT (educational and administrative activities), KD (scholarly publication productivity) and KE (engagement with external stakeholders).

Fifthly, most of the studies that have been conducted to explore the impact of study abroad programmes have employed econometrics as their main methodological approach (Kim, 1994) and used a single method (Celik, 2012b; Němečková and Krylova, 2014). There has been little investigation of academic engagement with external stakeholders in developing countries (Kruss and Visser, 2017; Giuliani *et al.,* 2010) and none at all of returning academics' achievement and contribution to HEIs and collaboration with non-academic organisations in Libya. The current study addresses this literature gap by answering the research questions highlighted in section 1.2.5 and achieving the aim set out in section 1.2.3.

2.7 Conclusion

This chapter draws upon the existing literature on HCT (Becker, 1994; Schultz, 1961), EGT (Romer, 1990) and the KBE concept (World Bank, 2007; Tchamyou, 2017) to discuss the issues underpinning investment in human capital in the context of HE, particularly the sponsoring of academics to pursue postgraduate study in overseas universities. HCT assumes that the ability of any country to develop and adopt new knowledge imported from advanced countries depends on its domestic human capital stock (Benhabib and Spiegel, 1994). The literature review shows that investment made in developing human capital in this way benefits not only the individual concerned but also the economy of his or her country through their academic work upon their return. It is therefore sensible for countries to invest in those who have shown the ability to achieve higher-level degrees. In developing economies, this may mean sending the best and brightest students to pursue postgraduate education in universities overseas.

Only a few studies have so far investigated the benefits this kind of investment in human capital can bring, and the evidence produced has been inconclusive; while some observe enhanced intercultural competence and language abilities, others find no significant differences between the productivity of those who have studied abroad and those holding equivalent domestic degrees. There is therefore space for further investigation of the extent to which this investment offers value for money. Such an investigation is especially relevant for Libya, where increasing attention is being paid to the state of the country's human capital reserves. Furthermore, while a few studies have compared the academic performance of foreign- and home-educated scholars, no one has yet extended the comparison to consider the relative performance of developed-country- and developing-country-educated groups. The current study seeks to address this gap. It investigates the academic achievement and contribution of domestic and returning scholars from a multidimensional perspective. These dimensions, generated from the review of the interdisciplinary literature, are KT (educational activities and administration), KD (scholarly publication productivity) and KE (academic engagement with external stakeholders).

A number of barriers may limit the academic achievement and contribution of scholars in the three knowledge dimensions. For example, they may find it difficult to publish in international journals if their English is poor, while having a heavy teaching timetable may leave them insufficient time to become involved in research activities. This is particularly noticeable for female academics, who tend to have a proportionately higher teaching workload than their male counterparts, and who, consequently, have very few opportunities to pursue research and secure funding (Anderson, 2012; Dhillon, Ibrahim and Selamat, 2015).

Furthermore, returning scholars do not always seem to make the most of the available opportunities to build relationships with external stakeholders; younger academics tend to be more focused on developing their careers, while more established academics, though more likely to engage with external organisations (e.g. in a consultancy capacity), generally prefer not to tie themselves to a single company. Such collaborations, however, can bring a number of benefits; academics get the chance to gain practical knowledge and access to resources, universities can reap financial rewards, and companies can take advantage of academic expertise.

The literature suggests that one of the benefits of studying abroad is the opportunity it affords scholars to network on a global scale and develop intercultural competence. However, there has been no systematic exploration of foreign-educated academics' engagement with external stakeholders in Libya. This is an area of research that would benefit from further investigation, given the potential for collaboration between Libyan universities and the large multi-national organisations which are currently in operation in the country. Such collaborations might prove fruitful in a number of ways; for example, evidence shows that an increase in the investment in human capital can produce a similar increase in economic value to firms when complemented by R&D and physical capital (Riley, Michael and Mahoney, 2017).

The next chapter describes the methodological approach that was employed to collect and analyse the data and meet the research objectives.

Chapter 3 : Methodology

3.1 Introduction

This chapter discusses the methodological and philosophical approach underpinning the research, the main aim of which is to compare, contrast and investigate the academic achievement and contribution of foreign-educated scholars currently working full time in Libya's HEIs and to identify the factors that may be hindering this contribution. To achieve this aim, an explanatory, sequential, mixed methods design was adopted comprising two phases: the implementation of a quantitative survey and collection of secondary documentary data, followed by qualitative interviews. The qualitative data gathered in the second phase facilitated the interpretation of the quantitative data gathered in the first (Creswell, 2014). For each of the quantitative and qualitative phases, this chapter discusses the sampling process, the development of the research instrument, and how data was collected and analysed. The chapter ends by discussing the steps taken to ensure the reliability and validity of the study, the limitations in the research design, and the measures implemented to ensure it complies with ethical guidelines.

3.2 Research design

Mixed methods research employs a combination of quantitative and qualitative approaches to collect and analyse data (Creswell and Tashakkori, 2007). It has become increasingly common (Bryman, 2006) because it allows the researcher to achieve a more comprehensive understanding of phenomena than using a single method (Mingers and Brocklesby, 1997). Accordingly, it was considered more likely to achieve the research objectives and answer the research questions in this study. The choice of which methodology to use, essentially depends on the research problem and questions to be addressed. Robson (2011) notes that there are many reasons for using a multi-strategy design, such as the purpose of the study, the conceptual and research questions, and the methods and sample procedures. The particular usefulness of the multi-strategy approach in the context of education has been noted by Molina-Azorin and Fetters (2016, p. 124), who claim that

> "Many educational researchers ha[ve] come to recognize that the complexity of current educational issues warrant[s] multifaceted research designs, and … there [is] increasing interest in mixing qualitative and quantitative methods to both

> thoroughly understand educational activities in context and to provide generalizable recommendations that could support educational policy decisions."

The decision to combine quantitative and qualitative methods in this study was primarily informed by the interdisciplinary nature of the topic: the economics of education, specifically the effect of education on labour productivity. According to Schinckus and Jovanovic (2013, p. 167), "Joint, coordinated and continuously integrated research done by experts with a different disciplinary background, working together and producing resulting understanding, is greater than the sum of its disciplinary parts".

An investigation of scholarly productivity may give some insight into the direct and indirect relationships that exist between HE (academics) and economic development (external stakeholders) in Libya. This productivity is expressed in three dimensions: KT (teaching, supervision and administration), KD (conference participation, scholarly publication etc) and KE (engagement with external stakeholders). A mixed methods research design was selected because it allowed for the initial collection and analysis of quantitative data, and then the further exploration of these findings using qualitative tools, to give a concrete explanation of the relationship between the government's investment in human capital and the academic achievement and contribution of scholars across the three dimensions. Details of the research design are highlighted in Figure 3.1.

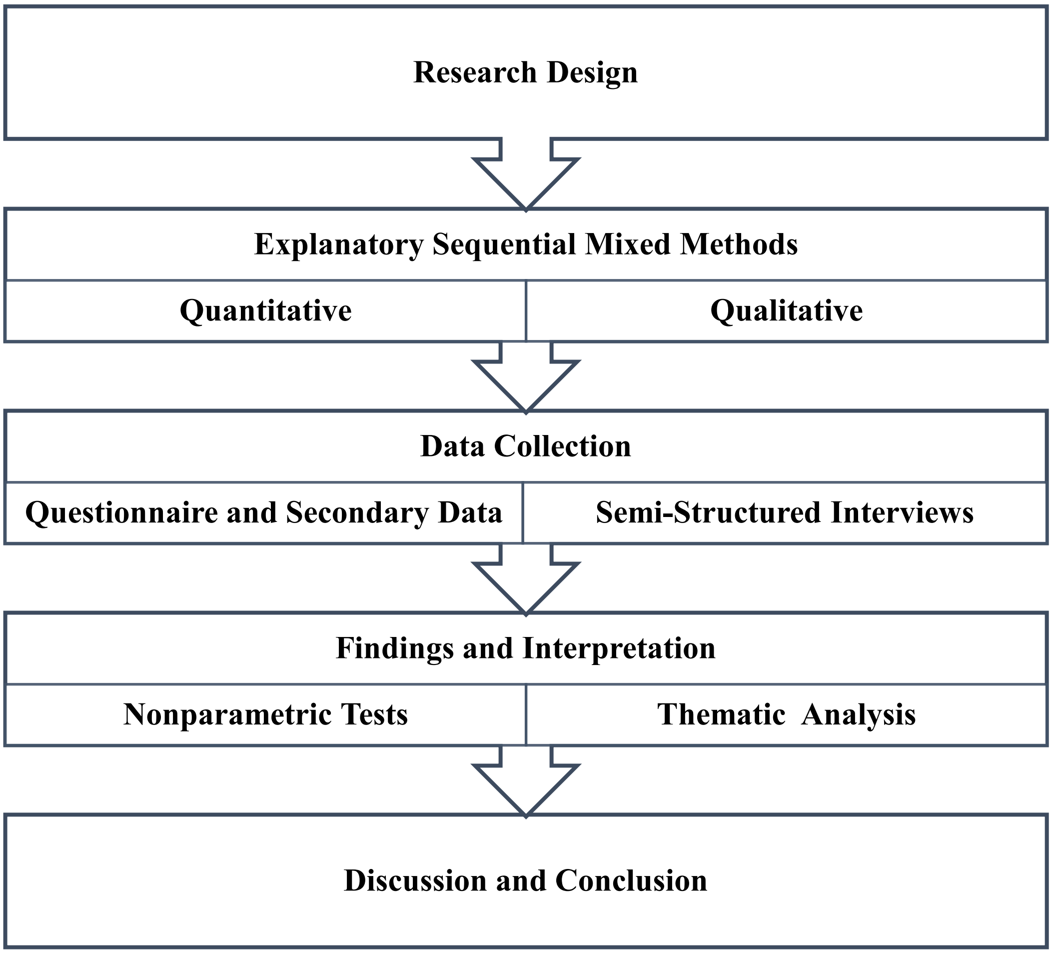

Figure 3.1: Research design

3.2.1 Research philosophy

Positivism and interpretivism are often seen as opposites because of the way each views the world; while positivism sees reality as external, objective and unaffected by human actions or intentions, interpretivism sees reality as socially constructed (Mertens, 2014) and dependent on other systems for meaning (Lincoln and Guba, 1985). However, Tashakkori and Teddlie (1998) argue that it may be much more appropriate to see these philosophies as a continuum rather than opposites; the researcher and what he or she is studying will inevitably interact at some points, introducing an element of subjectivity into the research process, but at other points, he or she may be able to take a more objective view.

Pragmatism emerged because researchers were dissatisfied with the existing paradigms, which were seen by many as being dominated by white, able-bodied, male perspectives

(Mertens, 2005) and as giving insufficient consideration to social justice and marginalised people. It has grown in popularity because it responds to the positivist-interpretivist dilemma by putting the research problem at its centre (Patton, 1990; Creswell *et al.*, 2003, Creswell, 2014). According to Creswell (2014), the philosophical world view under pragmatism "arises out of actions, situations, and consequences rather than antecedent conditions" (p. 10). Ontologically, it does not adhere to any one assumption (subjectivism or objectivism), but rather focuses on the research problem and questions that need to be addressed. From an epistemological point of view, pragmatism seeks to create knowledge for the purpose of change and improvement (Dewey, 2008). It goes beyond explanation and understanding to also encompass description (Goldkuhl, 2012). Rejecting the notion that a single scientific method is enough to ascertain the truth (Mertens, 2014), it encourages combined research methods to arrive at a more coherent, rational and rigorous understanding of the phenomenon (Gorard and Taylor, 2004). Pragmatism thus offers the theoretical underpinnings of the mixed methods research design (Tashakkori and Teddlie, 2003); it gives the researcher the flexibility to deploy both quantitative and qualitative methods to answer the research questions in a more detailed and comprehensive manner (Johnson and Onwuegbuzie, 2004). Pragmatism in light of these debates between positivism and interpretivism, it has become extremely difficult to ignore the existence of pragmatism (Morgan, 2014).

3.3 Explanatory sequential mixed methods

Teddlie and Tashakkori (2009) describe four types of mixed methods research design: triangulation, embedded, explanatory and exploratory. Creswell and Plano Clark (2007) describe the explanatory design (also called sequential design) as the most straightforward of these; a two-stage design, it involves the collection and analysis of quantitative data followed by the collection and analysis of qualitative data. Describing the advantages of the design, Creswell and Plano Clark (2011) point to its ease of execution (the researcher applies the two methods separately and gathers only one type of data at a time) and the fact that the findings can be presented in two stages, making it easier to get a clear picture.

In an explanatory design, the researcher is able to arrive at a general description of the research problem using the quantitative data from the first phase. However, even if the most appropriate statistical test has been chosen to explain the relationship between variables and establish causality, this may still be insufficient to provide a complete explanation of the phenomenon under investigation. Using a qualitative method in the second phase allows the researcher to explore and explain latent variables in a way that would not be possible within a purely positivist approach and to explore respondents' views in more depth (Creswell *et al.*, 2003). In this study, for example, the number of peer-reviewed publications was inadequate as a measure of scholarly productivity. Similarly, the number of citations generated was insufficient to assess the impact of a scholar's publications. Such information, though very useful, does not give a full account of a scholar's publication productivity. This can only be acquired by interviewing the scholar and investigating the factors that affect the quality of his or her output. Accordingly, the quantitative data derived from the questionnaire survey was supplemented by data derived from semi-structured interviews. The qualitative results helped to clarify and confirm the findings of the quantitative study (Bainbridge and Lee, 2013).

Knowledge is regarded as a key driver of scientific and industrial development (Kimenyi, 2011). The knowledge items investigated in the quantitative and qualitative phases of the current research are summarised in Table 3.1. The framework, which was designed to answer the research questions, was developed following the literature review.

Table 3.1: Conceptual framework specifying the assessed knowledge items

Dimensions of knowledge	Items
Knowledge transmission (KT)	Use of sources not written in Arabic. Number of undergraduate students. Number of master students. Number of PhD students. Number of hours a week spent on teaching, research or administration. Number of undergraduate supervisees. Number of master supervisees. Number of PhD supervisees.
Knowledge dissemination (KD)	Research funding (own institution, NASR, international funding bodies, government, industry and non-profit agencies). Number of sabbatical leaves. Number of papers published in peer-reviewed journals (local journals, Arabic journals and international journals). Number of international and national conferences attended. Number of scholarly contributions completed (books authored and edited, textbooks, book chapters, technical reports and scholarly translations).
Knowledge exchange (KE)	Intellectual properties (patent, invention, computer software, educational software, industrial design and start-up company). Continuing professional development (CPD) training provided to employees. Discussion of research findings with non-academic organisations. Consultancy or advisory contracts (number of contracts). Temporary positions with non-academic organisations (number of months).

The quantitative analysis was conducted in two stages. In the first stage, the sample was divided into three groups, depending on where the respondent completed his or her postgraduate study (in a developed country, a developing country or Libya). The performance of each group was then assessed against each of the knowledge items in Table 3.1. In the second stage, domestically educated scholars were excluded from the sample and the statistical analysis was repeated, this time comparing the performance of the two foreign-educated groups (developing-educated and developed-educated scholars) by gender, academic discipline and academic rank. The process was designed to answer the following research questions:

RQ1. What (if any) association is there between the study abroad experience and scholars' academic achievement and contribution to knowledge (KT, KD and KE)?

To answer this primary question, the following secondary research questions were addressed:

I. To what extent do scholars with foreign postgraduate qualifications have a distinct advantage over those holding equivalent domestic postgraduate qualifications in terms of:
    i. Knowledge transmission (KT) activities?
    ii. Knowledge dissemination (KD) activities?
    iii. Knowledge exchange (KE) activities?
II. What are the factors that might affect the academic achievement and contribution of foreign-educated (in developing and developed countries) scholars compared to their home-educated peers?
III. What (if any) differences are there in the academic achievement and contribution of foreign-educated scholars of different genders, academic disciplines and academic ranks?
IV. What factors might affect the academic achievement and contribution of foreign-educated scholars of different genders, academic disciplines and academic ranks?

3.4 Phase 1 – Quantitative approach

The quantitative approach was designed to gather empirical evidence regarding scholars' academic achievement across the three knowledge dimensions, including the form and extent of their engagement with external stakeholders and achieve the research objectives. This section discusses in detail the quantitative aspect of the research design, including the setting for the research, the population and how it was sampled, the development of the data-collection instrument and the analysis process.

3.4.1 Setting

Data was collected from scholars working full time in the universities of Tripoli, Al-Mergab, Misurata and Al-Asmarya. Four of Libya's biggest universities, they are located in some of the country's main cities, host departments in both social and applied sciences, and account for a large proportion of the foreign-educated scholars in Libya's HE sector. The University of Benghazi, which is located in the second largest city of Libya (in the north of the country near the Egyptian border) was excluded from this study for two main reasons. Firstly, the region has not been completely stabilised following the 2011 revolution. Secondly, at almost 1,050 kilometres away from the other universities in the sample, accessing the institution would have been both costly and time-consuming.

3.4.2 Target population and sampling

Identifying the size of the target population is the first step to ensuring that the selected sample will be large enough to offer a fair reflection of its characteristics and provide sufficient information to examine the relationship between variables and answer the research questions. The general target population for this research being full-time university academics, the total population size was established by contacting the head office of each of the four chosen universities. These inquiries revealed that there were 3,060 full-time academics at the University of Tripoli, 798 at Al-Mergab University, 1,054 at Misurata University and 796 at Al-Asmarya University at the time of the fieldwork. Table 3.2 shows how this population was distributed by academic rank and gender.

Table 3.2: Total number of scholars and distribution by academic rank and gender

Rank	University of Tripoli		Al-Mergab University		Misurata University		Al-Asmarya University	
	Male	Female	Male	Female	Male	Female	Male	Female
Professor	230	36	60	0	7	0	5	0
Associate Professor	155	49	42	4	35	0	30	0
Assistant Professor	171	72	51	7	47	5	42	0
Lecturer	219	164	63	18	134	98	123	45
Assistant Lecturer	954	1010	270	283	460	268	408	143
Total	**1729**	**1,331**	**486**	**312**	**683**	**371**	**608**	**188**

Source: Head offices of faculty members at four universities

3.4.2.1 Sampling frame

Given the difference in scholar numbers across the four universities, it was important to ensure that the sample for this research was extracted in such a manner as to reduce any potential for bias in the final result. Sampling entails choosing a group of representatives from the target population (Levy and Lemeshow, 2013). In this case, stratified sampling was used in combination with random sampling. This involved dividing the population into sub-groups, or strata, based on pre-determined criteria (in this case, academic discipline) and then randomly selecting participants from these strata (Teddlie and Yu, 2007).

3.4.2.2 Sample size

Creswell and Plano Clark (2007) explain that in quantitative research, the sample must be big enough to allow the researcher to generalise the results to the entire population. This means it needs to be large enough to reflect the characteristics of the entire population. The whole population in this study was 5,708 faculty members across the four universities. Yamane's formula (Yamane, 1967) was used to calculate the required sample size as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where

n = the sample size

N=the pobulation

e = 5% margin of error

The calculation identified 374 responses as the lowest acceptable number of responses to maintain a 95% confidence level and 5% error level. Placing information in the formula as above explained at a 95% confidence level and an error limit of 5% results in:

$$n = \frac{5708}{1 + 5708\,(0.05)^2}$$

n = 374 responses (required sample size)

3.4.3 Instrumentation

This section discusses the design and development of the survey questionnaire. It begins by discussing the rationale for using a questionnaire before describing the design of the questions and the translation process.

3.4.3.1 Rationale for using a questionnaire survey

Questionnaire surveys allow the researcher to gather rich statistical data from a large sample in a fairly short space of time. This was particularly useful for this study, as quantitative information had to be collected from a large sample of faculty members distributed across four different HEIs. The survey was in this case administered by the researcher, but it could just have easily been administered by someone else without affecting the reliability and validity of the gathered data. Finally, the quantitative results obtained could be analysed quickly and easily (Nardi, 2018; Mayoh and Onwuegbuzie, 2015).

The survey in this study focused on the individual level (i.e. academics) because in the university context, the decision to collaborate with external stakeholders and conduct research is taken primarily by scholars themselves. The survey approach enabled the exploration of the impact that key variables, such as country of study, foreign language proficiency and access to funding, have on these decisions.

3.4.3.2 Questionnaire design

The questionnaire survey was designed to answer research questions I and III. Accordingly, it was divided into four sections: knowledge transmission, knowledge dissemination, knowledge exchange and background information. Section 1, knowledge transmission (KT), was designed to answer RQ-I-i. It asked the respondent to give details about his or her duties and responsibilities including teaching and supervision load and the number of students taught and supervised. This section also asked for details about the respondent's use of non-Arabic resources. Section 2, knowledge dissemination (KD), addressed RQ-I-ii by asking for information about journal publications, research grants and sabbatical leaves received, conference attendance and other forms of scholarly contribution. Section 3, knowledge exchange (KE), addressed RQ-I-iii by asking for details about the respondent's interaction with external stakeholders. Respondents were asked whether they had provided training and consultancy services to local businesses, held temporary positions with non-academic public/private organisations, discussed their research findings with non-academic organisations or produced IP. The last section of the questionnaire aimed at collecting information relating to the demographic characteristics of the study participants, including age, gender, marital status, academic rank, discipline, years of experience and country in which their postgraduate studies were conducted. All respondents were expected to answer all the questions on the survey.

3.4.3.3 Question types

The vast majority of questions in the survey were closed-ended; only two open-ended questions were used (in Section 2: KD and Section 4: background information). Closed-ended questions are less likely to result in missing values/data ((Reja *et al.*, 2003), and the data they generate is easily measured (Rubin and Babbie, 2010), but another consideration in this case was that time-pressed faculty members would be more likely to respond to a survey that allowed a quick response (Goddard and Melville, 2004). The questionnaire was initially written in English and then translated into Arabic (see 3.4.3.4). Care was taken to avoid the use of complex language or structures that might cause confusion, hinder understanding and result in a low response. It was then distributed to faculty members currently working full time at the main four universities in Libya.

3.4.3.4 Translation of questionnaire

The questionnaire was initially designed in English, but as the participants were all native Arabic speakers it then had to be translated into Arabic. To avoid problems arising during the pilot study, great care was taken over the translation process. First of all, the final English version of the questionnaire was checked and approved by the study's supervisors. It was then translated into Arabic by the researcher and this translated version was sent to an Arabic-speaking proof-reader/editor for feedback. The revised translation and the original English version were both sent to a staff member in the Linguistics Department at Tripoli University for comparison. Finally, the Arabic version was sent to a freelance translator, who translated it back into English to ensure reliability and to confirm that the English to Arabic translation had had no effect on the meaning of the questions.

It was observed during the pilot study that many of the natural and physical scientists preferred to fill in the English version of the questionnaire, while most of the social scientists preferred to fill in the Arabic version. Consequently, when the questionnaire was finally distributed to the full sample of respondents in the main study, scholars in the applied and medical sciences were given the choice of completing it in English or Arabic (they were given a version with the questions printed in Arabic on one side and English on the other), while social scientists were given only the Arabic version.

3.4.4 Piloting phase

The main purpose of the pilot study was to test the reliability of the questionnaire. It was important to see whether the participants understood the questions and were answering them properly, and to find out whether they had any feedback regarding any aspects of the questionnaire that could be improved. The pilot phase of the research took place from 4th January to 25th January 2016, once ethical approval had been secured and the instrument had been translated into Arabic. The University of Tripoli was used as the pilot site, with 26 questionnaires being distributed non-randomly. The feedback received from this pilot phase was very helpful. In terms of the questions used in the questionnaire, most faculty members (including heads of department) agreed that the questions in the survey were mostly appropriate, though a few felt that the questionnaire was too long and that some questions could be omitted altogether or moved to the second phase of the research (interviews). Other comments raised related to some questions not being necessary at this stage of the project.

The pilot study showed that most of the questions in the survey were understood by the participants; only a few questions caused some confusion (Questions 1, 7, 9 and 21). These questions were discussed and revised. Interestingly, some Medical School staff who compared the English and Arabic versions found the English version the clearer of the two. Accordingly, more time was spent on the Arabic translation before the main study. Some participants also suggested that it might be better if Question 8, which related to respondents' participation in national and international conferences, focused on the four years leading up to the 2011 revolution, given that the MHE stopped financially supporting faculty members to participate in conferences after the revolution because of the ongoing conflict.

3.4.4.1 Questionnaire administration

The pilot survey was distributed by asking faculty members to collect the questionnaire from their pigeon hole when they signed themselves into work in the morning. Since this process worked very well in all departments, it was adopted in the main study. The only drawback of this method was the time it took, as it involved waiting for faculty members to return the completed questionnaire.

3.4.4.2 Reflections

During the pilot phase, one head of department at one of the target universities expressed an interest in learning more about and becoming actively involved in the research. I was invited to an informal meeting with his colleagues to discuss the significance of the university's KE with non-academic organisations. One of the most interesting things I came to realise during this pilot study was that all the faculty members I met seemed to be unaware of the role scholars can play in the activities of external stakeholders. When I gave examples of the kinds of interaction that can happen between academia and external stakeholders, one professor revealed that he had been liaising between Royal Haskoning (a large Dutch shipping company based in the Netherlands) and organisations in the Libyan public sector for more than ten years. This initiated a discussion during which faculty members started talking about their own experiences of working with external stakeholders and the public sector in Libya. Many complained about their university's lack of support for such co-operation; in fact, the discussion mainly served to highlight the barriers, such as inadequate university infrastructure, which faculty members face in their attempts to engage with external stakeholders.

3.4.5 Data collection

For the main questionnaire survey, a total of 1,000 questionnaires were distributed in the four selected universities. In order to avoid bias and ensure that the sample was representative of the target population, the questionnaires were distributed proportionally across the four universities. These proportions were calculated as follows:

Questionnaires were distributed to 17.519% of the total population (1,000/5,708). Distributing questionnaires to 17.519% of the population of each university meant that: 536 went to the University of Tripoli (3,060*17.519% = 536); 140 went to Al-Mergab University (798*17.519% = 140); 185 went to Misurata University (1,054*17.519% = 185); 139 went to Al-Asmarya University (796*17.519% = 139).

Table 3.3 below summarises the number of questionnaires distributed at each of the four universities.

Table 3.3: Number of questionnaires distributed

Universities	Distributed Questionnaires
University of Tripoli	536
Al-Mergab University	140
Misurata University	185
Al-Asmarya University	139
Total	**1,000**

Source: Author's calculations

The selection of a sample of faculty members to answer the questionnaire was done using Simple Random Sampling (SRS) in Microsoft Excel. A list of all faculty members was obtained from each individual heads at four universities. This list was then entered into Excel and a random number was generated for each entry using the **Rand()** command in

Microsoft Excel. Once the random number had been generated, the list was sorted into ascending order, and the first 17.5% of the list were selected as a sample. This method was chosen to ensure that all faculty members in the departments had an equal chance of being selected. After the random list had been generated, it was passed to heads of department, who dropped the questionnaires into staff pigeonholes. The participants were asked to return the completed questionnaire to their head of department. Table 3.4 summarises the response rates from the four universities.

Table 3.4: Response rates

Universities	Distributed Questionnaires	Received Questionnaires	Excluded Questionnaires	Completed Questionnaires	Response Rate %
Tripoli	536	289	4	285	53.50%
Al-Mergab	140	75	4	71	50.70%
Misurata	185	93	0	93	50.60%
Al-Asmarya	139	74	2	72	52.30%
Total	**1,000**	**531**	**10**	**521**	**52.10%**

Source: Author’s calculations

521 questionnaires were completed and collected, achieving a response rate of 52.1%. This was more than the required minimum of 374 (see 3.4.2.2). There were similar response rates for all four universities; the highest response rate (53.5%) was recorded by the University of Tripoli, while the lowest (50.6%) came from Misurata University. The literature indicates that response rates for paper-based surveys can vary from as low as 32.6% (Watt *et al.*, 2002) up to 75% (Dommeyer *et al.*, 2004). In his comparison of the response rates of paper-based and online surveys, Nulty (2008) found that the average response rate for paper-based surveys is around 56%, though the studies he used were administered face-to-face. Given that the surveys in this study were not administered face-to-face, a 52.1% response rate can be classed as good. A similar study by Hassan, Tymms and Ismail (2008) examining Malaysian academics’ perceptions about academic productivity achieved a response rate of 42%, which these authors describe as “quite promising in comparison with similar procedures in the past” (p. 286).

3.4.6 Data analysis

The questionnaire data was used to compare and contrast the academic achievement and contribution of scholars in three dimensions of KT, KD and KE. In the first stage of the statistical analysis, the scholars were divided into three groups to facilitate this comparison: the first group comprised scholars holding postgraduate degrees from developed countries, the second group, scholars holding postgraduate degrees from developing countries and the third group, scholars holding postgraduate degrees from Libyan universities. In the second stage of the quantitative analysis, the domestically educated group was excluded and the academic achievement and contribution of the foreign-educated groups was compared by gender, academic discipline and academic rank. The aim of this second analysis was to investigate the impact of the knowledge gap on the returnees' academic achievement and contribution. Collectively, the two stages were designed to give an initial picture of the extent to which foreign education may be impacting on the achievement of Libyan scholars within and beyond their HEI.

There are numerous statistical tools that can be used to analyse quantitative/numerical data in social science research. Choosing the most appropriate statistical analysis technique requires careful consideration of a number of issues such as the type of research questions being addressed and the nature of the data being collected, as well as the dependent and independent variables to be included in the analysis. The nature of these variables (i.e. nominal/categorical, ordinal or interval/ratio) will determine the level of measurement to be used. All this will help the researcher decide which is the best statistical technique to use. The choice of whether tests should be parametric or nonparametric also depends on the data distribution; parametric tests, for example, assume random independent samples, interval or ratio level of measurement, normal distribution and no outliers. Nonparametric tests, on the other hand, do not assume normality, and can deal with outliers and categorical data. Parametric tests are more powerful and more likely to detect a difference between groups than nonparametric tests, but nonparametric tests are more suitable when the data does not meet any of the assumptions of parametric methods (Corder and Foreman, 2014; Hollander, 2014; Richardson, 2018).

In the current study, there were multiple dependent variables, while most of the independent variables were categorical data and other continuous data which was not normally distributed (positive skewness). MANOVA can be used when there are multiple dependent variables, as long as these variables are randomly and independently sampled from the population, all continuous, and multivariate normally distributed within each group of independent variables, but the independent variables in the current study did not meet these requirements. Moreover, many of the survey responses were categorical (e.g. yes/no). MANOVA could have been applied for the continuous variables, such as the responses to Q2 (number of students) and Q4 (number of hours), but it made no sense to analyse these together as they were two distinct units. The Principal Component Analysis (PCA) and Categorical Principal Component Analysis (CatPCA) methods, which are designed primarily for data reduction, were also unsuitable because of the relatively small number of items in each of the first three survey sections (ranging from four in KE to seven in KD) along with the variation in required responses (continuous vs categorical).

Nonparametric tests were the most suitable option for this study firstly, because these tests do not assume that the data or population have any characteristic structure, such as normality, and secondly, because they are powerful when the sample size is large. Widely used nonparametric tests include the Mann-Whitney U test, the Kruskal-Wallis test and the Chi-squared test.

3.4.7 Secondary data collection

The secondary data gathered from documentary sources complemented the primary data gathered via the questionnaire and interviews by providing contextual background to the study. This data, which was retrieved from relevant organisations such as the universities whose faculty members participated in the study, the Libyan MHE and the National Agency for Scientific Research (NASR), included each university's rules and regulations for faculty members, and government data on the 11,458 faculty members in the study abroad programme at the time of the research. This government data also included scholars' country of study, academic discipline, gender, marital status and the amount of funding received each month.

The gathered data was coded and entered into the SPSS software and subjected to nonparametric tests (Wilcoxon rank-sum, Mann-Whitney and Kruskal-Wallis tests). In this way, it was possible to compare the money being invested in scholars studying abroad by country of study and gender; that is, to identify whether those studying in developing countries were receiving a similar amount to those studying in developed countries, and whether male and female academics were being given the same level of funding. The secondary data, like the quantitative data, was analysed before the individual interviews were conducted, so that the findings could inform the content of the interview schedule.

3.5 Phase 2 - Qualitative phase

The main purpose of the qualitative phase of this research was to gain further insight into the quantitative results. Cohen *et al.* (2011) explain that interviews can be used in conjunction with other methods to provide a concrete explanation about the phenomenon under investigation. In this case, the semi-structured interviews helped in understanding why groups differed in terms of academic achievement and contribution, and what they saw as the obstacles preventing them from engaging with external stakeholders. This section discusses the qualitative phase of the research in detail, including the setting, population and the sampling process, the development of the interview schedule and the procedure for analysing the gathered data (thematic analysis).

3.5.1 Setting and sampling

The qualitative phase of the research took place at the same four Libyan universities used during the quantitative phase of the study (University of Tripoli, Al-Mergab University, Misurata University and Al-Asmarya University) and focused on the same target population; that is, faculty members. In this phase, purposive sampling, a non-probability sampling method, was used to select potential interviewees from among the faculty members who had participated in the survey. Tashakkori and Teddlie (2003, p. 279) explain that "Purposive sample techniques seek to focus and, where practical, minimize the sample size, generally in non-random ways, so as to select only those cases that might best illuminate and test the hypothesis of the research team". Potential interviewees were selected based on their work experience, country of study, academic discipline and gender. Twelve participants were chosen from applied science departments and the same number from social science departments. In each discipline, four of the twelve had to have obtained their postgraduate degree in Libya, four had to have studied in a developing country and four in a developed country. In each of these three sub-groups, there had to be two males and two females. Since descriptive analysis of the total population suggested that the median of scholars' work experience in Libya is thirteen years (Figure 4.1), only interviewees with at least this level of experience were selected. The sampling process is depicted in Figure 3.2 below.

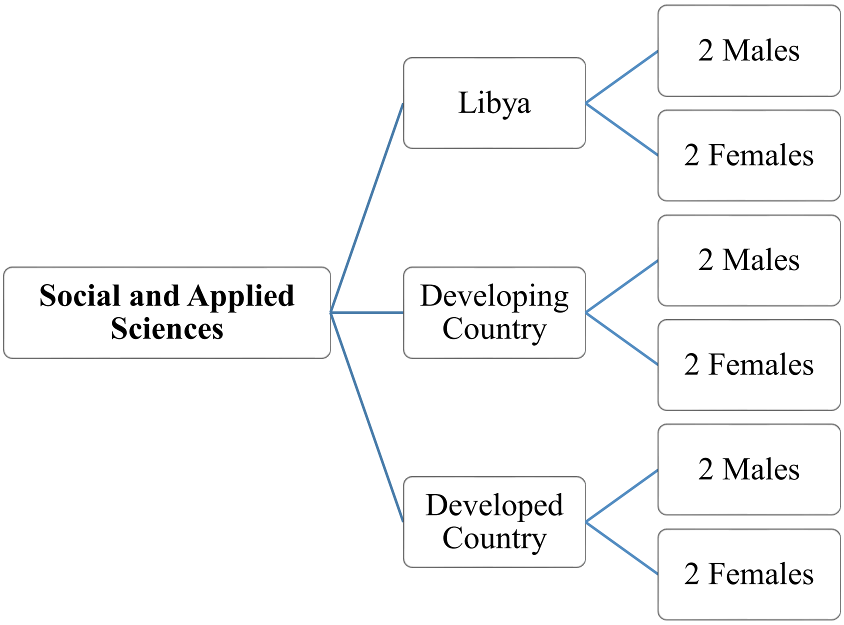

Figure 3.2: Purposive sampling

3.5.2 Instrumentation and data collection

Bryman and Bell (2011, p. 651) observe that "Qualitative methods may be used to provide important contextual information that supplements the finding from a larger quantitative study". In the qualitative phase of this research, primary data was gathered through the use of semi-structured interviews. These allow the researcher to work from a pre-prepared list of questions while giving him or her the flexibility to ask additional questions in response to emerging findings, or if they feel that more information is required (ibid). The interview schedule in this study was developed following the analysis of the quantitative findings, with additional questions being asked when required. Through the interviews, it was possible to capture scholars' personal viewpoints, attitudes, beliefs and experiences and to explore the relationship between foreign study and subsequent performance (Morris, 2015). They were crucial in identifying and investigating those factors that impact on individual academics' achievement and contribution.

3.5.3 Interview schedule

The interview schedule (see Appendix A) allowed for the further exploration of the primary and secondary research questions by obtaining additional information and clarification from participants regarding the themes that emerged in the quantitative analysis. It was designed to answer research questions II and IV; that is, to allow the researcher to understand fully the barriers faculty members might face, and why some of these barriers affect some scholars more than others. Thus, interviewees were asked about the impact their research, administration and teaching obligations had on their publication productivity, and the challenges they faced when supervising postgraduate students, applying for international or local funding or publishing in international journals. They were also asked about the challenges they faced when trying to engage with outside stakeholders. The aim was to gain insight into the reasons why scholars educated in developing countries are less productive than those educated in developed countries, and why domestically educated scholars contribute less to local businesses than scholars who have studied abroad.

3.5.4 Data analysis

The interview data was subjected to thematic analysis. This approach is useful for identifying and analysing patterns within qualitative data (Lyons and Coyle, 2008; Bryman, 2015). According to Braun and Clarke (2006, p. 78), "Thematic analysis provides a flexible and useful research tool which can potentially provide a rich and detailed, yet complex, account of data". These authors identify six stages to the analysis process: (1) familiarisation with the data (achieved by transcribing the interviews, reviewing the transcripts and making notes); (2) generation of initial codes (to capture interesting aspects of the data); (3) searching for themes and gathering codes into potential themes; (4) reviewing themes to check that they work; (5) defining and naming themes; and (6) producing a report.

3.5.5 Procedure for coding

According to Braun and Clarke (2006), the process of transcription is a good way to familiarise oneself with the data that has been collected. Accordingly, the analysis process began with the transcription of the semi-structured interviews by the researcher. The interviews were conducted in Arabic and were therefore transcribed in the first instance into Arabic. The transcripts were all reviewed and any emerging patterns were gathered into nodes; these were the starting point for categorising the data into themes and sub-themes (Bazeley, 2007). The nodes for this study were influenced mainly by the literature and findings from the quantitative analysis, but any additional information emerging from the data was also gathered by the researcher. Once the nodes had been set, the interview transcripts were coded manually and an initial framework was established. This is provided in Table 3.5 below.

Table 3.5: Initial codes

Interview transcript	Initial coding framework
Researcher: Could you please describe the greatest challenge you have faced in your research career so far? Respondent (SL-F3): “Most of the scholars who have done their postgraduate degree in Libya or any other Arab country, such as Egypt or Morocco, have low English levels in comparison to the staff who studied in America, England or any other English-speaking countries. There was a time in Libya when the English language was banned from schools by Gaddafi; I was in high school at that time. This will have certainly had negative effects on people’s language proficiency. Although I joined English classes to improve myself, I still experience difficulties when reading certain English written sources in Educational Sciences or Psychology.”	Low levels of English English language ban Extra English courses Lack of understanding of English sources Communication problems
Researcher: Could you please describe the greatest challenge you have faced in your research career so far? Respondent (SD-M9): “Lack of references, shortage of libraries and poor internet access prevent students and supervisors from accessing journals, papers and published studies and make it hard to find research materials. These factors do not facilitate broad supervision, which results in weak projects with limited resources.”	Poor internet access Shortage of libraries Problems with accessing sources and research materials

Once the initial coding framework had been developed, similar codes were collected together in order to establish the themes emerging from the interview data. Table 3.6 provides an example of the final coding framework and themes. This stage was also completed manually by the researcher.

Table 3.6: Definition of themes

Initial coding framework	Final coding framework
Low levels of English English language ban Extra English courses Lack of understanding of English sources Communication problems	Foreign Language Skills
Poor internet access Shortage of libraries Problems with accessing sources and research materials	Research Infrastructure

3.6 Reliability and validity

The perceived reliability and validity of a study will influence the degree to which its readers trust the honesty and rigour of its findings (Bryman, 2016). Reliability is the degree to which a research tool produces stable and consistent results when the data-collection and analysis processes are repeated, whereas validity refers to the extent to which a test measures what it is supposed to measure (Cohen, Manion and Morrison, 2018). There are two kinds of validity: internal validity and external validity. To achieve internal validity, “The findings must describe accurately the phenomena being researched” (ibid, p. 183). On the other hand, external validity indicates “the degree to which the results can be generalized to the wider population, cases, settings, times or situations” (ibid, p. 186).

The two terms are widely accepted by researchers working with quantitative data, but many qualitative and constructivist-oriented researchers find them problematic. Achieving consistency and replicability is relatively straightforward when the research is quantitative in nature (Zohrabi, 2013), but it may be much more difficult when using qualitative methods. Qualitative researchers argue that as data obtained from qualitative methods is highly subjective, rich and unique to the participants involved (Denzin and Lincoln, 2011), the focus should be on the dependability of the results, rather than their repeatability (Lincoln and Guba, 1985). According to Lincoln and Guba (1985) and Merriam (1998), dependability can be ensured in three ways: firstly, by ensuring that all processes within the research design are explicitly explained; secondly, by employing a combination of data-collection instruments; and lastly, by explaining clearly the processes used to analyse and interpret the data.

Qualitative researchers have proposed an alternative to reliability and validity: trustworthiness. This encompasses the concepts of credibility, transferability, dependability and conformability (Guba and Lincoln, 1982; Lincoln and Guba, 1986). Credibility is seen as relating to internal validity and the extent to which the findings reflect the participants' world view. Transferability, on the other hand, relates to external validity and the researcher's responsibility to describe research findings fully in a manner that is understood by fellow researchers so it can be utilised in other contexts. Dependability is used instead of reliability, while conformability substitutes for objectivity (Shkedi, 2005). The use of such terminology has been criticised by some researchers on the grounds that it can potentially make qualitative research even more subjective, leading to lack of rigour and subsequently undermining the value of research claims (Hammersley, 2009).

As a mixed methods study comprising both qualitative and quantitative approaches, the concepts of reliability, validity and transferability were all highly applicable here. The reliability of the data-collection instruments was enhanced by ensuring that they were both closely aligned with the research questions (see section 1.2.5) and would therefore be able to accomplish the purposes of the investigation. Both instruments also had to be designed in such a way as to avoid response bias; the questions and items had to be unambiguous and capable of giving an accurate reflection of participants' perceptions. Cohen *et al*. (2011) argue that such methods can enhance internal validity.

The use of three different data-gathering methods, along with both primary and secondary information sources, allowed for triangulation, further enhancing the reliability and validity of the findings (Creswell, 2009; Cohen *et al*., 2011). As Punch and Oancea (2014) note, data collected using one instrument can be cross-checked against data collected with the other instrument, allowing for comparison and confirmation of the findings. Beyond this, the questionnaire data was helpful in suggesting questions for the interviews, while the interviews allowed a more in-depth exploration of the quantitative findings.

The piloting of the questionnaire was another way in which the study's reliability, validity and trustworthiness were enhanced (Newby, 2010). Pilot studies can be very helpful in determining whether a data-collection instrument will permit the researcher to collect good quality information (Cohen *et al*., 2011); they allow the researcher to check that questions are fully understood by participants, that they are properly directed to elicit the most useful data, and that there are no redundancies. In this study, the piloting process also gave an indication of approximate completion time and confirmed the effectiveness of the proposed distribution method (see 3.4.4).

3.7 Limitations of research design

The mixed methods research design has a number of advantages, but it also has limitations. Johnson and Onwuegbuzie (2004) list some of these limitations, a few of which apply to this study. These authors argue that a mixed methods design can be difficult for a single researcher to carry out as it involves applying both qualitative and quantitative methods, often concurrently. This requires the researcher to master both approaches, which can be time-consuming and difficult. This was the case in this study, which necessitated the researcher learning new research techniques. In terms of the timing, the main problem was not that the two approaches had to be conducted concurrently, but the opposite; the qualitative phase of the study could not be started until the quantitative analysis had been completed. This was because the interview questions and the sampling for these interviews were dependent on the results obtained from the quantitative analysis.

3.8 Ethical considerations

It is important to consider the ethical issues involved before undertaking any kind of research (Bryman, 2016; BERA, 2018) because these directly affect the integrity both of the research and the discipline it represents. Thomas (2017) states that to ensure ethical practice in social science research, researchers should obey their university's formal policy. These ethical guidelines "are intended to help keep participants safe from harm, build trust with participants and ensure trustworthy outcomes from the research which will benefit society" (Briggs, Morrison and Coleman, 2012, p. 91). It is important that the researcher takes due account of ethical considerations when deciding upon the nature of the study, data-collection techniques and especially the treatment of participants (Potter, 2006), as he or she will only be able to build a collaborative relationship with these participants if they are willing contributors (Briggs, Morrison and Coleman, 2012). Thomas (2009) highlights the importance of consent being fully informed; in other words, potential participants should be clear about what they are agreeing to. As the data collection for this study took place in Libya, the following sections assess the ethical implications of the research from the point of view of both the UK and Libya.

3.8.1 United Kingdom

In the UK, the research was submitted for ethical approval via the University of Leicester's Ethical Review process (see appendix E). The main issue to consider was the ethics around involving human participants (in this case, faculty members) in the questionnaire survey and interview process. The consent forms for participants, the questionnaire and an indicative interview schedule were all submitted for approval.

3.8.2 Libya

Permission to undertake the fieldwork in Libya had to be obtained from the Libyan Embassy in London and the MHE in Tripoli. All participants were provided with information regarding the research, its aim and objectives and how the gathered data would be used. Written consent was received from all participants, with interviewees also giving verbal consent. Participants were invited to ask any questions they had regarding the research at any time, and they were reassured that they had the right to withdraw at any time during the data-collection process. They were also assured that any personally identifiable data, such as names, would be completely anonymised when reporting the findings and that no sensitive data would be included. For the ease of participants, all documents, including the consent forms and questionnaires, were translated into Arabic so they could be fully understood by those taking part in the study. During the interview stage, both written and verbal consent was secured from participants to make audio recordings. All data was stored in an encrypted file and only accessible to the researcher.

3.9 Conclusion

The chapter starts with a discussion of the research philosophy that underlies this study. Recognising that there are many different ways of understanding the nature of social research and interpreting the world, and that neither positivism nor interpretivism alone would have been sufficient to address the research questions, the study employs a pragmatic paradigm that allowed the deployment of a combination of research strategies. A sequential mixed methods approach was adopted in order to gain a more comprehensive understanding of the phenomenon under investigation. Quantitative data was collected via a questionnaire survey distributed to a large sample of foreign- and Libya-educated scholars working full time in four of Libya's main universities, after which qualitative data was collected via individual semi-structured interviews. This data gave further insight into the quantitative results. The chapter discusses the steps involved in the data-collection and analysis processes, from the calculation of an optimal sample size and the design of the instruments, to the choice of statistical methods and the coding procedure for the thematic analysis. It also discusses the steps that were taken to ensure that the research complies with ethical guidelines, and the measures to protect the reliability and validity of the findings. The first group of these findings – addressing the KT dimension – are presented in the following chapter.

Chapter 4 : Research Findings: Knowledge Transmission (KT)

4.1 Overview

This chapter presents the findings from the quantitative and qualitative phases of the project regarding knowledge transmission in the sample universities. The chapter begins with a descriptive analysis of the research participants before presenting the findings for each of the items within the KT dimension. For the purposes of the analysis, the respondents were classified in terms of four variables: country of study (i.e. Libya, other developing countries or developed countries), gender, academic discipline (social science or applied (physical or natural science) and academic rank (assistant lecturer, lecturer, assistant professor, associate professor or professor). In the first round of quantitative analysis (see 3.4.6), all three country of study groups were compared in terms of their performance against a range of items within the KT dimension. However, as the main focus of the study is the academic contribution and achievement of returning foreign-educated scholars, the domestically educated group was excluded from the second round of quantitative analysis to allow a two-way comparison of the productivity of the foreign-educated groups by gender, academic rank and discipline.

Descriptive and inferential statistics were employed to analyse the survey data and to explore differences between groups. These included Chi-squared tests for nominal variables, Kruskal-Wallis tests for scale variables having more than two groups and Mann-Whitney U tests for scale variables with two groups. Post-hoc tests with Bonferroni adjustment were also performed for those variables having more than two groups to identify whether results were significant and to avoid type 1 errors[2]. The interview data from Phase 2 was subjected to thematic analysis. The qualitative evidence is presented alongside the quantitative findings in order to further explore the differences between groups. The chapter ends by synthesising the findings to provide answers to the primary research question and the secondary research questions I-i, II, III and IV.

[2] A type I error is when a difference is indicated between groups. (α=0.05) where none in fact exists. Using a lower value level for alpha (α) reduces the risk of this happening.

4.2 Section 1: Descriptive analysis

Four independent variables describe the personal characteristics and education background of scholars currently working full time in Libya's HEIs: gender, academic rank and discipline and country of study. Table 4.1, which presents the distribution of these characteristics by country of study, reveals that most female scholars were educated outside Libya, with 48.10% studying in another developing country and 33.80% studying in a developed country. In contrast, 38.40% of male scholars studied in Libya, while 37.40% studied in a developed country. 52.90% of scholars in the applied sciences received their education in a developed country whereas 42.70% of those in the social sciences completed their education in a developing country. Most professors (46.40%) and associate professors (46.30%) were educated in developed countries, 43% of the lecturers were educated in developing countries and 43.10% of the assistant lecturers studied in Libya.

Table 4.1: Personal characteristics by country of study

Variable		**Domestic education** %	**Study abroad** Developing %	Developed %	**Total**
Gender	Male	38.40	24.30	37.40	**305**
	Female	18.10	48.10	33.80	**216**
					521
Academic discipline	Social science	35.90	42.70	21.40	**281**
	Applied science	22.90	24.20	52.90	**240**
					521
Academic rank	Assistant lecturer	43.10	29.40	27.50	**102**
	Lecturer	22.80	43.00	34.20	**149**
	Assistant prof	34.10	32.60	33.30	**132**
	Associate prof	20.40	33.30	46.30	**54**
	Professor	26.20	27.40	46.40	**84**
Total		**156**	**178**	**187**	**521**

Figure 4.1 illustrates the distribution of the study participants' age and years of full-time work experience in Libya's HE sector (the sample universities). At the time of the field work, the average age of the scholars in the study was 45 and their average academic experience was 13 years. 75% were under 53 and had less than 19 years' experience.

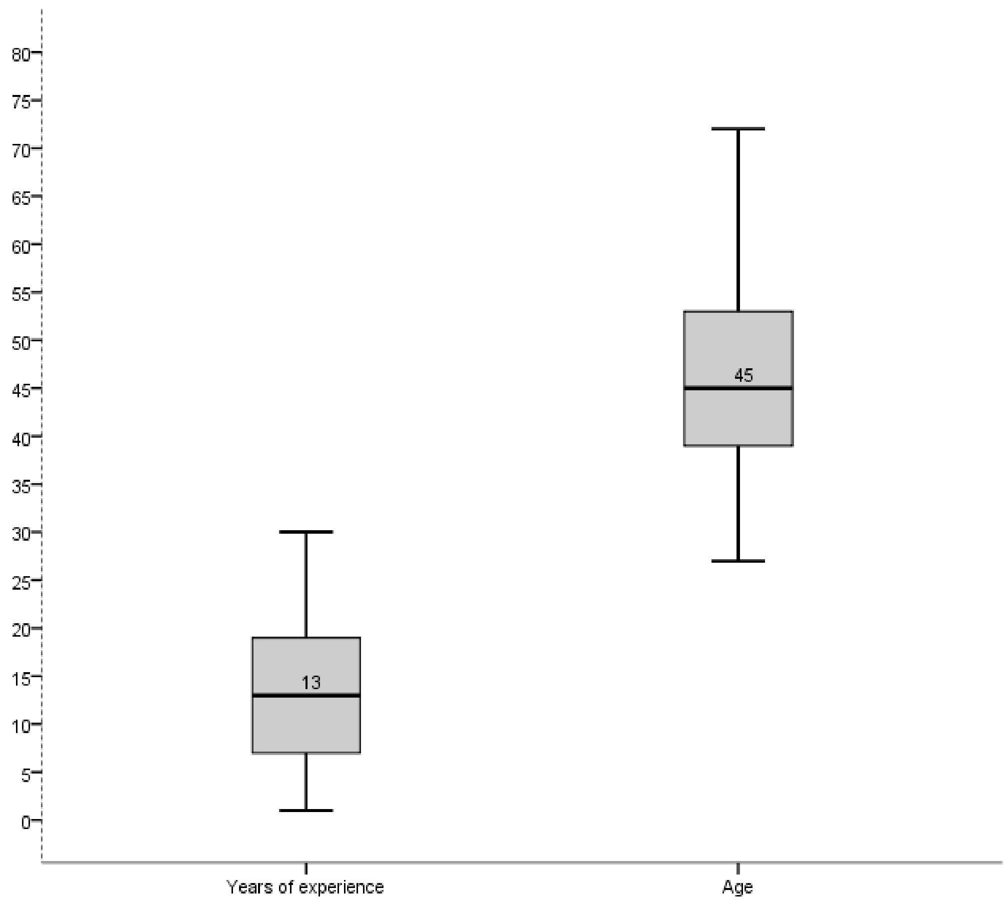

Figure 4.1: Boxplot of scholars' experience and age distribution

The standard deviations (6.14 to 7.84) for the groups within the country of study, gender and academic discipline variables (see Table 4.2) are all a similar distance from the mean value, suggesting comparisons between these groups will be reliable. Average work experience was broadly similar across the various groups in the country of study, gender and academic discipline variables, but there was a wide variation within the academic rank variable.

Table 4.2: Distribution of work experience for scholars in different groups

Variable		N	M	SD	Min	Max	Percentile 25%	Percentile 75%
Country of study	Domestic education	156	12.64	7.84	1	30	6	18
	Developing country	177	13.33	6.49	3	29	8	18
	Developed country	187	14.58	7.25	2	30	8	20
	Total	**520**						
Gender	Male	186	14.52	7.12	2	28	8	20
	Female	177	13.39	6.66	3	29	8	18
	Total	**363***						
Academic discipline	Social science	180	12.57	6.14	3	29	8	17
	Applied science	183	15.34	7.36	2	30	8.50	21
	Total	**363***						
Academic rank	Assistant lecturer	58	4.76	1.37	2	8	4	6
	Lecturer	113	9.37	2.18	5	14	8	11
	Assistant professor	87	16.01	2.11	12	21	15	17
	Associate professor	43	19.28	2.16	15	25	18	20
	Professor	62	24.42	2.62	20	30	22	26
Total		**363***						

*Gender, discipline and rank do not include scholars educated in Libya.

4.3 Section 2: Knowledge transmission (KT)

This section compares scholars' performance across a range of items including their use of non-Arabic sources in teaching, the number of hours spent on teaching, research and administrative duties, and the number of students enrolled and supervised at undergraduate and postgraduate (master and PhD) levels. Since the country of study and academic rank variables each contain more than two groups, post-hoc tests with Bonferroni adjustment were run to identify any differences between the groups in these variables. The subsequent qualitative analysis of the interview data allowed the in-depth investigation of the factors affecting scholars' academic achievement and contribution in these items.

4.3.1 Use of non-Arabic sources in teaching and research

More than a million scientific papers are published in peer-reviewed journals per year, most in languages other than Arabic. The aim of this survey question was to identify which scholars used non-Arabic sources in their teaching and research and to investigate how the use of such sources contributed to their academic achievement and contribution.

Accordingly, a Chi-squared test was conducted to explore any potential association between the use of non-Arabic sources and the independent variables. The results of the test are shown in Table 4.3.

Table 4.3: Use of non-Arabic sources by group

Independent variable	$\chi 2$	df	p	Cramer's V*	Phi**
Country of study	104.16	2	0.000	0.45	-
*Gender	2.85	1	0.09	-	0.10
*Academic discipline	31.91	1	0.000	-	-0.30
*Academic rank	18.77	4	**0.001**	0.23	**-**

*Cramer's V used when crosstabs more than 2 by 2 table
**Phi used when crosstabs are 2 by 2 table

There was strong evidence of a relationship between country of study, academic discipline, academic rank and use of non-Arabic sources in teaching ($p<0.01$). However, there was no association between gender and use of non-Arabic sources, with both genders using non-Arabic sources to an equal degree ($p=0.09$). Table 4.4 shows the differences in the use of non-Arabic sources across all groups.

Table 4.4: Percentage of scholars using non-Arabic sources in teaching

Variable	N	Yes %	No %	Adj. Res*
Domestic education	156	42.30	57.70	-9.10
Developing country	177	70.60	29.40	0.20
Developed country	186	93.00	7.00	8.50
Total	**519**			
Male	188	85.60	14.40	-
Female	175	78.30	21.70	-
Total	****363**			
Social science	178	70.20	29.80	-
Applied science	185	93.50	6.50	-
Total	****363**			
Assistant lecturer	57	75.40	24.60	-1.40
Lecturer	114	79.80	20.20	-0.80
Assistant professor	87	73.60	26.40	-2.40
Associate professor	43	95.30	4.70	2.40
Professor	62	95.20	4.80	2.90
Total	****363**			

*Adjusted Residual[3]
**Gender, discipline and rank do not include scholars educated in Libya

[3] Adj. Res, formed for independent variables with more than two groups.

A post-hoc test with Bonferroni adjustment was carried out to identify any significant differences between scholars educated in Libya and those educated in developing and developed countries in terms of their use of non-Arabic sources. The significance level was set at $p<0.008$[4]. The results indicate a significant difference ($p<0.001$) between those who received their degree domestically and those who graduated from HEIs in developed countries with 42.30% and 93% of these groups respectively using non-Arabic sources in their teaching and research. The Cramer's V value suggests that the association between the two variables is strong ($r=0.45$). 70.60% of the scholars educated in developing countries were seen to use non-Arabic sources in their teaching and research. While this percentage is much higher than that of scholars educated in Libya, the difference was found to be non-significant as the adjusted residual value failed to exceed 1.96 and $p=0.841$. A positive adjusted residual was recorded for scholars educated in developed and developing countries, with both groups using more non-Arabic sources than would be expected by chance. However, a negative adjusted residual was recorded for Libya-educated scholars, indicating that fewer of these scholars used non-Arabic sources than would be expected by chance.

The interview data revealed that this last finding is primarily down to the policies of the Gaddafi regime, which between 1986 and 1991 banned the use of any foreign language, including English and French, in Libya's secondary schools and HEIs. This prohibition has severely impacted the foreign language abilities of academics who have worked solely in Libya, and it continues to make it difficult for many to keep abreast of developments in their field. As SL-F3 (a female educated in Libya) explained:

> "Most of the scholars who have done their postgraduate degree in Libya or any other Arab country, such as Egypt or Morocco, have low English levels in comparison to the staff who studied in America, England or any other English-speaking countries. There was a time in Libya when the English language was banned from schools by Gaddafi; I was in high school at that time. This will have certainly had negative effects on people's language proficiency. Although I

[4] When conducting multiple comparisons, the chance of making a type I error increases if every group is tested at a significant level. An adjusted alpha (α/ **m**) is therefore advisable, where α is 0.05 and **m** is the number of cells in their contingency table ($3 \times 2 = 6$). The significance level of the new alpha will be **0.05/6 = 0.008**

> joined English classes to improve myself, I still experience difficulties when reading certain English written sources in Educational Sciences or Psychology."

Those scholars working in the applied sciences who were educated in Libya or other Arab-speaking countries faced a particular challenge, as the number of relevant sources in Arabic seems to be rather limited. Consequently, they were obliged to spend a lot of time and effort on understanding and using non-Arabic sources, as one participant (AG-M17, a male educated in a developing country) explained:

> "In certain subjects, for example my subject engineering, it is difficult to find Arabic written sources. We must therefore use sources that are written in English. Much time and effort is required to understand those materials, as a result of a low level of English."

In contrast, most of those applied scientists who were educated in foreign countries outside the Arab-speaking world encountered few difficulties in using non-Arabic sources. As AD-21 (a male educated in a developed country) explained:

> "When I did my undergraduate and postgraduate, the language used was English; as a result, I have no issue with using English written sources now. In most applied science subjects, particularly medicine, it is hard to find Arabic written sources and if there are any, they will be out of date."

The finding suggests that although scholars in the applied sciences may be forced to use sources written in foreign languages, in the long term, this has a positive impact on their academic and professional development.

The potential consequences of poor foreign language skills for KT in HEIs were highlighted by AL-F15 (a female educated in Libya), who commented on the difficulties she faced when using non-Arabic sources in her teaching:

> "In the pharmacology department, the teaching materials used are in English. Therefore, a lack of English may affect the process of communicating the knowledge to the students."

In both social and applied sciences, there was a moderate relationship between a foreign education and the use of non-Arabic sources in teaching ($p<0.001$, $r=0.30$), though scholars in the applied sciences were more likely to use non-Arabic sources than social scientists (93.50% and 70.20% respectively). Social scientists recorded a negative adjusted residual value, suggesting fewer scholars in this discipline used non-Arabic sources than would be expected by chance.

Asked why this might be, the interviewees suggested that social scientists who have qualified in other Arab-speaking developing countries tend not to use non-Arabic sources in their teaching firstly, because there are few such sources and secondly, because their students often lack language skills. According to SG-F7 (a female educated in a developing country),

> "Students in social sciences are very weak in foreign languages and also most of the sources available in the library are written in Arabic, but they are old. For these reasons, my use of English sources is limited."

The foreign language background of students and the ready availability of Arabic sources thus seem to be the main factors affecting the use of non-Arabic sources in social science teaching.

A significant but medium relationship (r=0.23) was observed between academic rank and the use of non-Arabic sources among foreign-educated scholars. Assistant lecturers, lecturers and assistant professors recorded a negative adjusted residual, while associate professors and professors recorded a positive adjusted residual (value higher than 1.96). Further investigation using a post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) showed that professors (95.20%, $p=0.003$) were significantly more likely to employ non-Arabic sources in their teaching than associate professors (95.30%, $p=0.162$), assistant professors (73.60%, $p=0.424$), lecturers (79.80%, $p=0.016$) and assistant lecturers (75.40%, $p=0.016$). The Cramer's V value indicates that the strength of the association between the variables is moderate (r=0.23). Academics who were educated abroad and who occupied high ranks were more likely to actively engage with international academia. This was confirmed by SD-M9 (a male educated in a developed country):

> "The responsibility of being in a higher rank motivates me to participate in international conferences and publish in international journals. This encourages me to use English sources in teaching and research."

International communication thus appears to be another factor incentivising scholars to use non-Arabic sources.

4.3.2 Number of enrolled students

The number of enrolled students scholars have at undergraduate, master and PhD level may serve as one measure of their contribution and achievement within the university. Accordingly, this was investigated in the survey and interviews.

Statistically significant differences were observed in the number of students enrolled at undergraduate (domestic, n=154, developing country, n=177, developed country, n=186; $\chi 2$ (2, n=517) = 16.124, $p<0.001$) and master level (domestic, n=78, developing country, n=84, developed country, n=108; $\chi 2$ (2, n=270) = 86.283, $p<0.001$) across all groups. No such effect was observed for the number of students enrolled at PhD level (see Table 4.5).

When a post-hoc test with Bonferroni adjustment was conducted to further investigate the difference in the number of students enrolled at undergraduate level, the significance level was set at $p<0.017$[5]. Significant differences were found between the domestic and developing country groups ($p<0.001$) and the domestic and developed country groups ($p=0.001$), as shown in Table 4.7. Table 4.6 shows that the domestic group had higher median and mean rank scores (Mdn=87.50, MR=299.47) than both the developing country (Mdn=50, MR=242.97) and developed country groups (Mdn=53, MR=240.75); in other words, the domestically educated scholars had more undergraduate students than those educated in developing and developed countries, though the effect sizes were small (r=0.13 and r=0.16 respectively). There was no significant difference between the two foreign-educated groups.

When these findings were explored in the interviews, most Libya-educated scholars explained that their main motivation to teach large numbers of undergraduate students was the prospect of a higher salary. As SL-F4 (a female scholar educated in Libya) put it: "Teaching undergraduates is easy and has a positive effect on my salary but negatively

[5] significance level set at 0.05/m. m = K(K-1)/2,

3(3-1)/2 = 3

0.05/3 = 0.017

impacts my publication". The comment highlights the direct and positive relationship between teaching load and scholars' income, but it also reveals the perceived negative impact that the increased teaching workload (the extra time taken up with monitoring, assessing and providing pastoral support to undergraduate students) has on publication productivity.

The post-hoc test also revealed a statistically significant difference between the domestic and developing country groups in terms of the number of students enrolled at master level (domestic, n=154, developing country, n=177; $\chi2$ (2, n=331) = 16.124, p<0.001), with the latter having a higher mean rank and median score (MR=144.90, Mdn=2) than the former (MR=73.59, Mdn=0). The effect size was large (r=0.58) (see Tables 4.6 and 4.7). An even greater difference was recorded in the number of students enrolled at master level between the developed country and domestic groups (developed country, n=186, domestic, n=154; $\chi2$ (2, n=340) = 16.124, p<0.001). The scholars educated in developed countries had a higher mean rank and median score (MR=172.84, Mdn=6) than the scholars educated in Libya (MR=73.59, Mdn=0) with a large effect size (r=0.67). The same finding was observed for scholars educated in developed country (MR=172.84, Mdn=6) as compared to those educated in developing country groups (MR=144.90, Mdn=2).

In terms of the number of students enrolled at PhD level, there was a significant difference between the domestic group and both foreign-educated groups (p<0.01). Scholars educated in Libya (MR=124.83) had a lower mean rank than scholars educated in both developing (MR=137.35) and developed countries (MR=141.76). No statistically significant differences were observed between the foreign-educated groups in this respect (p=0.494).

In the Libyan HE sector, only scholars holding an assistant professor post or higher can teach students at postgraduate level. However, as several of the Libya-educated interviewees pointed out, promotion in the sector is linked to publication output, and if an academic's publication productivity is low, it can take a very long time to rise through the ranks. This was explained by AL-M13 (a male educated in Libya):

> "Scholars must be in a position of assistant professor to be able to teach master students and supervise PhD students. And getting this position depends on how

many publications the academic has. In my case, although I have been in academia for 20 years, I still remain a lecturer, and that is why I only teach undergraduates."

Publication and promotion thus play an important part in allowing scholars to become involved in teaching postgraduate programmes. However, most of the domestic group actually claimed to prefer teaching undergraduate students on the grounds that teaching advanced modules requires more time and effort. SL-F4 (a female educated in Libya) commented that "A lot of effort and time is required to prepare the advanced modules lectures for postgraduate students. That is why I prefer to teach undergraduates". The comment suggests that Libya-educated staff are less inclined to devote the extra time required to teach postgraduate students.

Participants who were educated in developed countries generally appeared more confident in their ability to teach at postgraduate level. SD-M9 (a male educated in a developed country), for example, asserted that "I have no problems teaching advanced modules to postgraduates". The effect size value (r=0.67) indicates that foreign-educated scholars were more likely than their Libya-educated colleagues to take on higher numbers of students at master level, with the developed country group having slightly more master students than the developing country group (r=0.20) (see Table 4.7). Three-quarters of the scholars, irrespective of their country of qualification, did not teach PhD students. This may be explained by the fact that, as the majority of interviewees pointed out, most departments in the sample universities do not run PhD courses. Where departments do have PhD courses, these tend to be taught by

> "Scholars who got a scholarship from the government and had the chance to study abroad. They can teach PhD students but, unfortunately, there are not enough resources for that, and the Higher Education system does not have any clear policies regarding PhD programmes." (SD-M10, a male educated in a developed country)

In other words, opportunities to teach PhD students are limited because of inadequate infrastructure and lack of policy at the macro level.

Postgraduate programmes tend to be concentrated in the social sciences (e.g. the Islamic, Arabic and History departments), partly because Arabic sources are more readily available in these disciplines and partly because they do not require laboratories. As SG-M6 (a male educated in developing a country) observed:

> "Experienced scholars in the department of social sciences do not face massive challenges in teaching PhD students, since all they need are references, pen and paper. All of the required references are in Arabic, which are accessible in Egyptian libraries, as they are full of Arabic publications and resources."

Setting up postgraduate programmes in the applied sciences is arguably much more difficult because these programmes require sophisticated equipment and facilities, technicians, non-Arabic sources and, as AD-F24 (a female educated in a developed country) explained, highly qualified teachers:

> "Most departments of applied science are unable to establish PhD programmes. The main reason for this is the low number of experienced scholars who are able to teach PhD students."

Again, the problem in most universities is one of inadequate infrastructure, particularly in terms of human resources.

On the question of the relationship between academic rank and the number of students enrolled at different levels, significant differences were observed between ranks at undergraduate level ($\chi 2$ (4, n=363) = 13.274, p=0.010), but not at master and PhD levels. However, a post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$)[6] revealed no significant differences ($p>0.005$) in the number of undergraduate students enrolled on courses taught by assistant lecturers, lecturers, assistant professors, associate professors and professors (Table 4.7). This indicates that when the domestic group was excluded from the comparison, scholars in different academic ranks were equally likely to enrol students at all three levels. As shown in Table 4.7, the comparison at master and PhD levels was limited to assistant professors, associate professors and professors as university regulations do not allow assistant lecturers and lecturers to teach students at

[6] $5(5-1)/2 = 10$

$0.05/10 = 0.005$

these levels. Table 4.6 shows that as scholars move up through the academic ranks, the median value for enrolled students at the three levels declines.

Most participants pointed out that promotion to an assistant professorship qualifies the scholar to teach students at postgraduate level. This undoubtedly brings a sense of achievement, but crucially, it also has a positive effect on their income as they are paid a higher hourly rate for teaching. However, as AD-M21 (a male educated in a developed country) explained:

> "The upgrade to a higher academic level and teaching postgraduate students makes me feel that I am establishing myself among my colleagues."

The fact that the regulations allow senior ranks to reduce their teaching hours without impacting their salary means that the most experienced staff, who arguably have the most to offer, have little incentive to teach a large number of students.

Table 4.5: Country of study and academic rank by number of students enrolled at different levels

Variable	Undergraduate			Master			PhD		
	χ2	df	p-value	χ2	df	p-value	χ2	df	p-value
Country of study	16.124	2	0.000	86.283	2	0.000	8.694	2	0.013
Academic rank	13.274	4	0.010	1.125	2	0.570	2.011	2	0.366

Table 4.6: Mean rank, median and interquartile range for students enrolled at different levels of education by country of study and academic rank

Variable	Undergraduate						Master						PhD					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	154	299.47	87.50	10	295	70	78	73.59	0	0	14	0	78	124.83	0	0	3	0
Developing country	177	242.97	50	0	251	89	84	144.9	2	0	17	9	84	137.35	0	0	3	0
Developed country	186	240.75	53	0	280	108	108	172.84	6	0	26	10	108	141.76	0	0	4	0
Total	**517**						**270**						**270**					
Assistant lecturer	58	208.91	72.50	15	251	70	-	-	-	-	-	-	-	-	-	-	-	-
Lecturer	114	198.51	55.50	10	280	89	-	-	-	-	-	-	-	-	-	-	-	-
Assistant professor	87	172.09	45	0	250	107	87	91.93	3	0	26	12	87	95.42	0	0	4	0
Associate professor	43	154.86	35	0	210	60	43	99.73	6	0	22	10	43	102.45	0	0	4	0
Professor	61	158.82	37	0	255	88	62	100.68	4.50	0	23	5	62	93.89	0	0	3	0
Total	**363**						**192**						**192**					

*MR= Mean Rank
*Mdn= Median
*IQR= Interquartile range

Table 4.7: Multiple comparisons of country of study and academic rank for students enrolled at different levels

Variable		Undergraduate			Master			PhD		
		U*	p	Effect size[7]	U*	p	Effect size	U*	p	Effect size
Domestic										
	Developing	10512.50	0.000	0.20	1445	0.000	0.58	2970.50	0.014	0.13
	Developed	11206.50	0.001	.019	1214	0.000	0.67	3685.50	0.003	0.16
Developing	Developed	16182	0.780	0.01	3501	0.006	0.20	4386	0.494	0.04
Assis lecturer										
	Lecturer	3078	0.460	0.10	-	-	-	-	-	-
	Assis prof	2069	0.067	0.15	-	-	-	-	-	-
	Asso prof	858.50	0.008	0.27	-	-	-	-	-	-
	Prof	1279	0.009	0.24	-	-	-	-	-	-
Lecturer					-	-	-	-	-	-
	Assis prof	4249	0.082	0.12	-	-	-	-	-	-
	Asso prof	1843	0.017	0.19	-	-	-	-	-	-
	Prof	2684.50	0.013	0.19	-	-	-	-	-	-
Assis professor					-	-	-	-	-	
	Asso prof	1720.50	0.458	0.10	1770	0.606	0.05	1732.50	0.255	0.10
	Prof	2501.50	0.553	0.01	2399.5	0.244	0.10	2653	0.752	0.03
Asso professor	Prof	1291	0.892	0.01	1294.5	0.800	0.02	1215	0.193	0.13

*U= Mann-Whitney U test value

[7] The general formula for effect size in nonparametric tests is (r= $z/\sqrt{n}$) (Coolican, 2009, p. 395).

Table 4.8: Number of students enrolled at different levels by gender and academic discipline

Variable	Undergraduate				Master				PhD			
	U	z	p	Effect size	U*	z	p	Effect size	U	z	p	Effect size
Gender	15686	-0.77	0.444	0.04	3780.50	-2.16	0.031	0.16	4437.50	-0.72	0.474	0.10
Academic discipline	14720	-1.75	0.080	0.10	4140.50	-0.99	0.323	0.10	3799	-3.25	0.001	0.23

Table 4.9: Mean rank, median and interquartile range for students enrolled at different levels of education by gender and academic discipline

Variable	Undergraduate						Master						PhD					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Male	188	177.94	50	0	280	95	101	104.57	5	0	25	10	101	94.94	0	0	4	0
Female	175	186.37	55	0	280	85	91	87.54	3	0	26	9	91	98.24	0	0	4	0
Total	**363***						**192****						**192****					
Social science	179	191.77	65	0	280	109	82	101.01	4	0	25	12	82	105.17	0	0	3	0
Applied science	184	172.50	45	0	255	65	110	93.14	5	0	26	7	110	90.04	0	0	4	0
Total	**363***						**192****						**192****					

*Gender and discipline do not include scholars educated in Libya, and **do not include assistant lecturers and lecturers.

Further investigation revealed a statistically significant difference ($p<0.05$) between genders in the number of students enrolled at master level with male scholars having more master students than female scholars (Mdn=5, MR=104.57, n=101 versus Mdn=3, MR=87.54, n=91, U=3780.50, z=-2.16, p=0.03). The effect size recorded was small (r=0.16). A significant difference was also observed between academic disciplines in the number of students enrolled at PhD level with scholars in the social sciences having more PhD students than scholars in the applied sciences (MR=105.17, n=82 versus MR=90.04, n=110, U=3799, z=-3.25, p=0.001). Once again, the effect size was small (r=0.23). No significant differences were observed between genders in the number of students enrolled at undergraduate and PhD levels (p=0.44 and p=0.47 respectively) or between academic disciplines in the number of students enrolled at undergraduate and master levels (p=0.08 and p=0.323 respectively) (Table 4.8).

The interviews provided an opportunity to explore possible reasons for the gender disparity at master level. The majority of participants reported that female scholars are widely considered to be insufficiently qualified to teach students at postgraduate level, and that this is frequently associated with their low publication productivity. AG-F20 (a female educated in a developing country) pointed out that

> "There is still a prevalent view among academics that women do not possess the ability to teach in higher education, even if they have studied abroad. This may be because of their weakness in terms of publishing and participation in local and international conferences. This negative view does not encourage female academics to put themselves forward to teach PhD and master's students."

Another female participant (SD-F11, educated in a developed country) added:

> "I am working in a department that does not provide postgraduate courses; however, I did apply to join another department which provides postgraduate studies, but my application was rejected because of their opinion that a woman's academic productivity does not empower them to teach postgraduates."

The comment suggests that widespread assumptions about the productivity of female academics severely limit their ability to build a good reputation. These assumptions and stereotypes have become institutionalised to the point that they affect the decision making of those in charge. SD-F12 (a female educated in a developed country) observed that

> "Not all university departments provide postgraduate courses for many reasons. One of the most important reasons is the lack of academics able to teach PhD and master's students. Although there are women who are capable of teaching master's students, the dominant view about their weak productivity affects the decision makers at the university, discouraging them from involving female scholars in teaching master's students."

A vicious circle is created as the stereotype that female academics operate at a lower standard limits their opportunities to engage in academic work and thus their chance to be more productive. As the above quote suggests, however, it also reduces the opportunities available to potential postgraduate students.

Table 4.6 indicates that 50% of the domestic group had on average 88 students (Mdn=87.5, IQR=70) enrolled at undergraduate level. Three-quarters had no students at master or PhD level (Mdn=0, IQR=0). Very few social scientists taught any students at PhD level (Mdn=0, IQR=0). A negative z value (z=-2.16) indicates that at the time of the field work, male scholars had fewer than average students at master level (Mdn=5) (see Table 4.9).

The effect size was very large for scholars educated abroad as compared to scholars educated in Libya in relation to the number of students enrolled at master level. This indicates that studying abroad has a significant effect on scholars' teaching at this level. Conversely, the effect size was small for scholars educated in developed countries as compared to scholars educated in developing countries, indicating no significant difference between the two groups.

4.3.3 Number of supervisees

The participants' academic contribution was also measured by the number of supervisees they had at undergraduate, master and PhD levels. Statistically significant differences ($p<0.05$) were observed between the domestic, developing country and developed country groups in the number of supervisees at master and PhD levels, but there was no difference ($p=0.199$) at undergraduate level. Furthermore, while significant differences were observed in the number of undergraduate and master supervisees taken on by different academic ranks, there was no significant difference at PhD level ($p=0.089$).

The post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$) revealed a significant ($p<0.001$) difference between the domestic and developing country groups in the number of supervisees at master level with the latter group (MR=137.48, Mdn=1.50) observed to supervise more students than the former (MR=61.63, Mdn=0) (see Table 4.11). The effect size was large (r=0.63). Scholars educated in developed countries were also found to supervise more students at master level (MR=187.31, Mdn=4) than scholars educated in Libya (MR=61.63 and Mdn=0). The effect size was significantly large (r=0.79); the developed country group accounted for 62.41% ($r^2 = 0.6241$) of variability at this level. The difference between the developed country and developing country groups (MR=187.31, Mdn=4 versus MR=137.48, Mdn=1.50) produced a large effect size (r=0.35).

At PhD level, the domestic group supervised fewer students (MR=123.80) than either of the foreign-educated groups (MR=139.32, p=0.005 for the developing country group and MR=140.98, p=0.003 for the developed country group). The effect size was medium (r=0.22). No statistically significant difference (p=0.781) was observed between the foreign-educated groups. It should be noted that although these two groups had significantly more PhD supervisees than their Libya-educated colleagues, 75% of these scholars had supervised no PhD students in the four years leading up to the 2011 revolution (Mdn=0, IQR=0) (see Table 4.11).

The interviewees suggested several reasons why scholars (both Libya-educated and foreign-educated) might be deterred from supervising students at postgraduate level. These can be broadly divided into institutional factors, challenges related to students (e.g. poor academic performance) and challenges related to research resources. Interviewees citing poor resources complained about the difficulty of accessing international journals, explaining that most departments do not provide free access to Arabic or international publications. SD-M9 (a male educated in a developed country) argued that

> "Lack of references, shortage of libraries and poor internet access prevent students and supervisors from accessing journals, papers and published studies and make it hard to find research materials. These factors do not facilitate broad supervision, which results in weak projects with limited resources."

AG-M18 (a male educated in a developing country) complained that "There are no allocated places or offices for academics to meet and hold discussions with postgraduate students", implying an institutional lack of commitment to supporting academics in delivering postgraduate programmes. Other interviewees pointed to the lack of inter-departmental co-operation; AL-F16 (a female educated in Libya) explained:

> "A master's student needs to spend a lot of time and effort to get the approval to perform specific experiments in different divisions within the university. These university regulations make it hard to supervise postgraduate students."

The comment suggests that an obstructive internal bureaucracy, compounded by departmental divisions, make life more difficult for both postgraduate students and their supervisors. Libya-educated scholars may also be deterred by a lack of self-confidence, given that most postgraduate students prefer to be supervised by scholars educated abroad. AL-M13 (a male educated in Libya) explained that

> "The predominant view in the academic field is that academics who study and graduate in Libya do not have the skills and abilities to supervise postgraduate students. This view does not encourage scholars educated in Libya to become postgraduate supervisors, particularly PhD students."

Domestically educated academics therefore tend to stick to teaching and supervising students at undergraduate level. In contrast, most of the interviewees who had studied at well-known institutions abroad said this gave them greater confidence to supervise students at postgraduate level when they returned to Libya. SD-M10 (a male educated in a developed country) asserted that

> "Although supervising master's students is not getting any easier because of the university's lack of resources, I have the capability and the personal motivation to continue doing so."

For these scholars, their enthusiasm for supervising students at postgraduate level was strong enough that they were willing to put up with the difficulties caused by inadequate infrastructure.

The view that the vast majority of students at postgraduate level are supervised by scholars who have studied abroad was echoed by a number of developed-country-educated interviewees. AD-M22 (a male educated in a developed country) explained:

> "Only 10% of the academics in the statistics department are capable of supervising master's students. Most of those graduated abroad. This percentage can represent the fraction of capable supervisors in the whole university. The main reason for this is that we earned our skills in statistics from studying overseas."

This interviewee appeared to believe that foreign-educated scholars, particularly those who have studied in developed countries, are better equipped to supervise postgraduate students.

On top of all this, the general view among interviewees was that whether one gains any financial benefit by taking on supervision duties is to a large extent dependent on one's relationship with those who oversee the payroll. For instance, SD-M10 (a male educated in a developed country) said:

> "I stopped supervising students in their projects, and the main reason for that is that I have not been financially rewarded for the supervision of previous students. Since 2004, I have not received any money from the university, as I have no personal relationships with the financial department."

SG-M5 (a male educated in a developing country) commented that

> "Money is one of the factors that motivates scholars to achieve in the workplace, so when academics do not get financial rewards, they feel frustrated and disappointed."

It seems from these results that managers in Libyan universities are ignoring one of the main factors affecting individual productivity.

Table 4.10: Number of supervisees at different levels by country of study and academic rank

Variable	Undergraduate			Master			PhD		
	$\chi2$	df	p-value	$\chi2$	df	p-value	$\chi2$	df	p-value
Country of study	3.229	2	0.199	127.136	2	0.000	9.172	2	0.010
Academic rank	22.297	4	0.000	8.351	2	0.015	4.905	2	0.080

Table 4.11: Mean rank, median and interquartile range for number of supervisees at different levels of education by country of study and academic rank

Variable	Undergraduate						Master						PhD					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	156	262.06	4.50	0	30	9	78	61.63	0	0	6	0	78	123.80	0	0	2	0
Developing country	178	274.94	6	0	30	10	84	137.48	1.50	1	11	4	84	139.32	0	0	2	0
Developed country	187	246.84	4	0	32	9	108	187.31	4	0	15	5	108	140.98	0	0	4	0
Total	**521**						**270**						**270**					
Assistant lecturer	58	154.97	3	2	20	8	-	-	-	-	-	-	-	-	-	-	-	-
Lecturer	115	195.37	6	0	32	9	-	-	-	-	-	-	-	-	-	-	-	-
Assistant professor	87	170.20	4	0	30	9	87	85.22	2	0	14	5	87	94.39	0	0	3	0
Associate professor	43	241.05	10	0	32	12	43	114.24	4	0	13	5	43	106.23	0	0	2	0
Professor	62	163.99	4	0	30	8	62	100.02	3	0	15	4	62	92.72	0	0	2	0
Total	**365**						**192**						**192**					

*MR= Mean Rank
*Mdn= Median
*IQR= Interquartile range

Table 4.12: Multiple comparisons for supervisees at different levels by country of study and academic rank

Variable		Undergraduate				Master				PhD			
		U	z	p	Effect size	U	z	p	Effect size	U	z	p	Effect size
Domestic													
	Developing	13189.50	-0.79	0.428	-0.04	1216.50	-8.02	**0.000**	0.63	2892.50	-2.83	0.005	0.22
	Developed	13725.50	-0.95	0.343	-0.05	509.50	-10.76	**0.000**	0.79	3683	-3.00	0.003	0.22
Developing	Developed	14856.50	-1.79	0.074	-0.09	2643	-4.91	**0.000**	0.35	4473	-0.28	0.781	0.02
Assis lecturer													
	Lecturer	2569	-2.48	0.013	-0.19		-	-	-		-	-	-
	Assis prof	2290.50	-0.95	0.343	-0.08		-	-	-		-	-	-
	Asso prof	692.50	-3.84	**0.000**	-0.38		-	-	-		-	-	-
	Prof	1725.50	-0.39	0.700	-0.04		-	-	-		-	-	-
Lecturer							-	-	-		-	-	-
	Assis prof	4255.5	-1.83	0.068	-0.13		-	-	-		-	-	-
	Asso prof	1762.50	-2.79	**0.005**	-0.22		-	-	-		-	-	-
	Prof	2946	-1.92	**0.055**	-0.14		-	-	-		-	-	-
Assis professor							-	-	-		-	-	
	Asso prof	1164	-3.52	**0.000**	-0.31	1343.50	-2.64	**0.008**	0.23	1639	-1.83	0.068	0.16
	Prof	2590	-0.42	0.677	-0.03	2243	-1.77	0.077	0.15	2649.50	-0.34	0.733	0.03
Asso professor	Prof	808	-3.44	**0.001**	-0.34	1097	-1.55	0.122	0.15	1146	-1.95	0.051	0.19

Further investigation revealed significant variation ($p<0.01$) in the number of supervisees assigned to different academic ranks (see Table 4.12). A post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) showed significant differences in the number of undergraduate supervisees between assistant lecturers and associate professors (MR=154.97 versus MR=241.05), assistant professors and associate professors (MR=170.20 versus MR=241.05) and associate professors and professors (MR=241.05 versus MR=163.99). On average, associate professors scored higher mean ranks on the number of undergraduate supervisees than assistant lecturers, assistant professors and professors (large effect size of $r=0.38$, $r=0.31$ and $r=0.34$ respectively). No significant difference was found in the number of supervisees at undergraduate level for other academic ranks.

At master level, a post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$)[8] revealed a statistically significant difference in the number of students supervised by assistant and associate professors (MR=85.22 versus MR=114.24), with assistant professors scoring a lower mean rank than associate professors (medium effect size of $r=0.23$). No difference was found between assistant professors and professors and associate professors and professors. No significant differences were observed across the academic ranks for supervisees at PhD level. Taking all academic ranks (from assistant lecturer to professor) together, it is evident that the higher the rank, the smaller the number of supervisees. As Table 4.11 indicates, the median of supervisees at undergraduate, master and PhD levels by different ranks increases, it then starts to decrease.

In terms of gender and academic discipline, the results (see Table 4.13) revealed significant differences in the number of students supervised by male and female scholars at master level, and by social and applied scientists at PhD level. However, no significant differences were observed in the number of PhD students supervised by male and female scholars, or in the number of master's students supervised by social and applied scientists. There was no observed difference in the number of students supervised by male and female or social and applied scientists at undergraduate level.

[8] This comparison included only three groups (assistant professors, associate professors and professors) as lecturers and assistant lecturers are not allowed to supervise master and PhD students. $K(K-1)/2$ $3(3-1)/2 = 3$

$0.05/3 = 0.017$

At master level, male scholars (Mdn=3, MR=106.4) were found to supervise significantly ($p<0.01$) more students than female scholars (Mdn=2, MR=85.50, n=192, U= 3594.50, z=-2.63, p=.0009). The effect size was zero (r=0.02). The negative z score indicates that 50% of female scholars supervised fewer master's students than the average (Mdn=2) in the four years leading up to the 2011 revolution, but there was no strong evidence of big differences between male and female foreign-educated scholars. In terms of academic discipline, scholars in the social sciences were observed to supervise significantly ($p<0.01$) more students at PhD level (MR=104.10) than scholars in the applied sciences (MR=90.83, n=192, U=3886.50, z=-2.76, p=0.006). The effect size was small (r=0.20).

It is evident from the above results that overall, the male scholars were significantly more involved in supervision than their female peers. When this was investigated in the interviews, several female participants noted the difficulties of helping supervisees to navigate bureaucratic and institutional barriers within a male-dominated culture. AG-F7 (a female educated in a developing country) recalled:

> "A postgraduate student faced difficulties with the sample collection process… It is the supervisor's duty to help the student by communicating with the university's administration and government (i.e. hospitals)…. Unfortunately, I could not help the student with this due to the complicated procedures. Because of admin complexity and my inability to help, I stopped supervising students at master level."

Some of these interviewees felt that their gender made it more difficult for them to help their students overcome these hurdles.

Table 4.13: Number of supervisees at different levels by gender and academic discipline

Variable	Undergraduate				Master				PhD			
	U	z	p	Effect size	U*	z	p	Effect size	U	z	p	Effect size
Gender	16304.5	-0.33	0.739	-0.02	3594.50	-2.63	0.009	-0.02	4562	-0.14	0.885	-0.01
Academic discipline	16097	-0.55	0.580	-0.03	3795.50	-1.89	0.059	-0.14	3886.50	-2.76	0.006	-0.20

*U= Mann-Whitney U test value

Table 4.14: Mean rank, median and interquartile range for supervisees at different levels by gender and academic discipline

Variable	Undergraduate						Master						PhD					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Male	188	184.77	5	0	32	8	101	106.41	3	0	15	6	101	96.83	0	0	2	0
Female	177	181.12	5	0	32	11	91	85.50	2	0	14	5	91	96.14	0	0	3	0
Total	**365**						**192**						**192**					
Social science	180	186.07	5	0	32	10	82	87.79	2	0	15	5	82	104.10	0	0	2	0
Applied science	185	180.01	5	0	32	9	110	103	3	0	13	5	110	90.83	0	0	3	0
Total	**365**						**192**						**192**					

4.3.4 Number of hours per week spent on teaching, research and administration

Scholars working full time in HEIs may devote their time to teaching, research or administration. The survey measured the hours spent per week on each activity in order to gain an insight into the contribution and achievement of scholars, including any variation between groups.

As shown in Table 4.15, statistically significant differences ($p<0.01$) were identified across the country of study variable in the number of hours spent each week on teaching (domestic, n=156, developing country, n=176, developed country, n=187; $\chi2$ (2, n=519) = 11.389, p=0.003) and research (domestic, n=156, developing country, n=177, developed country, n=187; $\chi2$ (2, n=520) = 19.643, $p<0.001$). No significant differences were found between the groups in the hours spent on administration.

The post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$) revealed a statistically significant difference in the number of hours taught by scholars educated in Libya and those educated in developed countries (MR=290.71, Mdn=17 versus MR=236.08, Mdn=12) with small effect size (r=0.18). Overall, the teaching hours of the developed country group were lower than the average, as indicated by the negative z score (z=-3.27). In contrast, this group scored a higher mean rank (MR=295.06, Mdn=4) for research than the domestic group (MR=224.25, Mdn=2) with medium effect size (r=0.23). The developed country group also scored a higher mean rank and median (MR=295.06, Mdn=4) for research than the developing country group (MR=255.94, Mdn=3) with a small effect size (r=0.13). The findings suggest that scholars educated in Libya spent most of their time on teaching (Mdn=17) and only two hours a week on research (Mdn=2). Scholars educated in developed countries spent fewer hours teaching (Mdn=12) and more hours on research (Mdn=4). There were no significant differences between the domestic and developing country groups across teaching, research or administration; both groups were equally likely to contribute in all three activities.

The findings also revealed significant differences ($p<0.001$) between the academic ranks in terms of their teaching and research activities (see Table 4.15). A post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$)[9] revealed significant

[9] m=K (K-1)/2. K is the number of academic rank (assistant lecturer, lecturer, assistant professor, associate professor and professor). 5(5-1)/2 = 10. An adjusted alpha, a/m , 0.05/10=0.005

differences in the number of hours spent on teaching each week by assistant lecturers and assistant professors (MR=218.97 versus MR=152.62) and assistant lecturers and professors (MR=218.97 versus MR=139.93). There were also significant differences between lecturers and assistant professors (MR=213.27 versus MR=152.62), lecturers and associate professors (MR=213.27 versus MR=166.94) and lecturers and professors (MR=213.27 versus MR=139.93). Overall, assistant lecturers were found to have higher mean ranks for teaching activities than assistant professors and professors with a large effect size (r=0.33 and r=0.38 respectively). Lecturers were also observed to have higher mean ranks than assistant professors, associate professors and professors, though the effect size ranged between medium and large (r=0.30, r=0.20 and r=0.32 respectively).

Conversely, assistant lecturers were seen to have significantly lower mean ranks for time spent on research than assistant professors (MR=144.33 versus MR=186), associate professors (MR=144.33 versus MR=194.88) and professors (MR=144.33 versus MR=237.53). This result indicates that assistant lecturers spent fewer hours on research per week than assistant professors, associate professors and professors, though the effect size ranged from medium to large (r=0.20, r=0.25 and r=0.46 respectively). There was also a difference between lecturers (MR=164.47) and professors (MR=237.53), with the former spending fewer hours on research than the latter. The effect size in this case was large (r=0.32). Professors also scored higher a mean rank (MR=237.53) than assistant professors (MR=186) on research with medium effect size (r=0.25).

The general trend indicated by these findings is that as individuals move up through the academic ranks, they spend less time on teaching and more hours on research, although this transition happens very gradually; no significant differences were observed in the number of hours spent on teaching and research by assistant lecturers and lecturers, assistant professors and associate professors, and associate professors and professors. Similarly, there were no significant differences between assistant lecturers and associate professors, and assistant professors and professors in terms of hours spent on teaching. In terms of hours spent on research, there were no significant differences between lecturers, assistant professors and associate professors. No significant differences at all were observed in the number of hours spent on administration per week.

Elsewhere, a significant difference was identified in the amount of time spent on research by males and females ($p<0.01$). Male scholars were observed to spend more time on research (MR=198.53, Mdn=4, n=188) than females (MR=165.37, Mdn=3, n=176; U=13529.50, z=-3.04, p=0.002), though the effect size was small (r=0.16). There was no significant difference in the amount of time spent on teaching and administration by male and female scholars. Similarly, no statistically significant differences were observed between academic disciplines.

Table 4.15: Number of hours spent per week on teaching, research and administration by country of study and academic rank

Variable	Teaching			Research			Administration		
	χ2	df	p-value	χ2	df	p-value	χ2	df	p-value
Country of study	11.389	2	0.003	19.643	2	0.000	4.662	2	0.097
Academic rank	35.041	4	0.000	29.132	4	0.000	1.970	4	0.741

Table 4.16: Mean rank, median and interquartile range for hours spent on teaching, research and administration by country of study and academic rank

Variable	Teaching						Research						Administration					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	156	290.71	17	4	30	7	156	224.25	2	0	10	4	156	240.44	0	0	24	4
Developing country	176	258.20	14	6	40	8	177	255.94	3	0	12	4	178	267.92	2	0	24	5
Developed country	187	236.08	12	0	26	10	187	295.06	4	0	14	4	187	271.57	2	0	40	4
Total	**519**						**520**						**521**					
Assistant lecturer	58	218.97	17	6	40	8	57	144.33	2	0	8	4	58	171.09	2	0	24	4
Lecturer	115	213.27	16	5	40	9	115	164.47	2	0	14	4	115	178.13	2	0	25	4
Assistant professor	86	152.62	12	4	24	10	87	186	4	0	13	3	87	187.15	2	0	30	5
Associate professor	43	166.94	12	6	23	9	43	194.88	4	0	14	4	43	193.40	2	0	24	6
Professor	61	139.93	10	0	25	9	62	237.53	5	0	13	3	62	190.15	2	0	40	7
Total	**363**						**364**						**365**					

*MR= Mean Rank
*Md= Median
*IQR= Interquartile range

Table 4.17: Multiple comparisons of country of study and academic rank by hours spent on teaching, research and administration

Variable		Teaching				Research				Administration			
		U*	z	p	Effect size	U*	z	p	Effect size	U*	z	p	Effect size
Domestic													
	Developing	11919	-2.08	0.038	0.11	12156.50	-1.92	0.055	0.11	12451.50	-1.73	0.083	0.10
	Developed	11604	-3.27	0.001	0.18	10662	-4.35	0.000	0.23	12811.50	-2.10	0.040	0.11
Developing	Developed	14964.50	-1.50	0.134	0.10	14092.50	-2.47	0.013	0.13	16441.50	-0.21	0.835	0.01
Assis lecturer													
	Lecturer	3269	-0.21	0.832	0.02	2960	-1.10	0.293	0.10	3173.50	-0.54	0.587	0.04
	Assis prof	1541	-3.90	0.000	0.33	19000	-2.40	0.016	0.20	2304.50	-0.92	0.356	0.08
	Asso prof	882	-2.51	0.012	0.25	877	-2.47	0.014	0.25	1098.50	-1.07	0.286	0.11
	Prof	1008	-4.10	0.000	0.38	837	-5	0.000	0.46	1636	-0.90	0.371	0.08
Lecturer													
	Assis prof	3267.50	-4.13	0.000	0.30	4406	-1.47	0.142	0.10	4754.50	-0.63	0.531	0.04
	Asso prof	1859.50	-2.40	0.016	0.20	2058	-1.64	0.101	0.13	2252.50	-0.891	0.373	0.07
	Prof	2135.50	-4.28	0.000	0.32	2185	-4.28	0.000	0.32	3311	-0.81	0.417	0.06
Assis professor													
	Asso prof	1710.50	-0.70	0.486	0.10	1778	-0.47	0.643	0.04	1810	-0.31	0.757	0.03
	Prof	2381.50	-1	0.340	0.10	1918	-3.10	0.002	0.25	2652	-0.19	0.857	0.02
Asso professor	Prof	1119.50	-1.27	0.203	0.12	1010	-2.12	0.032	0.21	1315	-0.121	0.903	0.01

*U=Mann-Whitney U test value

Table 4.18: Number of hours spent on teaching, research and administration by gender and academic discipline

Variable	Teaching				Research				Administration			
	U	z	p	Effect size	U*	z	p	Effect size	U	z	p	Effect size
Gender	16147.50	-0.32	0.753	0.02	13529.50	-3.04	0.002	0.16	15535.50	-1.14	0.255	0.10
Academic discipline	15279	-1.19	0.233	0.06	14624	-1.95	0.052	0.10	16535.50	-0.12	0.906	0.01

*U= Mann-Whitney U test value

Table 4.19: Mean rank, median and interquartile range for number of hours spent on teaching, research and administration by gender and academic discipline

Variable	Teaching						Research						Administration					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Male	186	180.31	14	2	40	10	188	198.53	4	0	14	4	188	188.86	2	0	30	5
Female	177	183.77	13.50	0	40	8	176	165.37	3	0	12	3	177	176.77	2	0	40	4
Total	**363**						**364**						**365**					
Social science	179	188.64	15	4	40	8	179	171.70	3	0	13	4	180	182.36	2	0	30	5
Applied science	184	175.54	13	0	26	10	185	192.95	4	0	14	4	185	183.62	2	0	40	4
Total	**363**						**364**						**365**					

The interviews revealed a strong correlation between teaching hours and scholars' income, as a result of which most Libya-educated scholars prefer not to spend much time on research. SL-M4 (a male educated in Libya) commented that

> "The time I spend on research is only for the sake of academic promotion. Receiving income from my research will take a long time. This is why I need to spend extra hours teaching, to directly improve my monthly wage."

Similarly, AL-F15 (a female educated in Libya) observed that

> "Life nowadays is challenging and difficult; that is why I am teaching extra hours to improve my income and be able to face financial challenges."

The quotes reflect a pragmatic approach from the Libya-educated scholars, many of whom were primarily concerned with securing a reliable income. However, financial considerations were not the only reason why many of the scholars in the sample did relatively little research. Most of the interviewees claimed that the working environment in their department did not encourage scholars to spend time on research. SG-M6 (a male educated in a developing country) said:

> "It is difficult to find a quiet place at the university to spend a couple of hours on research. Most of the time I have to lock the door… to make sure no one can interrupt me."

Despite the time constraints and lack of facilities, however, a number of interviewees were keen to engage in research because they understood its importance in establishing an academic reputation. AD-M22 (a male educated in a developed country) asserted that

> "Studying abroad allowed me to see the importance of research in academia, and that to distinguish myself among my peers, I must spend a lot of time on research, in order to make valuable findings."

The comment suggests that scholars who have been educated abroad are perhaps more likely than their Libya-educated colleagues to be motivated by the desire to achieve success and distinction in their chosen field of study.

4.4 Section 3: Discussion of the findings

This section discusses the major findings from the collected data regarding KT. It addresses the research aim set out in section 1.3.3 relating to investment in human capital, firstly by investigating the academic achievement and contribution of scholars who were educated in overseas universities and comparing them with those of domestically educated academics, and secondly, by examining the factors that may affect these academics' contribution. The findings are important because human capital development is a key factor in improving academic achievement. Many developing countries see sending academics to study at high-ranking universities overseas as a worthwhile investment (see sections 1.2.1 and 2.3.1) because it enables these academics not only to improve their own academic performance but also equips them with skills and knowledge that they can then pass on to students in their home country, either through teaching or supervising at undergraduate or postgraduate levels (section 2.4.1.1), when they return. Study abroad programmes (as investment in human capital) are thus a potentially invaluable way of improving the academic achievement of scholars and raising HEI quality in developing countries.

The research questions serve as guides in directing the investigation to achieve the aim of the study and the research objectives. This section starts by discussing the performance of all academics in the sample against a range of items within the KT dimension, including their use of non-Arabic sources in teaching, the number of hours spent on teaching, research and administrative duties, and the number of students enrolled and supervised at undergraduate and postgraduate levels (see Figure 2.2). It then discusses the significant findings for the same range of items when the group of domestically educated scholars are excluded from gender, academic discipline and academic rank. Finally, it discusses the factors that affect the academic achievement and contribution of scholars based on country of study, academic discipline, rank and gender.

By focusing on the key variables of scholars' country of study (whether they were educated in Libya, or developing or developed countries), academic discipline, academic rank and gender as a guide for this discussion. The reason behind highlighted these variables is the micro level focus of the study and hoped that a clear and direct explanation about human capital development.

4.4.1 Country of study

Few studies have discussed the contribution of returning scholars or those factors that might affect these returnees' academic achievement and contribution. Furthermore, those studies that do consider the productivity of returning scholars do not distinguish between those educated in developing and developed countries. The current study addresses this gap by comparing the academic achievement and contribution of scholars who have chosen to study in Libya with those who have studied in developing and developed countries. This variable has a significant impact on the factors that affect scholars' academic achievement and contribution in relation to KT. The results discussed in this section were derived first from the questionnaires and then from the interviews with academics educated in Libya, and in developing and developed countries. Analysis of the questionnaire results highlighted several differences among the three groups. Similarly, the interview data showed that the Libya-educated group faced different barriers to KT than those educated in developing and developed countries.

One of the most significant findings is the strong evidence of a relationship between being educated in a developed country and the use of non-Arabic sources in teaching. No such association was found for the other two groups (section 4.3.1). The interviewees attributed this primarily to the MHE's banning of the teaching of foreign languages in secondary schools and universities in the late 1980s. This policy has also been highlighted by Al-Khawaldeh, Bani-Khair and Al-Edwan (2016), Linvill (2012) and El-Hawat (2003). The banning of English and French language teaching was only one manifestation of Gaddafi's rejection of the West and its ideologies, including capitalism (St John, 1983), which he feared might threaten Libya's national identity (Aloreibi and Carey, 2017). However, the policy has had a long-term adverse effect on HE in the country by making it much more difficult for postgraduate students, who in turn have become the next generation of HEI staff, to access non-Arabic sources and employ them in their teaching. Since many Arabic sources are out of date, students being taught from these sources are being denied access to new information. The interview findings appear to support Aloreibi and Carey (2017) in showing the damage this policy has afflicted on both students and teachers in Libya.

However, the findings also show that Libya-educated academics were not the only ones in the sample to find using non-Arabic sources challenging. Interviewees educated in other developing countries, particularly Arab-speaking countries, described experiencing similar difficulties (section 4.3.1). This is disappointing, given that one of the main goals of study abroad programmes is to improve the academic performance of faculty members. Both the interview findings and the quantitative findings indicate that academics educated in developed countries are more likely to be actively engaged in international communication and more productive (Lee and Bozeman, 2005) because they are more likely to be able to use English. This proficiency also encourages them to use non-Arabic sources in their teaching. This finding is in line with Finn (2007), who indicates that returning scholars are more likely to use foreign language teaching and research materials when they return to their home country. Crook *et al.* (2011, p. 444) define human capital as “knowledge, skills and abilities (KSAs) embodied in people”.

In terms of the other two items in the KT dimension (teaching hours and the number of students enrolled and supervised), Libya-educated scholars spent more hours teaching and had more students enrolled at undergraduate level than either of the other two groups (sections 4.3.2 and 4.3.4). However, the majority of domestically educated scholars neither taught nor supervised students at postgraduate level. When this was explored in the interviews, the majority of this group explained that while teaching large numbers of undergraduate students means extra hours of teaching time, these extra hours have a positive effect on their salary. The interviewees also indicated that teaching undergraduates does not require too much preparation because it usually involves simply repeating the same modules each year. The problem with this is that without the requirement to prepare afresh each time, scholars may not be transmitting the latest knowledge to students. It may also make the academic concerned appear less productive. Several of the interviewees explained that the teaching workload and monitoring and providing pastoral support to undergraduate students left them little time produce scholarly publications. This may explain Leisyte, Enders and de Boer’s (2009) finding that some academics try to avoid teaching-only roles for fear of appearing less productive in academia.

The interviews yielded one explanation for why so few Libya-educated scholars in the sample were teaching and supervising postgraduates (Table 4.6 and Table 4.11): they wanted the extra money that is available for teaching undergraduate programmes. However, in the interviews, these scholars also explained that as Libya’s HE system does not train postgraduate students in research skills, when these students become academics themselves they lack the ability to supervise students at postgraduate level. This finding is in line with Kincheloe (2003), Franke and Arvidsson (2011) and Boikhutso, Dinama and Kebabope (2013), all of whom note that academics need to be well trained before they can supervise undergraduate or postgraduate students. The low productivity of Libya-educated scholars in terms of postgraduate supervision may thus be explained as the result of poor KT by HEIs, who are failing to develop their human capital or offer postgraduates the training they need to be creative (Lanzi, 2007). This in turn results in reduced research output from the next generation of postgraduates.

This reduced research output may also explain why Libya-educated scholars find it difficult to reach the higher academic ranks, as promotion is generally tied to publication. Academic rank is also tied to supervision productivity, with MHE regulations only permitting assistant professors and above to teach or supervise students at postgraduate level. Since scholars educated in developed countries do most of the teaching and supervising of students at this level, they tend to occupy the higher positions. They are thus more likely to transmit their own research skills to others when they return to Libya. This appears to support Kim's (1989) argument that returning foreign-educated students are more likely to transfer their knowledge to others without incurring any additional cost to the government beyond its original investment in human capital.

The quantitative survey highlighted that very few academics in Libya's HEIs supervise students at PhD level (sections 4.3.2 and 4.3.3). There are a number of reasons for this, the first being that few departments have the equipment, resources or staff to provide PhD teaching. The finding bears out Harman (2002) and Pearson and Brew's (2002) observation that a lack of equipment and computer access in universities affects the productivity of faculty members. Another barrier is lack of confidence, particularly among Libya-educated scholars, many of whom felt unqualified to supervise students at this level. This perception is shared by postgraduate students themselves, most of whom prefer to be supervised by foreign-educated scholars. Interviewees who had studied in well-known universities in developed countries, on the other hand, were generally more confident that they had the skills needed to supervise PhD students. This appears to confirm Boateng and Thompson's (2013) argument that studying abroad positively affects the professional development of returning academics by improving their self-confidence. These interviewees were willing to supervise PhD candidates but were being frustrated by a lack of policy at the macro level.

The supervision productivity of all academics, irrespective of their country of study, may be reduced by the poor academic performance of postgraduate students. This confirms the views of Lumadi (2008), Mutula (2009), Lees (2007) and Boikhutso, Dinama and Kebabope (2013), who all note the limiting impact of poor research skills among undergraduate and postgraduate students. Institutional factors, such as difficulties accessing funding (Vilkinas, 2007) and a lack of dedicated office space for supervisors to discuss projects with their students, may also limit supervision productivity. Finally, numerous interviewees mentioned that academics are not always financially remunerated for taking on supervisory duties.

Although the challenges which scholars face in terms of KT have been discussed by researchers, no one has yet investigated the extent to which these challenges depend on the country of study. The findings here indicate that scholars who are educated in developed countries face fewer challenges than those educated in Libya or developing countries, and that the choice to study in a high-ranking university in an advanced economy has a positive and significant effect on KT. However, these returning scholars are losing opportunities to be more productive because of institutional barriers; in other words, potential returns on the government's investment in human capital are being limited by the lack of educational infrastructure. It would seem that improving HEI infrastructure and investing in human capital are equally important to promote KT.

In line with the study's focus on the academic productivity of returning scholars, the following sections discuss the findings regarding the performance of the two foreign-educated groups across the same range of items (use of non-Arabic sources in teaching, number of hours spent in teaching, research and administrative duties, number of students enrolled and supervised at undergraduate and postgraduate level). In terms the focus of research is on investment in foreign education, Libya-educated scholars were excluded from academic discipline, academic rank and gender. This gives a valid explanation about the academic achievement and contribution of returnees.

4.4.2 Academic discipline

The survey questionnaire offered strong evidence that applied scientists in the sample were more likely to use non-Arabic sources in their teaching than social scientists. This disparity between disciplines was explained in the interviews, with interviewees highlighting two main reasons why social scientists tend not to use non-Arabic sources: students in the social sciences generally have poor foreign language skills, and the majority of social science resources carried by university libraries are in Arabic and most of them out of date. In contrast, most teaching materials and resources in the applied sciences are in English. Academics who have been educated in English-speaking developed countries generally find it much easier to use non-Arabic sources in their teaching than those educated in Arabic-speaking developing countries. Scholars from this latter group explained that significant time and effort are needed first to assimilate materials written in English and then to communicate this knowledge to students. This issue has not been considered extensively in the literature and this discussion is a novel contribution to knowledge in particularly in the Libyan context, though Elgllab and Shehata (2017) have investigated the information-seeking behaviour of scholars in Arabic and English. They found that while some participants were able to search for information using Arabic words, applied scientists had to use English words because this is the language in which most of their potential sources are written. Finding that many Arab academics struggled to employ Google Scholar because they lacked proficiency in English, the authors concluded that

> “There is a need to improve their skills in using the English language, as most of the information available on the internet is in English, which makes them disconnected from the rest of the scholarly community in their fields.” (p. 9)

The current study found that scholars who could use non-Arabic sources were more likely to transmit the latest knowledge in the field to their students. This further underlines the importance of selecting a host country that uses an international language, as it enhances the scholar’s ability to access new knowledge without any direct cost.

Looking at the number of students taught and supervised at all levels (undergraduate and postgraduate), the statistical findings reveal no significant differences between social and applied science except at PhD level, where social scientists were more productive than applied scientists (sections 4.3.2 and 4.3.3). The interviews confirmed that more postgraduate programmes are available in social science departments, particularly in the Islamic Studies, Education, Linguistics and History departments. Arabic sources are readily available in these fields both domestically and from neighbouring countries such Egypt. The interviewees also explained that it is easier to run PhD programmes in the social sciences because they do not generally require expensive laboratory facilities. This echoes Crosta and Packman (2005), who note that while applied scientists need specialised equipment and facilities, much empirical social science research can be conducted using already available data and statistical packages. Foreign-educated scholars in the applied sciences explained that the main challenge when setting up these PhD programmes is that they require sophisticated equipment and facilities, qualified technicians and non-Arabic sources.

The findings suggest that the policy of sending academics to be educated abroad is unlikely to yield the hoped-for results unless HEI infrastructure is reformed (Celik, 2012b); returnees can only be productive if they are given the facilities they need. There has been some progress in the social sciences, with postgraduate programmes being established in universities where returning social scientists have the skills and knowledge to teach and supervise PhD students, but more universities need to improve their infrastructure if the study abroad programme is to achieve its full potential and be a worthwhile investment.

4.4.3 Academic rank

The questionnaire results indicate that associate professors and professors in the sample were more likely than junior ranks to use non-Arabic sources in their teaching. The interviews revealed that senior scholars are more motivated to engage with international academia and to employ non-Arabic sources, not least because this is one way of gaining recognition among their peers. The practical advantage of English language proficiency in particular was highlighted by several interviewees, who reported that it meant they were able to search both Arabic and English databases. This is also highlighted by Elgllab and Shehata (2017), who note that faculty members with limited English are much more restricted in their ability to use English databases.

The quantitative results show that as scholars move up through the academic ranks they tend to spend less time on teaching and more on research. This echoes Botha and

Swanepoel (2015), who found that professors spend less time teaching than other ranks. Senior staff also tend to teach less at undergraduate level. The interviews revealed that scholars prefer to teach master's students rather than undergraduates not only because it involves fewer hours and students and is better paid, but also because it brings a greater sense of achievement. However, as mentioned earlier, MHE regulations in Libya require scholars to reach the level of assistant professor or above before they can teach or supervise postgraduates. This is in stark contrast to other countries such as Uganda, which require all academics to teach and supervise postgraduates (Wamala and Ssembatya, 2015). Libya's policy in this area particularly limits the productivity of Libya-educated academics, many of whom struggle to gain promotion because of their low scholarly publication productivity (see chapter 5).

There was strong evidence that the higher the academic rank of scholars, the fewer supervisees they tend to take on. The interviewees explained that both postgraduate students and their supervisors face an obstructive internal bureaucracy that makes supervision difficult; for example, one participant described how students struggle even to get permission to use a laboratory in another department. This finding is consistent with Boikhutso, Dinama and Kebabope (2013), who found that students and supervisors alike are frustrated by the poor facilities and lack of administrative support in many universities.

4.4.4 Gender

Surprisingly, when Libya-educated scholars were excluded from the sample, the results revealed no significant differences between genders in the number of enrolled taught and supervised students at undergraduate level. Nor was there any difference between genders in time spent on teaching and administration at this level (section 4.3.4). This appears to contradict Barrett and Barrett's (2011) finding that female academics have a heavier teaching load and spend more hours on administration than their male counterparts (Link *et al.,* 2008) and may suggest that study abroad has the effect of increasing parity between the genders in these items.

In contrast, a significant difference was observed between the genders in the number of students enrolled at master's level (teaching and supervision), with male academics teaching and supervising more of these students. The literature offers mixed results on this item; Vilkinas (2008) finds no difference between the genders in terms of supervision, but Botha and Swanepoel (2015) also conclude that male scholars supervise more postgraduate students than their female counterparts (though they offer no explanation why). The findings here suggest that male scholars are more likely than female scholars to transmit the research knowledge they have accrued abroad to students in their home country. The interviews offered one reason behind the gender disparity at master's level with female scholars explaining that women are widely regarded as insufficiently qualified to teach and supervise postgraduate students (a view arising in part from women's poor research productivity, which restricts their ability to build up their academic reputation and credibility). However, their low supervision productivity at master's level may also be attributed to the administrative complexity and male-dominated culture of Libyan universities. Female interviewees described the difficulties of overcoming bureaucratic hurdles, either on their own behalf or on behalf of their postgraduate students, in a system dominated by male social networks. Buttery *et al.* (2005), Pearson and Brew (2002) and Latona and Browne (2001) all argue that supervisors need to be able to establish good relationships with the university administration if they are to mentor students.

4.5 Conclusion

The preceding sections discuss how full-time scholars in the four sample universities varied in terms of their performance in the KT dimension. Table 4.20 shows the significant differences between groups (and the effect sizes associated with these differences) and offers initial suggestions as to their underlying causes. It is clear that several barriers limit the academic achievement and contribution of scholars in relation to KT. Some affect all scholars, irrespective of their country of study, gender, academic discipline and academic rank, while others affect some groups more than others.

Lack of infrastructure is one of the main obstacles affecting all scholars, whatever their country of study, gender, academic discipline or academic rank. Lack of dedicated office space affects the supervision productivity of all scholars, as does poor library provision and limited internet access, while bureaucratic complexity makes it difficult for scholars to obtain the remuneration they are owed for taking on supervisory duties. Poor academic performance from postgraduate students is another obstacle affecting everyone's supervision productivity. Table 4.20 shows that scholars educated in developed countries were observed to supervise more students at master's level than scholars educated in Libya and developing countries, and returning social scientists were found to supervise more PhD students than returning applied scientists (though the effect size was small). Only a few applied science departments run PhD programmes, and the scholars teaching and supervising these students have generally been educated in developed countries. Lack of infrastructure was the main reason cited for the lack of PhD programmes in the applied sciences: universities do not have the equipment, technicians, laboratories and qualified staff they need to establish these programmes. Collectively, these barriers serve to limit the returns the Libyan government is getting on its investment in sending scholars overseas.

Lack of foreign languages is another obstacle affecting the transmission of knowledge, particularly among scholars educated in Libya and other Arab-speaking countries. These groups' comparative lack of language competence seems to be affecting their professional development and consequently their ability to transmit new knowledge to students and to teach and supervise at postgraduate level. In the case of Libya-educated scholars, this may be attributed to the government's 1980s policy of banning the teaching of foreign languages in schools and universities. As a result, Libya-educated scholars are more likely to concentrate on teaching, particularly undergraduate students, as this is an easy way to increase their salary without too much effort. Scholars educated in developed countries use more non-Arabic sources in their teaching than their developing-country- and Libya-educated peers. Table 4.20 illustrates a significant and strong association between being educated in a developed country and the use of non-Arabic sources. Arabic sources are more readily available in the social sciences than the applied sciences, but most are out of date.

Sociocultural factors affect the academic achievement and contribution of female scholars in particular. Male scholars were more likely than females to teach and supervise postgraduate students and they spent more time on research (see Table 4.20). It seems that female academics face more institutional and sociocultural obstacles than men due to gender stereotypes, the main stereotype being that female scholars do not possess the ability to teach and supervise postgraduates. Not surprisingly, this affects the motivation of female academics.

Looking at all of the items within the KT dimension, it is evident that scholars who have been educated abroad, particularly in developed countries, face fewer obstacles than those who studied in Libya. Overall, it seems that the greatest contribution in terms of KT is being made by scholars educated in developed countries, followed by scholars educated in developing countries – both appear to be contributing more towards the transmission of knowledge in Libya's universities than domestically educated scholars.

Overall, the KT findings provide compelling evidence for policy makers that HEI infrastructure must be developed if Libya is to benefit fully from its investment in human capital. The government, policy makers and university managers all need to be made aware that academic achievement and contribution will be enhanced by investing more in HEIs to give scholars more office space, expand libraries and extend internet access to scholars and students alike. The findings suggest that university managers can play a key role in delivering a strong message to the MHE about what universities need (laboratories equipped to run PhD programmes in applied science, for example), but that they could do more to reduce bureaucratic complexity and make it easier for scholars who take on supervisory duties to get paid. This will motivate scholars to be more productive in terms of supervision activities.

The findings suggest that current policy regarding continuing professional development needs to be reformed, with more training opportunities being offered to domestically educated scholars, female academics and those educated in countries where the knowledge gap is small. This would improve the ability of these academics to transmit new knowledge to the next generation through their teaching and supervision activities. More generally, it is vital to recognise the association between HE policy and academic contribution to HEIs if the barriers blocking KT and its potential benefits are to be overcome. The extent to which this impacts on knowledge dissemination within HEIs is discussed in the next chapter.

Table 4.20: Statistically significant differences among variables across different items

Variable	Country of study			Foreign-educated scholars								
				Academic discipline		Academic rank					Gender	
Item	Libya	Developing	Developed	Social	Applied	Assi-lect	Lect	Assi-prof	Asso-prof	Prof	Male	Female
Non-Arabic resource	**Weak	Weak	**Strong	None	**Moderate	Weak	Weak	Weak	Weak	**Weak	None	None
Teaching hours	**Small	None	None	None	None	**Medium	**Medium	None	None	None	None	None
Research hours	None	*Small	**Small	None	None	None	None	*Small	*Small	**Big	**Small	None
Administration hours	None	None	None	None	None	None	None	None	None	None	None	None
No-T-undergraduate	**Small	None	None	None	None	None	None	None	None	None	None	None
No-T-master	None	**Small	**Big	None	None	None	None	Small	Small	Small	*Small	None
No-T-PhD	None	*Small	*Small	*Small	None	None	None	None	None	None	None	None
No-S-undergraduate	None	None	None	None	None	None	None	None	**Medium	None	None	None
No-S-master	None	**Big	**Big	None	None	None	None	None	*Small	None	*Small	None
No-S-PhD	None	*Small	*Small	*Small	None	None	None	None	None	None	None	None

*p<0.05 and **p<0.001 Effect size with weak, moderate and strong association
*p<0.05 and **p<0.001 Effect size with small, medium and big differences
None: no statistical differences
No-T-undergraduate: number of enrolled students at undergraduate level
No-T-master: number of enrolled students at master level
No-T-PhD: number of enrolled students at PhD level
No-S-undergraduate: number of supervised students at undergraduate level
No-S-master: number of supervised students at master level
No-S-PhD: number of supervised students at PhD level

Chapter 5 : Research Findings: Knowledge Dissemination (KD)

5.1 Overview

This chapter presents the findings from the quantitative and qualitative analyses regarding scholars' academic achievement and contribution across a range of items within the KD dimension (RQ-I-ii). The quantitative analysis aims to identify the differences in KD-related performance firstly, between Libya-educated, developed-country-educated and developing-country-educated scholars, and secondly, between foreign-educated scholars in terms of gender, academic discipline and academic rank (RQ-III). The results from the semi-structured interviews are presented alongside the quantitative analysis with the aim of identifying some of the key factors that affect the academic performance of scholars (RQ-II and RQ-IV) and giving further insight into the differences identified in the quantitative findings. These findings are then discussed alongside those from the literature review. The chapter concludes by summarising the main findings for this dimension thematically and statistically in table form (5.18).

5.2 Section 1: Knowledge dissemination (KD)

This section compares scholars across a range of items within the KD dimension: research funding, number of publications (and where these were published), sabbatical leaves, participation in conferences and scholarly contributions over the four years leading up to the popular revolution of 2011 (see Figure 2.2). These items, which were selected following a review of the relevant literature, were used as indicators to investigate the extent to which scholars from different education systems (country of study), academic ranks, genders and academic disciplines contribute to their HEIs. The section also explores the factors that affect scholars' achievement in this dimension, as identified by the interviewees.

5.2.1 Research funding

The ability to attract research funding is a key determinant of a scholar's achievement and ability to contribute to his or her HEI. In Libya, this funding may come from the scholar's own institution, the NASR, other government bodies, international funding bodies, industry or a non-profit agency. The survey allowed the performance of the different groups to be compared, while the interview analysis permitted a deeper understanding of the causes of the differences between among groups.

A statistically significant ($p<0.05$) association was observed between country of study and all but one of these funding sources, with the exception being non-profit agencies (see Table 5.1 and Table 5.3). Further significant associations were found between gender and funding from international bodies and industry, and between academic discipline and funding from industry. There was no significant association between gender or academic discipline and other sources of funding. Surprisingly, there were no statistical differences between any of the academic ranks when it came to sources of research funding.

The developed country group recorded positive adjusted residual values for all funding sources apart from non-profit agencies. This indicates that more of these scholars were able to secure different kinds of funding than expected by the model, adjusted for sample size. In contrast, the domestic and developing country groups recorded negative adjusted residual values. The post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$)[10] showed that 12.80% (n=187, $p<0.0001$) of the developed country group received funding from the NASR, compared to just 0.60% (n=156, p=0.001) of the domestic group. Domestic graduates (00.00 %, n=154) were also significantly less likely to receive funding from international bodies than those educated in developed countries (10.20%, n=198), despite the fact that there was only a weak relationship between country of study and the ability to secure research funding from such bodies (Cramer's V=0.19). Just 2.80% of scholars educated in developing countries received research funding from the NASR or international bodies, compared to 3.90% of scholars educated in developed countries, but this difference was not significant ($p>0.017$) (see Table 5.1 and Table 5.2).

The interviewees gave some insight into why scholars educated in Libya find it so difficult to access research funding from these two sources. Most Libya-educated interviewees cited strong competition and the strict rules and regulations set by the NASR as the main obstacles. SL-M1 (a male educated in Libya), for example, pointed to the NASR's prioritisation of

[10] Donald Sharpe (2015). 'Your Chi-square test is statistically significant: Now what?' *Practical Assessment, Research & Evaluation,* 20, 1-10.

> "those who supervise postgraduate students, but I do not supervise students at postgraduate level. It is very hard to meet the requirements set by NASR."

Some social scientists also expressed the view that the NASR tends to favour research with practical applications; SL-M2 (a male educated in Libya), for example, complained that "My project proposal has been rejected because the NASR committee's report says that the research proposal does not benefit society". This was echoed by another social scientist educated not in Libya but in another developing country; SG-M6 (a male) claimed that "The priority set by NASR for funding mostly goes to projects related to applied sciences such as agriculture, engineering and manufacture". This perception of bias, whether well-founded or not, may be enough to deter some researchers from approaching the NASR.

Perhaps most worrying was the fact that some Libya-educated participants were not even aware that local bodies like the NASR provide funding for research. SL-F3 (a female educated in Libya) claimed that

> "The university does not provide any information about organisations which give research funding, this is the first time I have heard of NASR or that it provides funding."

This lack of information from universities may be limiting academics' research productivity. The interviewees noted that as Libyan universities are primarily funded by the government, they have little incentive to encourage scholars to attract external research funding. According to AG-F19 (a female educated in a developing country),"In Libya all public universities are funded by the government; that is why universities do not encourage scholars to seek funding because they mostly do not get the benefit from individual funding". It appears that public universities see little point in helping staff attract funding that is not going to benefit the institution as a whole.

Political factors were also cited as another barrier to scholars receiving international funding for research. AG-M17 (a male educated in a developing country) explained that

> "In the last regime [before the revolution on 17/02/2011], it was risky for scholars to contact international organisations to secure funding without first obtaining a permission letter from the security sector."

AG-F19 (a female educated in a developing country) observed that

> "Under the Gaddafi regime, it was very hard to have any obvious personal contact even with academic international organisations without getting permission from the Ministry of Defence."

The comments highlight the particular difficulties faced by researchers in Libya, whose ability to communicate with international academia for many years depended on their willingness to negotiate the regime's security apparatus.

As highlighted above, Libya-educated interviewees spoke of the difficulty of satisfying the strict requirements set by the NASR, but interviewees educated in developed countries described facing similar difficulties in their attempts to secure funding from international funding bodies. They explained that these bodies invariably require applicants to meet specific conditions; according to AD-M21 (a male educated in a developed country),

> "Publishing in international journals, a personal network, the quality of research and the ability to communicate in foreign languages are key factors to receive funding from international bodies."

In other words, to stand any chance of success, the researcher must expend considerable effort on developing not just their academic but also their personal skills.

Scholars with a developed country qualification were significantly ($p<0.017$) more likely to receive funding from government bodies or industry than either the domestic or the developing country groups: 10.70% and 5.90% respectively for the developed country group, versus 2.60% and 1.30% for the domestic group and 7.30% and 00.00% for the developing country group (see Table 5.4). However, the relationship between country of study and research funding from government bodies and industry was small (Cramer's $V=0.13$ and 0.17 respectively).

In contrast to the Chi-squared test, no significant association was found in the post-hoc test between country of study and the ability to secure research funding either from one's own institution or from non-profit agencies ($p>0.017$) (see Table 5.1 and Table 5.3). The majority of interviewees agreed that universities and non-profit agencies in fact provide financial support only rarely, and that what they do provide is not channelled in the right direction. AD-M22 (a male educated in a developed country) complained that this is because “The higher education sector and many other organisations do not have full awareness of the importance of scientific research in our society”. Other foreign-educated scholars attributed the limited funding to the lack of high-quality research in Libya. SD-F11 (a female educated in a developed country) explained that

> “I worked as a reviewer in a national agency for scientific research [NASR] which was created by the Ministry of Higher Education to provide funding to scholars. Most of the projects do not meet the standard requirements for research funding”

This suggests that raising the quality of research proposals might be the first step to unlocking funding from these sources.

The second round of quantitative analysis revealed a significant difference (p=0.001) in the number of male and female foreign-educated scholars securing research funding from industry organisations (5.90%, n=188 versus 0.00%, n=177) and international bodies (11.80%, n=187 versus 2.30%, n=177), though the effect size was weak (phi=0.17 and phi=0.18 respectively). There was no evidence of any significant relationship between gender (for scholars educated abroad) and other sources of research funding (phi=0). The adjusted residuals were less than 2 (in absolute value), indicating that both male and female foreign-educated scholars were equally likely to secure funding from their own institution, the NASR, government bodies or non-profit agencies.

When these slight gender differences were investigated in the interviews, foreign-educated female participants explained that one reason women might be less inclined than their male colleagues to apply for research funding is because of concerns about field work:

> “obtaining financial funding for research from industrial enterprises requires field work, which I think is not consistent with the nature of women.” (AD-F23, a female educated in a developed country)

It was also highlighted that the nature of the academic culture in Libya can make it difficult for female scholars to communicate with their male colleagues. SD-F11 (a female educated in a developed country) observed that “Most positions are held by men, which makes it difficult to build personal relationships within the workplace”. The working experience of female scholars – whether this be in terms of research or teaching – is thus influenced by wider sociocultural practices and expectations. These shape not only personal relationships in the workplace but also institutional policies.

A significant ($p=0.003$) but weak ($phi=0.17$) association was observed between academic discipline (for scholars educated abroad) and receipt of research funding from industry bodies, with 5.90% of applied scientists receiving funding from these bodies compared to 0.00% in the social sciences. Most foreign-educated applied scientists saw this funding as vital as this kind of research is more likely to require field work and be expensive. For example, AD-M21 (a male educated in a developed country) explained that

> "Most researchers in applied sciences (engineering, medicine, agriculture, physics...) need special tools and sometimes need to travel to neighbouring countries to do experiments. The cost of the research is therefore very high, and I cannot afford all this expense."

Industry bodies may be more inclined to fund experimental research in the applied sciences because they see the fruits of such research as being of potential value to themselves; there was no such significant association between academic discipline and other sources of funding.

There was no association between academic rank and research funding from scholars' own institution ($n=362$, $p=0.386$), the NASR ($n=362$, $p=0.512$), international bodies ($n=361$, $p=0.950$), government bodies ($n=365$, $p=0.725$), industry ($n=365$, $p=0.147$) or non-profit agencies ($n=365$, $p=0.257$). The adjusted residuals (Table 5.2 Table 5.4) indicate that the differences between observed and expected frequencies for securing funding may be attributed to chance fluctuation, suggesting that academic rank does not significantly affect an individual's ability to contribute to their HEI in terms of funding. Associate professors were seen to attract more funding than scholars in other academic ranks from all sources (apart from non-profit agencies), but the differences recorded were insignificant. Several interviewees confirmed that funding does not generally depend on the academic rank of the scholar making the application. As SG-M6 (a male educated in a developing country) explained:

> "Academic level or work experience in academia are not considered too much by non-academic organisations when giving out funding; the main consideration is the topic chosen."

The main priority seems to be the originality of the proposed research topic.

Overall, positive adjusted residual values (see Table 5.2 and Table 5.4) indicate where more scholars received funding than would be expected by chance. Negative adjusted residual values show where funding was received by fewer scholars (regardless of their country of study) than would be expected by chance.

Table 5.1: Sources of funding for scholars in the last 4 years before the revolution of 17/02/2011

	Own institution					NASR					International bodies				
Variable	$\chi2$	df	p	Cramer's V	phi	$\chi2$	df	p	Cramer's V	phi	$\chi2$	df	p	Cramer's V	phi
Country of study	6.29	2	0.034	0.11	-	27.64	2	0.000	0.23		19.11	2	0.000	0.19	-
Gender	0.00	1	1.000	-	-0.00	0.310	1	0.578	-	-.04	10.99	1	0.001	-	0.18
Academic discipline	0.05	1	0.903		-0.02	1.176	1	0.278	-	-.07	3.901	1	0.076		-.10
Academic rank	4.15	4	0.386	0.11		3.28	4	0.512	0.10		0.710	4	0.950	0.05	-

Table 5.2: Percentage of scholars by research funding

	Own institution					NASR					International bodies				
Variable	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value
Domestic education	156	2.60	97.40	-2.20	0.028	156	0.60	99.40	-3.30	0.001	154	0.00	100	-3.40	0.000
Developing country	178	6.20	93.80	0.00	1.000	178	2.80	97.20	-2.10	0.036	178	3.90	96.10	-0.80	0.424
Developed country	187	9.10	90.90	2.10	0.036	187	12.80	87.20	5.2	0.000	186	10.20	89.80	4.10	0.000
Total	**521**					**521**					**518**				
Male	188	7.40	92.60	-	-	188	6.90	93.10	-	-	187	11.80	88.20	-	-
Female	177	7.90	92.10	-	-	177	9	91	-	-	177	2.30	97.70	-	-
Total	**365**					**365**					**364**				
Social science	180	7.20	92.80	-	-	180	6.10	93.90	-	-	180	4.40	95.60	-	-
Applied science	185	8.10	91.90	-	-	185	9.70	90.30	-	-	184	9.80	90.20	-	-
Total	**365**					**365**					**365**				
Assistant lecturer	58	3.40	96.60	-1.30	0.194	58	5.20	94.80	-0.90	0.368	58	8.60	91.40	0.50	0.617
Lecturer	115	8.70	91.30	0.50	0.617	115	6.10	93.90	-0.90	0.368	115	6.10	93.90	-0.50	0.617
Assistant professor	87	6.70	80.30	-0.30	0.764	87	8	92	0.00	1.000	86	7	93	-0.10	0.920
Associate professor	43	14	86	1.60	0.110	43	14	86	1.60	0.110	43	9.30	90.70	0.60	0.549
Professor	62	6.50	93.50	-0.40	0.689	62	9.70	90.30	0.60	0.549	62	6.50	93.50	-0.20	0.841
Total	**362**					**362**					**364**				

Table 5.3: Sources of funding by scholars in the last 4 years before the revolution of 17/02/2011

	Government					**Industry**					**Not for profit**				
Variable	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi
Country of study	8.54	2	0.014	0.13	-	14.32	2	0.001	0.17	-	1.93	2	0.381	0.06	-
Gender	0.30	1	0.581	-	0.04	8.77	1	0.003		0.17	0.00	1	.976	-	-.05
Academic discipline	1.03	1	0.311	-	-.06	9.10	1	0.003		-.17	0.00	1	1.000		-.05
Academic rank	2.06	4	0.725	0.08	-	6.80	4	0.147	0.136	-	5.31	4	0.257	0.12	-

Table 5.4: Percentage of scholars for research funding

	Government					**Industry**					**Not for profit**				
Variable	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value
Domestic education	156	2.60	97.40	-2.60	0.009	156	1.30	98.70	-1.20	0.230	156	0.00	100	-0.70	0.484
Developing country	178	7.30	92.70	0.10	0.920	178	0.00	100	-2.60	0.009	178	0.60	99.40	1.40	0.162
Developed country	187	10.70	89.30	2.40	0.0164	187	5.90	94.10	3.70	0.000	187	0.00	100	-.70	0.484
Total	**521**					**521**					**521**				
Male	188	10.10	89.90	-	-	188	5.90	94.10	-	-	188	0.00	100	-	-
Female	177	7.90	92.10	-	-	177	0.00	100	-	-	177	0.60	99.40	-	-
Total	**365**					**365**					**365**				
Social science	180	7.20	92.80	-	-	180	0.00	100	-	-	180	0.00	100	-	-
Applied science	185	10.80	89.20	-	-	185	5.90	94.10	-	-	185	0.50	99.50	-	-
Total	**365**					**365**					**365**				
Assistant lecturer	58	8.60	91.40	-0.10	0.920	58	0.00	100	-1.50	0.134	58	1.70	98.30	2.30	0.021
Lecturer	115	7.80	92.20	-0.50	0.617	115	4.30	95.70	1	0.317	115	0.00	100	-0.70	0.484
Assistant professor	87	10.30	89.70	0.50	0.617	87	3.40	96.60	0.30	0.764	87	0.00	100	-0.60	0.549
Associate professor	43	14	86	1.20	0.230	43	7	93	1.60	0.110	43	0.00	100	-0.40	0.690
Professor	62	6.50	93.50	-0.80	0.424	62	0.00	100	-1.50	0.134	62	0.00	100	-0.50	0.617
Total	**365**					**365**					**365**				

5.2.2 Sabbatical leave and publication

Libya's MHE awards a one-year, paid sabbatical leave to any scholar who has held a lecturer's post for four years or more. During this year, the scholar is freed from his or her teaching and administrative work so that they can conduct research or produce books. Statistical tests were performed to find the differences in the number of leaves awarded to and the number of publications produced by the various scholar groups. The interviews investigated the factors underlying these differences.

Statistically significant differences were observed in the number of sabbatical leaves awarded to scholars educated domestically (n=78), in developing countries (n=83) and in developed countries (n=107) ($\chi2$ (2, n=268) = 91.710, p<0.001). There were also differences in the number of publications produced by the domestic group (n=156), the developing country group (n=178) and the developed country group (n=187) ($\chi2$ (2, n=521) = 64.473, p<0.001). The number of sabbatical leaves awarded also varied significantly (p<0.001) between academic ranks (assistant professors, n=85; associate professors, n=43; professors, n=62; $\chi2$ (2, n=268) = 90.439, p<0.001), as did the number of papers published in peer-reviewed journals (assistant lecturers, n=58; lecturers, n=115; assistant professors, n=87; associate professors, n=43; professors, n=62; $\chi2$ (4, n=365) = 90.795, p=0.000) (see Table 5.5).

A post-hoc test with Bonferroni adjustment (significance level set at p< 0.017) confirmed that there were significant differences between the groups educated in different countries in regard to both sabbatical leaves and publication (p<0.001). Overall, scholars educated in Libya were awarded fewer sabbatical leaves and produced fewer publications (Mdn=0, MR=67.89 and Mdn=0, MR=184.08 respectively) than scholars educated in both developing (Mdn=1, MR=156.03 and Mdn=2, MR=305.76) and developed countries (Mdn=1, MR=166.36 and Mdn=2, MR=282.56 respectively). In both cases, there was a large effect size between the scholars educated in Libya and abroad (r=0.65 and r=0.66; r=0.42 and r=0.35 respectively). The effect sizes indicate a strong association between being educated abroad and being awarded the sabbatical leaves one needs to produce more publications. As can be seen in Table 5.7, majority of the domestic group were awarded no sabbatical leaves and published no articles during the four years leading up to 2011. Conversely, few of the foreign-educated scholars were awarded one sabbatical leaves on average and published two articles on average in these four years. However, while big differences were observed in the number of sabbatical leaves awarded to and outputs published by the Libya-educated and foreign-educated groups in terms of effect size, the negative z score indicates that the latter group were awarded fewer sabbatical leaves and published less than the average that might have been expected. There were no statistically significant differences in the number of sabbatical leaves awarded to or publications produced by scholars educated in developing and developed countries.

The interviews gave some insight into why the Libya-educated and foreign-educated scholars in the sample differed in terms of these two items. Interviewees from the former group reported several obstacles that prevented them from publishing including a heavy teaching load, the large number of students at undergraduate level and limited training in research skills. This comment from SL-M2 (a male educated in Libya) was typical:

> "Conducting research requires the researcher to have full knowledge of the analytical tools, whether statistical, mathematical, or qualitative tools. Unfortunately, the university does not offer any training courses or programmes to support scholars in research. Those of us who have not studied abroad in particular do not have sufficient knowledge of scientific research, and this affects the quality of my research."

The comment highlights the lack of professional development provided by the university, but SL-F4 (a female educated in Libya) was more concerned about finding the time to do any research at all. She observed that she spent most of her time

> "marking exam papers and teaching; it is a consequence of teaching a large number of students. It prevents me finding enough time to produce good quality research."

The heavy teaching load was thus one of the main obstacles for many Libya-educated scholars. As AL-15 (a male educated in Libya) pointed out:

> "Both research and teaching are required in the job description of scholars. Scholars who do not teach the required number of hours per week are seen as not fulfilling their obligations, but this is not the case if they do not produce any publications."

Scholars may theoretically be expected to divide their time between teaching and research, but in practice, it seems that HEIs place a much higher priority on teaching.

Foreign-educated scholars were more likely to cite the difficulty of finding appropriate journals to publish their papers as a reason for their low publication rate. For example, SG-M6 (a male educated in a developing country) explained that

> "The academic culture in Libya believes that the type and location of the scientific journal (local or international) reflects the quality of the research. So finding a prestigious journal takes a lot of time. This affects the number of papers that I publish every year."

This pressure to publish only in the right journal may be having a depressive effect on the number of papers published per year.

Most foreign-educated scholars felt that their experience of studying abroad in a different education system had given them an advantage by enabling them to publish more papers than their Libya-educated peers. According to SD-M9 (a male educated in a developed country),

> "One of the most important advantages of the study abroad programmes is to be exposed to a variety of research topics. Encountering these topics, which are not addressed in the Libyan context, motivates these scholars to be more productive in research than their Libya-educated colleagues."

Studying in a different education system broadens scholars' experience and affords them research opportunities they would not get at home, enhancing both their productivity and their motivation. However, this motivation is often challenged when they return to Libya; a number of foreign-educated scholars described how their attempts to engage in research had been frustrated not just by a lack of support from their university but also an academic culture that appears not to value collaboration. AD-F24 (a female educated in a developed country) explained that

> "I have tried many times to co-operate with my colleagues and work as a team and learn from their experience, but unfortunately, in Libyan academic culture it is hard to co-operate. For instance, I had a chance to do an experimental

> research with my colleague, but after six months she lost her motivation – the lack of equipment and limited support services led her to stop the experiment."

The problem thus seems to be not just practical (inadequate university infrastructure) but also cultural, in that there is little understanding of the value and benefit of team work.

It emerged in the interviews that in Libyan HEIs, there is a direct association between academic rank, the awarding of sabbatical leave and publication. The more a scholar publishes, the better his or her chances of being promoted, and the higher their rank, the more chances they have to get sabbatical leave. SG-F8 (a female educated in a developing country) explained that

> "Publishing a certain number of papers in a local journal every four years guarantees promotion to a higher academic level, which allows scholars to apply for sabbatical leave to obtain the stipend."

The comment suggests that many scholars see sabbatical leave as a chance to reap a financial benefit, rather than an opportunity to produce scholarly contributions, and indeed, the majority of participants cited the huge amount of money provided by the MHE as the main incentive for applying for sabbatical leave. AG-M19 (a male educated in a developing country) claimed that

> "The higher education regulations are inadequate in relation to sabbatical leave. The main requirement to receive the payment for sabbatical leave is to have an offer from an overseas university, not to produce a scholarly contribution. For example, when I finished my sabbatical leave, they did not ask me about the book I had produced – they just wanted a copy of my passport to make sure I had been abroad during my sabbatical leave. That is why most scholars do not produce anything in their sabbatical leave but still get paid for it."

This lack of oversight by the MHE means that many sabbatical leaves are not being used productively.

The relationship between academic rank, sabbatical leave and publication was explored by conducting a series of post-hoc tests with Bonferroni adjustment to compare the number of sabbatical leaves awarded to assistant professors and above (the usual recipients) (significance level set at p<0.017) and the number of publications produced by all academic ranks (significance level set at p<0.005).

Overall, assistant professors (Mdn=1, MR=57.98) were observed to be awarded fewer sabbatical leaves than associate professors (Mdn=1, MR=105.03, strong effect size of r=0.53) and professors (Mdn=2, MR=140.32, strong effect size of r=0.72). Professors were also awarded more sabbatical leaves than associate professors (large effect size of r=0.44). There was no statistically significant difference, however, between associate professors, professors and assistant professors in the number of publications produced in the four years leading up to 2011 (p>0.005). In other words, while the number of sabbatical leaves appeared to increase for scholars in higher ranks, this was not accompanied by an increase in the number of publications produced.

Among the lower ranks, there was a significant difference (p<0.001) in the number of publications produced; assistant lecturers published fewer papers (Mdn=0.00, MR=82.25) than lecturers (Mdn=2, MR=164.39, strong effect size of r=0.47) and assistant professors (Mdn=3, MR=233.78, very strong effect size of r=0.70). Assistant lecturers also scored a lower mean rank than associate professors (Mdn=3, MR=217.94, strong effect size of r=0.60) and professors (Mdn=3, MR=216.29, strong effect size of r=0.59). Lecturers recorded a lower median and mean rank (Mdn=2, MR=164.39) than assistant professors (Mdn=3, MR=233.78, large effect size of r=0.37), associate professors (Mdn=3, MR=217.94, medium effect size of r=0.24) and professors (Mdn=3, MR=216.29, medium effect size of r=0.26).

As shown in Table 5.6, there was strong evidence (U and z values) that promotion to a higher academic rank actually has a negative effect on the number of publications appearing in peer-reviewed journals. The majority of interviewees, from both the social and applied sciences, stressed that once scholars get promoted to the position of assistant professor, their desire to publish their work decreases. SD-M10 (a male educated in a developing country) explained that

> "I set out to publish in order to secure a position as assistant professor, which allows me to teach and supervise postgraduate students. Because the income gained from teaching and supervising postgraduate students is much higher than

that for teaching and supervising undergraduate students, I am less motivated to publish."

AL-M14 (a male educated in Libya) told a similar story:

"I want to retire as professor so that I can benefit from the high salary. There is no other incentive to encourage me to publish."

Financial motives thus play a central role in determining the research productivity of many Libyan academics, though SD-F11 (a female educated in a developed country) observed that this is not the only motivation:

"If the purpose of publication is to get promoted or benefit financially, scholars stop publishing when they achieve these goals. However, if the aim is to disseminate knowledge and gain a sense of achievement, scholars will carry on publishing even after they have been promoted to professor."

There are still many scholars for whom academic reputation and recognition are the prime factors influencing their research productivity.

Turning to the effect of gender on sabbatical leave and publication, Tables 5.6 and 5.7 show that male scholars (Mdn=1, MR=109.38, n=101) were awarded significantly more sabbatical leaves than their female peers (Mdn=1, MR=79.75, n=89, U=3093, z=-3.90, $p<0.001$), though the effect size was moderate (r=0.28). Both male and female scholars had the same median but different IQRs (IQR=1 for males and IQR=2 for females), indicating that the scores for female scholars were more broadly spread from the average. There were no significant differences between genders in terms of publication ($p>0.05$, n=365, U=15372, z=-1.28, p=0.201). As shown in Table 5.6, 50% of both groups published two articles on average (Mdn=2) in the four years up to 2011. The IQR=4 reveals that the distribution of the dataset (number of publications) was spread out from the average.

Table 5.6 and 5.7 also reveal a significant difference ($p<0.001$) in the number of sabbatical leaves awarded across academic disciplines (scholars in social sciences, n=81, scholars in applied sciences, n=109, U=3256, n=190, z=-3.25, p=0.001), the former being awarded more sabbatical leaves (MR=106.13) than the latter (MR=81.20) with moderate effect size (r=0.24). There were no significant differences between academic disciplines in the number of publications in peer-reviewed journals, with both groups being equally likely to publish.

Table 5.5: Sabbatical leave and publication by country of study and academic rank

Variable	Sabbatical			Publication		
	$\chi2$	df	p-value	$\chi2$	df	p-value
Country of study	91.710	2	**0.000**	64.473	2	**0.000**
Academic rank	90.439	2	**0.000**	90.795	4	**0.000**

Table 5.6: Multiple comparison for scholars by sabbatical leave and publication

Variable		Sabbatical leave				Publication			
		U*	z	p-value	Effect size	U	z	p-value	Effect size
Domestic									
	Developing	1045	-8.21	**0.000**	0.65	7450.50	-7.62	**0.000**	0.42
	Developed	1169.50	-8.99	**0.000**	0.66	9019.50	-6.40	**0.000**	0.35
Developing	Developed	4035.50	-1.13	0.258	0.082	15109	-1.55	0.121	0.08
Assistant lecturer									
	Lecturer	-	-	-	-	1513	-6.17	**0.000**	0.47
	Assi professor	-	-	-	-	477	-8.47	**0.000**	0.70
	Asso professor	-	-	-	-	434.50	-6.05	**0.000**	0.60
	Professor	-	-	-	-	635	-6.50	**0.000**	0.59
Lecturer									
	Assi professor	-	-	-	-	2870.50	-5.25	**0.000**	0.37
	Asso professor	-	-	-	-	1728.50	-3.00	**0.003**	0.24
	Professor	-	-	-	-	2478.50	-3.40	**0.001**	0.26
Assistant prof									
	Asso professor	762	-6.00	**0.000**	0.53	1790	-0.40	0.688	0.04
	Professor	511.50	-8.72	**0.000**	0.72	2538	-0.62	0.537	0.05
Asso professor	Professor	677.50	-4.47	**0.000**	0.44	1306.50	-0.18	0.861	0.02
Gender		3093	-3.90	**0.000**	0.28	15372	-1.28	0.201	0.07
Academic discipline		3256	-3.25	**0.001**	0.24	16131.50	-0.52	0.600	0.03

Table 5.7: Descriptive statistics for sabbatical leave and publication

Variable	Sabbatical						Publication					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	78	67.89	0	0	2	0	156	184.08	0	0	7	1
Developing country	83	156.03	1	0	4	1	178	305.76	2	0	11	4
Developed country	107	166.36	1	0	4	1	187	282.56	2	0	12	4
Total	**268**						**521**					
Assistant lecturer		-	-	-	-	-	58	82.25	0	0	8	1
Lecturer		-	-	-	-	-	115	164.39	2	0	7	3
Assistant professor	85	57.98	1	0	3	1	87	233.78	3	0	10	3
Associate professor	43	105.03	1	0	3	1	43	217.94	3	0	12	5
Professor	62	140.32	2	0	4	1	62	216.29	3	0	12	4
Total	**190**						**365**					
Male	101	109.38	1	0	4	1	188	189.73	2	0	12	4
Female	89	79.75	1	0	4	2	177	175.85	2	0	12	4
Total	**190**						**365**					
Social science	81	81.20	1	0	4	1	180	180.12	2	0	10	4
Applied science	109	106.13	1	0	4	2	185	185.80	2	0	12	4
Total	**190**						**365**					

IQR: Interquartile Range

5.2.3 Publication in different journals (local, Arabic and international)

This section investigates the association between the type of journal (local, Arabic or international) in which scholars publish their work and the country of study, gender, rank and academic discipline variables.

A significant ($p<0.01$) association was recorded between country of study and journal type (see Table 5.8). Further investigation using the post-hoc test with Bonferroni adjustment (significance level set at $p<0.008$) revealed a significant difference ($p<0.001$) between the number of Libya-educated (37.20%, n=156) and developing-country-educated (57.90%, n=178) scholars publishing in local journals, with the relationship between the latter and publication in local journals being weak (Cramer's V=0.18). There was no strong evidence of a relationship between the developed country group and publication in local journals ($p>0.008$).

There was also a significant difference ($p<0.008$) in the number of Libya-educated (7.10%, n=156) and developing-country-educated (19.70%, n=178) scholars publishing in Arabic journals, with the former being found to publish significantly less than the latter. The association between these variables was weak (Cramer's V=0.16). Again, there was no strong evidence of a relationship between the developed country group and publication in Arabic journals ($p=0.406$) (see Table 5.9).

When these findings were explored in the interviews, it emerged that most scholars, irrespective of their country of study, found publication in local and Arabic journals easier because they are more readily accessible. AL-F16 (a female educated in Libya) explained that "There are no difficulties in finding an appropriate local journal because nearly every collage at university has their own journal". Highlighting another attraction of these journals, this interviewee went on to say that "The requirement for publication is not complicated". Finally, local and Arabic journals are popular because the time between submitting a paper for publication and getting it published is far less than in international journals. According to SL-M2 (a male educated in Libya), "Publishing in local or Arabic journals does not take a long time".

The drawback of publishing in local journals is that the standard tends to be lower. According to one interviewee, himself a reviewer for a local journal,

> “The evaluations of articles in local journals do not meet the standard of peer-reviewed international journals. So, the quality of papers published in local journals is very low.” SD-M9 (a male educated in a developed country)

AG-M17 (a male educated in a developing country) drew a direct link between the proliferation of local journals and the role of publication in helping scholars secure promotion to the higher academic ranks:

> “The main purpose for publishing in a local journal is promotion. The reason why local journals are emerging in every college in Libya is the linkage between the number of publications and promotion. If local journals did not exist, a lot of scholars would find it difficult to get promoted to the higher academic levels.”

It seems to be almost too easy to find and publish in local and Arabic journals. However, this emphasis on quantity rather than quality is unlikely to help raise research standards.

There was a strong relationship between the developed country group and publication in international journals (Cramer’s V=0.33). This group (30.50%, n=187) was observed to publish significantly more than scholars educated in Libya (1.30%, n=156). No statistically significant relationship was observed between the developing country group and publication in international journals (p=0.148) (see Table 5.9).

The interviewees highlighted a number of obstacles that prevent scholars educated in Libya and other developing countries from publishing in international journals, including the time-consuming nature of the process, the need to use a foreign language and the strict submission requirements. AL-F15 (a female educated in Libya) explained that

> “Not being able to read, write and speak a foreign language has a negative impact not just on publishing in international journals, it also makes it harder to adopt new data analysis technology.”

The comment highlights the multiple advantages of foreign language proficiency, not just in terms of publishing and keeping abreast of developments in one’s field, but for something as basic as being able to take advantage of new tools and software. Another participant (AG-M17, a male educated in a developing country) was more concerned about the time taken to publish internationally:

> "Publishing in local and Arabic journals does not take a long time, and it is not difficult to publish a couple of articles per year. However, an international journal might take a couple of years to publish an article."

This can be a serious problem for scholars who are intent on accumulating publications in order to qualify for promotion. Interviewees who had been educated in a developed country, while acknowledging the challenges associated with international publication, were more likely to be motivated by the desire for "recognition among peers and students' respect" (AD-M22, a male educated in a developed country). They were willing to put up with a time-consuming and rigorous selection/publication process because they saw publication in international journals as more likely to bring them these rewards.

In terms of the gender variable, 26% (n=188) of male scholars were observed to publish in international journals compared to 16.40% (n=177) of females. The effect size was small (r=0.12). However, there was no statistically significant association between gender and publication in other journals, suggesting that both males and females educated abroad were equally likely to publish in local and Arabic journals. The interviews revealed several possible reasons why female scholars publish less in international journals. SD-F12 (a female educated in a developing country) explained that

> "I do not have time to produce research of a high enough quality to be accepted in international journals because of responsibilities at home and in the extended family."

Sociocultural expectations around women's domestic and familial responsibilities were identified as one obstacle, but the other obstacles that were identified were essentially the same as face male scholars; that is, the difficulties of satisfying international journals' high expectations and the slow pace of the publishing process. AD-F24 (a female educated in a developed country) described her own experience thus:

> "I sent out a paper to one of the international journals, but after waiting a long time they asked me to add two tests to my experimental work. These tests might take year to do and I cannot wait because it has to be published this year to get the promotion. So, I decided to publish it in a local journal."

Like their male colleagues, female scholars publish in local journals because this is the easiest way to ensure promotion.

The fact that publishing in local journals is easier led some foreign-educated male scholars to argue that this should be taken into consideration when promotions are decided. SD-M9 (a male educated in a developed country) argued that

> "The Ministry of Higher Education should distinguish between those who have built an international relationship with academic institutions and spent a lot of time publishing in high-impact journals and those who publish in local journals."

Given that women publish less in international journals, such a policy would presumably put them at a disadvantage when it came to promotion.

On the question of academic discipline and publication patterns, the analysis revealed that 33% of scholars in the applied sciences published in international journals, compared to 10% of social scientists. The effect size was close to medium (phi=0.28). Overall, scholars in the social sciences were found to publish more in local and Arabic journals (52.20% and 18% respectively) than scholars in the applied sciences (45.40% and 12.40% respectively), but these differences were not significant.

The majority of participants in the social sciences used Arabic sources in their research and communicated only in Arabic. This affected their ability to communicate in English. SD-F11 (a female educated in a developed country) explained that

> "The atmosphere in our department does not encourage me to use English and over time I have lost the ability to write in English. This has a direct negative effect on my publication in international journals."

Lack of support within the working environment was also highlighted by SG-F7 (a female educated in a developing country), who complained that

> "Colleagues do not motivate me to conduct research…. i.e. most of the discussion among scholars is about the inadequate infrastructure of Libyan universities or political argument."

The evidence suggests that for these scholars, the academic culture itself may be reducing research productivity.

In contrast, most of the applied scientists who were interviewed revealed that the nature of their discipline meant they used both Arabic and English to communicate with departmental colleagues. AD-M21 (a male educated in a developed country) explained that

> "The second language used in our department is English…. There are several reasons why scholars use English in the applied sciences department. Firstly, not all the faculty members in the department are native Arabic. Secondly, we are teaching, writing research and communicating using English…. All these factors keep me up-to-date with my foreign language skills and motivate me to publish in international journals."

The comment implies a more internationalist outlook in the applied sciences, and a working environment that actively encourage scholars to write and publish in international journals.

A significant ($p<0.01$) association was revealed between academic rank and publication in all three journal types (local, Arabic and international) (Table 5.9). A post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) showed that 70.10% of assistant professors published in local journals (Cramer's V=0.35 indicates a large relationship), compared to 15.50% of assistant lecturers. Assistant lecturers were observed to publish less (1.70%, Cramer's V=0.22 indicates a medium relationship) in Arabic journals than any other academic rank, and significantly less (6.90%, Cramer's V=0.18 indicates a small relationship) in international journals than lecturers (24.30%), assistant professors (21.80%), associate professors (18.60%) and professors (32.30%). There were no statistically significant differences between the other academic ranks in terms of their publication in local, Arabic or international journals.

As shown in Table 5.9, the percentage of foreign-educated scholars publishing in local and Arabic journals gradually decreases as they move through the senior ranks towards professor, while the number publishing in international journals peaks at this point. This quantitative finding seems to be consistent with the qualitative finding that most academics publish in local and Arabic journals in order to gain promotion. As AD-M22 (a male educated in a developed country) explained:

> “In my early career in academia, the main factor motivating me to publish was to get promoted regularly, and this required publishing in a certain period of time. That is why publishing in local or Arabic journals is better. However, when you are a professor, the situation is different. Now, I try to spend more time and produce good research so that I can publish it in well-known international journals in my field. Now, I am motivated by a sense of achievement.”

Having reached the top of the career ladder and secured the accompanying benefits, professors can afford to focus on producing high-quality research and getting it published in high-impact journals.

Table 5.8: Publication per type of journal in the last 4 years before the revolution of 17/02/2011

Variable	Local					Arabic					International				
	$\chi2$	df	p	Cramer's V	phi	$\chi2$	df	p	Cramer's V	phi	$\chi2$	df	p	Cramer's V	phi
Country of study	17.53	2	**0.000**	0.18	-	12.49	2	**0.002**	0.16	-	57.32	2	**0.000**	0.33	-
Gender	00.145	1	0.703	-	0.03	2.412	1	0.120	-	-0.09	5.020	1	0.025	-	0.12
Academic discipline	01.435	1	0.193	-	0.07	2.013	1	0.156	-	0.08	27.05	1	**0.000**	-	-0.28
Academic rank	44.590	4	**0.000**	0.35	-	18.345	4	**0.000**	0.22	-	12.288	4	**0.015**	0.18	-

Table 5.9: Percentage of scholars publishing in different types of journal

Variable	Local					Arabic					International				
	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value
Domestic education	156	37.20	62.80	-2.40	0.015	156	7.10	92.90	-2.60	0.010	156	01.30	98.70	-5.90	0.000
Developing country	178	57.90	42.10	4.20	0.000	178	19.70	80.30	3.30	0.001	178	12.40	87.60	-1.40	0.148
Developed country	187	40.10	59.90	-1.80	0.075	187	11.20	88.80	-0.80	0.406	187	30.50	69.50	7.00	0.000
Total	**521**					**521**					**521**				
Male	188	50	50	-	-	188	12.20	87.80	-	-	188	26.60	73.40	-	-
Female	177	47.50	52.50	-	-	177	18.60	81.40	-	-	177	16.40	83.60	-	-
Total	**365**					**365**					**365**				
Social science	180	52.20	47.80	-	-	180	18.30	81.70	-	-	180	10.00	90.00	-	-
Applied science	185	45.40	54.60	-	-	185	12.40	87.60	-	-	185	33.00	67.00	-	-
Total	**365**					**365**					**365**				
Assistant lecturer	58	15.50	84.50	-5.50	0.000	58	1.70	98.30	-3.10	0.002	58	6.90	93.10	-3.00	0.003
Lecturer	115	43.50	56.50	-1.40	0.170	115	12.20	87.4	-1.10	0.255	115	24.30	75.70	0.90	0.395
Assistant professor	87	70.10	29.90	4.60	0.000	87	23.00	77	2.30	0.023	87	21.80	78.20	0.10	0.960
Associate professor	43	55.80	44.20	1.00	0.325	43	27.90	72.10	2.40	0.015	43	18.60	81.40	-0.50	0.606
Professor	62	54.80	45.20	1.00	0.294	62	14.50	85.50	-0.20	0.843	62	32.30	67.70	2.20	0.026
Total	**365**					**365**					**365**				

5.2.4 Participation in national and international conferences

Scholars educated in different countries differed significantly ($p<0.001$) in terms of their participation in international conferences. The post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$) revealed significant ($p=0.001$) differences between scholars educated in Libya and scholars educated abroad. Overall, the developed country group (MR=318.44) scored higher on participation in international conferences than the domestic group (MR=188.72). The Mann-Whitney U test value was found to be statistically significant ($U=7210.50$ ($z=-8.74$) $p<0.001$), and the difference between the two groups was close to strong ($r=0.47$). The developing country group (MR=260.28) also scored higher on participation in international conferences than the domestic group. The test value was again statistically significant ($U=9917$ ($z=-5.22$) $p<0.001$), though this time, the difference between the two groups was moderate ($r=0.29$). The developed country group scored a higher mean rank (MR=318.44) for participation in international conferences than the developing country group (MR=260.28) with small effect size ($r=0.20$). There was no statistically significant difference between the three groups in terms of their participation in national conferences.

As shown in Table 5.12, 75% of the domestic group did not participate in any international conferences at all in the four years leading up to the revolution of 2011 (Mdn=0, IQR=0), while for the developing country group, the figure was 50% (Mdn=0, IQR=2). Over the same period, 50% of the developed country group participated once (Mdn=1).

The interviewees reported a range of institutional and personal factors that affect attendance at international conferences. Institutional factors were seen to affect all scholars regardless of country of study, gender, academic rank or academic discipline, but personal factors were mostly associated with scholars educated in Libya. The main factor highlighted by these interviewees was their inability to communicate in a foreign language. SL-M1 (a male educated in Libya), for example, spoke of his "fear of not being able to communicate in a second language", while SL-F4 (a female educated in Libya) explained that

> "I was invited to participate in a conference in Morocco where the first language was supposed to be Arabic. I was disappointed because all the participants were

from Tunis, Algeria and Morocco and they presented their work in French. I could not benefit from the conference because of my foreign language capability."

The inability to communicate in foreign language is thus a major factor limiting the professional development and productivity of scholars in Libya's HEIs.

The institutional factors, which impacted all groups in this variable, were mainly the difficulties involved first, in securing financial support and second, in navigating complex bureaucratic procedures. SG-F8 (a female educated in a developing country) commented that

> "Most of the time, HEIs do not provide any funding to participate in international conferences. I paid all my expenses to participate in international conferences on the understanding that the university would reimburse me. However, I have not received my money back yet."

However, another interviewee suggested that whether or not a scholar receives funding to attend a conference may depend on whom they know. AL-M14 (a male educated in Libya) explained that

> "A personal relationship with the university administration is a key factor in whether you will receive the financial support you need to cover all the conference expenses."

Applicants are also required to go through a complex application process which is made all the more challenging by the fact that the regulations are frequently changed. SG-M6 (a male educated in a developing country) observed:

> "The administration procedures are very complex and hard to understand because the Ministry of Higher Education keeps changing the procedure for obtaining funding for international conferences every year."

Together, the lack of funding and unclear procedures seem to prevent many scholars from participating in or even applying to participate in international conferences.

Turning to the effect of academic rank, a post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) revealed a significant ($p<0.01$) difference between academic ranks in terms of their participation in both national and international conferences. Overall, assistant lecturers participated in fewer national conferences (MR=143.59) than assistant professors (MR=210.56, large effect size of $r=0.31$), associate professors (MR=197.29, medium effect size of $r=0.28$) and professors (MR=206.54, large effect size of $r=0.33$). Lecturers participated in fewer national conferences than assistant professors (MR=164 versus MR=210.56, medium effect size of $r=0.24$).

Assistant lecturers were also the least likely to attend international conferences, recording lower mean ranks than assistant professors (MR=134.33 versus MR=194.67, large effect size of $r=0.30$), associate professors (MR=217.93, large effect size of $r=0.40$) and professors (MR=220.72, large effect size of $r=0.40$). Lecturers participated in fewer international conferences (MR=165.32) than associate professors (MR=217.93, medium effect size of $r=0.24$) and professors (MR=220.72, moderate effect size of $r=0.27$).

There were no statistically significant differences between assistant professors, associate professors and professors in terms of their participation in national or international conferences. There were also no significant differences between lecturers, associate professors and professors in terms of their participation in national conferences.

It became clear in the interviews that early career scholars (i.e. assistant lecturers) tended to know very little about conferences. SG-M5 (a male educated in a developing country) gave one explanation for this:

> "In my early academic career, I spent most of my time on teaching and administrative duties. This prevented me from understanding the importance of participating in conferences."

However, it was also highlighted that universities often inform their staff about conferences too late for them to submit their work to conference organisers. AD-M22 (a male educated in a developed country) complained that

> "The university informed us one week before the conference was due to start. So, there was not enough time for me to prepare a paper so I could participate."

The poor communication between administrations and academics is partly due to the lack of information technology (electronic connection such as emails) in universities.

At the top end of the career ladder, the majority of foreign-educated scholars explained that the motivation to participate in conferences (both national and international) decreased once they reached the rank of professor. This finding aligns with the findings from the quantitative analysis. AG-F20 (a female educated in a developed country) had a whole range of reasons for not participating in conferences:

> "Participating in conferences is costly and I cannot afford the expense. Also, it does not affect my position because I am already a professor… and obstacles such as the poor internet make it difficult to contact and upload files to the organising committee, and it is difficult to obtain a permission letter from the Ministry of Higher Education authorising application for a visa."

The comment provides further evidence of the adverse impact institutional factors have on international participation, even for the most senior academic ranks.

In terms of gender, the test revealed that male scholars participated in more national ($MR=200.36$, $n=188$ versus $MR=164.56$, $n=177$, $U=13375$, $z=-3.50$, $p<0.001$) and international conferences ($MR=208.32$, $n=188$ versus $MR=156.11$, $n=177$, $U=11878.50$, $z=-4.98$, $p<0.001$) than female scholars, the effect size being small and moderate ($r=0.18$ and $r=0.26$ respectively).

Most female interviewees referred to social factors as one of the biggest barriers to their participation in international conferences. For example, AD-F23 (a female educated in a developed country) stated that

> "In our culture, it is not allowed for women to travel alone without a companion (father, brother or husband). I had the chance a couple of times to participate in international conferences, but it was difficult to travel alone."

SG-F7 (a female educated in a developing country) explained that this sociocultural expectation creates additional expenses for women scholars:

"Participating in international conferences has a lot of challenges and costs too much money. I had to pay additional costs for my husband such as an extra airplane ticket and accommodation."

The comments offer evidence of another way in which sociocultural factors affect the academic development of female scholars.

Finally, Table 5.11 and 5.12 show that there was no significant difference between disciplines in terms of their participation in national conferences (p>0.05), but that in international conferences, applied scientists had a higher level of participation (MR=207.01) than social scientists (MR=158.32).

Table 5.10: Participation in national and international conferences by country of study and academic rank

Variable	National			International		
	$\chi 2$	df	p-value	$\chi 2$	df	p-value
Country of study	1.851	2	0.396	76.568	2	0.000
Academic rank	25.253	4	0.000	32.477	4	0.000

Table 5.11: Multiple comparison of scholars for national and international conferences

Variable		National conferences				International conferences			
		U*	z	p	Effect size	U	z	p	Effect size
Domestic									
	Developing	13506.50	-0.36	0.717	0.02	9917	-5.22	**0.000**	0.29
	Developed	13682.50	-0.95	0.343	0.05	7210.50	-8.74	**0.000**	0.47
Developing	Developed	15442.50	-1.29	0.198	0.07	12903.50	-3.91	**0.000**	0.20
Assistant lecturer									
	Lecturer	2937.50	-1.493	0.135	0.11	2659	-2.412	**0.016**	0.18
	Assi professor	1611	-4	**0.000**	0.33	1670.50	-3.70	**0.000**	0.30
	Asso professor	893	-2.78	**0.005**	0.28	714.50	-4.00	**0.000**	0.40
	Professor	1175.50	-3.60	**0.000**	0.33	1036	-4.33	**0.000**	0.40
Lecturer									
	Assi professor	3707.50	-3.39	**0.001**	0.24	4137.50	-2.22	**0.027**	0.16
	Asso professor	2033.50	-1.90	0.058	0.15	1745.50	-3	**0.003**	0.24
	Professor	2716	-2.84	**0.005**	0.21	2448	-3.60	**0.000**	0.27
Assistant prof									
	Asso professor	1751	-0.62	0.537	0.05	1605.50	-1.35	0.176	0.12
	Professor	2626	-0.28	0.777	0.02	2260	-1.73	0.083	0.14
Asso professor	Professor	1274	-0.40	0.688	0.4	1310.50	-0.15	0.881	0.01
Gender		13375	-3.50	**0.000**	0.18	11878.50	-4.98	**0.000**	0.26
Academic discipline		15084.50	-1.68	0.093	0.09	12207.50	-4.64	**0.000**	0.24

Table 5.12: Descriptive statistics for participation in national and international conferences

Variable	National conferences						International conferences					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	155	257.14	0	0	6	2	154	188.72	0	0	6	0
Developing country	178	252.13	0	0	7	2	178	260.28	0	0	7	2
Developed country	187	271.25	1	0	8	0	187	318.44	1	0	8	3
Total	**520**						**519**					
Assistant lecturer	58	143.59	0	0	4	1	58	134.33	0	0	6	1
Lecturer	115	164	0	0	7	1	115	165.32	1	0	6	1
Assistant professor	87	210.56	2	0	7	3	87	194.67	1	0	6	2
Associate professor	43	197.29	1	0	8	3	43	217.93	1	0	7	3
Professor	62	206.54	1	0	7	2	62	220.72	2	0	8	3
Total	**365**						**365**					
Male	188	200.36	1	0	8	2	188	208.32	1	0	8	3
Female	177	164.56	0	0	7	2	177	156.11	0	0	6	1
Total	**365**						**365**					
Social science	180	174.30	0	0	7	2	180	158.32	0	0	6	2
Applied science	185	191.46	1	0	8	2	185	207.01	1	0	8	3
Total	**365**						**365**					

5.2.5 Scholarly contribution

The scholarly contribution items included books authored or edited either singly or jointly, book chapters and textbook contributions, technical reports and translations. Table 5.12 indicates that there were significant differences ($p<0.05$) between the country of study groups in the number of books authored or co-authored, book chapters, textbooks and technical reports, but not in books edited, co-edited or translated. Significant differences ($p<0.05$) were observed between academic ranks for books authored and co-authored, book chapters and textbooks.

Further investigation using a post-hoc test with Bonferroni adjustment (significance level set at $p<0.017$) revealed that the developed country group had higher mean rank scores for book chapters (MR=292.17) and technical reports (MR=284.79) than the domestic group (MR=225.90 and MR=240.02 respectively). The effect size was large to medium ($r=0.36$ and $r=0.23$ respectively). However, there were no significant differences between the two groups in terms of books authored or co-authored, books edited or co-edited, textbooks and books translated in the four years leading up to the 2011 revolution (see Tables 5.14 and 5.15).

The developing country group also had higher mean rank scores for books authored and co-authored (MR=270.75), book chapters (MR=259.02) and textbooks (MR=273.37) than the domestic group (MR=247.30, MR=225.90 and MR=248.63 respectively). The effect size was small to medium ($r=0.15$, $r=0.24$ and $r=0.15$ respectively). However, there were no statistically significant differences between the two groups in books edited or co-edited, technical reports and books translated in the four years up to 2011. There were no statistically significant differences between the developed and developing country groups apart from the number of book chapters and technical reports. The former group scored higher mean ranks (MR=292.17 and MR=284.79) than the latter (MR=259.02 and MR=252.89), but the effect size was small ($r=0.16$ and $r=0.015$ respectively).

Most domestically educated interviewees cited lack of writing skills as the main thing preventing them from producing books or technical reports. SL-F4 (a female educated in Libya) admitted: “I have not tried to write a book because I do not have enough skills to produce this kind of academic work”, while SL-M1 (a male educated in Libya) claimed:

> "I do not know how to write a book because the university does not provide any training or workshops to incentivise those who were educated in Libya to produce books."

The lack of support for those wanting to develop these skills is further evidence that the sample universities offer little in the way of professional development or training for their academic staff.

Those scholars who had written books noted the difficulties of getting their work published by the university. SD-M10 (a male educated in a developed country) complained about the length of time taken ("The university administration took one year to publish my book"), but he was also frustrated that he had received no money from the university. AD-M21 (a male educated in a developed country) summed up the dilemma of those contemplating whether to avoid university publishing and publish privately with his observation that this can leave the author out of pocket, especially if the publisher concerned is unscrupulous:

> "Private publishers cost a lot of money, and if there is a demand for a book, mostly the publisher will issue a second edition without informing the author."

Publishing privately is therefore a risky prospect.

Within the academic rank variable, a post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) found that overall, assistant lecturers authored/co-authored significantly fewer books (MR=164.04) than professors (MR=211.35, large effect size of r=0.36) and fewer textbooks than assistant professors (MR=192.57, medium effect size of r=0.24), associate professors (MR=194.49, large effect size of r=0.29) and professors (MR=198.01, large effect size of r=0.30). Lecturers had a lower mean rank for authoring/co-authoring books than assistant professors (MR=167.55 versus MR=186.03), associate professors (MR=202.88) and professors (MR=211.35). The effect size for these variables ranged between medium and large (r=0.24, r=0.29 and r=0.30 respectively). However, there were no significant differences between lecturers, assistant professors, associate professors and professors in terms of book chapters, textbooks and technical reports. Finally, there were no differences between assistant professors, associate professors and professors for any type of scholarly contribution.

The findings suggest that scholars in lower academic ranks contribute significantly less than those in higher ranks, but that mid-ranking assistant and associate professors contribute as much as those in the higher ranks. Giving some insight into why, most interviewees reported that MHE regulations do not encourage scholars at the top of the career ladder (i.e. professors) to produce academic work. SD-M9 (a male educated in a developed country) explained that

> "I have got all my promotions and now I am a professor, so authoring books does not do anything for me. Also the financial benefit I would get from this work would not justify the time and effort I would have to spend on it."

As previously highlighted, promotion up the career ladder is one of the main factors incentivising scholars to produce scholarly contributions; once this promotion has been achieved, the incentive disappears. However, the point was also made that there is no objective system in place to assess the quality of these contributions, or scholars' achievements in general. AG-M18 (a male educated in a developing country) pointed out that

> "There is no evaluation system in Libyan HEIs. For example, if I want to move from one university to another, the important thing is personal connections, not academic achievement and contribution."

Scholarly contributions are generally regarded as a central to achieving promotion, whether internally or externally, but the lack of performance evaluation mechanism (and, according to this interviewee, the significance attached to personal connections) mean that scholars are under very little pressure to make these contributions of high quality.

In relation to gender, there were no statistically significant differences for any type of scholarly contribution. Medians and interquartile ranges were zero for all items, indicating that 75% of male and female scholars made no scholarly contributions at all in the four years up to 2011 (see Tables 5.14 and 5.15). Among the few outliers who did make contributions in this period, the male scholars produced up to three book chapters (max=3), while female scholars produced up to four book chapters (max=4). This difference, however, was not significant (z=-1.16), as is shown in Tables 5.16 and 5.17.

The only significant difference between academic disciplines was in the number of technical reports (internal or external) produced. Scholars in the applied sciences produced significantly (p<0.01) more technical reports than scholars in the social sciences (MR=172.32, n=185 versus MR=172.32, n=179, U=14735, z=-2.64, p=0.008). The effect size was small (r=0.14).

Overall, 75% of scholars, regardless of country of study, made no scholarly contribution in the four years up to 2011 (Mdn=0, IQR=0). Of the other 25%, those most likely to make a contribution were foreign-educated, assistant professors or professors and applied scientists. On average, these scholars authored or co-authored a book and produced a book chapter and a technical report during this four-year period.

Table 5.13: Scholarly contribution in the last 4 years before the revolution of 17/02/2011 by country of study and academic rank

	Country of study			Academic rank		
Variable	$\chi 2$	df	p	$\chi 2$	df	p
Books authored or co-authored	7.821	2	**0.020**	32.637	4	**0.000**
Books edited or co-edited	1.727	2	0.422	6.248	4	0.181
Book chapters	44.920	2	**0.000**	10.257	4	**0.036**
Textbooks	8.133	2	**0.017**	16.714	4	**0.002**
Technical reports	20.319	2	**0.000**	8.880	4	0.064
Book translations	2.355	2	0.308	2.953	4	0.566

Table 5.14: Descriptive statistics for scholarly contribution

Variable	Books authored or co-authored						Books edited or co-edited						Book chapters					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	156	247.30	0	0	3	0	156	259.82	0	0	2	0	156	225.90	0	0	4	0
Developing country	178	270.75	0	0	3	0	178	257.48	0	0	7	0	178	259.02	0	0	3	0
Developed country	187	263.14	0	0	4	0	186	263.95	0	0	2	0	187	292.17	0	0	4	1
Total	**521**						**520**						**521**					
Assistant lecturer	58	164.04	-	-	-	-	58	176	-	-	-	-	58	163.56	0	0	3	0
Lecturer	115	167.55	0	0	3	0	115	179.19	0	0	3	0	115	175.93	0	0	2	0
Assistant professor	87	186.03	0	0	3	0	86	186.60	0	0	7	0	87	200.18	0	0	4	1
Associate professor	43	202.88	0	0	2	0	43	188.78	0	0	2	0	43	189.24	0	0	3	0
Professor	62	211.35	0	0	4	1	62	184.69	0	0	1	0	62	185.87	0	0	3	0
Total	**365**						**364**						**365**					
Male	188	187.28	0	0	4	0	187	182.82	0	0	3	0	188	187.34	0	0	3	0
Female	177	178.45	0	0	3	0	177	182.16	0	0	7	0	177	178.39	0	0	4	0
Total	**365**						**364**						**365**					
Social science	180	184.34	0	0	3	0	179	180.13	0	0	7	0	180	186.07	0	0	3	0
Applied science	185	181.69	0	0	4	0	185	184.79	0	0	2	0	185	180.01	0	0	4	0
Total	**365**						**364**						**365**					

Table 5.15: Descriptive statistics for scholarly contribution

Variable	Textbooks						Technical reports						Book translations					
	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR	N	MR	Mdn	Min	Max	IQR
Domestic education	156	248.63	0	0	3	0	156	240.02	0	0	3	0	156	257.56	0	0	3	0
Developing country	178	273.37	0	0	9	0	177	252.89	0	0	3	0	178	259.83	0	0	4	0
Developed country	187	259.54	0	0	7	0	187	284.79	0	0	5	1	187	264.98	0	0	3	0
Total	**521**						**520**						**521**					
Assistant lecturer	58	163.47	0	0	1	0	57	163.61	0	0	4	0	58	182.37	0	0	4	0
Lecturer	115	173.22	0	0	3	0	115	178.03	0	0	4	0	115	183.85	0	0	1	0
Assistant professor	87	192.57	0	0	3	0	87	185.91	0	0	3	0	87	178.16	0	0	3	0
Associate professor	43	194.49	0	0	9	0	43	185.17	0	0	3	0	43	184.53	0	0	2	0
Professor	62	198.01	0	0	3	0	62	201.52	0	0	5	1	62	187.74	0	0	2	0
Total	**365**						**364**						**365**					
Male	188	187.78	0	0	9	0	188	176.12	0	0	4	0	188	185.70	0	0	3	0
Female	177	178.98	0	0	3	0	176	189.31	0	0	5	0	177	180.13	0	0	4	0
Total	**365**						**364**						**365**					
Social science	180	187.63	0	0	9	0	179	172.32	0	0	4	0	180	185.06	0	0	2	0
Applied science	185	178.49	0	0	7	0	185	192.35	0	0	5	0	185	181.00	0	0	4	0
Total	**365**						**364**						**365**					

Table 5.16: Multiple comparison of scholars for scholarly contribution

Variable		Books authored or co-authored				Books edited or co-edited				Book chapters			
		U*	z	p	Effect size	U	z	p	Effect size	U	z	p	Effect size
Domestic													
	Developing	12639.50	-2.81	**0.005**	0.15	13759	-0.51	0.613	0.03	12113	-4.41	**0.000**	0.24
	Developed	13693.50	-2.10	**0.04**	0.11	14277.50	-0.74	0.46	0.04	10881.50	-6.61	**0.000**	0.36
Developing	Developed	16151.50	-0.86	0.388	0.05	16142	-1.28	0.202	0.07	14519.50	-3.02	**0.003**	0.16
Assistant lecturer													
	Lecturer	3275.50	-0.66	0.510	0.05	3277	-1.01	0.314	0.08	3099	-1.26	0.206	0.10
	Assi professor	2217	-2.49	**0.01**	0.21	2349	-1.86	0.063	0.16	2033	-2.80	**0.005**	0.23
	Asso professor	977.50	-3.43	**0.01**	0.34	1160	-2.03	0.042	0.20	1075	-1.91	0.056	0.19
	Professor	1333.50	-3.93	**0.000**	0.36	1711	-1.69	0.091	0.15	1568.50	-1.90	0.058	0.17
Lecturer													
	Assi professor	4494.50	-2.64	**0.008**	0.19	4744	-1.55	0.121	0.11	4334.50	-2.25	0.024	0.16
	Asso professor	1991.50	-3.81	**0.000**	0.30	2343.50	-1.66	0.097	0.13	2290	-1.06	0.290	0.08
	Professor	2717.50	-4.64	**0.000**	0.35	3456	-1.17	0.243	0.09	3366	-0.90	0.367	0.07
Assistant prof													
	Asso professor	1697.50	-1.31	0.189	0.11	1826.50	-0.27	0.788	0.02	1756.50	-0.72	0.469	0.06
	Professor	2319.50	-2.11	0.035	0.17	2637	-0.29	0.774	0.02	2474.50	-1.11	0.266	0.09
Asso professor	Professor	1264.50	-0.59	0.56	0.06	1301.50	-0.51	0.610	0.05	1305	-0.25	0.803	0.02
Gender		15833	-1.42	0.157	0.07	16490	-0.18	0.854	0.01	15822	-1.16	0.245	0.06
Academic discipline		16408	-0.46	0.671	0.02	16133.50	-1.31	0.189	0.07	16097.50	-0.79	0.432	0.04

Table 5.17: Multiple comparison of scholars for scholarly contribution

Variable		Textbooks				Technical reports				Book translations			
		U*	z	p	Effect size	U	z	p	Effect size	U	z	p	Effect size
Domestic													
	Developing	12550.50	-2.82	**0.005**	0.15	131128	-1.44	0.154	0.08	13762.50	-0.52	0.600	0.03
	Developed	13989.50	-1.40	0.162	0.08	12068.50	-4.17	0.000	0.23	14170.50	-1.43	0.153	0.08
Developing	Developed	15774	-1.51	0.131	0.08	14525	-2.94	0.003	0.15	16314	-0.98	0.326	0.05
Assistant lecturer													
	Lecturer	3158.50	-1.48	0.140	0.11	3022	-1.38	0.167	0.10	330.50	-0.26	0.800	0.02
	Assi professor	2127	-2.93	**0.003**	0.24	2165.50	-1.98	0.048	0.16	2465	-0.95	0.340	0.08
	Asso professor	1035	-2.95	**0.003**	0.29	1079	-1.69	0.09	0.17	1232.50	-0.30	0.768	0.03
	Professor	1450	-3.28	**0.001**	0.30	1406.50	-2.79	0.005	0.25	1745.50	-0.73	0.465	0.07
Lecturer													
	Assi professor	4478.50	-2.31	**0.021**	0.16	4782	-0.79	0.431	0.06	4845	-1.30	0.193	0.09
	Asso professor	2185	-2.15	**0.032**	0.17	2375.50	-0.57	0.569	0.05	2462.50	-0.11	0.913	0.01
	Professor	3075.50	-2.68	**0.007**	0.20	3113	-1.96	0.050	0.15	3487.50	-0.63	0.531	0.05
Assistant prof													
	Asso professor	1851.50	-0.14	0.888	0.01	1865.50	-0.04	0.972	0.00	1806	-1.23	0.220	0.12
	Professor	2628.50	-0.39	0.700	0.03	2454	-1.23	0.216	0.10	2556	-1.24	0.082	010
Asso professor	Professor	130.50	-0.23	0.819	0.02	1209.50	-1.05	0.294	0.10	1310	-0.37	0.709	0.04
Gender		15926.50	-1.24	0.216	0.06	15345	-1.74	0.08	0.09	16129.50	-1.52	0.129	0.08
Academic discipline		15816.50	-1.50	0.147	0.08	14735	-2.64	0.008	0.14	16279.50	-1.11	0.269	0.06

5.3 Section 2: Discussion of the findings

This section discusses the findings presented in the previous sections. Nonparametric quantitative analysis was first conducted to compare and contrast the KD-related achievement and contribution of scholars educated in Libya, in developing and in developed countries (RQ-I-ii). The results at this stage gave some indication of the knowledge gap between Libya and the host countries in which the participants had studied, but as the main focus of the research is on study abroad programmes (as an example of investment in human capital), Libya-educated participants were then excluded from the sample and the nonparametric analysis repeated to compare and contrast the KD-related achievement and contribution of the remaining participants by gender, academic discipline and academic rank (RQ-III). The subsequent semi-structured interviews were used to investigate the factors affecting the achievement firstly, of all three country of study groups (RQ-II) and secondly, of the foreign-educated groups by gender, discipline and rank (RQ-IV).

The items considered within this dimension were: research funding (whether this comes from the scholar's own institution, the NASR, government bodies, international funding bodies, industry or non-profit agencies), number of sabbatical leaves, number of papers published in peer-reviewed journals (local, Arabic and international) and number of scholarly contributions completed (scholarly books, book chapters, technical reports and scholarly translations). These items were chosen for analysis because they were all deemed to be central to the dissemination of academic knowledge (Gagnon, 2011), either by facilitating its production and preparation (research funding and sabbatical leave) or by providing a forum for its dispersal (publication in journals and participation in conferences). Since these activities are an important part of the KD role of any full-time university academic, it is appropriate that they form part of this investigation into human capital investment in HE. The analysis has already suggested that where an investment is made in sending scholars to high-ranking overseas universities (see sections 1.2.1 and 2.3.1), this improves their subsequent publication productivity, in turn enriching the home country's human capital by adding value to what is already known and expanding the horizon for everybody. The variable of country of study, academic rank, discipline and gender serve as a guide in this discussion section.

5.3.1 Country of study

This section discusses the significant statistical differences in KD among scholars who trained as postgraduate researchers in Libya, in developing and in developed countries, and the possible reasons for these differences, as revealed in the interviews. The findings may give some insight into the relationship between country of study and scholarly performance across a range of items within the KD dimension.

The first item investigated – research funding – is a key facilitator of the production and dissemination of knowledge. However, the findings indicate that while scholars educated in developed countries score a positive adjusted residual for research funding than the other two groups to secure research funding from the NASR, government bodies, industry and international bodies, less than a quarter of this group were able to secure this funding (see Table 5.1 and Table 5.3). A low Cramer’s V value suggests that there was in fact little difference between the three groups. Scholars educated in Libya had the greatest difficulties accessing funding, followed by those educated in developing countries. The interviewees perceived the principle barriers facing these groups in their search for funding as being the strict conditions set by the NASR and the high level of competition, but lack of awareness may also be a factor – one Libya-educated interviewee admitted that not all Libya-educated scholars are even aware of the NASR’s existence. This appears to support Tashani’s (2009) assertion that many Libyan academics are not aware of the national and international funding that is available for research. This might be attributable to university managers failing to keep academics informed about local funding bodies, or it might simply be that Libya-educated scholars do not take the trouble to find out about funding because they do not see research and publication as an important form of academic contribution. Whatever the cause, the findings appear to support Pho and Tran’s (2016) argument that there is a lack of research funding in Libya’s HEIs, and that this has a negative impact on publication output.

One factor making it more difficult for all scholars, irrespective of where they studied, to access research funding in Libya is the reluctance of the country’s public universities to encourage scholars to seek funding from anywhere other than the government. The potentially inhibiting effect of university policy on research funding and thence publication productivity has been highlighted by Dhillon, Ibrahim and Selamat (2015) and by Anderson (2012), who identifies lack of strategic planning as a key factor impeding academics from conducting research in Arab universities. The problem for Libyan academics is made all the more acute because here, as elsewhere, government funding for universities is under pressure. However, while the findings of this study suggest a link between low university funding and low publication productivity, this is not necessarily the case elsewhere.

They are at odds, for example, with Kyvik and Aksnes's (2015) finding that declining government funding in Norwegian research universities is not affecting the publication productivity of that country's academics, but merely driving them to seek more funding from external sources (e.g. non-academic organisations). One explanation for the difference might be the fact that Norway is a KBE in which the value of scientific research as a key engine of economic growth and development is widely recognised. Such an economy relies more on technical expertise than on either physical capital or natural resources (Powell and Snellman, 2004). This is not the case in the Arab region, and particularly in Libya. The descriptive statistical tests indicated that most of the funding accessed by the scholars in the study came from government organisations (e.g. the NASR), with only a few developed-country-educated scholars managing to secure funding from industry. This might not be enough to make a significant contribution to Libya's economic growth and development, although the evidence does suggest that when university staff are able to secure funding from external stakeholders and conduct research, this has a beneficial effect on the development of local businesses (Kantor and Whalley, 2014). This issue of academic engagement and its impact on the surrounding environment is discussed at length in Chapter 6 (KE). Lionel Robbins (1932) argues that economic problems are caused primarily by resource limitations, but it is arguably poor knowledge production and dissemination, rather than limited economic resources, that is helping to hold back Libya's economic development.

Another barrier faced by all scholars prior to the 2011 revolution was the political climate, which rendered it extremely difficult for scholars to apply for funding from international bodies (special permission was required from the government before any contact could be made). The finding is a clear example of Almansur's (2016) observation that political and socioeconomic factors have a major effect on scientific research in Arab universities.

Finally, those participants who had been educated in developed countries confirmed in the interviews that research quality is a key factor in securing any funding, be it from international agencies or local bodies. This finding underlines the importance of investing in human capital to raise the quality of research conducted by full-time scholars in Libyan universities. Furman, Porter and Stern (2002) argue that investing in HE is crucial for developing human capital, and that increasing public funding for HEIs is key to improving general innovation infrastructure.

The quantitative findings highlighted a direct link between sabbatical leave and the number of papers published in peer-reviewed journals, with Libya-educated scholars being shown to have fewer sabbatical leaves than the other two groups and correspondingly lower productivity in this area (see Table 5.6). Since publication is central to KD, the finding calls into question the extent to which Libya-educated scholars are contributing to knowledge dissemination. The interviewees reported several barriers that hinder Libya-educated scholars from producing and disseminating their knowledge, including a heavy undergraduate teaching load and their limited training in research skills. The finding echoes Wamala *et al.*'s (2015) observation that academics in developing countries tend to have a heavy teaching load and to be responsible for large numbers of students, and that this has a negative effect on their research output (Zyoud *et al*., 2017; Sweileh *et al.*, 2014). Also mentioned was the fact that MHE policy in Libya regards teaching as compulsory and publication as optional, which does little to motivate scholars to publish and disseminate knowledge.

Scholars who had been educated abroad were more motivated to produce scholarly publications because, they explained, they had been exposed to a variety of research topics which are not addressed in the Libyan context. This finding is consistent with Sueaed (2017), who explains that faculty members who have studied in an active research environment tend to have more research ideas. However, these returnees also faced obstacles; most explained that the lack of a collegial culture in Libya's HEIs makes collaborative research difficult. This echoes Ilon (2013) and Shin *et al.*'s (2014) finding that returnees often find difficulties in readjusting to the local academic culture. Lange and Topel (2004) argue that investing in the education of certain individuals benefits everyone as this knowledge is passed on (what they call knowledge spill over), but it seems that at the moment, the spill over of knowledge in Libyan HEIs is being frustrated at least in part by Libyan academics' own lack of understanding of the value of collaborative research.

The findings regarding publication patterns (i.e. whether this in local, Arabic or international journals) not only add to the Libya-based literature but also provide more detail for comparison in future studies. Publication in local and Arabic journals was significantly higher among scholars educated in developing countries than among Libya-educated scholars, while those educated in developed countries published more in international journals than either of the other two groups. Interviewees who had been educated in Libya or other developing countries explained that getting published in local and Arabic journals is relatively straightforward because the publication criteria are easy to meet, but all three groups acknowledged that the quality of local journals in particular is inferior to that of peer-reviewed international journals.

The interviewees from the domestic and developing country groups cited the language barrier and strict submission requirements as the main obstacles preventing them from publishing in international journals. This is in line with Almansour (2016) and Almansour and Kempner's (2015) finding that one of the barriers preventing faculty members in Arab universities from publishing in international journals is their lack of English language proficiency. However, it may also be the case that these groups are restricted to publishing in local and Arabic journals because they lack the research skills needed to produce the standard of work required by the international journals. Scholars who had graduated in developed countries saw the ability to communicate in other languages, especially English, as an advantage not just because it makes publication easier but also because it makes it easier to participate in international conferences in advanced economic countries. Sending scholars to participate in international conferences is seen as a worthwhile investment because it not only allows them to disseminate their knowledge internationally but also to gain new knowledge which they can then disseminate in their home country. Those who are unable to participate in these conferences thus lose an opportunity for professional and academic development, while their institution loses a chance to expand its human capital. Aside from language barriers, interviewees from all groups cited a lack of financial support and an over-complex bureaucracy as other barriers to conference attendance. Celik (2012b) also identifies bureaucratic rules, a flawed academic environment and lack of research funding as factors that reduce the academic productivity of both domestically educated scholars and returnees.

The secondary data analysis (Table 6.1) showed that a high proportion of Libyan scholars granted a scholarship by the Libyan government choose to study in developing (mostly Arabic) countries. Whether this is because Libyan candidates struggle to secure places in the top universities in developed countries or because they have difficulties obtaining UK, USA or EU visas, the findings suggest that they, along with their Libya-educated peers, may not be benefiting fully from their master's or PhD qualification in terms of the opportunities it should afford for research and international publication. The importance of education quality is highlighted by Almendarez (2013), who argues that it should be policy makers' highest priority, and by Easterlin (1981) and Lucas (1990), who suggest that the low quality of human capital (in terms of modern education and training) in some countries may partly explain why they remain undeveloped. Altbach (2013) suggests that academic institutions that place knowledge creation and dissemination at their heart are more likely to play a part in the global knowledge economy, but there is currently little evidence of this happening in HEIs across the MENA region. The region as a whole does not invest enough in R&D (Weber, 2011), preferring instead to rely on natural resources such as oil and gas rather than its human capital to drive economic growth and development.

The current research represents an advance on previous studies in that it investigates the scholarly contribution of foreign-educated academics in more detail. The findings reveal that those educated in developed countries produce more book chapters and technical reports than either Libya-educated or developing-country-educated scholars, and that the latter group author and co-author more books, book chapters and textbooks than Libya-educated scholars. Alzuman (2015) identified a similar finding: that foreign-educated academics write or edit significantly more books, translations and book chapters than their Saudi-educated colleagues. The interviews revealed that for the majority of Libya-educated scholars, it is a perceived lack of research skills that prevents them from producing any kind of scholarly contribution. This appears to confirm Suwaed's (2017) view that poor quality writing skills are holding back many Libyan academics from conducting research, but beyond this, it is indicative of a key weakness within Libya's HE system – one that is hindering its ability to produce real knowledge that might help non-academic communities. At present, HEIs in Libya do not seem to be teaching postgraduate students how to conduct research effectively.

The findings of this study contribute to the current literature, particularly in the context of developing countries like Libya, first, by highlighting that the level of benefit accruing from this kind of investment in human capital depends largely on the knowledge gap that exists between the host and home countries. If the knowledge gap between the two countries is big, the return from the investment might be similarly big. However, if the knowledge gap is small, the return may be so slight as to make the investment not worthwhile. These findings seem to be consistent with Kim (1998), who found an association between the number of students educated in developed countries and GDP rate, but no such association for those educated in developing countries. Second, the obstacles that were identified from the semi-structured interviews assist in our understanding of why the majority of scholars working full time in Libyan universities do not contribute to KD in the sector.

5.3.2 Academic discipline

Nonparametric tests showed that the number of scholars receiving research funding from all sources (most significantly from industry) was higher in the applied sciences than the social sciences, although as Table 5.2 and Table 5.4 show, only a small proportion of scholars in either discipline were able to secure research funding from any of the sources listed in the study (own institution, the NASR, international bodies, government, industry and non-profit organisations). Interviewees from the applied sciences pointed out the importance of funding for what can be costly research, and the view was expressed (by a social scientist) that the NASR gives funding priority to applied scientists because it sees this kind of research as more important to economic growth. Pho and Tran (2016) found that academics in disciplines requiring extensive fieldwork (e.g. geography, anthropology and social work) tend to be given more funding, but the discrepancy between the amount of money being given to applied and social scientists in Libya may simply reflect the ambition of the government and other bodies to support the country's move into industrialisation. A similarly pragmatic view may be determining the level of funding for social scientists, if prospective funding sources do not perceive the research proposals being put forward as addressing Libya's most important social issues.

In terms of publication, foreign-educated scholars in both disciplines appear to be key actors in KD, with social and applied scientists being equally likely to publish (though both published much less in the four years leading up to the 2011 revolution) (see Table

5.6). The interviewees identified lack of funding as one of the main barriers preventing them from conducting and publishing research, which appears to corroborate the view expressed by a number of authors that investment in R&D in developing countries is still too low to make any significant impact on scholarly contributions (El-Hawat, 2007; Tashani, 2009; Al-Ohali and Shin, 2013). It appears that at the moment, the publication productivity of both disciplines is too low to have a significant impact on HEIs or to represent a real return on the Libyan government's investment in human capital.

Both disciplines were more likely to publish in local or Arabic journals and to participate in local conferences. The finding that publication in international journals and participation in international conferences was significantly higher among applied scientists than social scientists (with medium effect size) echoes Pho and Tran (2016), who found that academics from the social sciences and humanities find participating in international conferences difficult. The foreign-educated social scientists who were interviewed cited foreign language proficiency as the main barrier to international participation; most relied on Arabic sources in their research and communicated only in Arabic with departmental colleagues. Gea *et al.* (2014) note similar difficulties among Spanish social scientists obliged to write articles in English. Many of the applied scientists, in contrast, claimed that both Arabic and English were used in their department and that they relied mostly on non-Arabic sources in their research and teaching (see section 4.3.1). Their English proficiency allowed these scholars to publish in international journals and participate in international conferences. Secondary data analysis (Table 6.2) revealed that applied scientists are more likely to study in developed English-speaking countries and therefore to be proficient in English. Social scientists are more likely to study in Arabic and Asian universities and to be less proficient in English. Flowerdew and Li (2009), Jiang (2014), Al-Khawaldeh, Bani-Khair and Al-Edwan (2016) and Jdetawy (2011) all reveal the same finding that English language is the main barrier preventing scholars whose first language is not English from publishing internationally.

In terms of other kinds of scholarly contribution, the analysis of the questionnaire data confirmed that the only significant difference between foreign-educated social and applied scientists was in the number of technical reports they disseminated (external or internal), with the latter group producing more, mostly industry-related, reports. This is perhaps not surprising in light of the finding that applied scientists are more likely to secure funding from industry than social scientists. However, while this indicates an association between scholars in the applied sciences and industrial institutions in Libya, the negative z score (Table 5.6) suggests that the majority of applied scientists in the country produce little knowledge and have limited impact on its capacity for innovation. EGT which assumes knowledge, ideas or IT is within economic system emphasises the importance of investing in human capital and research to facilitate innovation (Ajakaiye and Kimenyi, 2011).

5.3.3 Academic rank

The quantitative analysis revealed that there was no significant difference between academic ranks in relation to their ability to secure research funding from any of the six listed sources. This contradicts Aksnes *et al.*'s (2011) finding that academics in the higher ranks (e.g. professors) can access funding more easily. Foreign-educated interviewees gave some insight into the finding with the explanation that most funding bodies base their decision on the originality of the research topic rather than the academic rank of the applicant. However, as the descriptive analysis (Table 5.2 and Table 5.4) shows, relatively few returning scholars were able to secure funding from any of the listed sources. The proportion of returnees who did receive funding increased up to the level of associate professor and then declined.

In the Libyan HE sector, the more academics publish, the more likely they are to be promoted, and the higher their rank, the better their chances of being awarded sabbatical leave. Funding thus becomes even more crucial because it facilitates scholarly publication – the first link in the chain. It is not surprising that the highest rank (i.e. professors) in the sample had significantly more sabbatical leaves than assistant professors and associate professors, or that professors published significantly more than assistant lecturers and lecturers. What is surprising is that there was no difference in the amount published by assistant professors, associate professors and professors. This is strong evidence that publication productivity levels off when scholars are appointed to the rank of full professor. Sabatier (2012), who found a similar result in the French HE sector, concluded that the French promotion system might be having a deleterious effect on productivity. When the reasons for this finding were explored in the interviews, it was confirmed that the main reason scholars publish is to secure promotion, and that this incentive disappears once they have gained a professorship. Stephan and Levin (1992), Barjak (2006), Gonzlez-Brambila and Veloso (2007) and Aksnes *et al.* (2011) all echo the finding, highlighting a similar pattern of academics publishing more in the early years of their career and then, once promotion has been secured, easing off. The interviewees also reported that many professors are discouraged from authoring or translating books etc because they perceive these activities as not yielding a good enough financial return to justify the time and effort expended. This might indicate that the lack of rewards on offer disincentivises professors from increasing their research output.

The quantitative analysis highlighted significant differences between academic ranks in terms of their publication patterns; assistant professors in the sample were significantly more likely to publish in local journals, associate professors were most likely to publish in Arabic journals, and the group most likely to publish in international journals were the professors. The majority of those who were interviewed cited rapid promotion as the main reason for publishing in Arabic and local journals; since publishing in these journals is easy, with papers rarely being rejected or authors asked to resubmit, scholars can move up the career ladder more quickly. In contrast, the interviewees explained, publishing in international journals is a slow and time-consuming process and can delay promotion. Bol and Hacker (2013) also note that publishing in international (especially high-impact) journals is hard and time-consuming. The problem is that publishing in low-quality journals limits the ability of Libyan academics to make an original contribution to KD. One interviewee suggested that research quality in Libyan HEIs would be enhanced if universities took journal quality into account when assessing a candidate for promotion. Publishing in high impact journals might be used as an indicator of quality paper. This view echoes Garwe's (2015) finding that academic staff themselves feel that "academics should produce quality papers in order to guarantee promotion" (p. 130). It seems to be that there is a lack in Libya HE promotion system. Those interviewees who were keen to publish in international journals said they were motivated by a desire to feel a sense of achievement. This seems to support Omer (2015) and Sabatier's (2012) view that senior faculty members who publish in international journals tend to be driven by intrinsic motives, and Goktepe-Hulten and Mahagaonkar's (2010) argument that academics are driven not just by financial incentives but also by a desire to enhance their reputation among their peers.

As with publication, scholars in the early stages of their academic career (assistant lecturers and lecturers) were significantly less likely to participate in national and international conferences than scholars at the top end of the career ladder. Associate professors and professors were equally likely to participate in both national and international conferences. The interviewees explained that this is because early career academics spend most of their time on teaching and administrative duties (see section 4.3.4) and tend not to be aware of how participating in conferences can enhance their academic performance in relation to KD. Another obstacle reported in the interviews was the fact that universities often fail to inform scholars about upcoming conferences in a timely manner. This may be attributable to the inadequate communication infrastructure in Libyan universities; indeed, the poor telecommunications and internet connectivity have a significant effect on KD in general. These results are consistent with those of Almansour and Kempner (2017), who found that most professors in Arabic universities complained about the lack of infrastructure in their institution.

5.3.4 Gender

The analysis of the survey questionnaire data indicated that funding from industry and international bodies was significantly higher among returning male scholars than among returning female scholars, though the Phi vale for these items (funding from industry and international bodies) indicate that the difference between genders was small. Female scholars secured no funding from industry, supporting Carrington and Pratt’s (2003) conclusion that female academics face particular difficulties in accessing funding from this source. Returning males were also awarded more sabbatical leaves than females, but there was no difference in publication productivity. Hemmings and Kay (2010) observe that most studies addressing gender and publication patterns have found that male academics tend to be more productive than females (Aksnes *et al*., 2011), but the finding here suggests that the two are equally productive when the country of study variable is controlled. Other studies have identified similar results when the academic rank and academic discipline variables are controlled: Hill *et al*. (2015) and Behravan (2011) found that male and female academics in the same rank tend to have a similar publication output, while Mayer *et al.* (2017) found no differences in publication output between genders in the same discipline (urology).

Half of the sample population (both genders) published two articles in the four years leading up to the 2011 revolution. Interestingly, although the male scholars had more sabbatical leaves, their publication output was the same as their female peers. Iqbal (2011) found that most faculty members who are awarded sabbatical leave want to conduct research, but most of the interviewees in this study suggested that scholars in Libya apply for sabbatical leave primarily to receive the financial support on offer. HE regulations stipulate that this support is to be used for research, but most scholars use it to improve their economic situation. One foreign-educated interviewee criticised the poor regulation and lack of oversight in the sector, arguing that too many sabbatical leaves are wasted. It seems that current policy does not motivate scholars to produce knowledge on their sabbatical leave, with adverse consequences for KD in the HE sector.

One challenge facing returnees is to find appropriate journals in which to publish their academic work. Dhillon, Ibrahim and Selamat (2015) argue that publication in well-known local or international journals is a public validation both of the academic's research skills and the reputation of their HEI. Both genders were equally likely to publish in local and Arabic journals, but male academics were significantly more likely to publish in international journals than their female colleagues. Numerous female interviewees explained that achieving the high standard required by international journals takes more time than their family responsibilities will allow. These responsibilities also limited their ability to attend local and international conferences; accordingly, attendance at these events was significantly higher among male scholars than female scholars (but with a small effect size). This finding is consistent with Bentley's (2012) assertion that women academics are less likely to attend international conferences than men. In the current study, the statistical analysis indicated that half of the men in the sample had participated in at least one international conference in the four years leading up to the 2011 revolution, while less than a quarter of the women had done the same. Participation among female academics in local conferences was also relatively low. Female interviewees reported that, family responsibilities aside, travelling abroad or even locally to attend conferences is difficult because social norms dictate that they are accompanied by a male relative (father, brother or husband).

Women living in the Arab region face a particular set of religious and cultural expectations that restrict their movement (Naser *et al.,* 2009). This barrier impacts on the academic development of returning female scholars, in whom the government has invested huge amounts of money, and undermines their ability to contribute to KD in their home country. In Libya's case, this a cause for concern, given that nearly half of the full-time academics working in the four sample universities are female (see Table 3.2). Arguably, it has the potential to cause serious problems within the HE system.

5.4 Conclusion

Ajakaiye and Kimenyi (2011) link the neglect of the HE sector in many African countries to low levels of scientific research and slow economic growth in the continent. This chapter highlights a number of ways in which HE in Libya has been neglected, to the detriment of human capital development and the sector's ability to disseminate knowledge. It seeks to raise awareness of the barriers that are undermining the government's current attempts to expand KD, as highlighted in the semi-structured interviews.

Insufficient funds: is a key factor limiting the KD productivity of scholars. The evidence produced in this chapter seems to indicate that generally, the MHE spends too little on scientific research, and that what it does spend is not always being channelled in the right direction (see sections 5.2.1 and 5.2.2). As far as other funding sources are concerned, male scholars and applied scientists who have been educated in developed countries attract much more funding from international bodies and industry than domestic graduates and scholars educated in developing countries (Table 5.18). The main obstacles facing Libya-educated scholars in securing funding are the strict conditions set by funders and the high level of competition, but it also appears that many are unaware of organisations that provide funding. Academics educated in Libya are at a disadvantage when it comes to competing for grants from national and international bodies because their research tends to be lower quality and less original than that of their developed-country-educated peers. As far as international funding is concerned, all academics, irrespective of country of study, gender, discipline or rank, have in the past also had to overcome political opposition to their seeking funding from these bodies.

Lack of a research infrastructure: the absence of a basic research infrastructure in Libyan universities severely limits the ability of any scholar to be productive in KD. The findings indicate that those with degrees from developed countries have more opportunities to participate in international conferences than scholars educated in Libya and other developing countries, but all three groups struggle with a lack of funding for travel grants and an over-complex administration procedure. Female scholars – even foreign-educated ones – are prevented from attending international conferences by social and cultural factors. At the institutional level, the lack of experience in organising conferences, or a lack of appreciation of their importance, on the part of both university managers and the MHE further reduces academics' opportunities for KD. The lack of research infrastructure has arguably created an academic culture in which scholars see sabbatical leave as an opportunity to improve their economic situation rather than their scholarly productivity.

Barriers to scholarly publication productivity: Table 5.18 shows that Libya-educated scholars are the least likely to submit papers to international journals, followed by scholars educated in developing, particularly Arabic-speaking, countries. There are several reasons for this: most lack proficiency in foreign languages, teach large numbers of undergraduate students, have limited training in research skills and struggle with the strict submission requirements of peer-reviewed international journals. Developing-country-educated scholars are more likely to publish in Arabic journals, though female returnees are less productive than their male counterparts because their family responsibilities mean they cannot invest the time needed to produce high-quality research. Publication in local journals tends to be promotion-driven, with productivity declining once the academic has reached the upper rungs of the career ladder. HE regulations that do not incentivise continuing productivity at this level, an unsupportive collegial environment and lack of personal motivation were all cited as reasons why scholars produce fewer publications and other contributions when they reach the higher academic ranks. Low publication productivity was also attributed to the fact that university managers do not require scholars to publish.

Overall, the findings suggest that the main factors limiting KD in Libya's HE sector are the lack of infrastructure and the fact that much of the government's investment in human capital has gone into sending scholars to study in host countries that are too close to Libya in terms of the knowledge gap. This may have implications for the sustainability of economic development in the country – it is certainly not a good story for a country wishing to transform itself into a knowledge-based economy.

The MHE can start addressing this problem by revising the HE regulations that govern faculty members in Libya's HEIs. For example, it might be stipulated that when scholars are being assessed for promotion, only those publications that appear in peer-reviewed journals should be taken into account, or, since scholarly productivity declines once academics reach the rank of professor, new regulations could be introduced to encourage those in higher academic ranks to produce more publications. Other steps to raise the quality of KD include increasing the government budget for research funding, so that researchers in Libya's HEIs are able to conduct high-quality research and pursue innovation, and encouraging those educated in non-English speaking countries to improve their foreign language proficiency so that they are better able to publish in international peer-reviewed journals and attend international conferences. This policy, which should be the responsibility of the MHE, will also help scholars improve their chances of gaining international funding.

The KD findings could have implications for Libyan academic culture at the individual researcher level, given that they highlight the prevalence of negative stereotypes about women's academic productivity and the purpose of sabbatical leave. The first of these can only be challenged by female academics themselves becoming more confident and putting more effort into getting published in peer-reviewed journals. On the second – how sabbatical leaves are put to use – tighter regulation would help, but scholars need to be made to recognise these leaves as an invaluable opportunity to improve their scholarly productivity. The next chapter investigates whether the limitations discussed in this chapter are also having an impact on knowledge exchange.

Table 5.18: Differences and associations among variables across different items within KD

Variable	Country of study			Foreign-educated scholars								
				Academic discipline		Academic rank					Gender	
Item	Libya	Developing	Developed	Social	Applied	Assi-lect	Lect	Assi-prof	Asso-prof	Prof	Male	Female
Funding from own institution	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Funding from NASR	Weak	Weak	**Moderate	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Funding from international bodies	Weak	Weak	**Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Funding from government bodies	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Funding from industry	Weak	Weak	** Weak	Weak	*Weak	Weak	Weak	Weak	Weak	Weak	*Weak	Weak
Funding from non-profit agencies	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Sabbatical leave	Small	**Big	**Big	**Medium	Weak	-	-	Weak	**Big	**Big	**Medium	Weak
Publishing in local journals	Weak	**Weak	Weak	Weak	Weak	Weak	Weak	**Big	Weak	Weak	Weak	Weak
Publishing in Arabic journals	Weak	*Medium	Weak	Weak	Weak	Weak	Weak	Weak	*Medium	Weak	Weak	Weak
Publishing in international journals	Weak	Weak	**Strong	**Moderate	Weak	Weak	Weak	Weak	Weak	Weak	*Weak	Weak
Participation in local conferences	Weak	Weak	Weak	Weak	Weak	Weak	Weak	**Moderate	Weak	Weak	*Small	Weak
Participation in international conferences	Weak	**Moderate	**Strong	Weak	**Moderate	Weak	Weak	Weak	Weak	**Moderate	**Moderate	Weak
Book chapters	Small	**Big	**Medium	Small	Small	Small	Small	Small	Small	Small	Small	Small
Books authored or co-authored	Small	Small	Small	Small	Small	Small	Small	Small	Small	**Medium	Small	Small
Books edited or co-edited	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small
Textbooks	Small	Small	Small	Small	Small	Small	Small	Small	Small	**Medium	Small	Small
Technical reports	Small	Small	*Medium	Small	Small	Small	Small	Small	Small	Small	Small	Small
Book translations	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small

*p<0.05 and **p<0.001 Effect size with weak, moderate and strong association
*p<0.05 and **p<0.001 Effect size with small, medium and big difference

Chapter 6 : Research Findings: Investment in Human Capital and Knowledge Exchange (KE)

6.1 Overview

This chapter draws on the secondary data and the findings from the survey questionnaires and semi-structured interviews to investigate the interaction between Libyan universities and economic institutions, and how this facilitates KE in the country. The chapter starts by presenting the findings regarding the Libyan government's investment in human capital; that is, how much it spends on sending scholars to study in different countries and how much it invests in each gender. The second section of the chapter analyses the findings from the questionnaire, using nonparametric tests to compare various scholar groups across a range of items within the KE dimension. These items are: production of IP (patents, inventions, computer software, industrial designs and start-ups), provision of employee training (CPD), discussion of research findings with non-academic organisations, consultancy services, and temporary positions with non-academic organisations (see Figure 2.2). For each item, the analysis compares the performance of all the scholars in the sample by country of study (RQ-I-iii), and the performance of the foreign-educated scholars only by academic discipline, academic rank and gender (RQ-III). The thematic analysis of the qualitative interview data is presented alongside the quantitative analysis in order to identify the key factors affecting scholars' engagement with external organisations by country of study (RQ-II), and then, for foreign-educated groups only, by discipline, rank and gender (RQ-IV). This is followed by the discussion section, which considers these findings in the context of the findings from the literature review. The chapter concludes with a summary of the main findings presented in table form.

6.2 Section 1: Investing in human capital

This section presents the findings from the secondary data retrieved from the MHE, showing the differences in funding between male and female scholars sent to study abroad by the Libyan government, and the differences in funding between scholars sent to study in different countries (Arabic countries, England and Ireland, European countries, USA and Canada, Asian countries, Australia and New Zealand, and African countries).

6.2.1 Analysis methods

Descriptive statistics were used to summarise the continuous variable, funding. A QQ plot was used to determine the normality of the data. A QQ (quantile-quantile) plot is a probability plot for comparing two probability distributions by plotting their quantiles against each other (Moore *et al*., 2009). Each point on the plot corresponds to one of the quantiles of the second distribution (y-coordinate, in this study, the normal distribution) plotted against the same quantile of the first distribution (x-coordinate, in this study, the distribution of the observed data). If the two distributions being compared are similar, the points in the QQ plot will lie approximately on the line y = x (the 45 degree line). The QQ plot in this study (Figure 6.1) suggests that the data was not normally distributed, as the points deviate slightly from the 45 degree line.

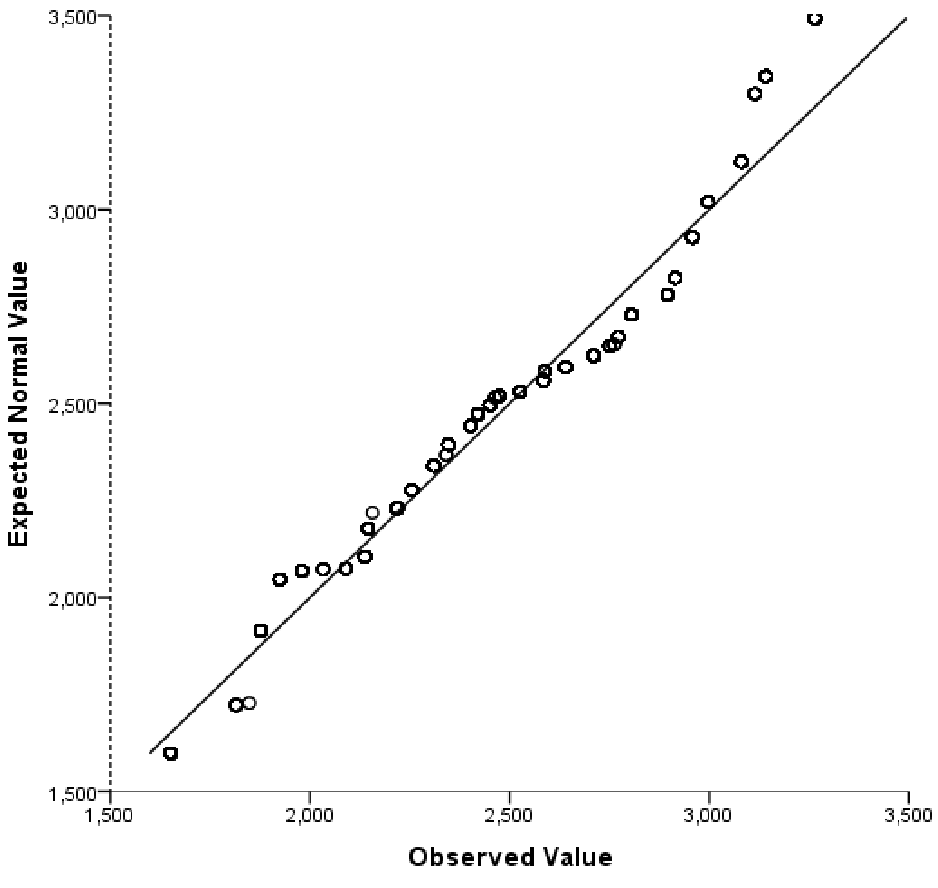

Figure 6.1: QQ plot for funding

As the data for funding was not normally distributed, a Wilcoxon rank-sum test was conducted to determine whether there was a statistically significant difference in funding between male and female scholars. The effect size of the Wilcoxon rank-sum test (r) was computed as $r = \frac{z}{\sqrt{N}}$ where z is the z-score (the standardized test statistic of the Wilcoxon rank-sum test) and N is the total sample size (Tomczak and Tomczak, 2014). The strength of the effect size was interpreted as: 0.1 (small effect size), 0.3 (medium effect size) and 0.5 (large effect size) (Cohen, 1988).

A Kruskal-Wallis test was conducted to determine whether there was a statistically significant difference in funding across the seven country groups. Dunn's procedure for pairwise comparisons was performed to investigate statistically significant funding differences between pairs of country groups. The effect size of the Kruskal-Wallis test (η^2) was computed as $\eta^2 = \frac{H-k+1}{N-K}$, where H is the Kruskal-Wallis test statistic, k is the number of groups, and N is the total sample size (Tomczak and Tomczak, 2014). In this case, the strength of the effect size was interpreted as: 0.01 (small effect size), 0.06 (medium effect size) and 0.14 (large effect size) (Cohen, 1988). In all cases, a p-value less than 0.05 indicates significance.

The total sample size of the secondary data throughout the period of 2016 was 11,458 (33.5% female and 66.5% male). Across the sample as a whole, the mean funding scholars received monthly was $2,471.74 (SD=408.191, Mdn=2420.00). Table 6.1 shows the two-way frequency for marital status, qualification, discipline and country of study, by gender. The test indicates that of those in the sample who were married with one or two children, nearly half (44.4%) were females. Only 25.2% of the single students were women. Women accounted for 36.8% of the master's students and just 28.2% of the doctorial students, and for 33.2% of the social scientists and just 24.4% of the applied scientists. Women were more likely to study in a developing country; 46.7% of those who had studied in an Arab country and 35.1% who had studied in an Asian country were women. In contrast, 75.2% of those who had studied in England/Ireland were men.

Table 6.1: Marital status, qualification, discipline and country of study, by gender in 2016

Variable		Gender: Female (%)	Gender: Male (%)	Total
Marital status	Single	25.2	74.8	3,077
	Married (no children)	35.4	64.6	1,872
	Married with one or two children	44.4	55.6	3,656
	Married with more than two children	27.2	72.8	2,845
	Divorced	87.5	12.5	8
	Total	33.5	66.5	**11,458**
Qualification	Master	36.8	63.2	5,904
	PhD	28.2	71.8	4,664
	Medicine	39.9	60.1	890
	Total	33.5	66.5	**11,458**
Discipline	Social science	33.2	66.8	3,856
	Applied science	24.4	75.6	4,834
	Fundamental science	65.9	34.1	674
	Medical science	44.8	55.2	2,094
	Total	33.5	66.5	**11,458**
Country of study	Arabic country	46.7	53.3	2,212
	England and Ireland	24.8	75.2	2,592
	European country	32.4	67.6	1,732
	USA and Canada	29.4	70.6	1,938
	Asian country	35.1	64.9	2,628
	Australia and New Zealand	30	51	81
	African country	31.3	68.7	275
	Total	33.5	66.5	**11,458**

Table 6.2 shows the percentage of scholars studying each discipline in each country group. For people studying in Arabic countries, social science (68.5%) was the most popular discipline. However, applied science was the most popular discipline for people studying in England and Ireland (51.5%), USA and Canada (58.0%), Asian countries (54.9%), and Australia and New Zealand (54.3%). Medical science was the most popular discipline for people studying in European countries (40.4%).

Table 6.2: Country of study by discipline

Country of study	Discipline: Social science (%)	Applied science (%)	Fundamental science (%)	Medical science (%)	Total
Arabic country	68.5	15.8	6.2	9.5	2,212
England and Ireland	25.6	51.5	5.6	17.3	2,592
European country	27.9	28.5	3.1	40.4	1,732
USA and Canada	18.0	58.0	7.2	16.8	1,938
Asian country	30.6	54.9	6.9	7.6	2,628
Australia and New Zealand	4.9	54.3	11.1	29.6	81
African country	14.2	16.4	2.5	66.9	275
Total	33.7	42.2	5.9	18.3	**11,458**

6.2.2 Investing by gender

Table 6.3 shows that in 2016 female scholars received \$2,476.18 (SD=409.45) per month on average, while male scholars received \$2,469.49 (SD=407.56). The results indicate no statistically significant difference in funding between the genders (Ws=43405871, z=-1.309, p=0.190).

Table 6.3: Descriptive statistics for funding by gender

Variable	N	Mean (SD)*	Mdn	Min	Max	IQR
Female	3,844	2476.18 (409.45)	2450.53	1650	3265	660
Male	7,614	2469.49 (407.56)	2420.00	1650	3265	660
Total	**11,458**					

*SD. Standard Deviation

6.2.3 Investing by country of study

In contrast, there was a statistically significant variation in the monthly funding received by scholars in different country groups (x^2 (6) = 6833.652, p<0.001, η^2=0.597[11]). The effect size (η^2) was large. The results of pairwise comparisons (Table 6.5) indicated that there was no statistically significant difference (p>0.05) between scholars in Arabic

[11] $\eta^2 = \frac{x^2}{N-1}$

countries and those in England/Ireland in the funding they received monthly from the Libyan government. Similarly, there was no statistically significant difference ($p>0.05$) between scholars in European countries and those in USA/Canada ($U=108.753$, $p=1.000$). However, those in England/Ireland received significantly less (Mdn=$2,137.82) than those in European countries (Mdn=$2,772), USA/Canada (Mdn=$2,710.40), Asian countries (Mdn=$2,915), Australia/New Zealand (Mdn=$2,996.68) and African countries (Mdn=$2,640) (see Table 6.4).

Furthermore, there were statistically significant differences ($p=0.00$) in the amount invested in scholars going to developing and developed countries. For example, scholars in (developing) Asian countries received statistically significantly higher monthly funding than scholars in (developed) England/Ireland, USA/Canada and European countries. On the other hand, scholars in (developed) Australia/New Zealand received significantly higher funding than scholars in (developing) Arabic and Asian countries. Notably, only 81 scholars studied in Australia/New Zealand, compared to 2,212 in Arabic countries and 2,628 in Asian countries. Scholars in African countries received statistically significantly higher funding than scholars in Arabic countries and England/Ireland but less than those in European countries, USA/Canada, Asian countries and Australia/New Zealand. Once again, the number of scholars educated in African countries was relatively small (275).

Table 6.4: Funding by country of study

Country of study	N	Mean	SD	Mdn	Min	Max	IQR
Arabic country	2,212	2098.35	247.36	2145	1650	2750	330
England and Ireland	2,592	2112.84	235.79	2137.82	1876	2451	470
European country	1,732	2728.98	319.40	2772	1815	3265	431
USA and Canada	1,938	2692.29	261.16	2710.40	2310	3080	513
Asian country	2,628	2791.88	253.26	2915	1815	3080	317
Australia and New Zealand	81	2895.63	249.01	2996.68	2463	3114	353
African country	275	2499.20	211.29	2640	2145	2750	220

Table 6.5: Pairwise comparisons

Country	Test statistic	η^2	p
Arabic country vs. England and Ireland	-76.518	0.00	1.000
Arabic country vs. African country	-3182.392	0.08	0.001
Arabic country vs. USA and Canada	-4811.194	0.18	0.001
Arabic country vs. European country	-4919.947	0.19	0.001
Arabic country vs. Asian country	-5656.114	0.24	0.001
Arabic country vs. Australia and New Zealand	-6788.073	0.35	0.001
England and Ireland vs. African country	-3105.874	0.07	0.001
England and Ireland vs. USA and Canada	-4734.675	0.17	0.001
England and Ireland vs. European country	-4843.429	0.18	0.001
England and Ireland vs. Asian country	-5579.596	0.24	0.001
England and Ireland vs. Australia and New Zealand	-6711.555	0.34	0.001
African country vs. USA and Canada	1628.801	0.02	0.001
African country vs. European country	1737.555	0.02	0.001
African country vs. Asian country	2473.722	0.05	0.001
African country vs. Australia and New Zealand	3605.681	0.10	0.001
USA and Canada vs. European country	108.753	0.00	1.000
USA and Canada vs. Asian country	-844.921	0.01	0.001
USA and Canada vs. Australia and New Zealand	-1976.880	0.03	0.001
European country vs. Asian country	-736.168	0.00	0.001
European country vs. Australia and New Zealand	-1868.126	0.03	0.001
Asian country vs. Australia and New Zealand	-1131.959	0.01	0.050

$p<0.05$, Effect size η^2

6.3 Section 2: Knowledge exchange (KE)

This section presents the findings in regard to how scholars in the sample engaged with external stakeholders. This engagement can take several forms, including collaborating on the production of IP, providing training courses (CPD), and discussing research findings with, acting as a consultant to or holding a temporary post within an external organisation. The analysis considers the key factors that affect academics' collaboration with external organisations.

6.3.1 Intellectual properties (IP)

The term "intellectual properties" here refers to creations of the mind such as patents, inventions, computer software, industrial designs and start-up companies. Scholars were compared in terms of their production of these items as this offered a way of assessing the level to which they engaged with external organisations. However, overall, there was no strong evidence of any significant contribution to the production of IP, with very few scholars producing anything in the listed categories.

There was no statistically significant ($p>0.05$) association between IP and country of study, suggesting that scholars who have graduated in different countries contribute equally to IP (see Table 6.6 and Table 6.7). Table 6.8 and Table 6.9 show that those in the developed country group were likely to have contributed more IP than those in the other two groups (0.5% to 3.5% of this group made a contribution in one of the listed areas, compared with 0.00% to 1.7% in the other two groups), but these associations were not large enough to be statistically significant. Similarly, no statistically significant difference ($p>0.05$) was observed between genders or academic disciplines for any type of IP. There was some evidence of significant difference ($p=0.01$) between academic ranks in the production of industrial designs, but a post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) showed no significant association.

Scholars most likely to be associated with start-ups were males, developed-country-educated, applied scientists, associate professors and professors (3.20% to 4.80%). Least likely to have such an association were females, domestically educated scholars, social scientists, lecturers and assistant professors (1.10% to 2.30%). However, this association was not significant (Adj. Res<2).

Table 6.6: Intellectual properties by scholars in the last 4 years before the revolution of 17/02/2011

Variable	Patent					Invention					Computer software				
	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi
Country of study	1.688*	2	1.000	0.06	-	0.682	2	0.864	0.03	-	1.321	2	0.754	0.05	-
Gender	0.000*	1	1.000		0.05	1.227	1	0.268		0.09	0.001	1	0.976		-0.05
Academic discipline	0.000*	1	1.000		-0.05	0.000	1	1.00		-0.03	0.000	1	0.989		0.05
Academic rank	4.537*	4	0.448	0.12	-	4.450	4	0.162	0.12	-	3.309	4	1.000	0.08	-

*Fisher exact test

Table 6.7: Intellectual properties by scholars in the last 4 years before the revolution of 17/02/2011

Variable	Education software					Industrial design					Start-up company				
	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi
Country of study	1.321*	2	0.754	0.05	-	3.600	2	0.112	0.10	-	2.370	2	0.308	0.07	-
Gender	0.001*	1	0.976		-0.05	0.000	1	1.000		0.03	0.054	1	0.816		0.03
Academic discipline	0.000*	1	0.989		0.05	1.279	1	0.258		-0.09	2.405	1	0.121		-0.10
Academic rank	3.309*	4	1.000	0.08	-	7.327	4	**0.01**	0.20	-	3.374	4	0.481	0.09	-

*Fisher exact test

Table 6.8: Percentage of scholars for intellectual properties

Variable	Patent				Invention				Computer software			
	N	Yes %	No %	Adj. Res*	N	Yes %	No %	Adj. Res	N	Yes %	No %	Adj. Res
Domestic education	156	0.00	100	-0.70	156	1.30	98.70	0.50	156	0.60	99.40	0.60
Developing country	178	0.00	100	-0.70	178	0.60	99.40	-.07	178	0.00	100	-1.00
Developed country	186	0.50	99.50	1.30	187	1.10	98.90	0.20	187	0.50	99.50	0.40
Total	**521**				**521**				**521**			
Male	187	0.50	99.50	-	188	1.60	98.40	-	188	0.00	100	-
Female	177	0.00	100	-	177	0.00	100	-	177	0.60	99.40	-
Total	**364**				**365**				**365**			
Social science	180	0.00	100	-	180	0.60	99.40	-	180	0.60	99.40	-
Applied science	184	0.50	99.50	-	185	1.10	98.90	-	185	0.00	100	-
Total	**365**				**365**				**365**			
Assistant lecturer	58	0.00	100	-0.40	58	0.00	100	-0.80	58	0.00	100	-0.40
Lecturer	115	0.00	100	-0.70	115	0.00	100	-1.20	115	0.90	99.10	1.50
Assistant professor	86	0.00	100	-0.60	87	2.30	97.70	1.70	87	0.00	100	-0.60
Associate professor	43	0.00	100	-0.40	43	2.30	97.70	1.20	43	0.00	100	-0.40
Professor	62	1.60	98.40	2.20	62	0.00	100	-0.80	62	0.00	100	-0.50
Total	**362**				**362**				**361**			

*Adjusted Residual

Table 6.9: Percentage of scholars for intellectual properties

Variable	Education software				Industrial design				Start-up company			
	N	Yes %	No %	Adj. Res	N	Yes %	No %	Adj. Res	N	Yes %	No %	Adj. Res
Domestic education	156	0.60	99.40	0.60	156	0.00	100	-1.10	156	1.30	98.70	-1.00
Developing country	178	0.00	100	-1.00	177	0.00	100	-1.20	177	1.70	98.30	-.70
Developed country	187	0.50	99.50	0.40	187	1.60	98.40	2.30	187	3.70	96.30	1.60
Total	**521**				**520**				**520**			
Male	188	0.00	100	-	187	1.10	98.90	0.50	187	3.20	96.80	-
Female	177	0.60	99.40	-	177	0.60	99.40	-0.50	177	2.30	97.70	-
Total	**365**				**364**				**364**			
Social science	180	0.60	99.40	-	179	0.00	100	-1.70	179	1.10	98.90	-
Applied science	185	0.00	100	-	185	1.60	98.40	1.70	185	4.30	95.70	-
Total	**365**				**364**				**364**			
Assistant lecturer	58	0.00	100	-0.40	58	0.00	100	-0.80	58	3.40	96.60	0.40
Lecturer	115	0.90	99.10	1.50	115	0.00	100	-1.20	115	1.70	98.30	-0.80
Assistant professor	87	0.00	100	-0.60	86	0.00	100	-1.00	86	1.20	98.80	-1.20
Associate professor	43	0.00	100	-0.40	43	0.00	100	-0.60	43	4.70	95.30	0.80
Professor	62	0.00	100	-0.50	62	4.80	95.20	3.80	62	4.80	95.20	1.10
Total	**365**				**364**				**364**			

6.3.2 Consultancy and temporary positions held

Scholars with specialist skills may act as consultants, providing advice to external stakeholders. This may involve signing a contract to work for a specified period with the external stakeholder. In Libya, scholars are permitted to sign a one-year contract with an industry partner, which may be renewed yearly if both parties choose. Scholars' engagement in consultancy work and temporary positions thus serve as an indicator of the extent to which they contribute to and engage with non-academic organisations.

Significant differences ($p<0.05$) were observed across the country of study, gender, academic discipline and academic rank variables in regard to the provision of consultancy services to external stakeholders. There was also strong evidence ($p<0.001$) of an association between country of study, gender and the holding of temporary positions in non-academic organisations (see Table 6.10). However, no significant association ($p>0.05$) was observed between the holding of temporary positions and either academic discipline or academic rank.

The results revealed that 33.20% (n=187) of the developed country group provided consultancy to external stakeholders, compared to 8.50% of the developing country group and 11.50% of the domestic group (see Table 11). 23.70% of the developed country group held a temporary position in public sector, compared to 6.80% of the developing country group. There was no significant association between the domestic group and this item ($p=0.841$). The findings suggest that foreign education has a significant association on academics' tendency to take on consultancy duties or temporary posts with industry partners in public sector. However, it should be noted that overall, while the association was stronger in the developed country group than in the other two groups, this group's percentages (33.20%, n=187 for consultancy and 23.70%, n=186 for temporary positions) were lower than the overall average percentages (36% and 35.83% respectively)[12] for the sample of 519 participants as a whole. The effect size was medium (Cramer's V=.29) for consultancy and close to medium (Cramer's V=0.20) for temporary positions.

[12] 187/519 = 0.3603 and 187/519 = 0.3583

The qualitative findings revealed two main barriers facing scholars when engaging with non-academic organisations. The first was the lack of institutional support for such external collaborations. SL-M2 (a male educated in Libya) asserted that

> "Universities and the Ministry of Higher Education do not acknowledge the role which universities might play in society and economic institutions, because there is no office in the university to link it with industry."

The administration's failure to set up a dedicated office suggests a lack of interest in fostering links between academics and industry, and perhaps a lack of understanding of the potential benefits such links might bring to both sides. For whatever reason, it does not seem inclined to do anything to make it easier for academics to connect with non-academic organisations.

Universities' prioritisation of teaching over research was also seen as a stumbling block for anyone wanting to collaborate with outside organisations. A number of Libya-educated scholars mentioned that academics whose experience is mainly teaching-based (especially at undergraduate level) are often hesitant about collaborating with private or public sector organisations because they assume that such collaborations will be research-based and that their own research will not be of sufficiently high quality. For instance, AL-F16 (a female educated in Libya) said that

> "I have been working in academia for nearly 20 years and most of my academic experience has been in teaching…. I am teaching 24 hours a week minimum. I think both private and public sectors require people with research experience within their field so they can provide solutions to the problems they are facing."

The perception was that engagement with external organisations is usually research-based; as important as teaching might be in the HE system, it was not seen as useful preparation for outside collaborations. For most interviewees, teaching was necessarily the top priority because it is compulsory. Research and collaboration with external stakeholders, on the other hand, are individual choices. SL-F3 (a female educated in Libya) explained that one of the reasons she chose not to work with external organisations was that it is "very hard to reconcile academic work (teaching and administration duties) and engagement with external stakeholders". The comment recognises the time pressures involved in doing two jobs at once, but it may also reflect an awareness of the potential for these two jobs to make conflicting demands of the academic.

Those scholars who were keen to engage with external organisations were frustrated by HEIs' general lack of interest in third stream activities and prioritisation of teaching. These priorities are reflected in current HE regulations, leading AG-M17 (a male educated in a developing country) to complain that

> "There are no clear rules regulating engagement with external stakeholders in the higher education regulations, which affects scholars' motivation towards engagement, with one exception, which is holding a temporary position in the public sector."

Scholars who had been educated abroad were particularly keen to see HE regulations reformulated. SD-M10 (a male educated in a developed country) noted that

> "If you read the faculty member regulations in higher education you will notice that they are rigid and not in line with the ambitions of those who have been educated abroad and have seen sophisticated educational systems."

This rigidity of attitude was also noted by a number of scholars who had worked in industry, only to find that this experience counted for nothing when it came to promotion. AD-M22 (a male educated in developed country) explained that

> "I worked [held a temporary position] for three years in the oil sector, which had an adverse effect on my career progression as the university links promotion with publication and time spent in academia….So for anyone wanting to rise up the academic ranks, engagement with industry does not help them."

The fact that time spent working with non-academic organisations is not taken into account by those awarding promotions is a further disincentive for academics.

Other institutional barriers reported by interviewees included bureaucratic complexity and lack of funding from the MHE. SD-M10 (a male educated in a developed country), for example, said that

> "After working hard for a year, I and my colleagues made a very big proposal showing how the Youth and Sports Federation could raise the efficiency of the

> handball game, but unfortunately, our proposal did not reach the policy makers because the administrative procedure was so complicated."

SD-F12 (a female educated in a developed country) got further, but she too was frustrated, this time by the denial of funding.

> "There is no welfare office at the university so I prepared a full proposal for opening a psychological consulting office….so the university could better understand students' problems and give them support. This idea was welcomed by all my colleagues, but traditionalists in the university refused to accept it. Their reason for rejecting the project was lack of funding from the Ministry of Higher Education because this was not a priority."

The comment implies that the refusal to fund the project may have had its origins in any one of the factors already identified: lack of understanding on the part of the HEI of the potential benefits of external engagement, an institutional focus on teaching over all else, and an instinctive resistance to change.

The second major obstacle discouraging academics from engaging with external stakeholders was the cultural difference between non-academic institutions and universities. Scholars were concerned that lack of trust between individuals from very different organisational environments often undermines the benefits of collaboration. If such collaborations are to work, scholars must be skilled at communication, and non-academic organisations should trust the capabilities of scholars, but the interviewees seemed to feel that this is rarely achieved. The difficulty of bringing two very different organisational cultures together was emphasised by SG-F7 (a female educated in a developing country), who commented that "The public sector still works in a traditional way which does not align with scholars' knowledge". The idea that academics and external organisations approach problems in different ways was also highlighted by AD-M21 (a male educated in a developed country), who explained that

> "Conducting academic research or doing experiments is a long-term approach to solving a problem faced by industry, but industry is more likely to require a short-term solution."

A bleaker assessment was offered by SD-M9 (a male educated in a developed country) in his conclusion that "Academics do not know the needs of policy makers and the latter do not know the capability of scholars". The statement seems to hold little hope of this gulf being crossed. Finally, some of the foreign-educated scholars noted that public sector managers in Libya have little trust in the consultancy provided by academics; according to SD-M10 (a male educated in a developed country), "Those in charge in the public sector prefer to engage foreign consultants rather than consult with Libyan scholars".

Others pointed to the technological gulf between academia and industry as a factor contributing to the difference in culture. Most of the scholars who had been educated in developed countries admitted that their motivation to interact with economic institutions in Libya was affected by the major ICT gap that exists between these institutions and academia. SD-M9 (a male educated in a developed country) commented that

> "I think that in most cases, public sector organisations in Libya are not sufficiently developed to be able to follow scholars' suggestions. The technology in public institutions is limited, which does not encourage scholars to engage and apply their knowledge….so the benefit will be limited."

There was a sense among these interviewees that any suggestions they might make would be impracticable, given the limited technology available.

Despite the barriers, however, most scholars could see the benefits of collaborating with non-academic organisations: opportunities to increase one's expertise, gain laboratory access, collect data and secure funding were all cited as important factors encouraging scholars to engage with industry. One interviewee, AG-M18 (a male educated in a developing country), described how his work with a local hospital prompted him to embark on research that ended up having a life-changing impact for the patients:

> "I worked for a couple of years in a children's hospital. I realised that some of the equipment being used by doctors was having a negative side effect on new-born babies. This encouraged me to conduct my own research, and my results proved my claim. The hospital administration stopped using this equipment, based on my research result."

Similarly, SD-M10 (a male educated in developed country) also noted that "Engagement with industry opens up the prospects for new research". Another participant from the applied sciences (AD-M, a male educated in a developed country) was more interested in the fact that "Engagement with the oil sector allows me to access and use specialist equipment which is not available in the university". Others saw outside collaborations as having the potential to make scholars not just better researchers but also better teachers. SG-F8 (a female educated in a developing country) explained that

> "Outside engagement has changed the way I teach. I have been able to discuss the problems faced in industry with my students in the classroom, and sometimes, these problems you cannot find in books."

The practical experience gained outside the classroom informed her teaching in it; in other words, not only the academic but also her students benefited from the collaboration.

On the question of gender, 29.90% (n=187) of male foreign-educated scholars had engaged in consultancy work, while 22.90% (n=188) had held a temporary position in a non-academic organisation, compared to 11.90% (n=176) and 7.40% (n=175) respectively of female foreign-educated scholars. However, the association with consultancy and temporary positions for the foreign-educated groups was lower than the overall averages for males and females (52% and 48% respectively). The effect size for both variables was medium (phi=0.22 for consultancy and phi=21 for temporary positions). Most female scholars acting as consultants were part of third sector organisations (voluntary and community institutions), while a few held temporary posts in the Libyan public sector.

The interviews revealed that the lack of a personal network, the need to regularly attend meetings, long working hours and lack of support from colleagues were the main reasons deterring female scholars from engaging with industry. SD-F11 (a female educated in a developed country) observed:

> "Males do not encourage female academics to collaborate with industry. Furthermore, when male academics discuss engagement, they always focus on the difficulties of working with non-academic communities, which does not motivate female scholars to collaborate with industry."

These male academics put their female colleagues off by emphasising the challenges of working with people outside the academic environment, but as another interviewee pointed out, these challenges are exacerbated for women by the sociocultural expectations that govern male-female relationships in the workplace:

> "Most senior staff in the public sector are male. In Libyan culture, it is very difficult to build a person relationship with a male in the work environment." (AD-F23, a female educated in a developed country)

Instead, female academics are more likely to engage with organisations that are staffed predominantly by women. AG-F20 (a female educated in a developing country) said that

> "The staff in third sector organisations tend to be female, which makes it easy for me to build a relationship and engage with their activities. These are mainly social in nature."

Female academics choosing to engage with these organisations are complying with sociocultural expectations in two ways: they are mostly working with women, and they are operating in areas (such as social welfare) that are traditionally regarded as female domains. SD-F11 (a female educated in a developed country) may also have been influenced by sociocultural expectations when she explained that she was deterred from working with outside organisations because of the time commitment involved:

> "Academic engagement with non-academic institutions requires a lot of meetings and working late hours, which is not convenient for me due to family responsibility."

Like working women around the world, this academic had chosen to put her domestic responsibilities ahead of her career.

Other female scholars said they were constrained by the fact that they had fewer publications than their male peers or publications that did not tie in with the interests or needs of industry. AD-F24 (a female educated in a developed country) mentioned that "It is very hard to find an original topic that reflects the needs of society or industry", while another female participant (AG-F20, educated in a developing country) said she thought that "engagement is related to research capacity and also personal motivations". As highlighted previously, female scholars in the sample universities were generally less productive in terms of research than their male peers, making it arguably more difficult for them to establish connections with outside organisations.

Perhaps not surprisingly, among the foreign-educated groups, applied scientists were more likely than social scientists to provide consultancy services to industry (26.10%, n=184 versus 16.20%, n=179, small effect size of phi=0.12). However, the level of academic engagement by foreign-educated with external stakeholders in both social and applied scientists was lower than the average for the sample as a whole (49.31% and 50.69% respectively). Social scientists in the sample attributed this low level of engagement to a general reluctance on the part of public and private sector organisations alike to consult specialists when taking decisions or adopting new policies. They insisted that academics are willing to provide consultancy services to both sectors, but that identifying those in need is difficult. SD-M9 (a male educated in a developed country) explained that “Academics struggle to establish long-term relationships with external stakeholders because most of the public sector is unstable”. Others also noted that the economic system is not yet sufficiently developed to facilitate academic-industry engagement, and that managers in the public sector don’t realise how academics could help. SG-F7 (a male educated in developing country) explained:

> “I think there are two reasons why scholars don’t collaborate with economic institutions: Libya is not an industrialised country, and people don’t realise that social scientists can help solve social problems. The public sector does not understand the role academia can play in public institutions.”

It appears that there is a huge gap between social scientists in particular and Libya’s economic institutions.

Most applied scientists in the sample, especially those in engineering, medicine and agriculture, preferred collaborating with small and medium-sized enterprises (SMEs). These enterprises are generally in the private sector, which as the interviewees pointed out means less bureaucracy and a stronger guarantee of financial return. AD-M21 (a male educated in a developed country) explained that

> “I have been working as a consultant in poultry farming for more than ten years. This experience has had a positive effect on my financial situation and my academic career.”

AD-M22 (a male educated in a developed country) added:

> “Engagement with the public sector requires too much paperwork such as filling in application forms and getting authorisation from the Ministry of Higher

> Education. However, engagement with SMEs does not need any permission from the university as long as it doesn't conflict with the academic timescale."

The interviewees valued the greater flexibility of the private sector, which made engagement easier than in the public sector.

There were a number of important differences between academic ranks in terms of their engagement with external organisations; this was most clearly evidenced by the fact that only 3.40% of foreign-educated assistant lecturers provided consultancy services, compared to 39.50% of associate professors. The association between rank and the consultancy item was significant ($p<0.05$), and the effect size was medium (Cramer's $V=0.27$). Adjusted standardised residual values above ±2 confirm the significance of the association, with the 39.50% of associate professors being substantially higher than the overall average (11.85%) and the 3.40% of assistant lecturers being substantially below average (15.97%) (Adj.Res=-3.60). However, despite the overall association between academic rank and engagement, only 29% (n=62) of professors provided consultancy services, which was not significant (though Adj.Res<2 indicates that this is not significant). The finding suggests that those in the most senior academic rank (professor) are not necessarily the most likely to engage with external stakeholders.

When this was investigated further in the interviews, it emerged that professors in the sample, who were on the highest salary and therefore in less need of the financial benefits of external collaboration, were less willing to put up with the bureaucracy involved. As SG-M5 (a male educated in a developing country) explained:

> "I am already a professor. One of the factors that would motivate me to engage is the financial benefits, but it takes ages to receive payment from the public sector."

From a purely financial point of view, these scholars had less incentive to work with outside organisations. Another interviewee, meanwhile, implied that private sector firms may undervalue the worth of the academic's help:

> "The private sector think that the advice academics provide is just a report on a piece of paper which should not cost more than 100 LYD." AD-M22 (a male educated in a developed country)

Table 6.10: Consultancy and temporary positions with non-academic organisations

Variable	Consultancy					Temporary position				
	$\chi2$	df	p	Cramer's V	phi	$\chi2$	df	p	Cramer's V	phi
Country of study	43.616	2	**0.000**	0.29	-	20.014	2	**0.000**	0.20	-
Gender	17.606	1	**0.000**	-	0.22	16.568	1	**0.000**	-	0.21
Academic discipline	5.306	1	**0.021**	-	-0.12	1.799	1	0.180	-	-0.07
Academic rank	26.140	4	**0.000**	0.27	-	6.926	4	0.140	0.14	-

Table 6.11: Percentage of scholars for consultancy and temporary positions with non-academic organisations

Variable	Consultancy					Temporary position				
	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value
Domestic education	156	11.50	88.50	-2.60	**0.009**	155	14.80	85.20	-0.20	0.841
Developing country	176	8.50	91.50	-4.10	**0.000**	177	6.80	93.20	-3.90	**0.000**
Developed country	187	33.20	66.80	6.60	**0.000**	186	23.70	76.30	4.00	**0.000**
Total	**519**					**518**				
Male	187	29.90	70.10	-		188	22.90	77.10	-	
Female	176	11.90	88.10	-		175	7.40	92.60	-	
Total	**363**					**363**				
Social science	179	16.20	83.80	-		179	12.80	87.20	-	
Applied science	184	26.10	73.90	-		184	17.90	82.10	-	
Total	**363**									
Assistant lecturer	58	3.40	96.60	-3.60	**0.003**	58	6.90	93.10	-2.00	0.045
Lecturer	114	14.90	85.10	-2.00	0.045	115	14.80	85.20	-0.20	0.841
Assistant professor	86	26.70	73.30	1.40	0.161	85	15.30	84.70	0.00	1.000
Associate professor	43	39.50	60.50	3.10	**0.001**	43	25.60	74.40	2.00	0.045
Professor	62	29.00	71.00	1.70	0.089	62	17.70	82.30	0.60	0.548
Total	**363**					**363**				

6.3.3 Discussion of research findings and providing professional development to employees

Other indicators of external engagement are when an academic discusses their research findings with a non-academic organisation, or when they provide training courses for the employees of these organisations. This engagement is a key facilitator of KE.

No significant ($p>0.05$) association was observed between country of study and the discussion of research findings item ($\chi2$ (2, n=515) = 2.182, p=0.336), indicating that scholars who graduated in different countries contributed equally to this form of KE over the research period (see Table 6.12). The percentage of scholars in each group who discussed their research findings with non-academic organisations was broadly similar (13.50% of the developing country group, 14.10% of the developed country group and 9.20% of the domestic group). Similarly, there was no significant association between gender or academic discipline and the discussion of research findings, with nearly 17% of male and 11% of female scholars, and around 14% of both social and applied scientists discussing their findings with external stakeholders.

The interviews highlighted a number of constraints that prevent scholars from sharing their research findings not just with non-academic organisations but even within the academic community. The suggestion was made, for example, that in-faculty discussions generally have little to do with academic matters; SL-F4 (a female educated in Libya) explained that

> "Meetings are mostly related to the administrative problems faced by students, and faculty members don't organise academic conferences or seminars to discuss academic issues."

Others, however, cited the generally low quality of research in Libya as the main reason why there is little discussion of findings in academic circles. According to SL-M2 (a male educated in Libya),

> "The reason there is little discussion about research findings in Libyan academic culture might relate to the weakness of this research. Because the main reason for conducting research is promotion, not to make a novel contribution."

The comment serves to re-emphasise that research is seen as a means to an end (promotion up the career ladder) by many, rather than as an opportunity to exchange knowledge with other academics.

The point was also reiterated that universities do not provide any support to facilitate KE and discussion between academics and external organisations (see section 6.3.2); the majority of scholars asserted that the extent to which scholars share their work with non-academic organisations largely depends on whether the scholar has a personal connection with someone in the organisation. Some participants had tried to build their own network with industry figures; SD-M9 (a male educated in a developed country) explained that

> "While I was collecting my data I built a good relationship with industry….when I sent them my findings I was invited to present and discuss these findings with industrialists."

Alternatively, the scholar can try to publish his or her findings in a well-known journal. AD-M22 (a male educated in a developed country) explained that

> "Those who publish their paper in international journals or any high-impact journal are more likely to be discussing their research findings with both academic and external organisations."

As this interviewee indicated, publication in a high-quality journal allows the researcher to share their findings both within the academic world and beyond.

The Chi-squared test indicated a significant ($p<0.05$) association between the discussion of research findings item and academic rank for foreign-educated scholars, but the post-hoc test with Bonferroni adjustment (significance level set at $p<0.005$) found no strong evidence of a relationship. 3.40% of assistant lecturers, 14% of lecturers, 12.80% of assistant professors, 21.40% of associate professors and 19.40% of professors discussed their findings with external stakeholders (see Table 6.13). In the case of the last two ranks, this was higher than the overall average (16.90% and 11.50% respectively)[13], but once again this was insignificant. The interviews revealed that professors saw the main benefit of discussing research findings with external organisations as being the recognition it

[13] (42/365*100 = 16.90) and (62/365*100 = 11.50)

draws from the private and public sector. According to AG-M18 (a male educated in a developed country),

> "The best way to be known in non-academic communities is to discuss your research findings outside the academic community. Discussing my research findings with policy makers helped facilitate further collaboration with external organisations."

Such discussions, if held with the right people, can open the door to future collaborations.

In the case of the training item, a significant ($p<0.05$) association was observed between this item and the country of study variable. A post-hoc test with Bonferroni adjustment confirmed this significant association ($p<0.017$). 18.60% of the developing country group provided training courses to employees in non-academic organisations, though this was less than the overall average of 34.10%. The effect size was small (Cramer's V=0.15). 31.60% of the domestic group and 33.70% of the developed country group provided training courses to non-academic organisations, but this association was non-significant.

The interviewees emphasised that the main factor determining whether a scholar is asked to provide training to company employees is their academic reputation among their colleagues. SD-M9 (a male educated in a developed country) explained that

> "The contribution and achievement of scholars in their academic field is what makes their peers nominate them to provide training courses to public sector employees."

However, others argued that the scholar's personal network outside academia is also a deciding factor. AL-M14 (a male educated in Libya) mentioned that

> "I have good relationships with people outside academia because I worked for many years in the Ministry of Health….so HR staff in hospitals know I am capable of providing courses in my area."

The comment highlights the importance of good personal networks in engaging with external stakeholders.

Among foreign-educated scholars, there was a statistically significant association ($p<0.05$) between gender and the training of company employees item (χ^2 (1, n=362) =

9.108, p=0.003, small effect size of phi=0.16), with 33.20% of male scholars providing training courses, compared to 19.20% of female scholars. The interviewees suggested that the main reason for this is that while male scholars are comfortable collaborating with both public and private sector organisations, female academics tend to find it more difficult to work with organisations in the (male-dominated) public sector. Most of their collaboration is with third sector organisations, which are independent of government. Many of the female interviewees were affiliated with a charity or social enterprise; AG-F20 (a female educated in a developing country) explained that this was because she found it

> "easy to engage with social enterprises because most of the administrators and trainees are female and easy to contact at any time."

Female academics in the sample found the work environment in such organisations more welcoming; SD-F11 (a female educated in developed country) explained that

> "As a professor working in academia and providing courses to women, I found a lot of respect among females working in the social enterprise environment."

In terms of the academic discipline variable, the quantitative analysis revealed that 34.60% of the foreign-educated applied scientists provided training courses, compared to 17.90% of the social scientists. Again, the effect size was small (r=0.19). Both these and the gender values were all lower than the overall averages. SG-M6 (a male educated in a developing country) offered one possible explanation for why fewer social scientists are called upon to provide employee training:

> "Many people think that social science has no impact on economic institutions because it doesn't use the same tools as science such as experiments or special software."

Looking at the association with academic rank, foreign-educated assistant lecturers (10.30%) and associate professors (46.50%) engaged significantly with external stakeholders by providing training courses. The percentage of assistant lecturers was below the overall average, while the percentage of associate professors was above the overall average (11.78%). However, there was no clear evidence of a significant relationship between this item and the other ranks (p>0.05). The observed frequency of assistant lecturers, lecturers and professors was less than the value the model would expect, and adjusted residuals were negative. The effect size across all academic ranks was medium (Cramer's V=0.23). There was no association between scholars in the highest academic position (professor) and the provision of training courses to external stakeholders. The interviewees revealed that this is because professors have no incentive to get involved in this activity. SD-F12 (a female educated in a developed country) was of the opinion that

> "The main reason for the decrease in productivity among scholars in high academic positions is the higher education regulations in Libya."

She felt that these regulations, especially those related to faculty members' role within the university, do not incentivise those at the top level to increase their academic achievement and contribution in terms of engagement.

Table 6.12: Training courses and discussion of research findings with non-academic organisations

Variable	Discussion of research findings					Training courses				
	χ2	df	p	Cramer's V	phi	χ2	df	p	Cramer's V	phi
Country of study	2.182	2	0.336	0.07	-	11.707	2	**0.003**	0.15	-
Gender	2.149	1	0.143	-	0.085	9.108	1	**0.003**	-	0.16
Academic discipline	0.000	1	1.000	-	0.00	12.247	1	**0.000**	-	-0.19
Academic rank	10.498	4	**0.033**	0.157	-	19.309	4	**0.001**	0.23	-

Table 6.13: Percentage of scholars for training courses and discussion of research findings with non-academic organisations

Variable	Discussion of research findings					Training courses				
	N	Yes %	No %	Adj. Res	p-value	N	Yes %	No %	Adj. Res	p-value
Domestic education	153	9.20	90.80	-1.50	0.133	155	31.60	68.40	1.20	0.230
Developing country	178	13.50	86.50	0.50	0.617	177	18.60	81.40	-3.40	0.000
Developed country	184	14.10	85.90	0.90	0.368	187	33.70	66.30	2.20	0.027
Total	**515**					**519**				
Male	186	16.70	83.30	-	-	187	33.20	66.80	-	-
Female	176	10.80	89.20	-	-	177	19.20	80.80	-	-
Total	**362**					**364**				-
Social science	180	13.90	86.10	-	-	179	17.90	82.10	-	-
Applied science	182	13.70	86.30	-	-	185	34.60	65.40	-	-
Total	**362**					**364**				
Assistant lecturer	58	3.40	96.60	-2.5	0.012	58	10.30	89.70	-3.00	0.002
Lecturer	114	14.00	86.00	0.10	0.920	115	23.50	76.50	-0.90	0.368
Assistant professor	86	12.80	87.20	-0.30	0.764	87	32.20	67.80	1.40	0.161
Associate professor	42	21.40	78.60	1.50	0.133	43	46.50	53.50	3.20	0.001
Professor	62	19.40	80.60	1.40	0.161	61	24.60	75.40	-.30	0.764
Total	**365**					**365**				

6.4 Section 3: Discussion of the findings

There is very little research addressing the interaction between academics and external stakeholders in developing countries (Kruss and Visser, 2017; Giuliani *et al.,* 2010). As the first study to investigate the KE-related achievement and contribution of full-time scholars in the Libyan context, this research takes a step towards filling the knowledge gap that exists in the local and international literature. An understanding of this contribution is important if university managers, policy makers and other stakeholders in the public and private sectors are to have a clear vision of the academic landscape and the barriers that prevent scholars from engaging with external stakeholders.

The study findings are important not just for the Libyan context but for all those developing countries that rely primarily on natural resources such as oil and gas for their national income. Oil and gas are finite commodities whose value is closely tied to prices on the international market, and a significant drop in these international energy prices can profoundly affect GDP and development. Local instability such as Libya's 2011 revolution can also badly affect this growth if it threatens oil and gas production and drives foreign energy companies out of the country (Ycharts, 2017). The resulting negative impact will be felt across all the economic and societal institutions in the country, including the HE sector. It is therefore in the interests of economies like Libya to attempt to become less reliant on their national resources and more knowledge-based. It is the contention of this study that by investing heavily in human capital, specifically that of its HE sector, the Libyan government can promote an exchange of knowledge between academics and non-academic organisations that might facilitate the country's transition from a resource-based to a knowledge-based economy.

In addition to their main pursuits of teaching and research, twenty-first century universities play an active role in the local economy and society through their engagement with external stakeholders (Branstetter and Ogura, 2005; Pittayasophon and Intarakumnerd, 2017; Schibany *et al*., 2000; Goel and Goktepe-Hulten, 2017). These external engagements facilitate the process of KE, allowing academics to produce knowledge that can then be used to benefit wider business and society. At the moment, the neglect of KE in Libyan academic culture may be impacting on other dimensions of human capital development and slowing Libya's progress towards becoming a KBE.

This section discusses the significant findings that emerged from the analysis of the quantitative, qualitative and secondary data and compares them with the findings from the literature review. The discussion is structured around the key variables: country of study, academic discipline, academic rank and gender. The KE-related achievement and contribution of scholars was measured across a range of items: the production of IP (patents, inventions, educational software, industrial designs and start-up companies), involvement in staff training and professional development, the discussion of research findings with non-academic organisations, and consultancy and temporary positions held in non-academic organisations. The discussion gives an insight into the interaction of scholars with external stakeholders and factors that affect this interaction.

6.4.1 Country of study

The Libyan government sees funding full-time scholars to study for postgraduate degrees overseas as a way of developing human capital, but the findings suggest that the benefit it gets on this investment depends to a significant extent on where the scholar chooses to study. Ranking systems such as that developed by World-Class Universities have made it easy for academics to identify the best universities at which to study (Rauhvargers, 2013), but the interviews revealed that many social scientists in particular were deterred from applying to universities in advanced economies such as the UK and USA because they lacked the required English language proficiency. The secondary data revealed that these academics were more likely to choose to study at universities in Arabic and Asian countries (see Table 6.2).

The secondary data also showed that the Libyan government invests equally in scholars choosing to study in developed and developing countries (there were no statistically significant differences in funding between scholars studying in Arabic countries and in England/Ireland, or in Asian countries and in Australia) (see Table 6.5). However, the empirical findings indicate that returning scholars educated in developed countries are likely to be more productive in all three of the KT, KD and KE dimensions than those educated in developing countries or domestically. In other words, the government is getting a greater return on its investment from this group than from the other two groups.

The different levels of academic engagement among applied and social scientists in Libya may be attributed to the fact that the majority of social scientists complete their postgraduate training in Arabic and Asian (i.e. developing) countries (see Table 6.2); in other words, applied scientists are more likely to engage with outside stakeholders because they are more likely to have studied in developed countries. The Libyan government is investing a huge amount of money in sending social scientists to countries like Egypt, but the knowledge gap between these countries and Libya is small. This was pointed out by one returning interviewee, who noted the similarity between the education systems and academic cultures of Egypt and Libya. Ahmed (2015, p. 142) asserts that

> "Some of the existing challenges of developing world-class universities in Egypt are language, research, infrastructure, the absence of a national program for the development of top institutions…..lack of public investment in scientific research capacities."

It can be argued that sending individuals to such countries represents a poor investment from the point of view of improving Libya's human capital.

The analysis of the questionnaire survey data revealed that scholars educated in developed countries were more likely than the other two groups to collaborate with external stakeholders by taking up a temporary position in or acting as a consultant to a non-academic organisation. More than a third of this group provided consultancy services to private or public sector organisations. Although engagement with non-academic institutions has been extensively discussed by researchers, this is the first study to investigate the association between this kind of engagement and country of study. Olmos-Penuela *et al.* (2014) ignore this variable in their study of the collaboration between academics and non-academic agents. These authors emphasise the importance of the consultancy role and temporary attachment in helping external organisations to resolve socioeconomic difficulties and providing advanced knowledge to those who need it (e.g. firms), but the Libya-educated interviewees were more inclined to prioritise their teaching activities over coming to the aid of outside stakeholders. There were two main reasons for this: many cited university insistence that they focus primarily on teaching, but many also felt under-qualified (see section 5.3.1 for a discussion of Libya-educated academics' low publication productivity) to engage in academic-industry collaborations that they saw as being mostly research-driven. The finding, which appears to support Watson *et al.*'s (2015) argument that the obligation to prioritise teaching prevents academics from collaborating with external stakeholders, may be explained by the fact that the traditional

Libyan education system places little emphasis on creativity or innovation. However, as Brewer, Hentschke and Eide (2010) point out, investing in HE to build individuals' skills allows them to contribute more to the economy. Those scholars who had studied in developed countries may simply have been better trained and prepared to put their theoretical knowledge to practical use in this way. Education should not see as consumption goods but is an investment goods (Schultz, (1961).

A number of barriers face those who are able and willing to engage with non-academic organisations. Echoing the view expressed by a number of researchers (e.g. Lambert, 2003; Bradley *et al.,* 2013; Ankrah *et al*., 2013), interviewees cited the cultural difference between academia (particularly traditional universities) and external organisations as the main obstacle to external collaboration. This difference manifests itself in a number of ways: interviewees described external actors' lack of trust in scholars' ability to provide any benefit to firms; the preference of some public institutions to seek advice from foreign, rather than domestic, consultants; and industry's preference for short-term solutions as opposed to the slower pace of most academic research. Other barriers highlighted by the interviewees included the poor ICT infrastructure in public and private sector organisations (the lack of databases and other potential research material arguably makes collaboration with these organisations less appealing for academics) and the lack of institutional support (most interviewees said that their university has no coordination office to facilitate the process of engagement). This last result seems to support Bradley *et al.* (2013) and Nilsson *et al.* (2010), both of whom point to the role the university coordination or transfer office plays in encouraging academics' collaboration with industry.

The finding contributes to the Libya-based KE literature by underlining the importance of Libyan universities establishing such an office to enhance engagement with non-academic organisations, but at the moment, this and other actions that might facilitate collaboration are being prevented by a lack of policy. The only kind of non-academic engagement currently mentioned in Libya's HE regulations is the acceptance of a temporary position in the public sector, but any development of these regulations is unlikely so long as Libyan HEIs, economic institutions and policy makers lack a full understanding of KE. The present study may go some way towards addressing this knowledge gap by providing a comprehensive insight into this phenomenon.

The previous barriers notwithstanding, some of the interviewees educated in developed countries explained that there are good reasons for actively engaging with local economic and public institutions. Key incentives for working with industry include the prospects of securing funding, laboratory access and easy access to data. This result is corroborated by Glaser and Bero (2005), who cite funding, and by D'Este and Perkmann (2010), who cite access to up-to-date resources, as key motivators. Working with industrial partners certainly benefits academics, for example, by allowing them to overcome the limitations of university facilities and expand the scope of their academic work, but as several interviewees noted, it can also have a significant impact on the external institution (one scholar described conducting research that led to major change in the local hospital) and on the academic's own HEI (as the practical experience they gain from the collaboration makes them a more effective teacher). This last result confirms the findings of previous studies regarding the positive effect that external engagement has on academics' teaching activities (Wright *et al.,* 2008; Abreu *et al.,* 2009).

There was no significant association between country of study and the production of IP. A low positive adjusted residual value (Adj. Res<2) indicated that more of the developed country group produced IP than might have been expected for the sample size, but the proportion remained very low (Table 6.8 and Table 6.9). At the same time, negative adjusted residual values for the other two groups indicated that fewer scholars in these groups produced IP than the model would have expected; for example, no one produced any patents or industrial designs at all. Perkmann *et al.* (2011) point to the commercial potential of IP production and its importance in generating income for universities, but the findings here suggest that the majority of full-time academics in the sample universities were unable to contribute to their HEI in this way. One possible explanation might be that as public universities rely only on public finance, there is less incentive for managers to push scholars to produce any kind of IP; hence, collaborations with external stakeholders tend to focus on consultancy and employee training rather than the production of commercially exploitable patents and designs. However, another possible explanation is that the creation of any kind of IP requires a level of high quality of research beyond that currently found in most of Libya's HEIs. This is a matter of concern, given the importance of new ideas and innovation in facilitating economic development (Romer, 1993). Arguably, human capital investment is not mere improve individual skills but rather the foundation on which strong knowledge is built.

The statistical analysis revealed that more than a third of scholars educated in developed countries provided training to external stakeholders. Slightly fewer Libya-educated scholars provided such training, while scholars educated in developing countries were significantly less likely to engage in this way (Table 6.12). The interviewees explained that academic reputation and personal contacts are the key factors in whether a scholar is invited to train public sector employees (section 6.3.3). If lack of job training and poor ICT skills, particularly among staff in economic institutions, are indeed holding back human capital development in developing countries like Libya (Easterlin, 1981; Lucas, 1990), then it can certainly be argued that academics in these countries have a duty to engage with these institutions and facilitate the process of human capital development.

All three groups were equally likely to discuss their research findings with external stakeholders (Table 6.12). This activity benefits both sides; it is an easy way to keep non-academic communities up-to-date with the latest knowledge, while the discussion might encourage scholars to orient their research more towards topics that are of direct interest to external stakeholders. Despite the potential advantages, however, the interviewees explained that many scholars are reluctant to discuss their research because they lack confidence in the value or interest of their findings. This is not purely a matter of modesty; as explained in section 5.2.3, Libyan academics tend to publish in local journals primarily to secure promotion, often to the detriment of research quality. The academics most likely to discuss their findings, both with other academics and with non-academic communities, are those who manage to publish their research in peer-reviewed international journals. These are also the academics who, according to Olmos-Penuela *et al.* (2014), external stakeholders are most likely to want as potential collaborators. Many of the interviewees also cited administrative problems and lack of university infrastructure as additional barriers preventing them from discussing their research with external stakeholders.

Prinsloo, Van Waveren and Chan (2017, p. 1) call knowledge dissemination “a part of the knowledge exchange process”, and the inability (for whatever reason) of Libyan academics, particularly those educated domestically or in developing countries, to disseminate their knowledge to those who may need it (i.e external stakeholders) is having a chilling impact on KE in Libya. For example, low academic engagement capacity to put knowledge dissemination into practice limit the benefit of HEIs in collaborating with external stakeholders. There is undeniably a huge gap between the HE system and the country's economic institutions, and this may be one of the crucial factors holding back economic development. The investment being made in sending scholars to study overseas is having a reduced impact because a high proportion of these scholars are going to countries where the knowledge gap is small compared to Libya. Even among those who have been educated in developed countries, relatively few manage to overcome the obstacles discussed above and collaborate productively with external stakeholders.

6.4.2 Academic discipline

The statistical analysis showed that less than 1.60% of foreign-educated applied scientists and less than 1% of social scientists managed to produce some form of IP (see Table 6.8 and Table 6.9). Returning applied scientists were more likely to be associated with start-up companies than other types of IP (patents, inventions, educational software, industrial design), but this association was not significant. In contrast, Perkmann *et al.* (2013) found, in a systematic review of research in developed countries, that between 5% and 40% of academics in these countries produce patents. The interviewees attributed Libyan academics' low IP productivity to under-development of the country's industrial base and the public sector's failure to realise the potential value of academic collaboration, but the findings also offer strong evidence that publication productivity in the country is geared more towards promotion than innovation. This is particularly worrying, given that university creativity/innovation is one of the factors taken into account in the Knowledge Economic Index (KEI) the World Bank uses to measure countries' overall level of development (World Bank, 2007; Tchamyou, 2017).

The quantitative data revealed that applied scientists were slightly more likely than social scientists to act as consultants to external organisations. In their UK-based study, Perkmann and Pavelin (2011) found a significant positive association between technology-oriented disciplines and industrial consultancy, but no such association for social scientists. In contrast, Zavale and Macamo (2016) found that both disciplines displayed only weak and informal engagement with non-academic communities in Mozambique, while Kruss *et al.* (2015) found the same across Sub-Saharan Africa. None of these authors provide a clear explanation of the obstacles or incentives facing different disciplines in terms of collaboration.

Applied scientists interviewed in the current study explained that it is easier to act as a consultant to private sector firms, particularly SMEs, because there tends to be less bureaucracy than in public sector collaborations (there also tends to be less managerial instability than in the public sector). These informal or indirect links, which are usually undertaken outside the university and arranged through personal contacts, tend to be more flexible than the formal or direct links (usually with the public sector) organised by university managers. As highlighted in Chapter 5, applied scientists produce significantly more scholarly publications, and are more likely to be published in international journals, than social scientists. Landry *et al.*'s (2010) finding that there are positive associations between publication and consultancy, and between international publication and engagement with external stakeholders (Schartinger *et al.,* 2002) would therefore seem to suggest that applied scientists have the advantage over social scientists when it comes to securing outside opportunities. However, social scientists and applied scientists alike in this study complained that lack of institutional support makes finding firms to interact with difficult.

The results suggest that in Libya, applied scientists are more likely to be involved in CPD (e.g. providing employee training) than social scientists. Zavale and Macamo (2016) found a similar result in Mozambique, but in contrast, Schartinger *et al.* (2002), in their Austria-based study, identified employee training as the main outside activity of social scientists. The current study gives some insight into these mixed results with the finding (from social scientist interviewees) that neither the private nor public sectors in Libya yet recognise the potential value of social scientists in resolving socioeconomic problems. A possible explanation for this might be that as the training provided by applied scientists tends to be more practical in nature (e.g. learning by doing or in-field training), it is seen to be of more tangible benefit. These findings provide clear evidence of how academics can help external stakeholders, to the benefit of overall economic development.

6.4.3 Academic rank

In Libya's HE system, movement up the career ladder is associated solely with publication; collaborations with non-academic or commercial organisations are not taken into consideration. As several interviewees explained, there is therefore no incentive to embark on outside projects that not only do nothing to aid one's career development but will leave less time to produce scholarly publications. Their comments echo Karlsson *et* *al.* (2007), who also highlight the demotivating impact of a publication-oriented promotion system on external engagement.

In light of this finding, it is perhaps unsurprising that none of the academic ranks surveyed in the questionnaire exhibited a significant association with commercial activities such as patents, inventions, computer software, educational software or start-up companies. There was an association between professors and the production of industrial designs, but this was not statistically significant. Among early career academics there was virtually no production of IP (see Table 6.8 and Table 6.9), suggesting that these academics prefer to concentrate on activities that are directly related to promotion. Professors, who are generally under less pressure to publish, were more likely to collaborate with outside partners on industrial designs and start-up companies. The finding supports D'Este and Perkmann (2011) and Abreu *et al.* (2009), who also found that professors are more likely than early career academics to collaborate with external stakeholders on commercial activities.

Senior academic ranks were statistically more likely to provide consultancy services to external stakeholders than those at the beginning of their career. This finding is consistent with D'Este and Perkmann (2011) and Perkmann and Pavelin (2011), both of whom found higher academic rank to be positively related to consultancy-based interaction with external stakeholders. When this was investigated further in the interviews, participants explained that public and private sectors alike prefer to interact with associate professors or full professors rather than with assistant lecturers or lecturers, whom they see as less knowledgeable. For their part, academics of all ranks explained that they preferred to consult for the private sector rather than the public because it pays more quickly, if not particularly well. The relatively modest fees available may be another reason why early career academics were less likely to regard consultancy as a useful way of supplementing their income.

Senior academics were also more likely to discuss their research findings with non-academic organisations and to provide training to employees in other sectors, though as Table 6.13 shows, the level of engagement declined once they had reached the position of professor. The interviewees attributed this to Libya's current HE regulations, which they saw as limiting the academic achievement and contribution of this rank, particularly in the KE dimension.

The very low level of knowledge/IP production and limited external collaboration among early career academics, along with the reduced engagement among scholars at the most senior level, may be hindering Libya's transition into a KBE. Satti (2014) identifies the main challenges preventing Arab countries from moving to a knowledge-based economic model as poor planning (in regard to human capital investment), lack of technology and innovation, lack of a well-educated or skilled workforce, and low investment in research and training. In Libya's case, university managers and HE policy makers need to understand how early career and senior academics differ in terms of their external engagement activities, and the factors that affect their collaboration, if they are to develop more effective strategies for investing in human capital.

6.4.4 Gender

The question of why the genders differ so markedly in terms of their KE with non-academic organisations is an important one for both policy makers and researchers, given that women account for a growing proportion of the HEI workforce in Libya. At the time of the fieldwork, 34.5% of the academics in Tripoli University (Libya's biggest HEI) were women, the majority of whom were low ranking (assistant lecturer or lecturer) (see Table 3.2). The secondary data shows that approximately one-third (33.5%) of the 11,458 Libyan academics sent to study abroad in 2016 were female, with the majority going to Arab and Asian countries (Table 6.1). This trend was even more pronounced in the survey sample for this study, with almost half (48.10%) of the 216 women participants having been educated in a developing country (Table 4.1). However, while the Libyan government invests equally in both genders (see section 6.2.2), it seems that as far as KE is concerned, it may be getting a smaller return on its investment from women than from men.

For example, the survey questionnaire analysis indicated that returning male scholars were more likely than returning female scholars to act as a consultant to non-academic organisations or hold a temporary position in the public sector (Table 6.11). The findings support Ding et al. (2013), who found that male academics were twice as likely to advise biotechnology companies than female academics. Tartari and Salter (2015) point to a consensus in the literature that female academics in science and engineering are less likely than their male peers to collaborate with external stakeholders. Their suggestion that female academics face higher barriers to collaboration was supported by both the quantitative and the qualitative results in this study.

The semi-structured interviews highlighted that the difficulties associated with reconciling academic work and external collaborations are even more acute for female academics, most of whom also have family and childcare responsibilities. Female interviewees explained that the need to attend regular meetings and work long hours on top of their academic duties made engaging with external stakeholders too demanding. They also cited lack of support from their male colleagues and university managers as deterrent factors, echoing the findings of Tartari and Salter (2015), who conclude that women scientists working in male-dominated environments are put off from engaging with non-academic organisations by a lack of support from colleagues and family responsibilities.

Another consideration cited by female interviewees in the study was the influence of cultural norms, with one explaining that it can be hard for female academics to build collaborative relationships with non-academic organisations when most of their senior managers are male. Female interviewees, especially if foreign-educated, were more likely to collaborate with third sector voluntary and community organisations, which tend to be mostly dominated by women. This finding is in line with Faulkner (2009), who suggests that female academics are more likely to collaborate with non-academic communities whose focus is on social development rather than technology. It seems that in Libyan culture, female scholars are more likely to work in areas which are culturally regarded as female domains, such as social welfare. Other female scholars pointed to low scholarly publication productivity as a key factor hindering women from playing a full part in KE in Libya. One female participant highlighted the difficulty of finding an original topic which reflects the needs of industry, but returning female scholars generally appear to face greater barriers around scholarly publication than their male counterparts, which limits their ability to disseminate their research and establish their academic credentials to potential collaborators.

Returning male scholars in the sample also provided more employee training than returning female scholars, though the difference between the two groups was small. The provision of CPD to employees in both public and private sectors is key to developing human capital and driving economic growth (Becker, 1964), making this form of KE especially important, However, the interview data showed that while male scholars were able to train both male and female staff, female scholars were more likely to prefer engaging with female trainees only. Cultural norms may offer one explanation, or it may simply be that female scholars in the sample lacked the confidence in their own abilities to engage with business leaders. The fact that most chose instead to work informally with private sector organisations such as charities or voluntary bodies appears consistent with Tartari and Salter's (2015) idea that female scholars' external engagement is affected by personal and societal considerations.

As mentioned above, there is no difference in the amount spent by the Libyan government on sending male and female academics to study abroad. However, while the highest proportion of the investment in female scholars goes on sending them to study in developing Arabic and Asian countries, the highest proportion of the investment in male scholars goes on sending them to study in developed countries like England/Ireland, Europe and the USA/Canada (Table 6.1). Given that those educated in developing countries face additional barriers that make it more difficult for them to engage with external stakeholders, this may explain why returning female academics appear to make less of a contribution to KE in Libya than their male peers.

6.5 Conclusion

The analysis shows that the Libyan government is investing equally in both genders, and that while the funding given to scholars studying in different countries varies slightly, the differences are very small. However, the results from the questionnaire survey (summarised in Table 6.14) provide strong evidence that in terms of KE, the government is not getting an equal return on its investment from all these scholars. The table indicates that those who are educated in developing countries are less KE-productive, but despite this, a high proportion of scholars are still being sent to study in these countries (see Table 6.1). Furthermore, (Table 6.14) summarised the association between full time scholars and academic engagement across a range of items within KE.

Overall, being sent to study abroad seems to have a significant impact on a scholar's engagement with external organisations (except for their production of IP, which showed no significant association with any of the variables) (Table 6.14). Academics educated in developed countries in particular were more likely to collaborate with non-academic communities compared to other groups, with these collaborations more likely to be advisory in nature (e.g. consultancy, employee training, temporary positions and discussion of research findings) than geared towards the production of research-based IP. Among foreign-educated scholars, men, applied scientists and associate professors contributed more to KE than women, social scientists and scholars from other ranks. Foreign-educated female scholars were most likely to engage with independent third institutions such as third stream organisations, while male academics engaged with both the private and public sectors (though most preferred dealing with the former as it tends to be less bureaucratic).

The main factor motivating foreign-educated academics to collaborate with external stakeholders was the prospect of securing funding and access to commercial laboratories/facilities, though most also saw the experience as having a positive impact on their teaching activities. Most recognised that having an established academic reputation, a track record of publication in well-known (preferably international) journals and an extensive personal network significantly increases the likelihood of being invited to work with outside organisations. Conversely, institutional barriers make collaboration more difficult; interviewees complained of inadequate regulation, the lack of coordination offices in Libyan universities and bureaucratic complexity (particularly if the proposed partner is in the public sector). Cultural differences were also cited, with a number of interviewees expressing doubt about whether industry and academia can fully trust or understand each other.

There was no strong evidence of any significant association between Libya-educated scholars and the consultancy, temporary position, training or even discussion of research findings items (Table 6.10 and Table 6.12). KE productivity was particularly low among domestically educated, women, social scientists and scholars in the lower ranks. A number of reasons were identified for this, including Libyan HEIs' prioritisation of teaching over research and outside collaboration, the relatively low research standard and indifferent academic reputation of these HEIs, and individuals' limited personal networks. Female scholars face additional barriers such as lack of support from colleagues and university managers, and difficulties 1) reconciling their academic and outside work with their childcare responsibilities, and 2) going into a male-dominated business environment. However, the main obstacle, according to Libya-educated interviewees, is the fact that neither the private nor public sectors in Libya have yet learnt to recognise the potential benefits of engaging with academics.

Overall, Table 6.14 illustrates that full-time scholars in Libya's HEIs have a weak association with almost all of the items within the KE dimension. The evidence suggests that KE in Libya, and thus human capital development, is being hindered by a range of barriers that prevent full-time scholars from collaborating with external stakeholders. However, an equally significant factor may be the choice of many scholars to complete their postgraduate studies in Libya or other developing countries. These findings could have significant implications for reforming the policy regarding study abroad programmes.

The study findings indicate that Libyan academic culture urgently needs to recognise KE as a key factor in its collaborations with external stakeholders. This could narrow the gap between academia and non-academic organisations and facilitate Libya's economic development. One step in the right direction would be for university managers and the MHE to establish dedicated offices within universities to facilitate the process of collaboration for both academics and non-academic organisations. Another would be for universities to consider engagement with external stakeholders as one of the criteria for academic promotion. The particularly low productivity of academics in terms of IP highlights an urgent need for the establishment of new policy by the MHE clarifying IP rights. This body also has a part to play in reducing some of the barriers that prevent female scholars in particular from contributing fully in the KE dimension. The findings of the study may serve as a baseline in discussions between policy makers and female academics and aid in the formation of new policies to encourage more women to engage with external stakeholders. These policy implications, based on the study's KE findings, may benefit researchers at the micro level, universities as a whole, and non-academic organisations. The extent to which these findings having an impact on policy makers is discussed in more depth in the next chapter.

Table 6.14: Differences and associations among variables across different items within KE

Variable	Country of study			Foreign-educated scholars								
				Academic discipline		Academic rank					Gender	
Item	Libya	Developing	Developed	Social	Applied	Assi-lect	Lect	Assi-prof	Asso-prof	Prof	Male	Female
Intellectual properties												
Patent	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Invention	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Computer software	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Education software	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Industrial design	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Start-up co	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Employee training	Weak	Weak	Weak	Weak	** Weak	Weak	Weak	Weak	**Moderate	Weak	** Weak	Weak
Discussion of research findings	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Consultancy	*Weak	**Weak	**Strong	Weak	*Weak	Weak	Weak	Weak	**Moderate	Weak	**Moderate	Weak
Temporary position	Weak	Weak	**Moderate	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak	Weak

*p<0.05 and **p<0.001 Effect size with weak, moderate and strong association

Chapter 7 : Conclusion

7.1 Introduction

Gylfason (2001) argues that nations that see natural resources as their most important development asset are more likely to develop a false sense of security and to invest too little in their human capital because this "easy cash" allows them to maintain good living standards even if they have poor economic policies and a weak skills base. This is to some extent what has happened in Libya, which has relied too heavily on its natural resources to drive its economic development, and done too little to invest in its human capital. It is the contention of this study that this low level of investment, and the poor targeting of this investment, is limiting knowledge creation in the country and adversely affecting its economic development.

The UN's HDI measures economic development in terms of per capita income, life expectancy and education (Ul Haq, 1995; Cypher, 2014). This study focuses on the last of these, specifically the Libyan government's provision of academic scholarships to public university staff. For more than four decades, the government has been investing in sending full-time scholars to overseas universities with the aim of improving their academic performance. Rose (2015) argues that this is the best way to bring about rapid improvement in Libya's HEIs, but no one has yet investigated in depth the academic achievement and contribution of these returning scholars. This study is the first to investigate returning scholars' achievement and contribution across the three dimensions of knowledge transmission (KT) (through teaching, supervision and administration), knowledge dissemination (KD) (through publication and attendance at national and international conferences) and knowledge exchange (KE) with external stakeholders (e.g. through consultancy, taking up a temporary position in the public sector, discussing research findings with non-academic communities and offering training to employers). The review of the literature revealed that no previous study has examined such a wide range of items using a sequential mixed methods approach. The study is also novel in that investigation of the link between investment in knowledge and engagement with external stakeholders is still rare in developing countries (Kruss and Visser, 2017; Giuliani *et al.,* 2010). Drawing on HCT (Becker, 1964), EGT (Romer, 1990) and the KBE concept

(Powell and Snellman, 2004), it explains the importance of knowledge as a factor in development.

The aim of the study was to compare and investigate the academic achievement and contribution of returning scholars in four of Libya's most popular universities, and to identify the factors affecting this contribution. Initial quantitative data was collected by means of a survey and subjected to statistical analysis, with individual semi-structured interviews then being employed to collect qualitative data. In the first stage of the analysis, the survey respondents were divided into three groups based on their country of study (Libya, developing or developed countries) and the data subjected to nonparametric testing to compare their performance across the three knowledge dimensions. However, since the main focus of the study is on the potential impact of the study abroad programme (as an example of human capital investment) on KT, KD and KE, in the second stage of the analysis, domestically educated scholars were excluded from the dataset and the nonparametric tests repeated to identify differences between foreign-educated scholars by gender, academic discipline and academic rank. The data from the individual semi-structured interviews was analysed to gain insight into the factors affecting the academic achievement and contribution of the various scholar groups. Secondary data was also collected from Libya's MHE in order to investigate whether scholars' gender or choice of host country have any effect on the level of investment given.

This chapter summarises the main findings that emerged in response to the research questions and discusses how they contribute to our understanding. These findings provide empirical evidence of the extent to which investing in knowledge by sending scholars to study abroad is improving human capital in Libya's HEIs, as well as identifying which scholars make the greatest contribution to knowledge development and highlighting the factors that most affect this contribution. They give a clear insight into the role – both direct and indirect – that academia can play in economic development by engagement with external stakeholders in developing countries such as Libya. The chapter goes on to discuss the limitations of the study before outlining the implications of the findings and making suggestions for future research.

7.2 Main findings and original contributions to knowledge

This research makes a significant contribution to the literature available on the mobility of Libyans who have been offered government scholarships to study abroad. The results suggest that underinvestment (or at least, poorly targeted investment) in HE may be compromising the development of human capital in Libya and holding back economic development. The evidence could be used as a starting point for education policy reform, such as making research funding contingent upon researchers working with external stakeholders, thereby promoting KE and giving academic research a more prominent role within Libya's economic development. The study attempts to provide a mechanism to understand how studying abroad in a developing or developed country can boost the academic achievement and contribution of scholars. Given that the strategies and advanced knowledge these scholars bring home have the potential not only to improve the quality of HEIs but also to enhance their engagement with external stakeholders, this information should be of interest to the Libyan government as it attempts to restructure and stimulate the country's economy.

7.2.1 Main findings

Arguably the most interesting finding of the study is that investment in sending scholars to study abroad is much more likely to be worthwhile when there is a big knowledge gap between the host and the home country (Libya) than when this gap is small. For example, Libyan academics who studied in developed countries in the study were more productive in terms of KT and KD (sections 4.3 and 5.2) than Libyan academics who studied in developing countries. In the KT dimension, they were more likely to use non-Arabic sources in their teaching and research and supervised more postgraduate students (section 4.3.1). This, in turn, had a positive impact on their KD productivity, enabling them to participate in international conferences, publish in international journals, secure national and international research funding and gain sabbatical leaves (sections 5.2.1, 5.2.2, 5.2.3 and 5.2.4). Their increased productivity in the KT and KD dimensions made them more likely to collaborate with external stakeholders (KE) either by providing consultancy services or taking on temporary positions in the public sector (section 6.3.2). The empirical findings are the first indication that KT and KD interact to facilitate scholars' engagement in collaborations that, by improving outcomes for external stakeholders, have the potential to impact positively on economic development. Libyan scholars educated in developed countries contribute indirectly to human capital development by transmitting international knowledge (KT) to their students, and by making this knowledge generally available in scholarly publications (KD), but their engagement with external stakeholders allows them to have a more direct influence.

External engagement, in turn, positively affects academics' own teaching, supervision and scholarly productivity. For example, the interviewees explained that by giving them real-life insights and practical experience to complement their theoretical understanding, collaboration with outside stakeholders had enriched their teaching, to the benefit of students. The literature has investigated the association between academia and industry (Wright *et al.,* 2008; Watson *et al*., 2014), but few empirical studies have illustrated the impact of academic engagement on teaching activities. In terms of research, engagement often suggests new topics, gives academics opportunities to access funding and laboratory facilities, and enables them to collect data and gain an understanding of the problems faced by non-academic communities. Previous researchers (e.g. Shin *et al*., 2014; Elgllab and Shehate, 2017; Celik, 2012b; Nemeckova and Krylova, 2014; Altbach, 2013; Ramesh, 2013) who have investigated the benefits of study abroad programmes have not considered their impact on academic achievement in much detail.

Figure 7.1 shows how the various scholar groups in the sample contributed to KT, KD and KE. It shows that domestically educated scholars focused mainly on the KT dimension, with most taking on as much teaching as they could in order to ensure a reasonable income. This group taught the vast majority of undergraduate students (sections 4.3.2 and 4.3.4), but their ability to pass on the latest knowledge to this new generation was limited by a lack of foreign language proficiency, which prevented them from using non-Arabic resources and accessing international research (Elgllab and Shehate, 2017). The interviews revealed several barriers that limit the academic achievement and contribution of Libya-educated scholars across all three dimensions, including the 1986 policy banning foreign language teaching in high schools and universities, a lack of CPD, and an HE system which does little to encourage the development of academics' research skills (see Table 7.1). These barriers severely limit Libya-educated scholars' productivity in terms of both postgraduate supervision and scholarly publication (see Figure 7.1), in turn restricting their ability and opportunities to exchange their knowledge with external stakeholders.

Similarly, scholars who were educated in developing countries also appeared to have only limited opportunities for external engagement. Their performance in relation to KT and KD was generally weak (Table 4.20 and Table 5.18), leaving them unable to be significantly active in the KE dimension. Most found it hard to publish in international journals (section 5.2.3) or to participate in international conferences (5.2.4) because they had trained in countries (e.g. Arab countries) where the knowledge gap is small. They were trapped in a vicious circle: without a good publication record it was harder for them to collaborate with external stakeholders, but the lack of outside collaboration made it harder for them to secure the research funding they needed to produce scholarly publications. The findings suggest that scholars returning from countries where the knowledge gap is small are, on the whole, less likely to collaborate with non-academic organisations.

The secondary data findings revealed that a high proportion of those sponsored by the government do their postgraduate study in developing Arabic and Asian countries (Table 4.1), and that roughly the same level of investment is given to scholars studying in developing and developed countries (Table 6.4). Given the lower productivity of developing-country-educated scholars compared to developed-country-educated scholars, policy makers may want to reconsider their approach to the scholarship programme; if it costs roughly the same to send scholars to developing and developed countries, it may make more sense to send them to the latter.

Figure 7.1: Academic achievement and contribution of scholars across the three knowledge dimensions

○ Significant difference

Another key finding of the study is that foreign-educated applied scientists, male academics and senior professors were more productive across some items in KT, KD and KE than foreign-educated social scientists, female academics and the lower academic ranks (assistant lecturers, lecturers, assistant professors), though for the most part, these differences were small. The former groups were more likely to be able to use non-Arabic sources, supervised more postgraduate students and spent more time on research. This made it easier for them to secure funding and publish in international journals, which, in turn, helped them to be more productive in the KE dimension (Figure 7.1). These groups thus appeared to have gained the greatest benefit from the study abroad programme as an investment in human capital. However, the proportion of scholars contributing more to the three dimensions was less than the average that might have been expected for the size of the sample, suggesting that even foreign-educated scholars face barriers which limit their academic achievement and contribution. How significant these barriers are depends on the country of study, academic discipline, academic rank and gender variables. Table 7.1 summarises the main barriers.

Table 7.1: Barriers impacting on KT, KD and KE, as perceived by scholars

Barriers	Group	Knowledge dimensions		
		KT	KD	KE
The 1986 policy banning foreign language teaching	Domestic and developing country groups	⊙	⊙	⊙
Faculty regulations	All groups	⊙	⊙	⊙
Lack of interdepartmental co-operation in universities	All groups	⊙	⊙	⊙
Gender stereotypes “women’s academic contribution”	Female academics	⊙	⊙	⊙
Lack of continuing professional development	Domestic group	⊙	⊙	⊙
Academic culture and lack of support	All groups	⊙	⊙	⊙
Complex bureaucratic procedures	All groups	⊙	⊙	⊙
Lack of reference material, inadequate libraries and poor internet access	All groups	⊙	⊙	
Large class sizes and heavy teaching load	Domestic group		⊙	⊙
Poor communication due to lack of ICT	All groups		⊙	⊙
Public universities’ dependence on government funding	All groups		⊙	⊙
Lack of policy regarding incentives for senior professors	Professors		⊙	⊙
Sociocultural factors	Female academics		⊙	⊙
Under-developed economic system (industry)	All groups		⊙	⊙
Difficulty of finding original research proposals	Domestic and developing country groups		⊙	⊙
Lack of understanding of the benefits of academic engagement	All groups		⊙	⊙
Difficulty of getting paid for academic work	All groups	⊙		⊙
Lack of equipment and facilities for teaching/supervising postgraduates	Applied scientists	⊙		
Poor academic performance of students	All groups	⊙		
Lack of funding	All groups		⊙	
High competition for funding	Domestic and developing country groups		⊙	
Political factors	All groups		⊙	
Teaching is compulsory, research is a choice	All groups		⊙	
Difficulty of finding well-known journals	Domestic and developing country groups		⊙	
Lack of performance evaluation mechanism	Developed country group		⊙	
Lack of policy on engagement	All groups			⊙
Collaboration is not considered in promotion	Those who collaborated			⊙
Culture differences between academia and non-academic communities	Those who collaborated			⊙
Lack of trust in academics’ knowledge	All groups			⊙
Low quality of research and poor academic reputation	Domestic and developing country groups			⊙
Lack of coordination offices in Libyan universities	All groups			⊙

Table 7.1 illustrates the barriers which impact on KT, KD and KE, as identified by the interviewees. It shows that while some barriers affect the academic achievement and contribution of all scholars in all dimensions, others affect particular groups and particular

dimensions. The most far-reaching barriers are institutional; for example, the lack of interdepartmental/interdisciplinary co-operation within universities, the complex bureaucratic procedures and the general lack of collegial support affect the academic achievement and contribution of all scholars across all dimensions. Poor internet access and inadequate, outdated libraries also directly affect the publication productivity of all scholars, while slow payment by university finance departments affects their supervision productivity. The fact that those who engage with public sector institutions face similar delays in receiving payment for their work discourages other academics from collaborating.

A high proportion of scholars – particularly female academics and those educated in Libya – are barred from teaching or supervising postgraduate students because their low productivity in terms of scholarly publication prevents them from being promoted to the required rank of assistant professor or above. Once scholars are appointed to professorships, the pressure to publish is removed and, in the absence of any other incentive, productivity, especially in the KD dimension, declines. For those scholars (of all ranks) that do publish, the lack of performance evaluation mechanisms means there is no reason to aim for high-impact journals. Nor is there any reason to spend time on external collaborations, as these are not taken into account when promotions are awarded.

Female scholars are also particularly impacted by sociocultural barriers (Naser *et al.,* 2009) and gender stereotypes in that they face widespread assumptions about their academic performance and practical restrictions on their freedom of movement. The first means that they are less likely to supervise postgraduates (Botha and Swanepoel, 2015) and secure research funding (Table 7.1), while the second prevents them from attending international conferences without a male relative. On the other hand, the interviews revealed that these academics engage with external stakeholders from a range of female-led charity organisations and are active in providing training courses to female employees.

In terms of publication productivity, scholars educated in Libya or developing countries are often held back by a lack of original research proposals. As a result, they find it harder to access research funding and have few opportunities to collaborate with external stakeholders. The political isolationism of the previous regime made it extremely challenging for even the developed country group to secure funding from international bodies, but the situation was (and remains) hardly any better for those seeking funding from national bodies such as the NASR, as intense competition means that few Libya-educated or developing-country-educated scholars are successful in their bid. The interviews suggested that for many academics, possibly the major disincentive to spend time and energy on research is the sector's clear prioritisation of teaching (which is compulsory) over research (which is a matter of personal choice). This can leave academics feeling that it doesn't matter if they misuse the funding they receive for sabbatical leave. Publication productivity is further depressed because, as noted earlier, the lack of performance evaluation means that scholars do not feel the need to aim for high-impact journals, though the findings suggest that many in the domestic and developing country groups have difficulty identifying these journals in any case.

Collectively, these barriers inhibit KD and thence KE; those exhibiting low productivity in KD cannot contribute to KE. In this study, the most productive group in terms of KT, KD and KE, and the least affected by these obstacles, was developed-country-educated male professors in the applied sciences. However, even this group, despite being the most likely to be awarded sabbatical leaves, participate in international conferences, publish in international journals and provide consultancy services to external stakeholders, was less productive than might have been expected.

7.2.2 Original contributions

The study's main contribution to knowledge in this area is its establishment of a new conceptual framework combining three dimensions of knowledge (KT, KD and KE). Previous studies focus on only one or two dimensions to investigate academics' performance (e.g. Torrisi, 2013). This framework is able to give a concrete and comprehensive explanation of the academic achievement and contribution of Libya's foreign-educated scholars and how these compare with those of domestically educated scholars.

Its second contribution relates to the main research question: "What (if any) association is there between study abroad experience and scholar's academic achievement and contribution to KT, KD and KE?" The fact that Libya, the largest oil- and gas-producing country in Africa and the ninth largest worldwide (Etelawi, Blatner and McCluskey, 2017), is still struggling to achieve sustainable economic development suggests that the country's developmental problems arise from a lack of human knowledge, rather than physical capital. Investing in knowledge development is therefore crucial (Teal, 2011), but the evidence in this study indicates that the rate of return on this investment varies depending on whether academics are sent to developing or developed countries, and whether they are female or male. Currently, the knowledge of returning academics is not being adequately disseminated to those who need it (either in the public or private sectors), IP production is low, and knowledge is not being exchanged with non-academic organisations. All of this makes it harder for the government to effect Libya's transition to a KBE.

The third contribution relates to RQ-I-iii: "To what extent do scholars with foreign postgraduate qualifications have a distinct advantage over those holding equivalent domestic postgraduate qualifications in terms of KE?" The study is the first to investigate the role that foreign-educated scholars play in external collaborations in Libya, and to compare this with the role played by their domestically educated peers. By then going on to examine the KE contribution of foreign-educated scholars by academic discipline, academic rank and gender, the study provides the first comprehensive analysis of how knowledge imported from abroad can facilitate the process of collaboration with external stakeholders. The research identifies the ways in which scholars' teaching, supervisory and administrative roles and scholarly productivity enhance or hinder the process of collaboration with external stakeholders. These findings may be transferable to other developing countries with a similarly traditional HE context.

The study's fourth contribution is its response to RQ-II ("What are the factors that might affect the academic achievement and contribution of foreign-educated scholars compared to their home-educated peers?") and RQ-IV ("What factors might affect the academic achievement and contribution of foreign-educated scholars of different genders, academic disciplines and academic ranks?"). The analysis of the semi-structured interviews, questionnaire survey and secondary data has extended our knowledge of the main barriers hindering academic achievement and contribution across the three knowledge dimensions. By grouping the respondents by country of study, academic discipline, academic rank and gender, it has been possible to identify which barriers affect all full-time scholars, and which affect some groups more than others. This is the vital first step if these barriers are to be overcome.

The study's final contribution is to offer a robust methodology for investigating and analysing the impact of human capital investment. The questionnaire survey was targeted at the micro (individual) level, allowing respondents to be divided into three groups (Libya-educated, developing-country-educated and developed-country-educated) in the subsequent statistical analysis. To my knowledge, the majority of the literature comparing domestically educated and returning academics does not distinguish these returning academics by their country of study (Shin *et al*., 2014). This study goes further, conducting a second round of statistical analysis for the foreign-educated groups only and comparing the performance of scholars educated in developing and developed countries by academic discipline, rank and gender. Purposive sampling in the individual semi-structured interviews (potential interviewees were divided into two disciplines, each of which was divided into three country of study groups, with two males and two females being chosen from each group, see Figure 3.2) ensured a diverse range of perspectives for the qualitative analysis. Together, the quantitative and qualitative analyses provide a deeper understanding of the return the Libyan government is getting on its investment in sending scholars to study abroad, and the factors that affect this return. The triangulation of data-collection methods (survey, interviews and secondary data from the MHE) increases the validity and reliability of the findings, which give a clear insight into the academic achievement and contribution of scholars and the barriers they face.

7.3 Limitations

Although the research is valuable for its exploration of a number of issues that have not yet been studied in interdisciplinary research, especially in Libya, its limitations should be acknowledged. The main limitation faced during the data-collection stage was the lack of available data regarding Libyan academics' performance (Rose, 2015). For example, it was impossible to calculate the h-index and number of citations for individual researchers (which might serve as an indicator of research quality) firstly, because most Libyan universities have no publication database and secondly, because the majority of academics publish in offline journals. The quantity of research might be considered less important than the quality, but both Creswell (1985) and Simonton (1997) indicate that there is a strong correlation between the two. Furthermore, the volume of information collected in the interviews was limited (though only slightly) by one respondent's refusal to give permission to record their interview.

The study's other limitations relate mostly to its scope. Firstly, although the sample was made up of full-time scholars from four of Libya's major universities, security concerns made it necessary to exclude the country's second biggest HEI, Benghazi University. Secondly, the questionnaire survey focused on scholars' contribution and achievement in the four years leading up to the 2011 revolution. Thirdly, the findings regarding KE might have been enriched by broadening the scope of the study to include outside stakeholders (e.g. managers from public and private organisations). This would have given insight into how non-academic organisations perceive KE and what they need from it, but time constraints made this impossible. Examining previous research collaborations between academics and industry might have strengthened the study's argument that economic development in developing countries like Libya is being held back primarily by inadequate R&D, which is the main driver of knowledge creation.

7.4 Policy Implications and recommendations

The Libyan government's policy of sending full-time academics to study abroad is central to developing human capital in the country's HE sector and beyond. Through their multidimensional activities, these returning scholars have the potential to play a key role in Libya's transition from a natural-resource-based to a knowledge-based economy. As Popescu and Crenicean (2012) point out, it is the job of universities to recognise that the global economy is based on knowledge, and to prepare professionals accordingly; it is therefore vitally important to understand the barriers and challenges that might be hindering the academic achievement and contribution of scholars and whether these vary by country of study, gender, academic discipline and rank.

The findings in the current study show that Libyan scholars who have been educated in a developed country are more productive across all three knowledge dimensions than those educated in a developing country or in Libya, and that returning male scholars and applied scientists are more productive than returning female scholars and social scientists. However, the secondary data revealed that despite this difference in productivity, scholars choosing to study in developing countries are given the same level of funding as those going to developed countries, as are both genders. A high proportion of academics choose to study in developing countries, including most social scientists and female academics. As a result, these academics, along with their Libya-educated colleagues, are less likely to supervise postgraduate students, publish in international journals, participate in international conferences and engage with external stakeholders. This prevents them from securing funding from non-academic organisations.

The findings thus highlight the urgent need for a change in policy as regards scholarship programmes. They suggest that the return on this investment is more likely to be maximised if scholars are directed to study in countries where knowledge is significantly more advanced than in Libya (in other words, where there is a big knowledge gap), and to choose universities that are highly placed in the world rankings. Liu and Liu (2016) assert that the highest-ranked universities, which arguably provide the best training, are located in developed countries. These steps should help improve academics' performance across all three knowledge dimensions. The main obstacles facing scholars of both genders who have been educated in Libya or other developing (particularly Arab) countries are poor English language proficiency and inadequate research skills. HEIs must therefore establish strong professional development programmes to address these issues, especially as, in Libya's current HE system, publication productivity is tied to opportunities for promotion and postgraduate supervision. Improving English language standards in the sector will also allow more scholars to benefit from international conferences.

Current promotion policy seems to be having a significant, and not necessarily positive, impact on academic performance. The fact that promotion is contingent on publication drives junior staff to raise their productivity in this area at the expense of others (e.g. external engagement) and to focus on quantity, often at the expense of research quality. Current HE regulations do nothing to correct this as they make no stipulation regarding publication quality (e.g. HEIs are not obliged to take into account the standing of the journal in which a paper is published).

At the opposite end of the career ladder, those achieving the rank of professor no longer have any extrinsic motivation to continue producing original research or to engage in external collaborations, and the productivity of many tends to decline. This result highlights the need for faculty regulations to be updated and for the development of a reward system that can meet the expectations of higher-ranked academics and encourage them to increase their productivity.

The regulations allow faculty members to apply for sabbatical leave every four years in order to

> “prepare scientific studies, conduct research or experiments, or carry out the compilation, translation or examination of manuscripts where the purpose is to fill a scientific gap, meet a perceived public need, acquire scientific experience in his/her specialist field, refresh his/her information and keep abreast of new scientific developments.” (MHE, 2010)

The statistical analysis showed a strong association between promotion and sabbatical leave, while the interviews revealed that some scholars see these leaves as a way of gaining financially rather than an opportunity to increase their scholarly productivity. The finding suggests that new procedures need to be developed for rewarding sabbatical leave, such as asking scholars to provide evidence of what they have achieved. More broadly, a key policy priority should be to plan for improving performance evaluation mechanisms.

Some of the issues emerging from the findings relate specifically to institutional factors such as lack of laboratory equipment, poor library facilities and inadequate internet access. These all have significant effects on KD and KT, particularly on HEIs’ ability to run postgraduate programmes (PhDs) in the applied sciences and on the ability of both scholars and students to conduct scientific research. These challenges need to be resolved or at least reduced by university managers. Poor ICT provision hinders communication between academics and students, and between departments, making administration more difficult and slowing down the dissemination of knowledge, while communication between scholars and external stakeholders is made more difficult by the lack of coordination offices in universities. Improving this communication would do much to encourage scholars to collaborate more with external stakeholders.

Increased government funding for HE, and especially R&D, is crucial to Libya’s development. However, university managers should also develop new strategies to raise additional funding from industry. Some interviewees stated that the NASR, the MHE’s main funding body, is not well-known to all academics. Continued efforts are needed to make the NASR more accessible to all scholars, and to revitalise its role in R&D.

By identifying which scholar groups are most likely to collaborate with non-academic organisations, the study increases our understanding of the main barriers and motivations that affect KE. However, as the concept of KE is not yet part of Libyan academic culture, there is a lack of policy regarding academic engagement. At the moment, the concept of academic engagement is generally understood to mean taking a temporary position in the public sector – that is to say, engagement is understood to be a formal arrangement. Under the current regulations, the MHE may transfer faculty members to other administrative units, institutions, departments and public companies as it sees fit. Faculty members may also be transferred at the Ministry's discretion to regional governments or to regional or international organisations. However, the analysis reveals that scholars are in fact more likely to collaborate informally, and with private sector organisations.

The findings have implications for anyone attempting to regulate academic engagement with outside stakeholders, but they may also give non-academic communities some insight into the importance of funding for research, especially when this research can be directed towards resolving the problems they face. This might increase research funding from external stakeholders and help ensure that research in Libya's HEIs directly addresses the country's current social and economic problems. Narrowing the culture gap between academia and the public and private sectors is also highly important in creating the trust needed to facilitate the transmutation of theoretical knowledge into real-world practice, and in motivating more scholars and non-academic organisations to engage. Overcoming the barriers to KE will put the HE sector on the right track to aid in the shift to a KBE.

Finally, although the developed country group managed to contribute more to the three knowledge dimensions than the developing country group, the findings suggest that their contribution was still limited by factors at both the micro level (gender, academic discipline and academic rank) and the macro level (infrastructure and current HE policy). Unless these barriers are overcome, the government is unlikely to achieve the returns it expects from investing in study abroad programmes.

7.5 Further research

First, future research should cover more universities, particularly Benghazi University. Security concerns and financial constraints made it impracticable to include this university in the current study, but as Libya's second biggest HEI, it demands to be considered. In general, increasing the sample size would allow the consistency of the findings to be established and address any issues of reliability.

Second, the research findings indicate that the domestic and developing country groups produced fewer scholarly publications than the developed country group, but further research is needed to examine research productivity using the h-index and number of citations metrics. This was not possible in this study due to time constraints and the lack of representation of Libyan scholars on international databases such as Scopus.

Third, this study identifies the barriers to KD and argues that low productivity in this dimension may have a direct impact on KM. Further investigation of this impact is necessary.

Fourth, future studies could investigate the impact that the changes in political situation since 2011 have had on the academic achievement and contribution of scholars in Libya. Interviews with university managers would be particularly useful for compiling a comprehensive picture of the infrastructure problems now facing universities and how these are affecting academic productivity.

Fifth, in terms of the KE dimension, it would be interesting to include in the sample participants, such as managers, from non-academic organisations to gain insight into how they perceive academic engagement.

Sixth, the interviews in this study revealed that there is a relationship between engagement with external stakeholders and educational activities, while the statistical analysis revealed an association between supervision and publication. Further research on the links between the KT, KD and KE dimensions is therefore recommended.

Appendix A

Osama Al Bashir Shtewi
University of Leicester
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SURVEY: Investing in Human Capital: The Contribution of Libyan Scholars Educated Abroad to Academic Institutions and Non-Academic Organisations

The purpose of this study is to compare, contrast and investigate the academic contribution and achievement of faculty members in higher education institutions (HEIs). This research project is being conducted by Osama Al Bashir Shtewi, a research student at the University of Leicester.

You are invited to participate in this survey, which is designed to be completed by all faculty members currently working full time in Libyan HEIs. I strongly believe that, given your current role, you can provide valuable insights for the research project.

The survey is divided into four sections relating to your experience either in a study abroad programme or domestic education. These sections cover knowledge transmission, knowledge dissemination, knowledge exchange and background information. Filling in this survey will take approximately 15 minutes. Your participation is voluntary and if you decide to take part in the survey, you may withdraw at any time. You may also be asked to participate in a follow-up interview to elaborate further on your responses. If you are willing to participate in this part of the study, please tick the YES box at the end of this questionnaire and provide your email address to facilitate further communication.

Your responses will be kept confidential and will not be disclosed or released to your institution or any other group or individual. All data will be stored securely.

The results of this study will be used for scholarly purposes only.

If you decide to take part in this survey, please read the instructions carefully and answer all questions.

If you have any questions about the survey or the study in general, please contact Osama Al Bashir Shtewi at oabs1@le.ac.uk.

Thank you for your participation.

Section 1: Knowledge Transmission

This section explores the teaching-related activities of faculty members in Libya.

1. Do you use sources which are not written in Arabic in the courses that you are currently delivering?

☐ Yes
☐ No

2. How many students are enrolled in all the courses that you are currently teaching? *(Please insert number in the boxes provided)*

	Undergraduate level	Postgraduate	Doctoral level
Number of students	☐	☐	☐

3. How many hours a week are you spending on teaching, research and administration activities in the current academic term?

	Teaching load	Research	Administration activities
Number of hours a week	☐	☐	☐

4. How many students have you supervised for research projects in the last 3 years?

	Undergraduate level	Master level	Doctoral level
Number of supervisees	☐	☐	☐

Section 2: Knowledge Dissemination

This section explores the research productivity (e.g. publications, conference and workshop-attendance) of faculty members.

5. Did you receive any research grants or other types of funding for research in the last 4 years before the revolution of 17/02/2011?

☐ Yes
☐ No

*If **YES**, please select from the list below (tick as appropriate – multiple answers possible)*

- ☐ Your own institution
- ☐ Public research funding agencies
- ☐ Government bodies
- ☐ International funding bodies
- ☐ Business firms or industry
- ☐ Private not-for-profit foundations/agencies
- ☐ Other (please specify)

6. How many times have you been awarded a sabbatical in your academic career? *(If none, please write '0')*

Number of times remunerated

7. How many papers have you published in peer-reviewed journals in the last 4 years?

Number of papers

Please give the name of the journal(s)

8. How many national and/or international conferences/congresses did you participate in in the last 4 years before the revolution of 17/02/2011?

National conferences/congresses

International conferences/congresses

9. How many of the following scholarly contributions have you completed in the last 4 years? *(Please specify the number completed; if none, write '0')*

Scholarly books (as author or co-author) ☐

Scholarly books (as editor or co-editor) ☐

Book chapters ☐

Textbooks ☐

Technical reports disseminated internally or externally ☐

Scholarly translation (e.g. books) ☐

Other (please specify)

☐ ☐

Section 3: Knowledge Exchange

This section explores the interaction between academia and external stakeholders (community and social engagement and business engagement).

10. Have you generated any kind of intellectual property during the last 3 years?

- ☐ Yes
- ☐ No

*If **YES**, please select from the list below (tick as appropriate – multiple answers possible)*

- ☐ Patent
- ☐ Invention
- ☐ Computer software
- ☐ Education software
- ☐ Industrial design
- ☐ Start-up company
- ☐ Other (please specify)

☐

11. Have you offered continuing professional development (CPD) training to local business and/or the government in the last 4 years?

- ☐ Yes
- ☐ No

12. Have you discussed any of your research (findings) with non-academic public/private organisations (private companies or government agencies) during the last 4 years?

- ☐ Yes
- ☐ No

13. Have you ever signed consultancy or advisory contracts with non-academic public/private organisations (industry, government and/or community) no matter their size, during the last 4 years?

- ☐ Yes
- ☐ No

*If **YES**, please indicate the number of contracts signed in the last 3 years*

Number of contracts signed ☐

14. Have you held any temporary positions with non-academic public/private organisations in the last 4 years (e.g. an extensive financial audit, leadership trainer, medical specialist or engineering consultant)?

- ☐ Yes
- ☐ No

*If **YES**, please indicate how many months you have been in this position in the last 3 years:*

Number of months ☐

Section 4: Background Information

15. What is your age?

Age ☐

16. What is your gender?

- ☐ Male
- ☐ Female

17. What postgraduate qualification(s) do you hold? (*Please tick as appropriate – multiple answers possible)*

☐ Master degree (MA, MSc, MRes, MED, MLitt, MBA)

☐ PhD

For each postgraduate qualification held (PhD and/or Master degree), please complete the relevant information below

Qualification(s) ______

Country ______

University ______

School/Department ______

Qualification(s) ______

Country ______

University ______

School/Department ______

18. How many years have you been working in academia?

Number of years ______

Please indicate any gaps in your employment and provide the reasons for these gaps

______

19. What is your current academic rank?

- ☐ Assistant lecturer
- ☐ Lecturer
- ☐ Assistant professor
- ☐ Associate professor
- ☐ Professor
- ☐ Other (please specify)

______

20. How many years have you been in this rank? *(Please write in years)*

Number of years

21. In which department are you currently working?

Department name

We may wish to undertake further qualitative research with participants of this survey. Would you be happy to participate in further research?

- ☐ Yes
- ☐ No

If **YES,** please confirm your email address or mobile phone number:
Email address……………………………………………………..
Mobile phone number………………………………………………..

Thank you for taking time to fill in the survey. Your input is greatly appreciated.

Note: Please return the completed questionnaire to your head of department.

Appendix B

INTERVIEW GUIDE

Second phase: semi-structured interview

Investing in Human Capital: The Contribution of Libyan Scholars Educated Abroad to Academic Institutions and Non-Academic Organisations

Background information

Well, I would like to thank you for accepting the invitation to participate in this interview. The questions we are about to discuss were based on key evidence generated by the analysis of the survey questionnaire conducted in the first phase of the project. The purpose of the interview is to provide more comprehensive interpretation of the evidence drawn from the quantitative findings.

If you have no questions, we can now begin….

Knowledge Transmission

This section explores the teaching-related activities of faculty members at Libyan universities.

Q1. How would you describe your experience of supervising postgraduate students?

- What sort of challenges do you have to face when supervising doctoral students?
- What sort of challenges do you have to face when supervising master students?
- How do you balance your time between teaching, supervision and research?

Q2. Could you please describe the greatest challenge you have faced in your research career so far?

- How do rules and regulation in higher education affect your publication productivity?
- How do the facilities/infrastructure at your university affect your research productivity? (*library, internet access, offices, etc*)
- From your experience of working in HE, which has more effect on your income: teaching load or spending more hours on research?

Knowledge Dissemination

This section explores the scholarly publication productivity of faculty members at Libyan universities.

Q3. What experience do you have of attracting research grants?

- How can you convince funding bodies to financially support/invest in your research?
- What type of support does your university provide for processing grant applications?
- What kind of barriers do you face that hinder you from receiving research grants or other types of funding?

Q4. In what ways has your postgraduate study affected your academic achievement and contribution in terms of scholarly contributions? (*Scholarly contribution refers to books, book chapters, textbooks, translations and papers*)

- What skills and qualities do you think you need to possess to increase your scholarly contributions?
- What has been the most productive period in your academic career and why?
- What kind of skills do you need to publish in international journals?
- How has your academic experience affected your research skills?
- How has participation in local and/or international conferences affected your academic experience?
- Which factors most impact on your publication productivity? (*promotion, training, funding, etc*).

Knowledge Exchange

This section explores the interaction between academia and external stakeholders. This will give a concrete understanding of the extent to which faculty members can contribute to the economic development of the country by engaging with external stakeholders.

Q5. Can you please describe your experience of engaging with external stakeholders? If you have engaged, can you explain why?

- What experience do you have of generating IP?
- What experience do you have of attracting contracts with non-academic organisations?
- In your experience, what are the main factors that facilitate engagement with external stakeholders? (*research co-operation with non-academic organisations, responding to local opportunities, temporary position, consultancy, discussion of findings, training, etc*)
- Have you ever co-operated with any researchers working for non-academic organisations? If yes, how?
- What are the barriers that hinder engagement with external stakeholders?

Q6. From your experience, why do you think professors tend to engage less with external stakeholders?

- If you have been promoted, does your promotion play a key role in your engagement with external stakeholders? If yes, how? (*academic rank)*

Q7. What motivates you to engage with external stakeholders?

- What impact might engagement with external stakeholders have on your academic career?

Appendix C

Consent form

INVESTING IN HUMAN CAPITAL: THE CONTRIBUTION OF LIBYAN SCHOLARS EDUCATED ABROAD TO ACADEMIC INSTITUTIONS AND NON-ACADEMIC ORGANISATIONS

BACKGROUND INFORMATION

Researchers: Osama Shtewi, Dr Sigmund Wagner-Tsukamoto, Prof Peter Jackson

Purpose of data collection: PhD study

Details of participation: You are invited, as faculty members currently working full time in Libyan higher education institutions (HEIs), to participate in a research study being conducted by Osama Shtewi. The purpose of this research is to compare, contrast and investigate the contribution and achievement of faculty members in HEIs. The survey is divided into four sections: knowledge transmission (KT), knowledge dissemination (KD), knowledge exchange (KE) and background information. Completing the survey will take approximately 15 minutes.

CONSENT STATEMENT

1. I understand that my participation in this research study is voluntary. I may choose not to participate and I may withdraw my consent to participate at any time.
2. I am aware of what my participation will involve.
3. I understand that all information about me will be treated in strict confidence and that I will not be named in any written work arising from this study.
4. I understand that data generated by the study must be retained in accordance with the university's policy on academic integrity and will be kept securely in paper or electronic form after the completion of the research project.

5. I understand that the research will involve follow-up interviews which are voluntary and that I can withdraw from the study at any time without giving any reason.
6. I understand that the overall findings may be submitted for publication in a scientific journal, or presented at scientific conferences.
7. I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Participant's signature: ___________________________________

Participant's name: ___________________________________

Date: __________

If you would like to receive a summary of the results by email, when this is available, please provide your email address: ______________________

Appendix D

UNIVERSITY OF LEICESTER

PARTICIPANT INFORMATION SHEET FOR INTERVIEW

INVESTING IN HUMAN CAPITAL: THE CONTRIBUTION OF LIBYAN SCHOLARS EDUCATED ABROAD TO ACADEMIC INSTITUTIONS AND NON-ACADEMIC ORGANISATIONS

Dear Participant,

You are being invited to take part in a research study. Before you decide whether to take part in the study it is important that you understand what the research is for and what you will be asked to do. Please take time to read the following information.

It is up to you to decide whether or not to take part. If you decide to take part you will be given this information sheet to keep. You will also be asked to sign a consent form. You can change your mind at any time and withdraw from the study without giving a reason. If you withdraw from the study all the information and data collected from you, to date, will be destroyed and your name removed from all the study files. You are welcome to contact me if you would like any further information.

The purpose of this research project is to assess the extent to which investing in human capital by sending scholars to complete their postgraduate studies abroad is improving the quality of higher education institutions (HEIs) in Libya and contributing to the overall economic development of the country. This research project is being conducted by Osama Al Bashir Shtewi, a research student at the University of Leicester in the UK. You have been chosen because you are currently working full time in a Libyan HEI and you have already participated in the questionnaire and offered very important information which needs more explanation.

The semi-structured interview (which will be conducted face-to-face) will take approximately 50 minutes. If you choose to take part I will organise a location for the interview convenient to you and I will ask you to answer some questions related to the previous survey. There are no right or wrong answers – I just want to hear about your opinions and experiences in terms of the quality of Libyan higher education and how faculty members engage with external stakeholders (knowledge exchange). Whilst there are no direct benefits from taking part in the project, it is hoped that the findings will identify ways of improving the quality of Libyan higher education and offer a more comprehensive understanding of academia's impact on the country's economic development.

The interview will be recorded on audio tape and then transcribed onto a computer. The audio tapes will be stored securely at all times and the computer data will be protected by password. The audio tapes will be destroyed at the end of the study. Your response will be treated with full confidentiality and anyone who takes part in the research will be identified only by code numbers. The interviews will be analysed using a software package. At the end of the research I will write a report and the results may be published in peer-reviewed journals and conference presentations, but no research participant will be identifiable. There are no risks associated with participating in this study.

Please do not hesitate to contact me if you need further information.

Thank you for taking the time to read this information sheet.

Yours sincerely,

Osama Al Bashir Shtewi

School of Business
University of Leicester
oabs1@le.ac.uk

Appendix E

UNIVERSITY OF LEICESTER

University Ethics Sub-Committee for Sociology; Politics and IR; Lifelong Learning; Criminology; Economics and the School of Education

12/01/2016

Ethics Reference: 4299-oabs1-education

TO:
Name of Researcher Applicant: Osama Shtewi
Department: Education
Research Project Title: Investing in Human Capital: The Role of Scholars Educated Abroad in Libya's Higher Education and Economic Development

Dear Osama Shtewi,

RE: Ethics review of Research Study application

The University Ethics Sub-Committee for Sociology; Politics and IR; Lifelong Learning; Criminology; Economics and the School of Education has reviewed and discussed the above application.

1. Ethical opinion

The Sub-Committee grants ethical approval to the above research project on the basis described in the application form and supporting documentation, subject to the conditions specified below.

2. Summary of ethics review discussion

The Committee noted the following issues:

Thank you for your application which is now in order.

3. General conditions of the ethical approval

The ethics approval is subject to the following general conditions being met prior to the start of the project:

As the Principal Investigator, you are expected to deliver the research project in accordance with the University's policies and procedures, which includes the University's Research Code of Conduct and the University's Research Ethics Policy.

If relevant, management permission or approval (gate keeper role) must be obtained from host organisation prior to the start of the study at the site concerned.

4. Reporting requirements after ethical approval

You are expected to notify the Sub-Committee about:

Significant amendments to the project

Serious breaches of the protocol

Annual progress reports

Notifying the end of the study

5. Use of application information

Details from your ethics application will be stored on the University Ethics Online System. With your permission, the Sub-Committee may wish to use parts of the application in an anonymised format for training or sharing best practice. Please let me know if you do not want the application details to be used in this manner.

Best wishes for the success of this research project.

Yours sincerely,
Dr. Laura Brace
Chair

Appendix F

This letter, issued by the Ministry of Higher Education, shows the amount (LYD 96,578,519) that the Libyan government invested in scholars studying abroad over the period 01/01/2017 to 31/03/2017.

STATE OF LIBYA
GOVERNMENT OF NATIONAL ACCORD
MINISTRY OF EDUCATION

دولة ليبيا
حكومة الوفاق الوطني
وزارة التعليم

وزارة التعليم
قسم التفويضات المالية

الرقم الاشاري : ش.م.م/8/478

التاريخ : ..../......./....... 14 هـ

الموافق : 01/03/2017 م

السيد/ مدير إدارة الخزانة بوزارة المالية

بعد التحية ,,,

بالإشارة إلى لائحة الإيفاد للدراسة العليا بالخارج رقم (43) لسنة 2015م، وبالإشارة إلى مراسلة السيد/ مدير إدارة البعثات رقم اشاري (وت ع /107) بتاريخ (2017/02/01)م وبالإشارة إلى مراسلات السيد/ مدير إدارة البعثات رقم اشاري (وت ع /143 ، 144 ، 145) بتاريخ (2017/02/08)م وبالإشارة إلى مراسلات السيد/ مدير إدارة البعثات رقم اشاري (وت ع /174 ، 175) بتاريخ (2017/02/27)م, وبالإشارة إلى قرار المجلس الرئاسي لحكومة الوفاق الوطني رقم (5) لسنة 2017م بشأن اقرار ترتيبات مالية للسنة المالية 2017م.

عليه ,,,

نحيل إليكم الكشوفات التفصيلية لعدد (9862) طالب والخاصة بالمنحة الشهرية لعدد (50) دولة (عدا امريكا وكندا) من الفترة 2017/01/01 والى غاية 2017/03/31 م (الربع الأول 2017) بإجمالي مبلغ وقدره (96,578,519.000) دل فقط ستة وتسعون مليون وخمسمائة وثمانية وسبعون الف وخمسمائة وتسعة عشر دينار لا غير, نأمل الاستلام وخصم المبلغ من بند الدراسات العليا بالخارج , وإحالته إلى حساب الطلبة بالسفارات الليبية بالخارج كلا حسب الكشف المرفق.

ولكم جزيل الشكر والامتنان
والسلام عليكم

أ.مصطفى محفوظ حمزة
مدير إدارة الشؤون الإدارية والمالية

أ.محمد ميلاد حمد
المراقب المالي العام

صورة لـ
السيد/وزير التعليم
السيد/ وكيل الوزارة
السيد/مدير إدارة البعثات الدراسية
السيد/المراقب المالي العام
السيد/مدير مكتب المراجعة الداخلية
مكتب الشؤون الإدارية والمالية
قسم التفويضات المالية
الملف الدوري العام
م/ إبراهيم طه فوزي

طرابلس - ليبيا
021 484 3457 - 021 4843252

Appendix G

Developing and developed economies, as classified by United Nation, World Economic Situation and Prospects (WESP).

Developed economies

Europe		Other countries	Major developed economies (G7)
European Union	Other Europe		
EU-15	Iceland	Australia	Canada
Austria	Norway	Canada	Japan
Belgium	Switzerland	Japan	France
Denmark		New Zealand	Germany
Finland		United States	Italy
France			United Kingdom
Germany			United States
Greece			
Ireland			
Italy			
Luxembourg			
Netherlands			
Portugal			
Spain			
Sweden			
United Kingdom			
New EU member States			
Bulgaria			
Croatia			
Cyprus			
Czech Republic			
Estonia			
Hungary			
Latvia			
Lithuania			
Malta			
Poland			
Romania			
Slovakia			
Slovenia			

Developing economies by region[a]

Africa

North Africa
- Algeria
- Egypt
- Libya
- Mauritania
- Morocco
- Sudan
- Tunisia

Central Africa
- Cameroon
- Central African Republic
- Chad
- Congo
- Equatorial Guinea
- Gabon
- Sao Tome and Prinicipe

East Africa
- Burundi
- Comoros
- Democratic Republic of the Congo
- Djibouti
- Eritrea
- Ethiopia
- Kenya
- Madagascar
- Rwanda
- Somalia
- Uganda
- United Republic of Tanzania

Southern Africa
- Angola
- Botswana
- Lesotho
- Malawi
- Mauritius
- Mozambique
- Namibia
- South Africa
- Zambia
- Zimbabwe

West Africa
- Benin
- Burkina Faso
- Cabo Verde
- Côte d'Ivoire
- Gambia
- Ghana
- Guinea
- Guinea-Bissau
- Liberia
- Mali
- Niger
- Nigeria
- Senegal
- Sierra Leone
- Togo

Asia

East Asia
- Brunei Darussalam
- China
- Hong Kong SAR[b]
- Indonesia
- Malaysia
- Myanmar
- Papua New Guinea
- Philippines
- Republic of Korea
- Singapore
- Taiwan Province of China
- Thailand
- Viet Nam

South Asia
- Bangladesh
- India
- Iran (Islamic Republic of)
- Nepal
- Pakistan
- Sri Lanka

Western Asia
- Bahrain
- Iraq
- Israel
- Jordan
- Kuwait
- Lebanon
- Oman
- Qatar
- Saudi Arabia
- Syrian Arab Republic
- Turkey
- United Arab Emirates
- Yemen

Latin America and the Caribbean

Caribbean
- Barbados
- Cuba
- Dominican Republic
- Guyana
- Haiti
- Jamaica
- Trinidad and Tobago

Mexico and Central America
- Costa Rica
- El Salvador
- Guatemala
- Honduras
- Mexico
- Nicaragua
- Panama

South America
- Argentina
- Bolivia (Plurinational State of)
- Brazil
- Chile
- Colombia
- Ecuador
- Paraguay
- Peru
- Uruguay
- Venezuela (Bolivarian Republic of)

a Economies systematically monitored by the Global Economic Monitoring Unit of DPAD.

b Special Administrative Region of China.

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