

**Internationalization of Faculty in Research and Faculty Research Productivity:
Evidence from Brazil and China**

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The benefits of the internationalization of higher education have contributed much to both its individual and institutional outcomes. They also contribute to faculty productivity and professional development. Growing budget cuts and operational costs, however, have led universities to begin to reduce academic staff's international activities.

International engagement is an important attribute of individual faculty members because it contributes to some of the most productive academic staff in the world (Finkelstein & Sethi, 2014). Thus, better measures of the impact of faculty international engagement on research productivity, have the potential to support institutional decision making related to higher education institutions' (HEIs) internationalization strategies.

The purpose of this dissertation study was to empirically examine if faculty research-related international activities were related to faculty research productivity at higher education institutions (HEIs). An additional question was, were these relationships significantly impacted by gender, academic rank, academic discipline, and institution type?

This study derived relevant data from the Changing Academic Profession (CAP) survey, an international large-scale dataset collected from 24,874 academic staff in 19 countries during 2007-2008. China's and Brazil's datasets were extracted as case studies. Significant individual and institutional variables were included in the statistical model. A multiple regression analysis using STATA/SE 14.2 software tool was performed to address the research questions. The

research model and conceptual approach were designed with the support of Knight's (1994, 2004, 2012) internationalization frameworks, as they are widely used in the literature.

The main results indicate that there is a positive and statistically significant relationship between international dissemination and faculty research productivity in both the Brazil and China samplings. The relationship between international collaboration and faculty research productivity, however, was not found to be significant in China; although it was in Brazil. The regression results included interaction effects. These also indicated significant differences between the observed relationships based on the following factors: gender, academic rank, academic discipline, and institution type, both in Brazil and in China.

This study provides a strong framework and empirical evidence for outcomes related to the internationalization of higher education. The implications of this study can help stakeholders make better HEI performance-related decisions.

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List of Acronyms/Abbreviation

IoHE	Internationalization of Higher Education
HEIs	Higher Education Institutions
CAP	Changing Academic Profession (Survey)

Preface

My first and deepest thanks to my beautiful wife, Elif, whose endless support, love, and patience have made this all possible.

To my lovely son, Emirhan, I remained strong all the time with your existence and smile. My hope is that you find the passion and ability to pursue your dreams and overcome all the obstacles as I have been able to do.

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1.0 Introduction

Today, internationalization is one of the key trends in higher education and an inseparable component of higher education institutions (HEIs). Universities are increasingly incorporating international scope and direction into their strategic plans, as they prioritize internationalization in teaching, learning, and research activities. In general, changes in information technology, the integration of research, everyday use of English in scholarly communication, and growing global labor and science market are among the factors fostering internationalization at HEIs (Altbach & Knight, 2007). Specifically, recent developments in higher education such as its privatization and commercialization, new quality and accreditation regulations, global ranking systems, international research networks and collaboration, and growing demand for advanced learning outcomes have influenced university systems to improve the international dimension of higher education (Knight, 2012).

The integration of internationalization into higher education has increased dramatically at a time of substantial changes in this era (Teichler, Arimoto, & Cummings, 2013). Recently, universities have faced such challenges as a decrease in government financial support, the demand for outcome-based accountability, pressure for market-driven innovations, and expectations for significant research advances (Altbach, Reisberg, & Rumbley, 2009). For many reasons, those pressures and financial constraints have led both public and private institutions to seek internationalization in higher education (Sutin & Jacob, 2016). While challenges and demands clearly exist, countries planning to develop higher education systems and establishing world-class universities have also invested considerably in the internationalization of the higher education (IoHE) (Salmi, 2009; Salmi & Altbach, 2011).

Historically, internationalization has long been viewed in the context of the mobility of the university community, with reference mostly to students. Over time, various efforts to integrate internationalization into higher education have enabled more academicians to engage in various international activities. In the past decade, for example, faculty engagement in internationalization has received significant attention and support from HEIs (Childress, 2010; Dewey & Duff, 2009). Recently, emphasis has shifted from studies minimally concerned with the changes and impact of globalization on higher education to others that are highly concentrated with faculty involvement in internationalization (Altbach & Knight, 2007; Schapper & Mayson, 2004).

Teaching, research, and service are the three areas where faculty play a vital role in the process of internationalization. As advancement in research is often considered one of the most desired outcomes of higher education, the importance of research activities in HEIs has increased markedly (Teichler et al., 2013). With the growing emphasis on knowledge production, there has been a tendency to focus on research and training (Cummings & Shin, 2014). Among various roles and tasks of faculty members, research has continued to receive most of the attention in the area of internationalization, as it is traditionally important in the quest for greater achievement, quality, and academic excellence (Altbach, 2013; Knight, 1994).

1.1 Statement of the Problem

Because international engagement is an important attribute of individual faculty members and, more importantly, of the most productive academic staff across the world (Finkelstein &

Sethi, 2014), it is crucial to explore the relationship of international engagement of faculty in research with faculty research productivity. However, researchers have often focused on short- and long-term mobility at the individual level and mutual collaboration at the institutional level. Furthermore, most studies have tended to focus on the factors affecting faculty engagement in internationalization (Altbach, 2004; Dewey & Duff, 2009).

While attention has been paid to individual and institutional factors affecting faculty involvement in higher education, the influence of internationalization on faculty academic life have been generally ignored (Finkelstein, Walker, & Chen, 2013). However, as Knight (2015b) emphasized, “the two most important benefits identified by higher education institutions are more internationally oriented staff/students and improved academic quality” (p. 9). Thus, it is crucial to understand the impacts and benefits of faculty involvement in research activities that are international in scope. More importantly, its impact remains critical as it relates to faculty development and policy design.

1.2 Purpose of the Study

The general purpose of this study is to explore the relationship between IoHE and faculty outcomes. Particularly, this study aims at examining the relationship between internationalization of faculty in research and faculty research productivity. This study will mainly address the research-oriented international activities of faculty, including the presentation of research efforts (publication in a different language and publication in a foreign country) and involvement in joint research projects (coauthorship with foreign colleagues), while addressing publication as an indicator of the research performance. The study will focus on full-time faculty members at HEIs

in Brazil and China. Significant individual and organizational attributes have been included in the research design to further explore the relationship between the selected international activities in research and faculty research productivity in both countries.

This study will draw upon an existing dataset of Brazil and China extracted from the Changing Academic Profession (CAP) survey, which was applied to faculty members from 19 different countries in 2007-2008 (Teichler et al., 2013). The present research study will provide a comparative analysis of Brazil and China of BRIC countries (Brazil, Russia, India, and China) where IHE is increasingly taking place within their higher education systems (Huang, 2003; Laus & Morosini, 2005). The study, finally, offers policy recommendations regarding faculty involvement in internationalization, international dimension to research, and faculty research productivity for policymakers, HEIs, and scholars in higher education.

1.3 Research Questions

The three research questions for this study are the following:

- 1- What is the relationship between international collaboration in research and faculty research productivity among full-time faculty members?
- 2- What is the relationship between international presentation of research and faculty research productivity among full-time faculty members?
- 3- How do observed relationships vary by gender, academic rank, discipline, and institution type?

1.4 Significance of the Study

This study is significant for several reasons. First, its general purpose is to add to the knowledge base of IoHE, because the existing literature lacks comparative and empirical studies that examine the potential influences, benefits, and outcomes of faculty involvement in international research activities. This study will help advance our understanding of the implications of international involvement in research on faculty research performance, while providing empirical evidence for future research. Second, the present research will make a significant contribution through comparing the results of two non-western, developing, and non-English-speaking countries. Not only Brazil and China, but also other developing as well as developed countries, will benefit from the results of this study in helping them design and reconsider institutional and national policies on IoHE, faculty involvement in internationalization, faculty research efforts, and research publication productivity. Third, this study is particularly important for institutions of higher education and their administrators. Possible findings indicating positive relationships would help improve reward systems, increase funding and grant opportunities for faculty international activities, advance faculty professional development, and promote research-oriented activities that are international in scope.

As a result, institutions may want to increase their support for faculty international involvement in research for greater faculty outcomes while they struggle with the growing public funding decline and increased operational cost. The advent realization of the potential impacts of faculty international activities on research outcomes has the potential to support decision making hence improving the institutions' overall performance and outcomes. The results are also important for faculty members themselves. If the findings indicate that international involvement in research has a positive relationship with research productivity, faculty members may want to

include more international dimensions to their research. Given these results, nations will also be able to put significant emphasis on the increasing internationalization of higher education.

1.5 Organization of the Study

This dissertation is presented in five major sections, as follows. The first chapter serves as an overview of the dissertation, including the statement of the problem, the purpose of the study, research questions, the significance of the study, and the organization of the study.

The second chapter comprising the literature review is fourfold. First, it presents some fundamental elements of the proposed research. Then, previous studies are critically examined relating to the indicators, factors, and measurement of faculty international involvement in research and faculty research productivity. After consideration of the relevant contexts and earlier research, the conceptual framework is explained. Finally, Brazil and China are introduced according to the purpose of the study.

The third chapter describes the study, including its research questions, sampling and data description, data management and preparation, independent and dependent variables, and statistical procedures. The fourth chapter presents the principal findings and analysis of the study, while providing some comparisons of the results from Brazil and China. The fifth, and last, chapter includes a discussion of the key findings, summary and conclusions of the study, policy implications, limitations and future research, and policy recommendations for academic staff, researchers, university administrators, and policymakers.

2.0 Literature Review

Internationalization of higher education is an evolving concept. The complex relationship among institutions, individuals, and knowledge affects the direction and perception of internationalization. Within this complexity, the internationalization of faculty has become a more complicated phenomenon (Enders, 2004; Kehm & Teichler, 2007; Welch, 1997). To provide a comprehensive understanding of IoHE and faculty, it is crucial to clarify some relevant dimensions of internationalization. Thus, the literature review in this chapter will follow a comprehensive order, as it critically reviews faculty involvement in international activities and faculty research productivity.

The first part of the literature review will set the stage for identifying the process and implications of internationalization in higher education. It will address several key elements, including globalization and internationalization; definition of IoHE; rationale and motivation for IoHE; internationalization at home; internationalization, research, knowledge production, and outcome; internationalization and faculty professional development; and internationalization and the socialization of faculty. The second part of this chapter will review previous research studies and methods that have investigated faculty engagement in international activities and research productivity.

The third part of the literature review will explain the conceptual framework on which this study is based. This section will show the relevancy of the use of the frames that Knight (1994, 1999, 2004) generated. Knight's frames provide a useful approach to study the relationship between the faculty international involvement in research and faculty research productivity, as she addresses the importance of research and scholarly collaboration, desired

outcomes, performance and productivity, and professional development in the process of internationalization. The last part of the literature review will include the rationales for the country selections and background information for Brazil and China.

2.1 Globalization and Internationalization of Higher Education

The role of globalization is apparent in the process of the internationalization of higher education. Globalization has led to more social, cultural, economic, political, and academic interactions between nations and provided the higher education community with opportunities for international involvement in teaching/learning, research, and service/outreach. Moreover, the cross-border interactions among researchers have improved significantly with the rise of globalization in the last few decades. Changes in information technology, the integration of research, the everyday use of English in scholarly communication, and the increasingly global labor and science markets have led the university community, including both students and faculty members, into more international engagement (Altbach & Knight, 2007; Bartell, 2003; Chan & Dimmock, 2008; Dodds, 2008; Foskett & Maringe, 2010; Gornitzka & Langfeldt, 2009).

Globalization has been the leading force for the expansion and implementation of internationalization at higher education institutions. However, the distinctive features of internationalization have been increasingly recognized in higher education although internationalization is often confused with globalization and used interchangeably because of the traditional, generic, and favorable use of the former term (Altbach, 2004). Ultimately, the internationalization of higher education as an underlying form of globalization has been an increasingly important topic of many research studies in the area of higher education (Abramo,

D'Angelo, & Solazzi, 2011; Altbach & Knight, 2007; Bartell, 2003; Chan, 2004; Chan & Dimmock, 2008; Dodds, 2008; Foskett & Maringe, 2010; Garson, 2016; Knight, 2004; Scott, 2000; Teichler, 2004; Van der Wende, 2001).

2.2 Definition of Internationalization of Higher Education

Historically, the concept of the internationalization of higher education has been developed from a rich literature base since the end of the Cold War. The concept mainly emerged from the terms *international education*, *global education*, *multicultural education*, *cross-cultural education*, and *comparative education* (Knight & De Wit, 1995). Since the early 1990s, internationalization of higher education has also incorporated the terms *regionalization*, *transnational*, and *borderless or cross-border education* into its conceptual meaning (Huang, 2014). Ultimately, the evolving nature of internationalization refers to a complicated process when attempting to generate a precise definition.

Although there exists relative agreement on the understanding of IoHE as a response to globalization, there is no consensus on a standard definition, due to its multifaceted and evolving nature (Sanderson, 2008). However, some definitions that have survived reflect the changing character of the term. For instance, Söderqvist (2002) defined *internationalization* as a change process resulting from the inclusion of an international dimension into all aspects of higher education in order to improve its quality. From a wider perspective, Huang (2014) defined IoHE as "basically the process of carrying out exchange activities in education and research of various kinds among universities and institutions in different countries" (p. 3). However, the most widely accepted definition was created by Knight in 1994, and it has received more attention over time.

Although Knight (2004, 2015a) updated it a few times, its main structure persists. One of the most comprehensive definition of the *internationalization of higher education* is as follows;

Internationalization of higher education is the process of integrating an international dimension into the teaching/learning, research and service functions of a university or college. An international dimension means a perspective, activity or service which introduces or integrates an international/intercultural/global outlook into the major functions of an institution of higher education. (Knight, 1994, p. 3).

Researchers have tended to adapt this definition for specific cases, groups, and stakeholders, as it is well designed and applicable to individual, institutional, and national situations. Thus, when referring to Knight's definition, researchers have used various terms in studying the academic profession and faculty members. For example, some have preferred using the terms *internationalization of the academic profession* and *internationalization of the academy*, while others have used *internationalization of the academic staff*, *faculty internationalization*, *internationalization of the academic-self*, and *internationalization of the faculty* (Finkelstein & Sethi, 2014; Li & Tu, 2016; Teichler et al., 2013).

2.3 Rationales and Motivations for Internationalizations of Higher Education

Rationales for IoHE vary dramatically among stakeholders, including individuals, institutions, sectors, and nations, as activities and participants differ (Van der Wende, 2001). While some address individual and institutional rationales that drive internationalization (Childress, 2009), others emphasize much more complex rationales, including economic, sector, and national factors (Knight & De Wit, 1995). Although rationales of different stakeholders

seem to indicate a contradiction, because each highlights a different aspect of internationalization (Gacel-Ávila, 2012), they are, in fact, part of an integrated process (Knight, 2004). All in all, improving the academic quality and excellence in HEIs is increasingly been a common justification for supporting international activities of the university community (Frølich, 2008).

Knight (2004) structurally categorized the rationales as economic, political, socio-cultural, and academic. These widely-accepted rationales are used by many researchers (Gornitzka & Langfeldt, 2009; Huang, 2014). The academic rationale, which is of relevance for faculty, includes an international dimension to research, extension of academic horizons, institution building, profile and status, enhancement of quality, and improved international academic standards. However, the most common academic rationales for internationalization are the rise of international standards in research and advancement in research (Qiang, 2003; Teichler et al., 2013).

Internationalization plays a significant role in the changing academic profession, as it is associated with faculty experiences, behaviors, and beliefs (Schwietz, 2006). As Mustafa et al. (2011) mentioned, internationalization helps faculty become interculturally matured through communication experiences with their peers from other countries and cultures. Internationalization efforts lead faculty to understand the importance of environmental, economic, cultural, and social interdependence among nations and, as a result, to strive to improve the academic skills essential for survival in an international environment and context (Knight & De Wit, 1995). Indeed, the changing global academic environment requires both advanced and multifaceted skills. For example, the demand for field knowledge of other countries and foreign language proficiency is increasing in both academia and the market (Teichler, 2004; Van Der Wende, 1997).

2.4 Growing Internationalization at Home

Although IoHE refers to a variety of activities, the main international activities fall into two major areas; internationalization at home and internationalization abroad (Knight, 2004; Nilsson, 2003). Internationalization at home often refers to the activities that take place in the current university environment, where faculty seek to engage in teaching, research, and service activities, while internationalization abroad includes programs that require crossing borders and traveling to another country for short- and long-term academic purposes. In a larger sense, internationalization at home refers to "any internationally related activity with the exception of outbound student and staff mobility" (Wächter, 2000, p. 6). However, internationalization at home has often been used to address the intercultural dimension of internationalization (Deardorff, 2004), whereas its focus has expanded over time (Knight, 2012).

While internationalization at home and internationalization abroad are two pillars of higher education, the former has received a significant attention in the last decade (Knight, 2004, 2012; Rostan, 2012). The growing number of international students and visiting scholars, curriculum, and social and cultural awareness have led institutions focus on the internationalization at home. Also, the financial constraints increasingly confronted by universities have led them gradually to reduce the intensity of international activities that mainly require traveling abroad, due to its high cost (Childress, 2009). Ultimately, lack of funding emerges as a significant barrier to developing faculty involvement in international research activities (Childress, 2009); internationalization at home has received considerable attention recently (Crowther et al., 2000; Knight, 2012).

In conceptualizing internationalization at home, Knight (2012) created a comprehensive framework in which curriculum and programs, teaching and learning processes, research and

scholarly activities, co-curricular activities, extra-curricular activities, and integration with the local community are listed from a broader perspective. Regarding research and scholarly activities at home, for instance, some specific activities are identified, namely, "area and theme centers," "joint research projects," "international conferences and seminars," "published articles and papers," "international research agreements," "research exchange programs," "international research partners in academic and other sectors," and "integration of visiting researchers and scholars into academic activities on campus" (p. 35). These dimensions of internationalization address faculty involvement in internationalization without requiring crossing-border and has been the major justification of the approaches taken in this study.

2.5 Internationalization, Research, Knowledge Production, and Outcomes

Internationalization has increasingly been defined as part of efforts in growing research and knowledge production (Gornitzka & Langfeldt, 2009). In other words, research and knowledge production have more and more become a primary rationale for IoHE at many institutions (Knight, 2004). Universities, after all, tend to be more research-oriented, and faculty members play a significant role in this process as part of collaboration-based, cross-disciplinary, and international partnerships (Friesen, 2012). Within this context, internationalization has changed the ways of research. Growing global issues and challenges have revealed the importance of international and interdisciplinary collaboration to overcome such global issues as health, crime, and environment (Teichler et al., 2013). English as the lingua franca of academia remains a common platform for international dissemination of research, international collaboration, and globalized research.

As global competitiveness demands for higher quality standards, and expectations for major contributions to national development are growing rapidly, higher education institutions are putting a significant emphasis on research, knowledge production, and outcome. The demand for knowledge economy increased the importance of research and training as social demands for knowledge production grew (Shin & Cummings, 2014). Currently, universities focused on policies and strategies to improve the global competitiveness of their institutions through research and knowledge transfer, while increasing the international experiences of faculty in research with high-quality outcome expectations. Enhancing the international dimension in research is often found to be related to the quality of higher education (Qiang, 2003).

Border-crossing communication and border-crossing reputations are deliberately being addressed and considered to be linked with quality (Teichler, 2004). Internationalization emerges as a valuable resource and opportunity for the development of higher education in the direction of high international standards and quality improvement. Thus, it relates to increasing faculty research performance and requires higher quality production. As faculty play a primary role in research, the outcome and quality of research must be addressed by institutions (Salmi & Altbach, 2011).

Designing a model of internationalization, Paige (2005) determined ten performance categories for HEIs in the process of internationalization, highlighting research and scholarly collaboration as part of the faculty involvement in international activities. Because growing global communication and cooperation in research often lead to knowledge transfer, the international activities in research are expected to result in a more rapid and concrete exchange of knowledge among participants or parties (Shin, Arimoto, Cummings, & Teichler, 2014; Teichler, 2004). As Laus and Morosini (2005) stated, "the internationalization of universities is

directly related to development of research and the production of knowledge.” (p. 123). Ultimately, the emphasis on research and knowledge transfer in the process of internationalization is increasing as high quality research and publication help raise the visibility of HEIs nationally and internationally (Liu & Metcalfe, 2016).

2.6 Internationalization and Faculty Professional Development

Professional development of faculty has traditionally been concerned with the advancement of expertise in a specific discipline (Sullivan, 1983). Although faculty development may take many forms at higher education institutions (Caffarella & Zinn, 1999), its major emphasis is placed on the professional development of faculty in research.

Faculty development has played an increasingly vital role in the process of internationalization at HEIs. Faculty development is one of two most important benefits of internationalization as it refers to internationally oriented faculty and increased academic quality (Knight, 2015a). The growing demand for quality in higher education has also highlighted the importance of professional development, which is crucial for academic excellence in research, particularly at world-class universities (Jacob, Xiong, & Ye, 2015). Therefore, most HEIs frequently design programs and policies to improve faculty and research development (Jacob, Xiong, et al., 2015; O'Meara & Terosky, 2010; Wang, Wang, & Liu, 2011).

Professional development has long been an important component of strategic planning for higher education institutions. Acknowledging the various elements of the process of IoHE, Rudzki (1995) named faculty development as one of the four critical dimensions for the effective use of a strategic management model. Supporting faculty involvement in international activities

is a form of investing in faculty development at the individual level. Development of individual capacities has become increasingly crucial in our highly globalized world. Thus, designing strategies and programs to foster the development of faculty's capacity in order for faculty to understand and deal with the complex issues and problems that we face today have become highly important in this era (Weidman, 2016).

It is evident that internationalization enhances professional development. Yeravdekar and Tiwari (2014) found that exposure to a foreign environment at a university setting would lead individuals to improve their personal and professional skills through experiential learning, cognitive resilience, and cultural empathy. They concluded that the international experience and knowledge have potential to influence individuals' self-integration into different academic environments and generate more autonomy. Thus, having faculty who involve in internationalization activities, particularly in research, is increasingly becoming a performance indicator of HEIs (Paige, 2005).

Collaboration is also crucial for faculty professional development as it provides a learning experience to obtain practical skills and techniques from partners for future research activities. The best acquisition of tacit knowledge between collaborators occurs when researchers jointly experience problem-solving through discussions and reflections. Furthermore, collaboration leads researchers to build social networks where they can reach more resources and information for future research activities and collaboration (He, Geng, & Campbell-Hunt, 2009). Thus, having international collaboration can help improve faculty personal and professional development.

2.7 Internationalization and Socialization of Faculty

Socialization provides individuals with the opportunity to engage in academic settings, which is important for all stakeholders in order to achieve educational goals (Bragg, 1976). Various definitions of socialization lead to different connotations. In general, Bragg (1976) defines it as a process, referring to "the acquisition of the specialized knowledge, skills, attitudes, values, norms, and interests of the profession that the individual wishes to practice" (p. 6). Within this definition, professional socialization is expected to lead to professional identity as an end product, while the socialization process itself results in the incorporation of group values and norms into the self-images of individuals.

Investigating the socialization of graduate students, Weidman, Twale, and Stein (2001) defined socialization as "the processes through which individuals gain the knowledge, skills, and values necessary for successful entry into a professional career requiring an advanced level of specialized knowledge and skills" (p. 5). Socialization can occur through engaging and participating in various activities and thus may not be limited to a single action or a particular group of activities.

In comparison to the socialization of students in graduate programs, the socialization process of faculty has received less attention from researchers. For Tierney (1997), socialization is an important way for faculty members to learn to be effective in HEIs; junior faculty, in particular, socialize by engaging in teaching, research, and service activities. Although several researchers have studied faculty socialization, no known study has discussed internationalization under socialization or vice versa.

However, there are some commonalities between socialization and internationalization. First, both are defined as dynamic processes (Knight, 2004; Weidman et al., 2001). As faculty

gain knowledge, skills, and values through socialization for a successful professional career and development (Weidman et al., 2001), they may engage in international activities, including research collaborations and publication opportunities, to obtain personal, professional, and cultural benefits. Also, Weidman et al. (2001) locate socialization experience at the center of three dimensions, namely, normative context (teaching, research, service), socialization processes (interaction, integration, learning), and core elements (knowledge acquisition, investment, involvement). Similarly, Knight (1999, 2004) addresses those aspects in terms of internationalization, referring to the internationalization of teaching, research, and service, the process approach of internationalization, involvement, and knowledge transfer. Furthermore, Weidman, DeAngelo, and Bethea (2014) addressed the critical relationship between socialization and identity development in the undergraduate student context, while the connection between internationalization of students and faculty and their personal and professional development is highly emphasized in the process of internationalization (Knight, 2004; Sanderson, 2008).

Socialization is not necessarily limited to specific activities at HEIs, at a time of increasing internationalization at home and abroad. Thus, socialization, in fact, is of particular relevance for studying the internationalization of students and faculty members at higher education institutions.

2.8 Faculty Productivity

The global trend of “doing more with less” at a time of financial constraints has led to a considerable increase in the expectations from faculty members at all levels of higher education. Faculty productivity has, indeed, clearly remained a key concern at colleges and universities, as

it affects various decision-making processes regarding faculty members. The regulation of faculty work is now a key policy issue in both developed and developing countries. From a general perspective, it is a response to the general accountability movement in the marketplace in which faculty are expected to be more productive in not only research, but also teaching and such other responsibilities as service, outreach, and leadership (Jacob, Sutin, Weidman, & Yeager, 2015). The growing expectations from faculty remains a driving force that has diversified the tasks and responsibilities of faculty members and dramatically increased their workload over time.

Numerous studies have explored research productivity from various perspectives and approaches, as productivity continues to remain at the top of the policy agenda at higher education institutions in many countries. Its importance has led to the accumulation of an extensive literature on faculty work and how to measure it. However, it is not easy to quantify faculty research productivity, given that tasks and responsibilities differ widely depending on a variety of factors, including individual, institutional, and environmental (Webber, 2011).

Today, faculty at any type of institution are under pressure to bring in external funding, conduct research, and publish more in addition to their normal responsibilities for teaching and service (Blackburn, Bieber, Lawrence, & Trautvetter, 1991). Since numerous studies have explored various measuring factors related to academic productivity, research, teaching, and service have remained the three areas in which faculty members are evaluated for their efforts (Webber, 2011). However, research publication productivity remains the primary focus of measuring faculty productivity in comparison to teaching and service (Meyer, 2012), as it is considered to be the principal means for production and dissemination of academic knowledge (Gok & Weidman, 2015).

2.9 Previous Research Studies

As the number of studies on IoHE increased substantially in the last three decades, the quality of both qualitative and quantitative research studies has also improved dramatically (Kehm & Teichler, 2007). Although IoHE is an emerging phenomenon, faculty research productivity has been studied since the 1950s (Creswell, 1985). With this recognition, this section presents the earlier studies on faculty involvement in internationalization and faculty research productivity, while critically reviewing them. Besides addressing well-recognized indicators of faculty engagement in international activities and research productivity, this section also highlights the relevant indicators to be used in the present study. Furthermore, although relatively little research has been done in this area, this section covers the studies investigating the relationship between internationalization of faculty in research and faculty research productivity.

2.9.1 Internationalization of Faculty

Teaching, research, and service have traditionally been the three major functions of universities and the expected primary roles of faculty members. Generally, indicators of the internationalization of faculty, therefore, refer to these three major roles (Huang, Finkelstein, & Rostan, 2014). Previous research studies focusing on internationalization of faculty in teaching, research, and service have often concentrated on factors influencing faculty international involvement (Butler, 2016; Doyle, 2013; Klyberg, 2012; Schwietz, 2006). Individual and institutional factors have often been addressed in the process of discovering how faculty members internalize their works and what drives them to become involved in internationalization

(Childress, 2010). For instance, in a very recent study, Li and Tu (2016) explored the individual and environmental factors that motivate faculty to engage in international activities, finding that both are positively associated with more international engagement, while individual reasons play a critical role in mediating between faculty engagement in internationalization and environmental factors. In addition, Lepori, Seeber, and Bonaccorsi (2015) suggested that country factors are also statistically significant and more important than institutional characteristics in driving internationalization.

While some studies were interested in investigating the factors affecting internationalization of faculty, others sought to explore the types of international activities in which faculty engage. In this area of inquiry, a major contribution was made by the International Survey of the Academic Profession, conducted by the Carnegie Foundation for the Advancement of Teaching in 1992. As the first international survey of the academic profession, this survey provided significant insight into the internationalization of faculty; it also documented a number of useful items that help measuring the international involvement of faculty in various contexts including research. Based on the Carnegie survey, Welch (1997) identified three general indicators of faculty international involvement, namely, long-term mobility (referring to the highest degree of faculty from another country), the extent of international connection and cooperation, and perceptions of the significance of the international activities. Based on these variables, Welch empirically defined two conceptual groups, that is, *peripatetic* (international) and *indigenous* (home-grown) faculty, looking at the differences between these two types of academics based on gender, discipline type, and forms of employment (full-time and part-time). He reported that peripatetic (international) scholars were more likely to be employed full-time than indigenous (home-grown) academics. In addition, early career academics (junior faculty)

were more likely to be internationally oriented than their senior colleagues at HEIs in most of the participating countries in the Carnegie survey. Peripatetic staff were also more likely to participate in international academic conferences and meetings than indigenous faculty members. Furthermore, academic staff with international experience were more likely to stay internationally connected with colleagues from other countries. In many cases, peripatetic scholars tended to prefer research to teaching (Welch, 1997).

Recently, Finkelstein and Sethi (2014) identified several useful measurement categories centered on the Changing Academic Profession (CAP) Survey. The categories included the decisions of academic staff to internationalize themselves through physical boundary crossing for graduate or post-graduate study or professional activities; the integration of international content into their academic works and tasks; and working with international colleagues and students. In identifying the determinants of these activities, the authors included national characteristics referring to size, language tradition, the level of economic development, and cultural traditions; organizational characteristics including institution type; and individual characteristics addressing academic field, career stage, level of engagement with scholarship and publication, gender, nativity, and age. Huang (2014) also listed several well-recognized indicators of international of faculty based on the CAP survey such as international travel for study or research, international travel to serve as a visiting scholar in a different country, research published in a different language, research published in a foreign country, and research with colleagues from other nations.

Similarly, Finkelstein et al. (2013) investigated the extend of internationalization of American faculty in scholarly work and its associated factors. Based on the CAP survey, they examined the impacts of socio-demographic, career characteristics, social knowledge, and self-

knowledge factors on two dimensions of faculty international research collaboration that refers to a) whether faculty reported collaborating with foreign colleagues in a research project in the past three years and b) the extent to which faculty characterized their research as “international in scope”. Regarding the CAP dataset, several studies also investigated the internationalization of faculty in research with often single-nation and/or descriptive perspectives (Cummings & Finkelstein, 2012).

As widely noted in the studies based on both international surveys on the academic profession—the International Survey of the Academic Profession and the Changing Academic Profession Survey—, academic mobility and international travel for scholarly purposes have been viewed as routine measures of internationalized academic staff (Finkelstein & Sethi, 2014; Welch, 1997). Mobility continues to remain a common indicator, as a more recent study employed a mobility indicator to evaluate the ability of higher education institutions in Europe to attract foreign researchers (Lepori et al., 2015). Although academic mobility and participation in a scholarly conference or meeting are highly regarded and used in many studies, they often refer to internationalization abroad. However, HEIs increasingly value international activities at home for various reasons. More importantly, research and scholarly works are increasingly addressed as part of growing internationalization efforts at home (Knight, 2010, 2012).

Internationalization of faculty in research is highly valued, as institutions consider this to be a priority in institutional and tenure decisions. Helms (2015) recently found that international activity and engagement in research have emerged as an important criterion in tenure decisions in more than half of the tenure code policies analyzed. In addition, based on the interview results in the same study, the most cited research activities regarding internationalization are listed as

follows: active participation in international conferences and meetings, publication in international journals, and publication in a foreign language.

The effective management of internationalization at HEIs requires appropriate measurement of internationalization at all levels. Two common indicators of internationalization include research and education. Analysis of research publications remains a useful and popular method to approach the internationalization of research (Pohl, 2015).

2.9.2 Faculty Research Productivity

Faculty research productivity is considered the most important measure of faculty performance, especially at research intensive higher education institutions. It has become a significant criterion for many academic decisions at higher education institutions (Porter & Umbach, 2001). However, measuring research output is often complex, because of various forms of knowledge production and differing intensity across disciplines (Abramo et al., 2011).

Qualitative and quantitative measurements are two generally standard approaches to examining faculty research productivity. However, it is evident in the literature that quantitative measurement stands out as a primary method for measuring productivity, as concrete indicators of research productivity have been identified by previous studies. Moreover, a quantitative enumeration of faculty activities will continue to be the common approach to measurement, due to its considerable strength in comparison to other methods (Webber, 2011). It suggests that quantitative analyses indicate more concrete results, while qualitative methods provide in-depth analyses for better understanding factors underlying faculty research productivity.

Various factors affect faculty research productivity. Creswell (1985) addressed three main categories, namely, individual, departmental, and institutional, while Bland, Center,

Finstad, Risbey, and Staples (2006) focused on individual, environmental, and leadership characteristics associated with high research productivity. Porter and Umbach (2001), based on a critical review of previous works, concluded that variations in faculty research productivity were analyzed in terms of numerous factors, including demographic and background information, that can explain variations in faculty research productivity.

It is evident that the individual attributes influencing faculty research productivity include the effects of age, gender, socioeconomic status, academic rank, years of experience, primary commitment, and educational background (Clark & Lewis, 1985; Creswell, 1985; Dundar & Lewis, 1998; Kaya & Weber, 2003; Perry, Clifton, Menec, Struthers, & Menges, 2000). Previous research also suggests that departmental and institutional factors include organization and faculty size, academic discipline, type of appointment, type of institution, department size, department rank, and average number of faculty publications (Bland et al., 2006; Buchmueller, Dominitz, & Hansen, 1999; Jordan, Meador, & Walters, 1989; Kaya & Weber, 2003; Kyvik, 1995; Porter & Umbach, 2001; Wanner, Lewis, & Gregorio, 1981). Considering all those attributes, Webber (2011) has pointed out that such institutional factors as the academic field or discipline from where faculty members come is one of the most important factors affecting research productivity.

In addition to the above factors affecting faculty research productivity, the measurement of research productivity itself has also characterized the literature. In terms of the most recent evidence, faculty research productivity has been measured by the number of journal articles, books, book chapters, research reports, and papers presented at a conference; professional articles written for a newspaper or magazine; patents secured on a process or invention; computer programs written for public use; artistic work performed or exhibited; and videos or

films produced (Teichler et al., 2013). For instance, Fairweather (2002) measured research productivity by counting the number of publications during the previous two years including articles in refereed journals; published reviews of books; articles or creative works; books; textbooks; monographs; and chapters in edited volumes. More recently, Jonkers and Tijssen (2008) utilized the number of published journal articles listed in the Science Citation Index as the main indicator of research productivity.

As approaches vary between studies quantifying research productivity, some have addressed the changing values and weights of research activities in different disciplines. Thus, criteria-based weighting systems for meaningful measurement of research productivity were suggested by some researchers (Braxton & Bayer, 1986), while others valued more the H-index referring to citation counts and journal impact for considering quality of publication as an important criterion (Bornmann & Daniel, 2009; Hirsch, 2005, 2007). However, Fairweather (2002) pointed out that weighted scales for publication productivity may be misleading and impractical, because a book, for example, may be highly valued in the social sciences, while a peer-reviewed article in a selective journal is more highly valued in another discipline such as engineering.

All in all, articles published in journals, books, book chapters, and conference papers are the types of publications more commonly used to assess individual performance (Rostan, Ceravolo, & Metcalfe, 2014). With this caveat, studies have usually tended to employ traditionally accepted indicators by simply counting the number of publications, including journal articles, books, or book chapters to measure research productivity (Fairweather, 2002). In this regard, the number of scholarly articles published in a given period of time continues to

receive most of the attention as the major criterion of productivity in the literature (Lee & Bozeman, 2005).

2.9.3 Relationship between Internationalization of Faculty in Research and Faculty Research Productivity

The relationship between internationalization of faculty in research and faculty research productivity has been examined by only a few studies from several perspectives while the measurement methods have differed widely. Two decades ago, Sheehan and Welch (1996) found a positive relationship between the two while comparing the distinctive features of internationally-oriented (peripatetic) faculty and nationally-oriented (home-grown) faculty in a cross-national study. One of their major results was that peripatetic faculty were more productive than home-grown faculty in research, as peripatetic faculty were more active in general.

Some studies approached such relationships by utilizing research as a predictor variable. For instance, regarding faculty commitment to research, Altbach and Lewis (1996) found that those committed to research had a likely larger involvement in international activities than faculty committed to teaching; moreover, they tended to publish more often for an international audience, travel more, work abroad, and collaborate more with international academics in other countries.

More recently, some studies have attempted to examine the effects of internationalization on research productivity from various dimensions in different country contexts. Using a secondary dataset on Chinese faculty members, Xian (2015) investigated the impact of the internationalization of Chinese academics on their research productivity, considering foreign degrees obtained from abroad as the main indicator of faculty international activity, and the

number of journal articles published as the main indicator of research productivity. The findings indicated some positive results regarding the relationship between faculty international engagement and research productivity. The study indicated that academics holding foreign degrees were more productive than those with domestic degrees, leading to more publication in co-authored foreign journals and more research funding. Similarly, Abramo et al. (2011) investigated the relationship between scientists' research performance and the level of internationalization of their research among Italian faculty members. In contrast to other research studies, they wanted to understand if there is an impact of researcher's scientific performance on their collaboration with foreign colleagues. They found that productive researchers are more likely to collaborate with foreign colleagues than less productive researchers.

Approaching a foreign degree as an international engagement, scholars tried to understand how returnees were productive, particularly in developing countries where a high percentage of talent goes abroad for long-term studies. For instance, Jonkers and Tijssen (2008) examined the question of whether the overseas experience of Chinese faculty had an influence on research productivity, looking at such explanatory variables as overseas research experience, the host country, time spent abroad, years since returning home, and years since completing the Ph.D. They found that all those variables were correlated with research productivity and co-authorship in international journals.

Although a positive correlation was found between the internationalization of faculty and research productivity in several research studies, Shin, Jung, Postiglione, and Azman (2014) found no statistical significance between internationalization and research productivity in Korea, Hong Kong, and Malaysia. In their study, they defined the highest degree obtained from a

foreign country as the indicator of the internationalization of faculty, while measuring research productivity by the number of journal articles, books, and book chapters published.

As indicated, recent studies have revealed some mixed results in different national contexts about the relationship between internationalization of faculty in research and faculty research productivity. However, it is important to note that most of those studies defined short- or long-term academic mobility, such as having earned a foreign degree or attended an international conference, as predictors of the internationalization of faculty. In addition, studies that examined the relationship between internationalization and research productivity mostly addressed internationalization abroad by employing the mobility indicator, while infrequently including in the analysis any indicators of internationalization at home and in research. It is, nevertheless, important to understand the impact of other faculty engagements in international activities at home, particularly in research. Furthermore, it is critical to utilize collaborations and publications, which are international in scope but may not necessarily require border-crossing.

The studies focusing on the relationship between research collaboration and publication productivity also provide some relevant findings, as international research activities include collaborative work. Investigating the two-way relationship between academic research publication and research collaboration, Mamun and Rahman (2015) found that collaboration contributed to the improvement of research publications and vice versa. In addition, Abramo, D'Angelo, and Di Costa (2009) investigated the relationship between research collaboration and productivity. In their study, they measured research publication productivity by quantifying the total number of scientific researches published in an international journal, finding a positive relationship between the two. In another study, Lee and Bozeman (2005) discovered that research productivity measured by the number of peer-reviewed journal articles was strongly

associated with research collaboration measured by the number of collaborators, including moderating variables such as age, gender, citizenship, grant, rank, marital status, family relations, job satisfaction, collaboration strategy, and perceived discrimination. Finally, He et al. (2009) found that international collaboration was positively associated with the quality of research articles and a scientist's future research output.

2.10 Conceptual Framework

This study is conceptually based on Knight's (1994, 1999, 2004, 2012) typologies—rationales, strategies, and approaches—for IoHE. Knight's studies have gradually received wide attention due to their holistic and comprehensive frameworks regarding the internationalization of higher education (Childress, 2010). Knight has not only offered several useful frames at various levels for researchers studying IoHE but has also created a well-recognized definition of IoHE including the research function.

More recently, researchers have tended to utilize Knight's frames as an underlying conceptual and/or theoretical framework when studying IoHE at various levels (see Beatty, 2013; Childress, 2010; Jiang, 2012; Schwietz, 2006). For example, Childress (2010) employed Knight's internationalization cycle as a theoretical framework for understanding faculty engagement in internationalization, concluding that Knight's model provides a useful lens to explore academic activities, organizational practices, and organizational principles that affect faculty engagement in internationalization at higher education institutions.

2.10.1 Rationales

Knight (2004) has presented a useful frame of rationales that drive the internationalization of higher education (Table 1). Originally published by Knight and De Wit (1995), the rationales were categorized as social/cultural, political, economic, and academic. In addition, many emerging rationales were addressed at the national and institutional levels. Even though all the rationales reflect the motivations of institutions and nations in different contexts, some are highly relevant to faculty. For instance, intercultural understanding, technical assistance, economic growth and competitiveness, and labor market characteristics are areas in which faculty can play an important role. In addition, human resources development at the national level, and staff development and knowledge production at the institutional level, are also important to explain institutional reasons for fostering faculty engagement in international activities. However, the most relevant rationales for the present study appeared in the academic rationale category, in which the international dimension of research, the extension of academic horizons, profile and status, the enhancement of quality, and international academic standards are addressed.

Table 1: Framework for Rationales Driving Internationalization of Higher Education

Rationales	Existing—National and Institutional Levels Combined
Social/cultural	National cultural identity Intercultural understanding Citizenship development Social and community development
Political	Foreign policy National security Technical assistance Peace and mutual understanding National identity Regional identity
Economic	Economic growth and competitiveness Labour market Financial incentives
Academic	International dimension to research and teaching Extension of academic horizon Institution building Profile and status Enhancement of quality International academic standards
Level	Of Emerging Importance— National and Institutional Levels Separated
National	Human resources development Strategic alliances Commercial trade Nation building Social/cultural development
Institutional	International branding and profile Income generation Student and staff development Strategic alliances Knowledge production

Source: Originally published by Knight and De Wit (1995). Updated by Knight (2004, p. 23).

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Academic rationales, and some institutional rationales such as staff development and knowledge production, appear to be more inclusive for the internationalization of faculty in research, which is highly crucial in the process of internationalization, as it is associated with many other actions and characteristics of faculty. Thus, Knight (1999) addressed the longstanding expectations for an international dimension to research in the pursuit of international academic standards. More specifically, Qiang (2003) addressed the fact that the academic rationales are directly related to international standards of quality and academic excellence at HEIs. Thus, the present study incorporates primarily the academic dimension of the rationales into its analytical framework.

2.10.2 Program Strategies

The second relevant frame, developed by Knight (1999), is the model for *program strategies* from an institutional perspective. Strategies are one of the most important institutional elements, and often the first, for sustainable changes in higher education (Jacob, 2015) as they are related to the core functions of universities (Frølich, 2008). Knight (1999, 2012) identified program strategies referring to teaching, learning, training, research, advising, and supporting activities managed by a higher education institution at home and abroad. The major strategies are categorized as academic programs, research and scholarly collaboration, external relations and services, and extra-curricular activities for IoHE (Table 2). Although Knight suggested many important strategies, the most relevant context for faculty and research in the process of internationalization is that of strategies for research and scholarly collaboration.

Regarding the research and scholarly collaboration category, the defined program strategies specifically address area and theme centers, joint research projects, international

conferences and seminars, published articles and papers, international research agreements, researcher and graduate student exchange programs, international research partners in academic and other sectors, and, finally, the links among research, curriculum, and teaching (Table 2). Indeed, Knight (2010, 2012) updated those categories including strategies for research and scholarly activities, connecting to the campus-based or “at home” strategies while most scholars neglected research and scholarly focus in approaching internationalization at home.

Table 2: Program Strategies

<p>Academic programmes</p>	<ul style="list-style-type: none"> – Student exchange programmes – Foreign language study – Internationalised curricula – Area of thematic studies – Work/study abroad – International students – Teaching/learning process – Joint and double degree programmes – Cross-cultural training – Faculty/staff mobility programmes – Visiting lecturers and scholars – Link between academic programmes and research, training and development assistance
<p>Research and scholarly collaboration</p>	<ul style="list-style-type: none"> – Area and theme centres – Joint research projects – International conferences and seminars – Published articles and papers – International research agreements – Researcher and graduate student exchange programmes – International research partners in academic and other sectors – Link between research, curriculum and teaching
<p>External relations and services (domestic and abroad)</p>	<ul style="list-style-type: none"> – Community-based partnerships and projects with non-government groups or private sector companies – International development assistance projects – Customised/contract training programmes off-shore – Link between development projects and training activities with teaching and research – Community service and intercultural project work – Off-shore teaching sites and distance education – Participation in international networks – Alumni development programmes abroad
<p>Extra-curricular activities</p>	<ul style="list-style-type: none"> – Student clubs and associations – International and intercultural campus events – Liaison with community based cultural groups – Peer groups and programmes – Social, cultural and academic support systems

Source: Knight (1999, p. 24).

Due to the importance of these strategies for international dimension to research, Söderqvist (2002, p. 33) represented them in a more comprehensive frame as relates to faculty research activities (Figure 2). Söderqvist (2002) grouped the research strategies into three categories—research mobility, joint research effort, and presentation of the research results. In this categorization, while research mobility addresses the requirement of cross-border activities, the other two categories, namely, joint research efforts and presentation of the research results, do not necessarily do so. For instance, joint research projects and publication opportunities can still be achieved without mobility, while it may need travel overseas at certain stages. Regarding the purpose of this research study and the availability of the given data, publication and collaboration activities seem highly relevant and can be measured.

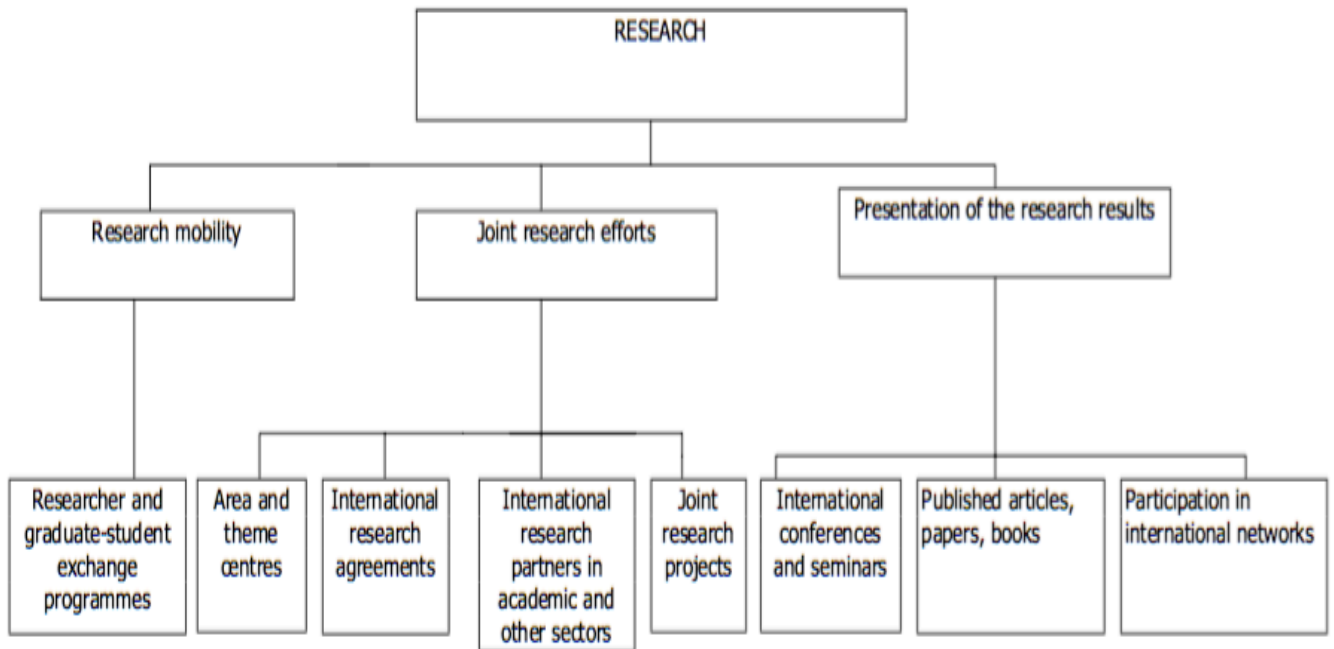


Figure 1. Research and Scholarly Collaboration

Söderqvist (2002, p. 33)

2.10.3 Approaches

The final relevant frame, offered by Knight (2004), is *the approaches to internationalization* at the institutional level. Knight identified six approach categories including activity, outcomes, rationales, process, at home, and abroad (Table 3). Each category addresses different characteristics and actions of institutions for IoHE. The term *approach*, in fact, reflects the changing priorities, values, and actions of institutions that may influence the implementation of internationalization.

The outcome approach was first introduced by Knight (1999) as a *competency approach* and was highlighted by some researchers (Ayoubi & Massoud, 2007; Söderqvist, 2002; Van der Wende, 2007). In its original version, Knight (1999) named the outcome category as the competency category, addressing the development of new skills, knowledge, attitudes, and values for students and faculty. Later, Knight (2004) updated the category, considering that, “given the strong emphasis on accountability and results in the higher education sector, it was decided to broaden this category from competencies to a wider interpretation of outcomes” (p. 19). She acknowledged the need for a wider interpretation of outcomes at a time of increased accountability and outcome-based paradigms.

Knight’s purpose in developing such a framework was to highlight various institutional approaches toward internationalization and to help HEIs understand the varieties and categories of internationalization. Institutions seeking to foster faculty engagement in internationalization need to determine approaches regarding academic staff for institutional purposes. It is important to note that these categories are also useful to understand the internationalization of faculty in research from an institutional perspective.

Table 3: Approaches at the Institutional Level

Approach at Institutional Level	Description
Activity	Internationalization is described in terms of activities such as study abroad, curriculum and academic programs, institutional linkages and networks, development projects, and branch campuses.
Outcomes	Internationalization is presented in the form of desired outcomes such as student competencies, increased profile, more international agreements, and partners or projects.
Rationales	Internationalization is described with respect to the primary motivations or rationales driving it. This can include academic standards, income generation, cultural diversity, and student and staff development.
Process	Internationalization is considered to be a process where an international dimension is integrated into teaching, learning, and service functions of the institution.
At home	Internationalization is interpreted to be the creation of a culture or climate on campus that promotes and supports international/intercultural understanding and focuses on campus-based activities.
Abroad (cross-border)	Internationalization is seen as the cross-border delivery of education to other countries through a variety of delivery modes (face to face, distance, e-learning) and through different administrative arrangements (franchises, twinning, branch campuses, etc).

Source: Knight (2004, p. 20).

While the process approach has traditionally received wider attention, all the approaches are of particular importance in different contexts and at different levels. However, the outcome approach is increasingly crucial because of the growing institutional expectations for greater benefits and outcomes of internationalization, as institutions highly invest in it. By outcomes,

Knight (2004) referred to the forms of desired outcomes such as increased competencies, projects, partnerships, and agreements through internationalization. As the desired outcomes differ slightly in her early and late studies, one may conclude that outcomes or competencies are not limited to certain activities or expectations at an institutional and/or national level. Rather, they vary depending on context, culture, stakeholders, institutional strategies, and national policies.

Considering the demand sought by institutions for knowledge of the concrete impacts of internationalization, the outcome approach is of particular relevance for this research study. For instance, the desired outcomes addressed in the original frame may be extended to the desired outcomes from faculty such as faculty competencies, an increased international profile, more international collaboration, and higher performance and productivity. Although the desired outcomes reflect on the teaching, research, service, and outreach roles of faculty, the expectations for research-related outcomes have increased dramatically at a time of global competitiveness and greater demand for academic excellence. Thus, Knight's frame for the outcome-based approach remains a very relevant framework for the current study, as it may refer to such faculty outcomes as productivity, competencies, increased academic profile, and/or more international collaboration.

2.10.4 Analytical Framework

The three frames of Knight—rationales, approaches, and strategies—are of particular relevance for this research study that focuses on internationalization of faculty in research and faculty research outcomes. Whereas Knight tends to present frameworks from a larger standpoint referring to the institutional, sector, and national levels, at the same time she addresses and

acknowledges the importance of a micro-level and bottom-up approach, which often refers to individual and institutional dimensions. For Knight (2004), “the national/sector level has an important influence on the international dimension of higher education through policy, funding, programs, and regulatory frameworks. Yet, it is usually at the individual and institutional level that the real process of internationalization is taking place” (p. 6). Within this framework, faculty is defined as one of the most important motives of higher education institutions in the process of internationalization.

Based on the frames including the rationales, strategies, and approaches presented by Knight (1994, 1999, 2004), I have developed an analytical framework to approach the internationalization of faculty in research and research productivity (Figure 2). Using an institutional lens, the framework incorporates academic rationales, strategies for research and scholarly works, and desired outcomes. The academic rationales address the international dimension to research, faculty development, and knowledge production, while strategies for research include international dimension to research and scholarly activities. The desired outcomes given in the approach category refer to faculty competencies, an increased academic profile, more international collaboration, and higher performance and productivity.

The academic rationales, strategies for research, and desired outcomes followed by an institution may foster the internationalization of faculty in research and may ultimately result in increased productivity. Figure 2 presents a flow from rationales to outcomes and research productivity. Institutions that invest in and support the internationalization of faculty in research should incorporate faculty-oriented rationales, strategies, and approaches in order to obtain the desired outcomes.

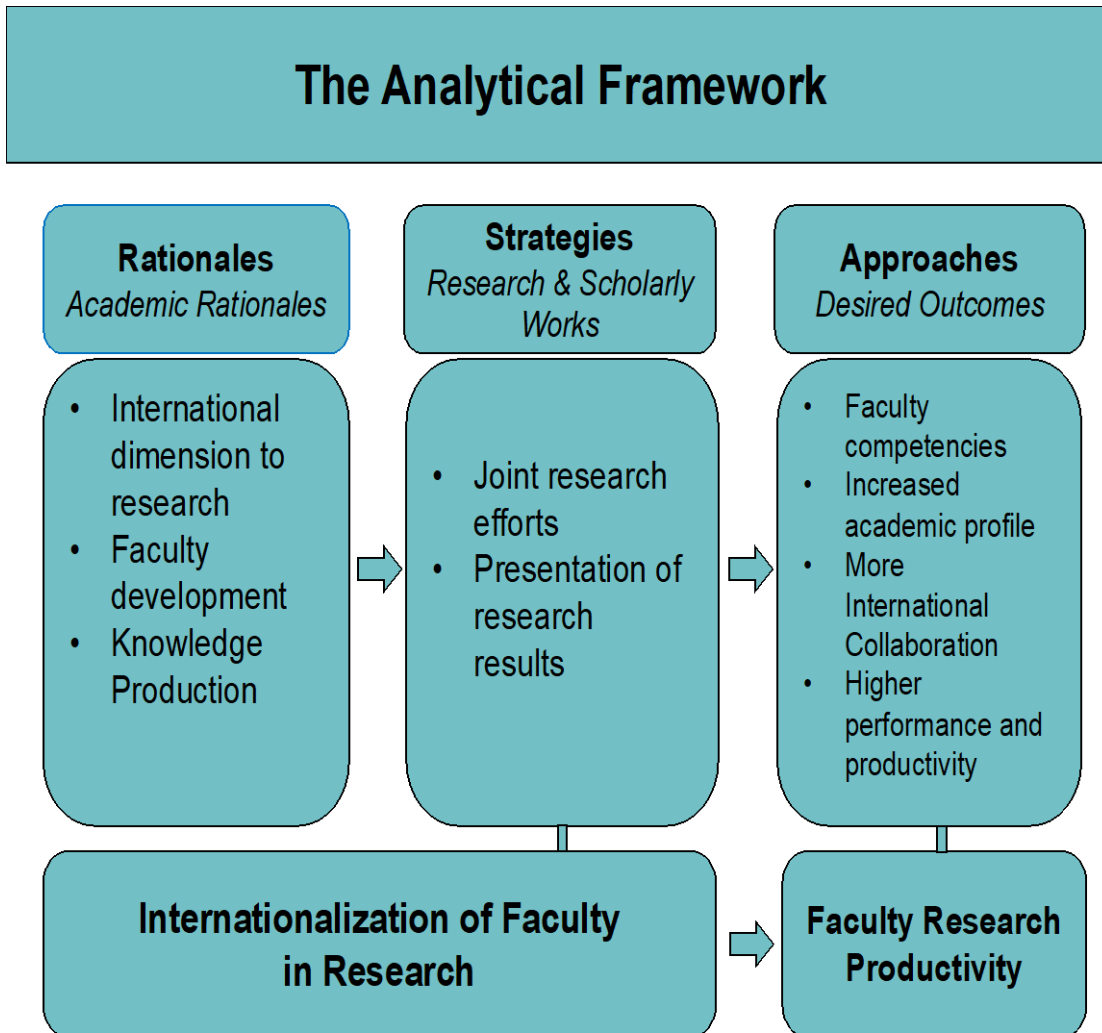


Figure 2. The Analytical Model

Knight (1999, 2004) considered that the emphasis on the institutional level approach in her studies covered individual faculty as part of an institution. Although Knight's approach may not necessarily recognize the distinction between internationalization at the individual level and internationalization at the institutional level, an omission that has been criticized by some researchers (Sanderson, 2008), it does offer useful frameworks within which to explore internationalization of faculty in relation to faculty research activities and productivity.

As previously addressed, Knight (1999) defined internationalization of higher education “as the process of integrating an international dimension into the teaching/learning, research and service functions of a university or college” (p. 3). Based on this highly cited definition, this study, for the purpose of its research, defines *internationalization of faculty in research* as the process of integrating an international dimension into research activities including dissemination of research publications and international joint research projects (collaboration). Even though this proposed definition recognizes that internationalization is a dynamic process, the benefits and outcomes of internationalization can be still identified and tested.

Knowledge production, productivity, and professional development through interacting with peers from foreign countries in research activities and engaging in other country contexts through collaboration and publication opportunities are essential components of the proposed definition. In addition, it does not emphasize the highly-accepted dimension of internationalization—short- and long-term academic mobility—as the purpose of the study is to explore faculty international engagement in research at home. For instance, faculty publication and collaboration activities do not necessarily include cross-border mobility. Rather, it is expected that, due to the lack of funding for high-cost oversea activities, support for publication and collaboration research opportunities on campus is more critical. Thus, the distinction between research activities abroad and those at home allows the researcher to narrow the definition and activities to address the growing importance of the internationalization in research on campus. It is important to note that internationalization at home has been referred to curriculum design and the integration of international students, while giving little attention to the international dimension to research and faculty.

2.11 Country Backgrounds

Brazil and China, important emerging economies in the world, are two critical members of the BRIC (Brazil, Russia, India, and China) countries from different continents. Although higher education systems in Brazil and China have distinctive features due to cultural, political, economic, and social variations, both are experiencing a rapid transformation, diversification of their higher education systems, considerable growth in the size and number of student bodies, and dramatic changes in policies and practices. Brazil and China are currently improving their higher education systems to stay competitive in the global market. The growing effort toward world-class universities and academic excellence emerges as an important initiative (Schwartzman, Pinheiro, & Pillay, 2015). In this context, the growing demand for higher education and the high expectations for academic excellence have led both countries to develop and address faculty growth in terms of quality and size, while acknowledging the need for internationalization.

The cases of Brazil and China indicate a valid representation of the growing academic profession and internationalization, as their higher education systems currently face new challenges. Although various comparisons between participating countries in the CAP survey were made by the CAP-based research studies in a wider perspective, the comparison of Brazil and China received little attention. Furthermore, no CAP-based study compared Brazil and China in terms of the relationship between internationalization of faculty and research productivity. Thus, examining the internationalization of faculty in research and the academic performance in those BRIC countries is of particular relevance at a time of high demand for internationalization and academic excellence in their higher education systems.

As Brazil and China are developing countries, they reflect some features and characteristics of other developing nations. For instance, while internationally oriented staff is often one of the institutional priorities in developed countries as part of their diversity initiatives, this may not be viewed as a priority in developing countries in the process of internationalization. Rather, these countries increasingly put greater emphasis on the benefits of curriculum, academic quality, and research (Knight, 2015b). In fact, being internationally oriented in teaching, research, and service can itself bring about the expected benefits and desired outcomes such as an internationalized curriculum, high academic quality and productivity, and advanced research. Thus, as developing countries, Brazil and China can benefit from the results of this study, as the present research emphasizes both the importance of an international dimension to academic activities (in this study, research activity) and research productivity.

2.11.1 Brazil

Brazil has made significant progress in national development as well as in higher education. Both public and private higher education in Brazil have expanded dramatically in the last few decades and become more diverse and stratified. As the enrollment in higher education has increased markedly, the number of faculty has risen dramatically. Nevertheless, higher education in Brazil is still a heavily regulated and centralized system. Thus, the primary actors in the internationalization of higher education are often governmental agencies such as the Ministry of Education, the Ministry of Science and Technology, and the Ministry of Foreign Relations, which are, respectively, the regulator, the coordinator, and the facilitator of bilateral and multilateral cooperation (Laus & Morosini, 2005; Schwartzman, 2014).

In fact, the first attempt toward internationalization in Brazil's higher education system was to revolutionize HEIs and improve the quality of graduate schools. This effort, led by the Ministry of Education, included certain criteria of internationalization when graduate programs were evaluated. Knowledge production, quality (referring to the competitiveness of similar programs overseas), and clear evidence for community service and leadership of academic staff were used as the criteria for the quality assurance of graduate programs in Brazil. In addition, the assessment of faculty academic qualifications became one of the essential elements to determine the national ranking of the university undergraduate programs. Academic credentials have been highly emphasized, especially by the Brazilian Ministry of Education, since the 1995 education act (Balbachevsky & da Quinteiro, 2003; Laus & Morosini, 2005).

Academic mobility has been the main force in this growth, while other activities such as joint research projects and international dissemination of research have also increased. The desired outcomes from internationalization form an object of new critical discussions in Brazil, while professional development and career paths are increasingly addressed in terms of academic performances. The dramatic growth in the number of international peer-reviewed journal articles, for example, shows how research plays a critical role in the development of internationalization in Brazil (Balbachevsky & da Quinteiro, 2003; Laus & Morosini, 2005).

The CAP survey presented some important descriptive results related to the internationalization trends in Brazil (Balbachevsky, Schwartzman, Alves, Santos, & Duarte, 2008). Only 30 percent of Brazilian faculty reported that their primary research included an international scope and orientation, referring to one of the lowest rate among 19 countries. Furthermore, only 28 percent of the participants, again among one of the lowest in the sample, indicated that they collaborated with international colleagues in their research efforts (Rostan et

al., 2014). These results reveal that Brazilian higher education should focus on internationalization of faculty in research to increase the international dimension to research.

In terms of institutional settings, Brazilian higher education is widely diverse as it has various types of institutions. There are approximately 2400 higher education institutions in which only 12 percent are public. In addition, there are only 190 institutions as defined “university” (Teichler et al., 2013). Based on this diversity, institutions of Brazilian higher education were constructed in the CAP survey as follows: Public Federal University, Public State University, Municipal University, Private University, Federal College, State College, Municipal College, Private College, Federal Research Institute, State Research Institute, Public Federal Research University, Private Elite University, and Private Elite College.

2.11.2 China

The Chinese academic profession has been experiencing a rapid transition from government control to the market, as the country gradually moves toward a market economy. However, the Chinese academic profession is still highly controlled by the government, while the market mechanism has relatively helped to improve academic freedom, quality, outcome, and some level of accountability. Currently, the academic profession in China has dealt with major transition issues where faculty members are affected. Recently, the rapid expansion of higher education has increased the workload of faculty members, mostly in terms of teaching loads, as the number of students has risen significantly (Altbach, 2013; Chen, 2003; Teichler et al., 2013). Ultimately, Altbach (2013) has observed that, “as an expanding postsecondary system still in the process of building both enrollment capacity and academic quality, China’s challenges are different from those facing the developed world” (p. 156).

China's government has developed some goals to improve the global competitiveness of the national universities; moreover, it is dedicated to the establishment of research universities and centers at the highest level. Currently, there is a growing effort in China toward establishing world-class universities; thus, internationalization and research are two critical components of this process of expected academic quality. In order to reach this goal, the Chinese government has initiated two important projects: the 211 Project and the 985 Project. While both endeavors have their own specific goals, the common theme in both is to put considerable emphasis on internationalization, research, and faculty development (Wang et al., 2011). Chinese HEIs increasingly recognize that internationalization is an important way to foster the transformation into world-class universities when it is strategically and effectively used (Salmi, 2009).

Currently, the internationalization of higher education occurs mostly in some common contexts such as academic mobility for short and long terms, joint educational and degree programs with foreign partner institutions, curriculum design, and foreign language centers in China (Krechetnikov, Pestereva, & Rajovićb, 2016). Academic activities and collaboration play a significant role in addressing research practices at Chinese higher education institutions (Yoder, 2010).

The CAP data indicates several interesting descriptive findings for the internationalization of Chinese faculty. For instance, two-thirds of Chinese faculty members who participated in the survey reported that their research studies were international in scope or internationally oriented, which is among the highest rate of groups in 19 participating countries. However, only ten percent of respondents declared that they themselves collaborated with international colleagues in their research efforts (Rostan & Ceravolo, 2014). This rate indicates the lowest among all CAP participating countries. Overall, these results indicate that most of the

Chinese faculty who are active in research include an international dimension to their research, while they rarely collaborate with colleagues from other countries. These results and growing demands for internationalization and greater outcomes provide important rationales for further research to understand the relationship between faculty international activities in research and faculty research productivity.

In terms of institutional settings, most of the Chinese higher education institutions are public-oriented while private institutions are growing gradually. The quality also varies between institutions. One of the major differences between universities is whether they are defined as 211 type university or 985 type university. While “211 universities” refer to emerging good universities, “985 Universities” refer to the emerging elite institutions in China (Teichler et al., 2013). However, in the CAP survey, institutions of Chinese higher education were only constructed as National Public University, Local Public University, and Local Public College with no reference to the Projects 211 or 985.

3.0 Research Design and Methodology

Rooted in the preceding discussions of internationalization of faculty in research and faculty research productivity, this chapter reviews the methods and describes the research design to be implemented in the present study. The sections in this chapter include research questions, sampling and data description, data management and preparation, and statistical procedures. The framework, adopted from the works of Knight (1994, 2004, 2012), was the conceptual framework for the study and the methodology of the study reflects some of the relationships in the framework. The methodology of the study examined the internationalization of faculty in research because of its potential relationship with faculty research productivity. Secondary data analysis techniques were implemented to study the relationship between internationalization of faculty in research and faculty research productivity. Regression analysis was used as a statistical modeling. University of Pittsburgh IRB exempt approval was obtained for this study.

3.1 Research Questions

Internationalization of faculty in research includes two major dimensions, referring to a) international dissemination of research; and b) international collaboration. In the purpose of this study, international dissemination of research is defined as publication in a different language and publication in a foreign country while international collaboration is defined as the coauthorship with foreign colleagues from other countries while. Although more detailed

explanations are given in the latter sections, those dimensions are reflected in the research questions of the present study, as follows:

- 1) What is the relationship between international dissemination of research and research productivity among full-time faculty members in Brazil and China?
- 2) What is the relationship between international collaboration and research productivity among full-time faculty members in Brazil and China?
- 3) How do observed relationships vary by gender, academic rank, discipline, and institution type?

3.2 Data Description

This study derives the relevant data from the Changing Academic Profession (CAP) survey, which was collected during 2007 and 2008. In general, the sampling of the CAP survey consists of 24,874 faculty members at both teaching and research universities from 19 countries including Argentina, Australia, Brazil, Canada, China, Hong Kong, Finland, Germany, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, Norway, Portugal, South Africa, the United Kingdom, and the United States. Improving cross-national comparability, a highly standardized questionnaire with 53 identical or similar questions was designed. The CAP dataset is designed to examine the variations in the academic profession. Among many items, the dataset included some individual-level items that may lead to a model building for a good measurement of internationalization of faculty in research and faculty research productivity (Teichler et al., 2013).

In the CAP survey, several sampling designs were implemented, containing simple random sampling, stratified sampling, stratification with unequal sampling ratios between groups and cluster sampling. The CAP survey included many questions regarding career and professional situation, general work situation and activities, teaching, research, management, and personal background and professional preparation (Teichler et al., 2013).

Standard procedures of survey application were implemented in participating countries, depending on their higher education systems. Based on the different structures of higher education institutions, participating countries with relatively few institutions (50 or less) used a random sampling design, targeting 1,800 academics and expecting about 30% response rate. In countries with many institutions (50 or more), one or two-stage cluster and stratified sampling design were performed, targeting approximately 1,800 or more participants with 33% response rate. Ultimately, about 100,000 academics in all participating countries received the questionnaire by mail, mail, and/or hand delivery. After the number of reminder actions, 25,819 valid responses with a sufficient response rate for each country were collected from the target groups. In order to avoid biases in the respective countries, the process of weighting the respondents by institutional type, academic field, academic rank, and gender was implemented. The final data cleaning process resulted in 24,874 total valid weighted sample. The overall response rate was around 30%, which meets the expectations set at the beginning of the survey design (Teichler et al., 2013).

3.3 Target Population and Sampling

This study restricts itself to two of the 19 participating countries—Brazil and China—where the data is sufficiently available. The target populations in both countries are full-time faculty members who are active in research at HEIs. Following the international standardized questionnaire, the individual countries distributed the survey to their sample groups.

Regarding China, a paper survey had been circulated to the Chinese faculty sample (N=4,200) from 70 public HEIs, stratified by region, discipline, and institution type. The faculty and institution response rates for the Chinese dataset were 86.1 % (N=3,618) and 97.1 % (N=68), respectively (Huang & Li, 2010). 3,159 participants were full-time faculty members while the rest were part-time staff in China sampling.

The standardized CAP questionnaire was also distributed to Brazilian faculty sample (N=4,702), stratified by institution type. The data collection process occurred between October and December 2007. Overall, 1,500 faculty members responded to the distributed survey questionnaire, and only 1,200 of them completed answering all the questions. There were 581 full-time faculty in Brazil sampling. Faculty response rate was 25.5%. Although the response rate was below the 33% desired rate, it still meets the criteria of the standards of the CAP international project (Balbachevsky et al., 2008; Teichler et al., 2013).

3.4 Data Management and Preparation

As previously addressed, the main purpose of this study is to investigate the relationship between internationalization of faculty in research and faculty research productivity. To achieve

that, potential measures of internationalization of faculty in research and research productivity were determined based on the previous literature and the CAP dataset. As the analytical framework addressed, program strategies at HEIs indicate two important major research activities including international dissemination of research and international collaboration. These institutional strategies, referring to research activities at faculty level, suggest that the dissemination of research as an international activity, include a) publication in a different language and b) publication in a foreign country. Also, international collaboration, namely joint research efforts, refer to c) co-authorship with foreign colleagues from other countries. These indicators and variables have been used in the previous studies and are consistent with the relevant literature (Finkelstein & Sethi, 2014; Huang, 2014; Rostan & Ceravolo, 2014). For instance, Huang (2014) indicated that “two other well-recognized indicators of international involvement are having research published in another country and conducting research with academics from other countries.” (p. 5).

The primary predictor variables, which are continuous, are measured regarding the percentage of the activities. In the CAP survey, faculty members were asked which percentage their publications in the last three years were a) published in a language different from the language of instruction at their current institutions, b) published in a foreign country, and c) coauthored with colleagues located in other (foreign) countries (Appendix C). All those measures are evident in the literature as studies increasingly utilized those variables in their statistical models (Finkelstein & Sethi, 2014). Significant individual and institutional factors were added to the research model of the study as those variables are evident and widely recognized in both literatures on internationalization of faculty and research productivity (Table 4).

The dependent variable is faculty research productivity, which is also continuous, measured in terms of the total number of articles published in an academic book or journal. Although various techniques were used to measure faculty research publication productivity in research studies (Bornmann & Daniel, 2009; Braxton & Bayer, 1986; Hirsch, 2005, 2007), this study attempted to measure faculty research productivity by simply counting the number of scholarly articles published in a given three-year period because of its greater applicability to different environments, disciplines, and country contexts. Furthermore, the preliminary analysis confirmed that scholarly articles are the most preferred publication produced by both Brazilian and Chinese faculty members as it covers both articles published in an academic book or journal. Also, Cummings (2014) revealed that article focus are the broadest pattern explored in 19 participating countries. As a result, this measurement method is evident and widely used in the relevant literature (Fairweather, 2002; Lee & Bozeman, 2005; Shin, Jung, et al., 2014; Xian, 2015).

Gender, academic rank, discipline, and institution type were used as both control and factor variables depending on the statistical model in the study. Although there are many other factors (variables) that might affect both internationalization of faculty in research and faculty research productivity, the major variables that are evident in both literatures were included in the research design of this present study. Also, these given covariates were re-coded for the purpose of this study, based on a review of the frequency distribution of the variables. Because gender and academic rank were originally dummy-coded in the dataset, discipline and institution type were considered for the recoding process. To that end, the discipline variable was regrouped from 12 different academic disciplines to two disciplines (soft and hard disciplines), and the institution types were categorized into teaching-oriented institutions and research-oriented

institutions in both countries. All the recoding procedures were aimed at providing a clear, distinctive distribution of cases and enhancing the interpretation of the results. Particularly, regarding institution type, a two-level stratification seemed to be a better fit for this study, because the types of higher education institutions differed dramatically between Brazil and China and did not allow for a more sophisticated stratification depending on potential tiers of institutions. Overall, similar recoding strategies were also obtained in some CAP-based research studies; thus, it is consistent with the relevant literature.

Table 4: Variables and Indicators of the Study

Independent Variables	Indicators
International Disseminations of Research	Publication in a language different from the language of instruction at their current institutions (%)
	Publication in a foreign country (%)
International Collaboration	Coauthoring with colleagues located in other (foreign) countries (%)
Dependent Variable	
Publication Research Productivity	The total number of articles published in an academic book or journal
Control/Factor Variables	
Gender	Female = 0, Male = 1
Academic Rank	Junior Faculty = 0, Senior Faculty = 1
Discipline	Soft Disciplines = 0, Hard Disciplines = 1
Institution Type	Teaching-Oriented Institution = 0, Research-Oriented Institution = 1

A copy of the CAP questionnaire addressing the indicators outlined in Table 4 is provided in Appendix C.

3.5 Statistical Procedures

As the most common form of linear regression, a multiple regression model is used to explain the relationship between the independent and dependent variables. The multiple regression model is a useful method for this study in which more than two independent variables and a dependent variable are included (Acock, 2012; Cohen, 2003). The multiple linear regression model is helpful to determine whether the relationship is statistically significant, understand how much of the variation in the outcome variable can be explained by the predictors, and identify the direction and magnitude of any relationship. Control variables, determined based on the existing literature of internationalization of faculty and research productivity, are used for a clear predictive approach in the model building. Also, gender, academic rank, discipline, and institution type were used as factor variables in a multiple regression model with interaction terms to determine whether they differ the observed relationships.

The following multiple regression equation models explain the relationships between independent and dependent variables, regarding each research question:

For the research questions #1 and #2, the following equation indicating main effect is used to predict faculty research productivity:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$$

Where Y = Faculty Research Productivity, X₁ = International dissemination of research (publication in a different language/ publication in a foreign country), X₂ = International collaboration, X₃ = Gender, X₄ = Academic rank, X₅ = Discipline, and X₆ = Institution Type.

For the research question #2, the equation indicating interaction effect is as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7(X_1 * X_3) + b_8(X_1 * X_4) + b_9(X_1 * X_5) + b_9(X_1 * X_6) + b_{10}(X_2 * X_3) + b_{11}(X_2 * X_4) + b_{12}(X_2 * X_5) + b_{13}(X_2 * X_6) + e$$

Where Y = Faculty Research Productivity, X₁ = International dissemination of research (publication in a different language/ publication in a foreign country), X₂ = International collaboration, X₃ = Gender, X₄ = Academic rank, X₅ = Discipline, and X₆ = Institution Type.

For the statistical analysis, the distributions of the independent and dependent variables are described and interpreted through examining box plots, histograms, and scatterplots. Scatterplots provide some valuable insight into the data, showing the direction of the relationship, linearity of the relationship, any unusual observations, and strength and magnitude of the relationship. Also, the first fitted regression equation model and the ability of the variation to explain the dependent variable with main effect is examined while the second regression model is used to explain whether the observed *relationship of international dissemination of research and international collaboration with faculty research productivity* differ by gender, academic rank, discipline, and institution type.

Before running multiple regression analyses, some assumptions are checked through a statistical software program. Alpha level is constructed as 0.05 because this level of significance is most commonly used in education and relevant for this present research. This will show the probability of making a wrong decision about the inferences (Hair, Black, Babin, Anderson, & Tatham, 1998).

4.0 Results

The results chapter begins with the section on missing data management (Section 4.1) and then the assumptions check of the Brazil and China samples (Section 4.2). Participant demographics are presented in Section 4.3. The following section provides descriptive statistics of participants from both countries (Section 4.4). The findings of the multiple regression analysis for the research questions regarding the Brazil and China datasets are presented in Section 4.5. The final part of this chapter provides a summary of its contents.

The purpose of this study was to evaluate the relationship between internationalization of faculty in research (dissemination of research in a different language, dissemination of research in a foreign country) and faculty research productivity in Brazil and China. Also, this study examines if those relationships differ by gender, academic rank, discipline, and institution type. The study's samples for Brazil and China were obtained from the CAP 2007 international database. The major findings of the study are presented in this chapter, including missing data, a check on assumptions, participants' demographics, descriptive statistics, and multiple regression results. The STATA/SE 14.2 statistical software program was used to analyze the data.

The outcome variable was faculty research productivity measured by the total number of articles published in an academic book or journal, while the major predictor variables were international dissemination and international collaboration in research. International dissemination of research was a composite variable based on the percentage of publications written in a different language and publications written in a foreign country for the Brazil sampling (correlation = .78), while it was included as separate predictor variables in the Chinese sampling because of a very low correlation between the two variables (correlation = .01).

Ultimately, there were two major predictors including international dissemination of research and international collaboration in Brazil data while there were three major predictors including international dissemination of research in a different language, international dissemination of research in foreign country, and international collaboration in China data.

4.1 Missing Data

Because the study focus was on full-time faculty members who were active in research in both countries, part-time academic staff and those who were inactive in research were excluded from consideration. Thus, the total sizes of the focus samples were 581 for Brazil and 3,159 for China. Missing data for each variable were checked. A low number of missing values were detected in Brazil sample, while a high number of missing values were identified in Chinese sample.

In the Brazil data, there were only 25 (4%) missing values out of 581 cases. Most the missing values (19 of them) came from the item asking for the name of the academic discipline of faculty members. Decisions to exclude missing values were based on empirical and theoretical considerations, as there are no firm guidelines for exclusion of missing values (Hair et al., 1998). Little's MCAR test was also conducted to determine whether the data were missing completely at random (Little, 1988). After this criterion (MCAR) was checked and met, all identified missing values were removed from the dataset by the listwise deletion method. As a result, the total sample size in Brazil was reduced to 556 full-time faculty members who were active in research. Because the overall missing values were very low, and there were a substantial number of participants, complete case data were used for the analysis of Brazil data.

In contrast to the Brazil data, a high number of missing values (44%) were detected for the study variables, including the dependent variable, in the China data. Most of the missing values were from the dependent variable. Little's MCAR test was carried out to determine if the missing values were completely at random in the China data, which did not meet MCAR (Little, 1988). As most of the missing values were found in the dependent variable, the cases with missing values were excluded from the study (Hair et al., 1998). As a result, all identified missing values were removed from the dataset by the listwise deletion method and the complete data cases ($N = 3,159$) were used in all analyses of the China data.

4.2 Assumptions Check

A preliminary analysis was conducted to review the assumptions of linearity, potential outliers and influential cases, normality, homoscedasticity, independence of residuals, and multicollinearity (Acock, 2012). The preliminary analysis indicated that both Brazil and China data were not normally distributed because of high positive skewness. Also, some assumptions of linear regression seemed to be violated, thus; a square root transformation of the dependent variable was performed as a remedial action, according to the Tukey ladder of powers (Tukey, 1977). The following assumptions check shows the results after the remedial actions of both Brazil and China data were taken.

4.2.1 Assumptions Check for Brazil Data

After the square root transformation of the faculty research productivity variable was included in the analysis, the assumptions were rerun to determine if the model still fits the data. Linearity was checked first. To that end, scatterplots of the outcome variable against the two continuous predictor variables were plotted. As shown in Figure 3, visual inspection of these scatterplots revealed a linear relationship between the variables. In other words, there seemed to be a linear relationship between faculty research productivity and both international dissemination and international collaboration in the Brazil sampling.

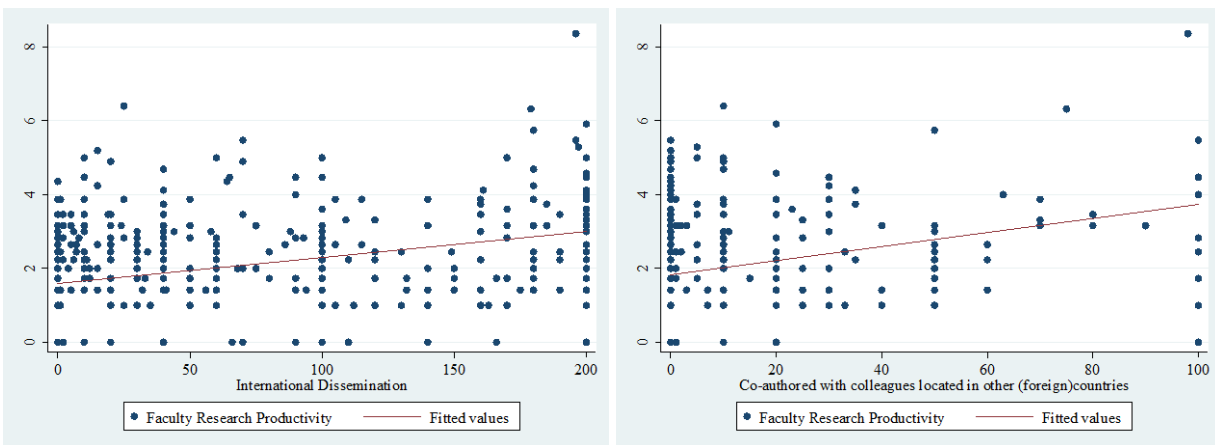


Figure 3. Scatterplots of Research Productivity versus International Dissemination and International Collaboration in Brazil Data

Scatterplots were also visually inspected for potential outliers and influential cases. In addition to detecting outliers using the scatterplots, studentized residuals were used to investigate them. To do that, residuals and deleted studentized residuals were generated. Only two cases (ID = 94 and ID = 547), where studentized residuals were greater than three standard deviations, were identified. Checking the possibility of data entry and measurement errors revealed that those cases were genuinely unusual data points. However, to confirm the potential influential

points, the Cook's Distance and DFBETA were also checked and found lower than 1.00. Because the observations for potential outliers had no large residual or DFBETA, and do not indicate a substantial impact on the regression models, the identified outliers were kept in the analysis.

For the normality check, two graphical methods, including a histogram of the residuals and a normal quantile plot of the residuals, were generated. After the square root transformation, the histogram of the residuals with a normal curve indicated that they appeared to be normally distributed with the density curve. The normal quantile plot generated also confirmed that the residuals were normally distributed (Figure 4).

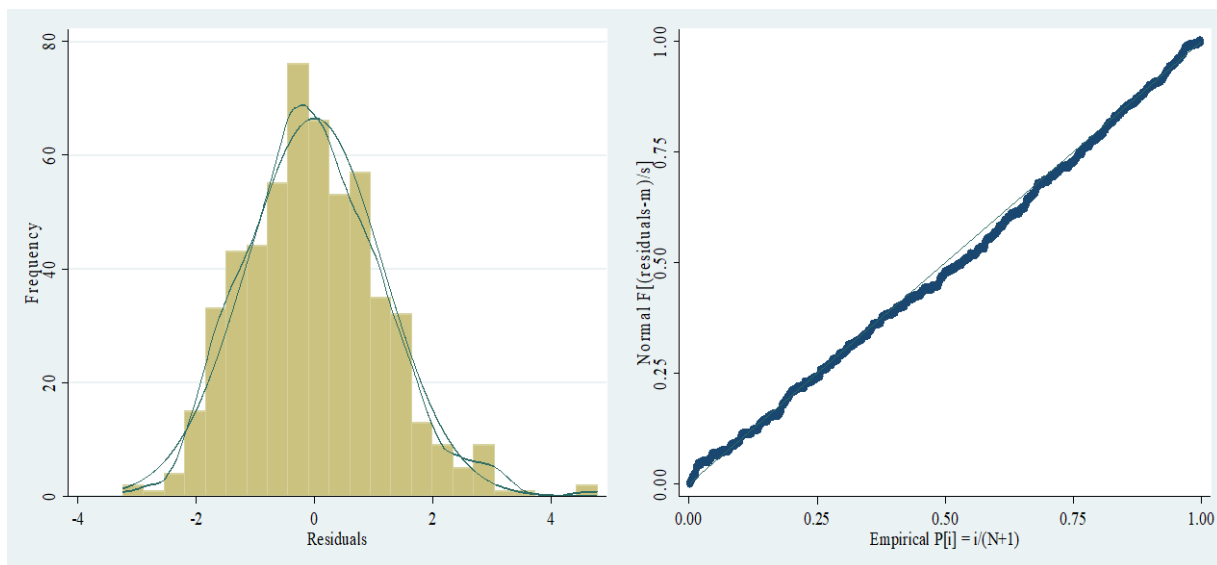


Figure 4. Histograms of Residuals and Normal Quantile Plot in Brazil Data

Homoscedasticity is another assumption of linear regression, referring to the variance of residuals that is constant across all the values of the independent variables (Hair et al., 1998). Thus, the assumption of homoscedasticity was checked by inspection of a plot of the unstandardized residuals against the predicted values. Figure 5 indicates that the residuals were spread relatively evenly across all the values of the independent variables. The residuals were

not, however, perfectly spread, because there were a high number of zero scores at continuous variables. Further discussion was provided in the final chapter of this study.

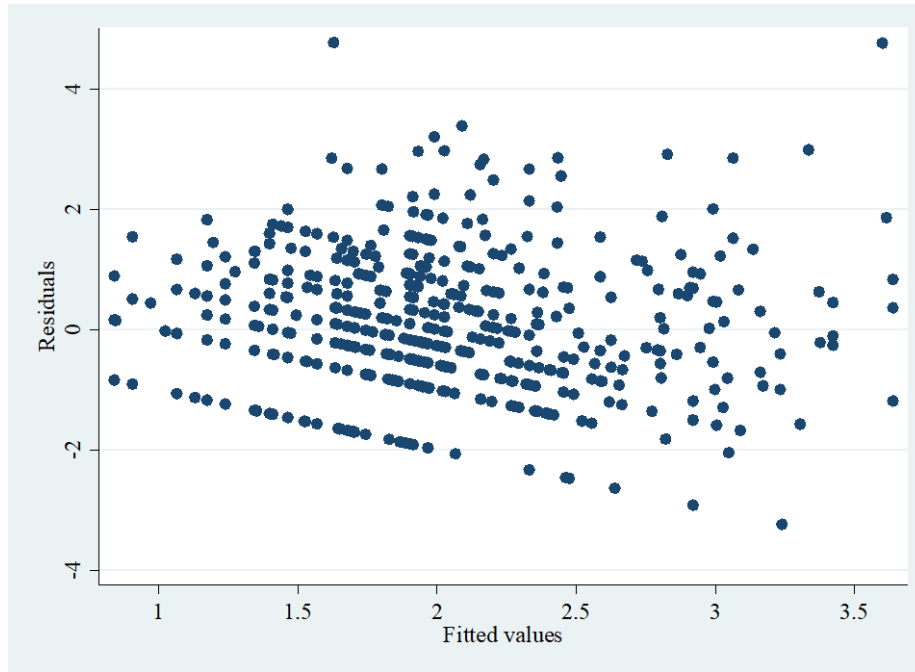


Figure 5. Variance of Residuals in Brazil Data

The independence of the residuals was also checked for the assumption of the linear regression model. Such independence was found, as assessed by a Durbin-Watson statistic of 2.040. Finally, multicollinearity was also tested to determine if the independent variables were or were not highly correlated with each other. The variance inflation factor (VIF) was used as an indicator of multicollinearity. The highest VIF among predictor variables was 1.63. Because the suggested maximum level of VIF for each predictor was $VIF < 10$ (Hair et al., 1998), it was confirmed that there was no multicollinearity in the Brazilian sampling (see Appendix A).

4.2.2 Assumptions Check for China Data

The scatterplots were generated and visually inspected to determine if linearity and unusual cases existed in the China data. Three scatterplots were generated in the China dataset because there were three explanatory variables—dissemination of research in a different language, dissemination of research in a foreign country, and international collaboration—. The scatterplots of the dependent variable against independent explanatory variables demonstrated that the relationships followed a relatively straight line (Figure 6). When the scatterplots were inspected visually, it appeared that there might be some unusual points in the data. To determine if the outliers were influential, studentized residuals that were greater than three standard deviations were listed. There seemed to be seven genuinely unusual data points greater than three standard deviations in the Chinese sample. However, Cook's Distance and DFBETA tests, which were lower than 1.00, statistically confirmed that the outliers were not influential (see Appendix B) (Cohen, 2003). Thus, all the outliers were kept in the China data, as they were in the Brazil data.

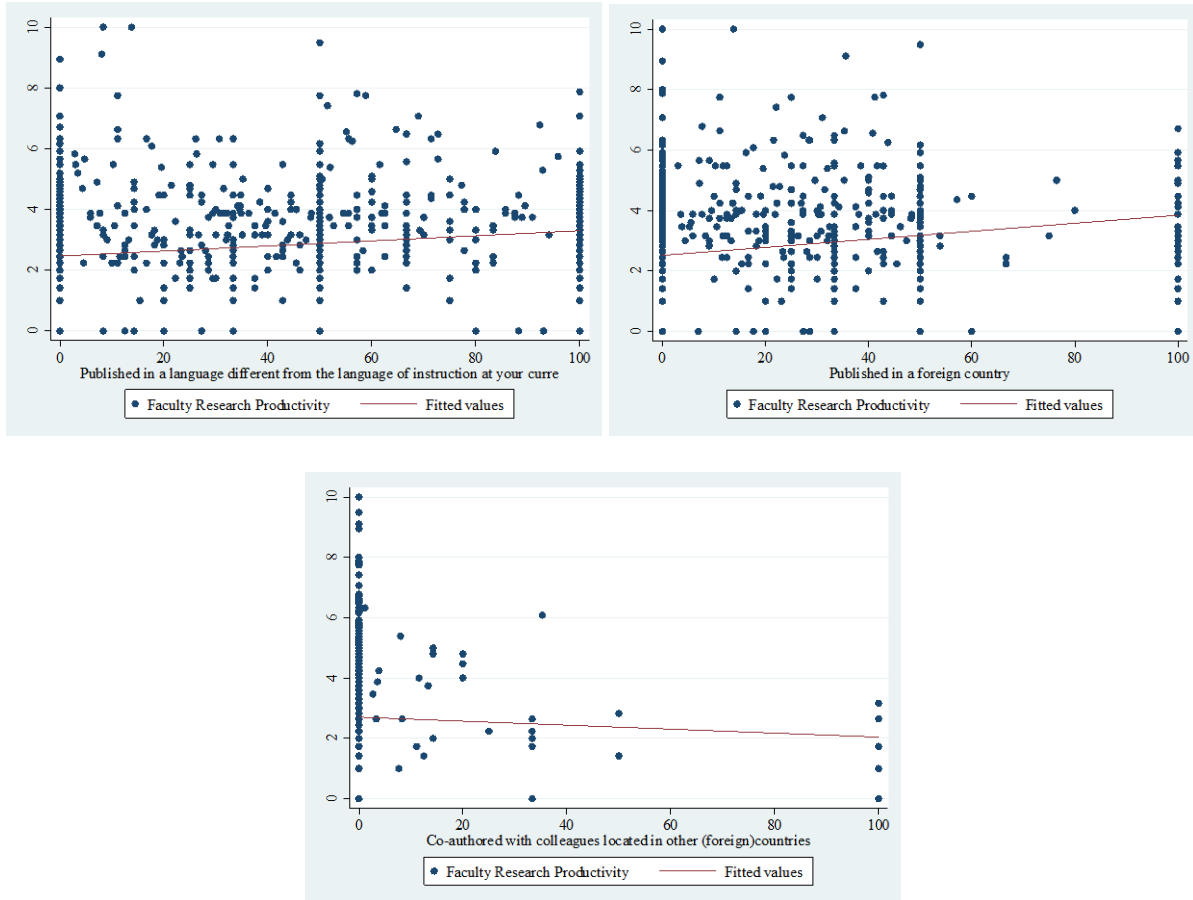


Figure 6. Scatterplots of Research Productivity against Three Explanatory Continuous Variables

Two graphical methods, including a histogram of the residuals and a normal quantile plot of the residuals, were used to assess normality. The histogram with a normal curve indicated that the residuals were normally distributed, although it slightly tended to skew positively. The residuals were also normally distributed with a population parameter. In addition to the histogram, the normal quantile plot generated further confirmed that the residuals were normally distributed in the China data (Figure 7).

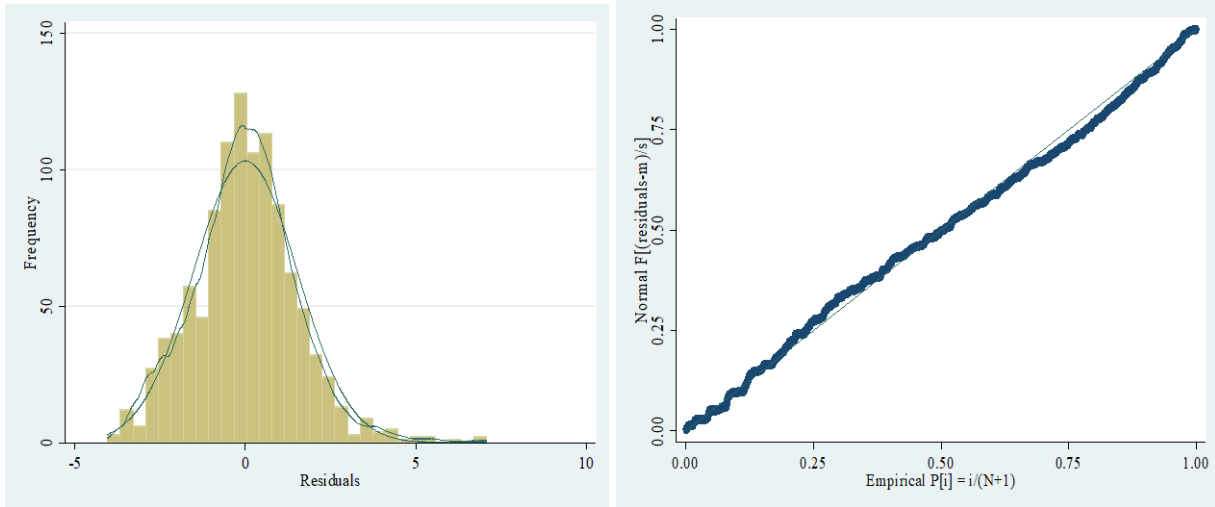


Figure 7. Histograms of Residuals and Normal Quantile Plot in China Data

The assumption of homoscedasticity was also checked by the inspection of a plot of the residuals against the predicted values (Figure 8). The residual-versus-fitted plot apparently exhibits an increasing funnel shape. The main reason for the heteroscedasticity was the high number of zero scores across one of the major predictor variable “international collaboration,” as well as the dependent variable. The potential threat of heteroscedasticity was further discussed in the final chapter of the study.

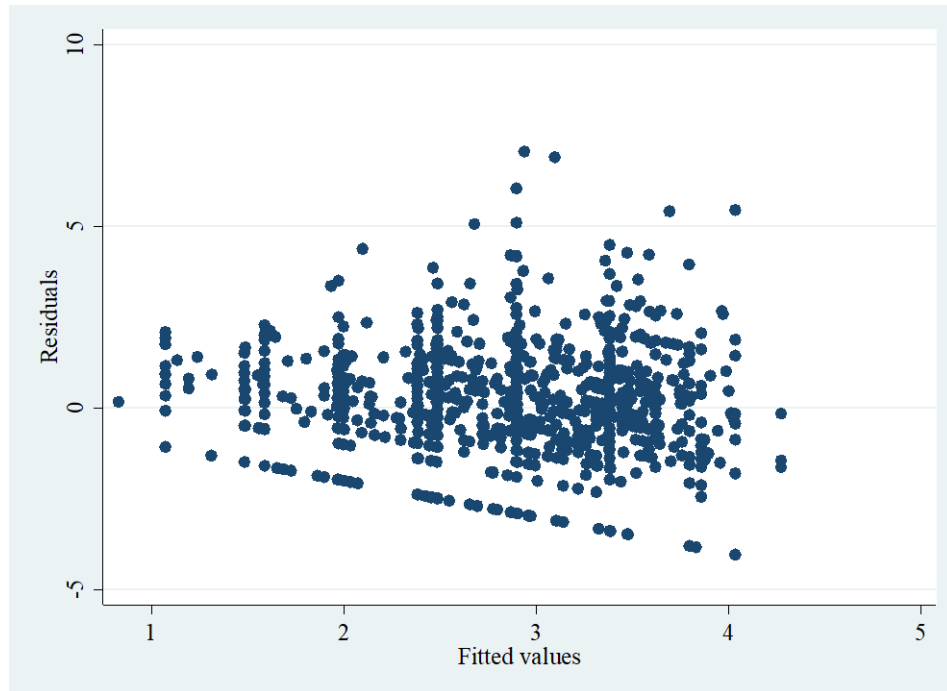


Figure 8. Variance of Residuals in China Data

The residuals need to be independent, while there should be no multicollinearity for a linear regression in the data (Acock, 2012). Independence of residuals was indeed found in the China data, as assessed by a Durbin Watson statistic of 1.881. The variance inflation factor (VIF) was used as an indicator of multicollinearity. The highest VIF among the predictor variables was 1.15. Because the suggested maximum level of VIF for each predictor was $VIF < 10$ (Hair et al., 1998), there was no multicollinearity in the China sampling (see Appendix B).

4.3 Descriptive Results

4.3.1 Participant Demographics

In this section, major participant demographics and descriptive statistics of the full-time faculty were provided in both the Brazilian and Chinese samplings. Table 6 indicates the distribution and frequency of faculty members based on gender, academic rank, discipline, and institution type, while Table 7 shows descriptive statistics and the correlation matrix.

Gender

Gender distribution differs across the two countries. Out of 556 respondents, 56% were male, while 44% were female in Brazil. On the other hand, out of 1,067 respondents, 70% were male, and 30% were female in China. It is evident from Table 6 that Brazil has a more balanced distribution between male and female participants, while China has many more male faculty members than female.

Academic Rank

In both the Brazil and China samplings, the number of faculty members with senior position were considerably higher than the number of junior faculty members. Both shared similar characteristics of academic status, showing that 71% were senior faculty (associate and full professors), and 29% were junior faculty members (assistant professors and lower ranks) in both countries (Table 6).

Academic Discipline

Academic disciplines were presented into two major groups: Soft disciplines and hard disciplines. Soft disciplines refer to education, humanities, and social sciences, while hard disciplines refer to the sciences and engineering. Thirty-eight percent of the Brazilian

respondents were in soft disciplines, while 62% were in hard disciplines. For the Chinese sampling, 33% were from soft disciplines, and 67% were from hard disciplines (Table 6). The distribution indicated that the number of participants in hard disciplines was considerably higher in both countries than the number of respondents from soft disciplines. Like academic rank, the frequency of the academic disciplines was not much different between the Brazilian and Chinese samplings.

Institution Types

Brazil and China have different types of higher education organizations. Table 6 indicates the frequency of the institution types regarding teaching and research focus in both countries. For a clear distinction and comparability between the institutions of higher education in the two countries, institution types were reported under two relevant categories: research-oriented institutions and teaching-oriented institutions. Based on the distribution table, it seems that Brazil and China have opposite distributions. Most of the Brazilian respondents were from research-oriented institutions (81%), while only 20% were from research-oriented institutions in China. On the other hand, only 19% were from teaching-oriented institutions in Brazil, while 80% came from teaching-oriented institutions in China.

Table 5: Demographic Characteristics of Full-Time Faculty Members in Brazil and China

Characteristic	Brazil		China	
	<i>n</i>	%	<i>n</i>	%
Gender				
Female	245	44.1	317	29.7
Male	311	55.9	750	70.3
Academic Rank				
Junior position	162	29.1	306	28.7
Senior position	394	70.8	761	71.3
Academic Discipline				
Soft disciplines	209	37.6	357	33.4
Hard disciplines	347	62.4	710	66.6
Institution Type				
Teaching-oriented HE institutions	107	19.2	850	79.7
Research-oriented HE institutions	449	80.8	217	20.3
Total (N)	556		1,067	

4.3.2 Descriptive Statistics and Correlation Matrix

In addition to the participant demographics, Tables 7 and 8 report descriptive results including mean, standard deviation, and correlation between variables in both samplings. The mean scores of the continuous dependent and independent variables in the Brazilian sampling were 5.5 (SD = 6.7) for faculty research productivity, 53.1% (SD = 67.6) for international dissemination, and 7.1% (SD = 18.7) for international collaboration. For the Chinese sampling, the mean scores of the independent and dependent variables were faculty research productivity at 10.1 (SD = 11.5), international dissemination in a different language 27.7% (SD = 36),

international dissemination in a foreign country 13.6% (SD = 24.8), and international collaboration 1.0% (SD = 7.8). Based on the review of the means and standard deviations reported in Tables 7 and 8, it was found that the variance of faculty research productivity in the China data seemed to be greater than the variance of faculty research productivity in the Brazil data.

The self-reports of full-time faculty members regarding the number of articles published in an academic journal or a book in the past three years revealed that respondents from China were apparently more productive than the full-time faculty members in Brazil. However, international dissemination of research was considerably lower in China in comparison to that in Brazil. The average rate of international dissemination of research was 53% among Brazilian faculty members, while it was only 27.7% for publications in a different language and 13.6% for publications in a foreign country among Chinese faculty members. Also, faculty members in Brazil collaborated more with international colleagues who were located in another country ($M = 7.1$), published more in a different language, and published more in a foreign country. Chinese participants had a very low rate of international collaboration in research publications (.95%).

Table 6: Mean, Standard Deviation, and Inter-correlations for Faculty Research Productivity and Predictor Variables in Brazil Data (N = 556)

Variables	1	2	3	4	5	6
Faculty research productivity	.37***	.28***	.13**	.12**	.08	.22***
Predictor Variables						
1. International dissemination (ID)		.51***	.30***	.01	.39***	.19***
2. International collaboration (IC)			.16***	.06	.19***	.14**
3. Gender				.01	.16***	.03
4. Academic rank					.05	-.01
5. Academic discipline						.10
6. Institution type						
<i>M</i>	53.1	7.1	.56	.71	.62	.81
<i>SD</i>	67.6	18.7	.50	.45	.48	.39

Note. Faculty research productivity ($M = 5.53$, $SD = 6.72$). ^aGender: 0 = female, 1 = male.

^bAcademic rank: 0 = junior position, 1 = senior position. ^cAcademic discipline: 0 = soft discipline, 1 = hard discipline. ^dInstitution type: 0 = teaching-oriented institution, 1 = research-oriented institution).

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 7: Mean, Standard Deviation, and Inter-correlations for Faculty Research Productivity and Predictor Variables in China Data (N = 1,067)

Variables	1	2	3	4	5	6	7
Faculty research productivity	.18***	.20***	-.03	.20***	.29***	.21***	.16***
Predictor Variables							
1. Dissemination of research in a different language (DRDL)		.01	-.06	.06	.09**	.27***	.12***
2. Dissemination of research in a foreign country (DRFC)			-.04	.04	.05	.22***	.10***
3. International collaboration (IC)				-.01	-.02	.01	-.03
4. Gender					.14***	.11***	.07*
5. Academic rank						.10**	.02
6. Academic discipline							.03
7. Institution type							
<i>M</i>	27.7	13.6	.95	.70	.71	.66	.20
<i>SD</i>	36.0	24.8	7.75	.46	.45	.47	.40

Note. Faculty research productivity (M = 10.12, SD = 11.46). Gender: 0 = female, 1 = male. Academic rank: 0 = junior position, 1 = senior position. Academic discipline: 0 = soft discipline, 1 = hard discipline. Institution type: 0 = teaching-oriented institution, 1 = research-oriented institution).

* $p < .05$; ** $p < .01$; *** $p < .001$

4.4 Multiple Regression Results

4.4.1 Results for the Research Questions One and Two

4.4.1.1 Brazil

Table 9 indicates the multiple regression results for the Brazil sampling. The fitted multiple regression model for the Brazil data revealed a positive relationship between the predictor variables (international dissemination and international collaboration) and the outcome variable (faculty research productivity), when all other variables held constant. It was found that international dissemination significantly predicted participants' research productivity ($\beta = .31$, $p < .0001$), as did international collaboration ($\beta = .10$, $p < .05$). The overall model was statistically significant in predicting faculty research productivity (Prob < 0.001) in the Brazil sampling.

The results of the regression revealed that all the predictors, including international dissemination, international collaboration, gender, academic rank, discipline, and institution type, explained 19% of the variance in faculty research productivity ($R^2 = .1875$, $R^2_{\text{adj}} = .1786$, $F(6,549) = 21.11$, $p < .05$). It indicated a medium-size effect, according to (Cohen, 1988). Based on the multiple regression results, it was concluded that the explanatory variables international dissemination and international collaboration did help to predict faculty research productivity among participating full-time faculty members in Brazil. As faculty engaged in international dissemination and international collaboration, their research productivity likely increased in Brazil.

Table 8: Summary of Multiple Regression Analysis for Predicting Faculty Research Productivity in Brazil

data				
Variables	B	SEB	β	sr^2
International dissemination (ID)	.006***	.001	.31	.058
International collaboration (IC)	.007***	.003	.10	.008
Gender	.065	.105	.03	.001
Academic rank	.333**	.109	.12	.014
Academic discipline	-.225*	.111	-.08	.006
Institution type	.503***	.128	.15	.023

Note. $R^2 = .188$, $F(6, 549) = 21.11$ ($N=556$, $p < .001$). Gender: 0 = female, 1 = male. Academic rank: 0 = junior position, 1 = senior position. Academic discipline: 0 = soft discipline, 1 = hard discipline. Institution type: 0 = teaching-oriented institution, 1 = research-oriented institution).

* $p < .05$, ** $p < .01$, *** $p < .001$

4.4.1.2 China

Table 10 indicates the multiple regression results for the China sampling. The fitted multiple regression model for the China data revealed a positive relationship between the predictor variables, including dissemination of research in a different language, dissemination of research in a foreign country, and international collaboration, and the outcome variable (faculty research productivity), when all other variables were held constant. It was found that dissemination of research in a different language significantly predicted participants' research productivity ($\beta = .005$, $p < .0001$); and dissemination of research in a foreign country also significantly predicted participants' research productivity ($\beta = .01$, $p < .0001$). However, there was no statistically significant relationship between international collaboration and faculty research productivity.

The overall model was statistically significant in predicting the faculty research productivity (Prob < 0.001) in the China sampling. The results of the regression indicated that the overall model explained 19% of the variance in faculty research productivity ($R^2 = .1836$, $R^2_{adj} = .1782$, $F(7, 1059) = 34.03$, $p < .0001$). It also indicated a medium-size effect, according to (Cohen, 1988). Based on the multiple regression results, it was concluded that the explanatory variables “international dissemination through publication in a different language” and “international dissemination in a different language” did help to predict faculty research productivity among participating full-time faculty members in China. Chinese faculty members likely produced more if they published in a different language and a foreign country.

Table 9: Summary of Multiple Regression Analysis for Predicting Faculty Research Productivity in China

data				
Variables	B	SEB	β	sr^2
Dissemination of research in a different language (DRDL)	.005***	.001	.103	.010
Dissemination of research in a foreign country (DRFC)	.010***	.001	.141	.019
International collaboration (IC)	-.002	.006	-.011	.000
Gender	.515***	.104	.139	.019
Academic rank	.899***	.105	.241	.056
Academic discipline	.410***	.107	.115	.011
Institution type	.415***	.122	.099	.010

Note. $R^2 = .184$, $F(7, 1059) = 34.03$ ($N=1,067$, $p < .001$). Gender: 0 = female, 1 = male. Academic rank: 0 = junior position, 1 = senior position. Academic discipline: 0 = soft discipline, 1 = hard discipline. Institution type: 0 = teaching-oriented institution, 1 = research-oriented institution).

*** $p < .001$

4.4.2 Results for the Research Question Three

The third research question sought to explain the unique effect of factors on the relationship between explanatory and outcome variables. Indeed, the third question was designed to discover if the observed relationships of international dissemination and international collaboration with faculty research productivity differ by gender, academic status, academic discipline, or institution type. To see if there was a variance on the relationships depending on certain factors, a new regression model that included interaction terms was fitted. The new model added the interactions of covariates (gender, academic rank, academic discipline, and institution type) with each explanatory variable. Testing for interaction effect would allow us to see if the slopes were different for female and male participants; junior and senior faculty; those who come from soft disciplines and those who come from hard disciplines; and those working at teaching-oriented institutions and those working at research-oriented institutions. As a result, interaction terms were generated as the product of explanatory variables and covariates and added to the multiple regression model for the data from both Brazil and China.

4.4.2.1 Brazil

Table 11 shows the regression results with interaction terms in Brazil data. The results indicated that we could explain 20.56% of the variance, $F(14, 541) = 10.00$, $p < 0.0001$, in faculty research productivity, after the effects of interactions were added to the model. This is an increase of approximately 2% from the main effect. When looking at the interaction terms, none of the interactions was significant except for the interaction of gender and international collaboration. The interaction of gender and international collaboration was significant ($p < .05$), although the main effect of gender was nonsignificant in the original standard regression model

presented in the previous section. Overall, the observed relationships of faculty research productivity with international dissemination and international collaboration did not vary depending on differences in academic rank, academic discipline, and institution type in Brazil sampling.

Table 10: Summary of multiple regression analysis with interaction between continuous variables and covariates in Brazil data

Variables	B	SEB	β	sr^2
International dissemination (ID)	.006	.003	.32	.004
International collaboration (IC)	-.008	.018	-.11	.000
Gender	.060	.128	.02	.000
Academic rank	.259	.138	.09	.005
Academic discipline	-.308*	.129	-.12	.008
Institution type	.551***	.148	.17	.020
<i>Interaction for International Dissemination (ID)</i>				
Gender x ID	-.002	.002	-.091	.001
Academic rank x ID	.000	.002	.004	.000
Discipline x ID	.002	.003	.115	.001
Institution type x ID	-.001	.003	-.062	.000
<i>Interaction for International Collaboration (IC)</i>				
Gender x IC	.018*	.007	.232	.008
Academic rank x IC	.011	.007	.138	.003
Discipline x IC	.011	.010	.150	.002
Institution type x IC	-.017	.016	-.238	.002

Note. $R^2 = .206$, $F(14, 541) = 10.00$ ($N=556$, $p < .001$). Gender: 0 = female, 1 = male. Academic rank: 0 = junior position, 1 = senior position. Academic discipline: 0 = soft discipline, 1 = hard discipline. Institution type: 0 = teaching-oriented institution, 1 = research-oriented institution).

* $p < .05$

Figure 9 indicates a better view of the statistically significant effect of gender on the relationship between international collaboration and faculty research productivity. Based on the results, male faculty respondents who collaborated with their colleagues from other countries were more productive than female faculty respondents who collaborated with colleagues from other countries in Brazil. However, the effect increased for the male faculty while it remained same for the female faculty. Gender differences in the relationship between international collaboration and research productivity were small at lower levels of collaboration, but increased greatly as Brazilian faculty members collaborated more. Basically, the graph suggests that the more faculty members collaborate internationally, the greater benefits male faculty get.

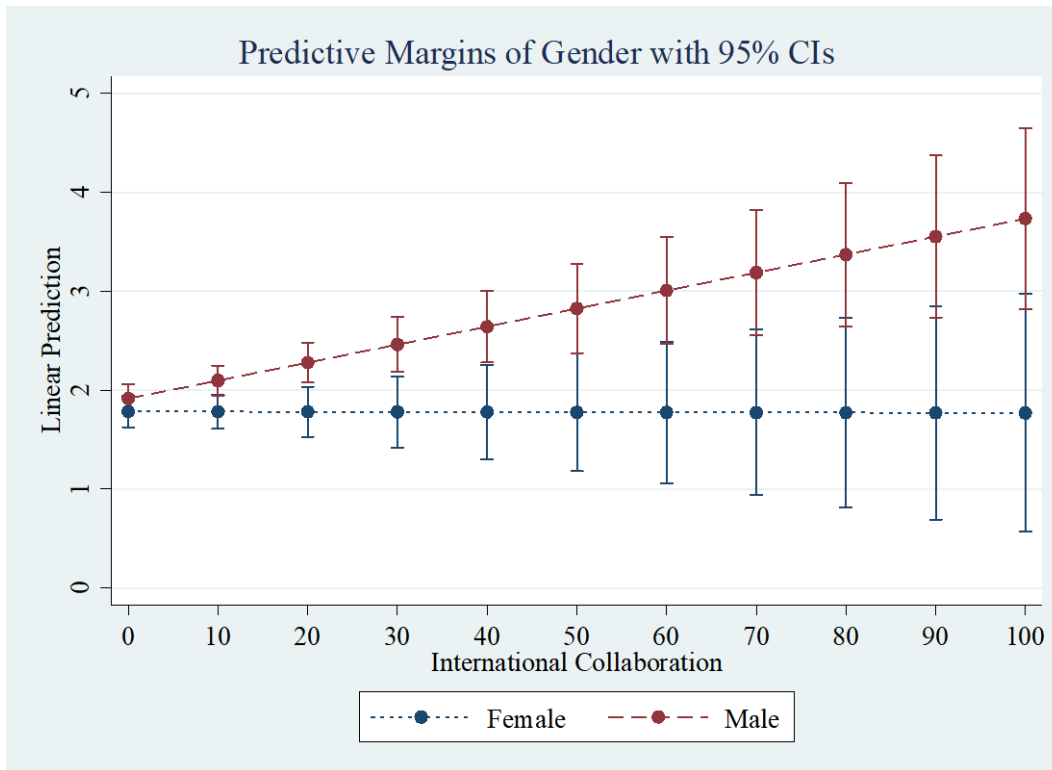


Figure 9. Gender Differences for the Relationship between Faculty Research Productivity and International Collaboration in Brazil

4.4.2.2 China

A similar procedure was conducted for the Chinese sampling to see if the observed relationships differed by gender, academic rank, academic discipline, and institution type. Thus, a new regression model was generated, as interaction terms were added to the model for the China sampling. In contrast to the Brazil data, interaction terms of all covariates were generated for the three explanatory variables (dissemination of research in a different language, dissemination of research in a foreign country, and international collaboration). Testing for interaction would allow us to see if the observed relationships of faculty research productivity with dissemination in a different language, dissemination in a foreign country, and international collaboration differ by gender, academic status, academic discipline, and institution type.

Table 12 shows the regression results with interaction terms for the China data. The results indicated that we could explain 21.61% of the variance, $F(19, 1047) = 15.19, p < 0.0000$, in faculty research productivity, after the effects of interactions were added. This is an increase of approximately 3.3% from the main effects. When looking at the interaction terms, the only two interactions that were significant were those of academic discipline with dissemination in a different language, and institution type with dissemination in a different language. In other words, the relationship between faculty research productivity and dissemination in a different language differed significantly depending on the academic discipline and the institution type ($p < .001$). All other interactions did not reveal any significant difference.

Table 11: Summary of multiple regression analysis with interaction between continuous variables and covariates in China data

Variables	B	SEB	β	sr^2
Dissemination of research in a different language (DRDL)	.000	.004	.01	.000
Dissemination of research In a foreign country (DRFC)	.004	.005	.06	.000
International collaboration (IC)	.003	.013	.01	.000
Gender	.459**	.138	.12	.008
Academic rank	.975***	.137	.29	.038
Academic discipline	.118	.129	.03	.000
Institution type	.796***	.184	.19	.014
<i>Interaction for Dissemination of research in a different language (DRDL)</i>				
Gender X DRDL	-.001	.003	-.023	.000
Academic rank X DRDL	-.005	.003	-.100	.002
Discipline X DRDL	.015***	.003	.308	.018
Institution type X DRDL	-.011***	.003	-.149	.009
<i>Interaction for Dissemination of research in a foreign country (DRFC)</i>				
Gender X DRFC	.003	.004	.040	.000
Academic rank X DRFC	.004	.004	.052	.000
Discipline X DRFC	.001	.005	.015	.000
Institution type X DRFC	-.001	.005	-.008	.000
<i>Interaction for International Collaboration (IC)</i>				
Gender x IC	-.002	.016	-.009	.000
Academic rank x IC	-.007	.014	-.023	.000
Discipline x IC	.000	.016	.002	.000
Institution type x IC	.035	.044	.024	.000

Note. $R^2 = .216$, $F(19, 1047) = 15.19$ ($N=1,067$, $p < .001$). Gender: 0 = female, 1 = male. Academic rank: 0 = junior position, 1 = senior position. Academic discipline: 0 = soft discipline, 1 = hard discipline. Institution type: 0 = teaching-oriented institution, 1 = research-oriented institution). ** $p < .01$, *** $p < .001$

As Figure 10 demonstrated a better view of the interaction, the effect of academic discipline changed by international dissemination. In other words, the prediction differed as the dissemination of research in a different language increased. The pattern of the effect of the academic discipline appears to be somewhat different for those from soft disciplines and those from hard disciplines. The difference in effects between faculty of soft disciplines and faculty of hard disciplines was first larger in favor of faculty of soft disciplines, but then changed and reversed after 60% of dissemination in a different language. Also, the confidence intervals substantially overlapped.

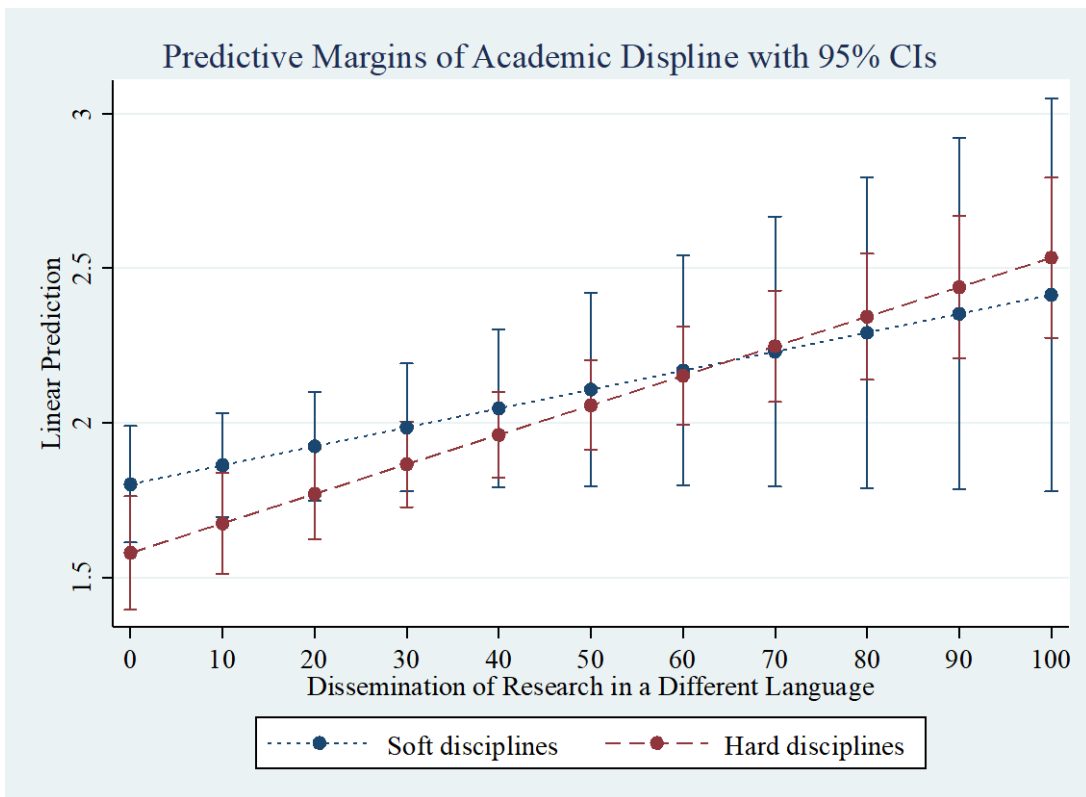


Figure 10. Academic Discipline Differences for the Relationship between Faculty Research Productivity and Dissemination of Research in a Different Language in China

On the other hand, the Figure 11 suggests that faculty of research-oriented institutions who published in a different language were more productive than faculty of teaching-oriented institutions who published in a different language in China sample. The differences between faculty of research-oriented institutions and faculty of teaching-oriented institutions remained almost same across the level of dissemination in a different language. Institutional differences in the relationship were large at all levels of the dissemination, but increased slightly as faculty of research-oriented institutions disseminated in a different language more.

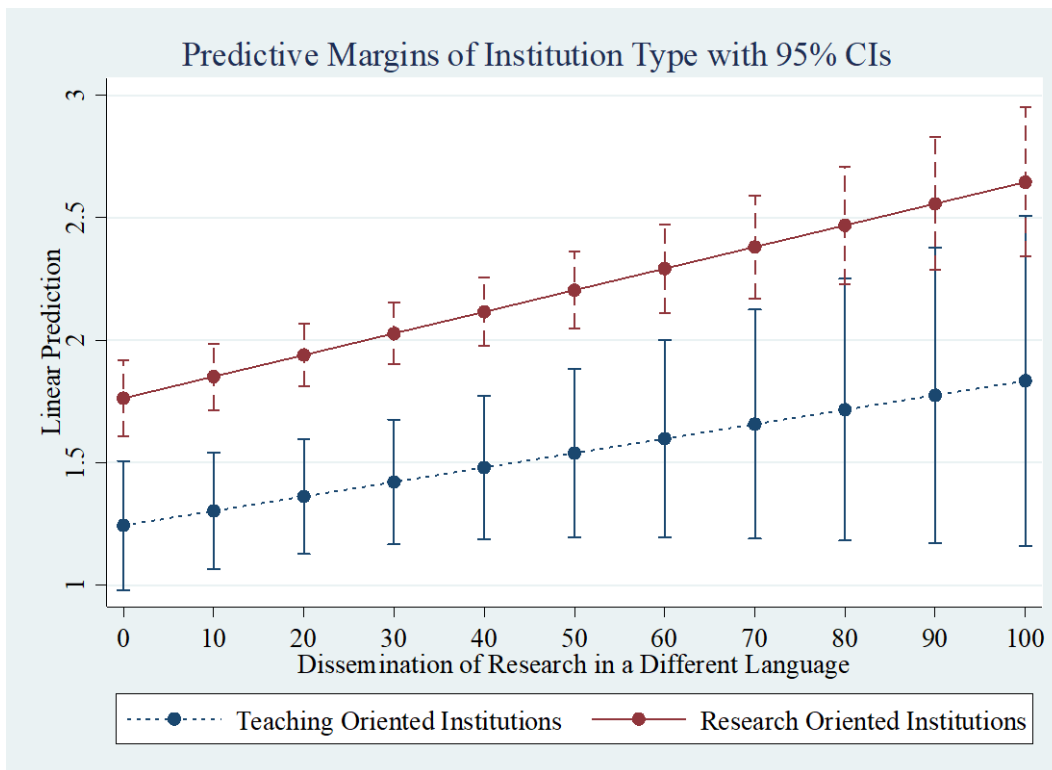


Figure 11. Institution Type Differences for The Relationship between Faculty Research Productivity and Dissemination of Research in a Different Language in China

4.5 Summary

This chapter presented the missing management, assumptions check, participant demographics, descriptive statistics, and the findings of the multiple regression analyses in terms of the main effects of predictor variables on faculty research productivity. The chapter also included the regression results with interactions effects, indicating the significant differences between the observed relationship based on gender, academic rank, academic discipline, and institution type.

Faculty research productivity was assessed by the number of articles published in an academic journal or book, while international dissemination and international collaboration were measured by the percentage of scholarly research published in a different language, the percentage of scholarly research in a foreign country, and the percentage of research coauthored with foreign colleagues. All covariates were re-coded for the analysis to enhance the interpretation of the results. Also, two of the explanatory variables (dissemination in a different language and dissemination in a foreign country) were used to create a composite variable in the data from both Brazil and China. Based on the correlation results, they were used only as a composite variable in the Brazil sampling, while they were entered into the regression model as separate explanatory variables.

Descriptive results were also presented regarding the basic statistics. Senior faculty, on average, published more articles than junior faculty members, while faculty members from soft disciplines published more articles than those who were in hard disciplines in both countries. Faculty from research-oriented institutions were more productive than faculty members who worked at teaching-oriented institutions in both countries. However, male faculty members

published more than female faculty members in China, while gender was not a statistically significant predictor of faculty research productivity in Brazil.

The standard multiple regression results were also provided for each country. The relationship between faculty research productivity and international dissemination was found to be statistically significant in both the Brazil and China samplings. However, when it came to the international collaboration of faculty, the relationship between faculty research productivity and international collaboration was not significant in China, although it was in Brazil. In general, the more international research activities in which a faculty engaged, the more scholarly articles a faculty published, on average, in Brazil. In particular, the more international publications a faculty disseminated, the more a faculty published in Brazil. Furthermore, the more faculty collaborated with international colleagues from other countries, the more articles faculty published in Brazil. The same tendency existed among Chinese faculty members, except that there was no relationship between international collaboration and faculty research productivity in China.

In comparison to the standard regression model, a new regression model with interaction was generated, the results of which were presented in this chapter. As the results revealed, the relationship between faculty research productivity and international collaboration in Brazil differed only by gender, in favor of male participants. Male Brazilian faculty who collaborated with colleagues located in other countries were more productive than female faculty collaborating with colleagues from other countries. On the other hand, there were no other differences regarding the observed relationships, related to such factors as academic rank, academic discipline, and institution type.

Among Chinese faculty members, the only interaction effect existed between dissemination in a different language and faculty research productivity, depending on academic discipline and institution type. Faculty in China from hard disciplines, including science and engineering, who published in a different language, were more productive than those who published in a different language but came from such soft disciplines as social science, humanity, and education. On the other hand, faculty from teaching-oriented institutions who published in a different language published more articles than those from research-oriented institutions who published in a different language. Overall, the regression models designed were statistically significant and predicted faculty research productivity.

5.0 Discussions, Implications, Conclusion, Recommendations, And Future Research

This chapter consists of five sections. The first section, Summary and Discussions, provides a comprehensive summary of the dissertation chapters and further explanation of the findings and measurements in relation to the relevant literature. The second section, Implications, includes several significant implications of the results for the internationalization of faculty in research and faculty research productivity in Brazil and China. The third section, Conclusion, provides an overall conclusion of the study. The fourth section, Policy Recommendations, presents some suggestions for HEIs, policy makers, and faculty. The fifth section, Limitations and Future Research, addresses the study limitations while giving some suggestions for future study to advance the internationalization of higher education.

5.1 Summary and Discussions

The problem, presented in Chapter 1, was clear: How does internationalization of higher education manifest itself in faculty research productivity and development? More to the point, how does international dissemination of research and international collaboration affect faculty research productivity? Gender, academic status, discipline, and institution type were addressed if the observed relationships differed by those factors.

In Chapter 2, a comprehensive framework and theoretical justification were sought. Although the literature was lacking an established theoretical framework that might explain the relationship between the internationalization of higher education and research productivity, there

were some useful approaches to framing faculty international involvement in research and academic productivity. As a result, in this study, the relationship of the international scope of scholarly works and research productivity was conceptually designed based on the typologies of Knight (1994, 1999, 2004, 2012). Knight (1999, 2004) not only provided several frameworks that can be used to explain internationalization of higher education at different levels, but also provided a well-recognized definition of the internationalization of higher education. Based on Knight's approaches, a conceptual and analytical framework addressing the internationalization of research at the individual faculty level and research productivity as an outcome was developed. The conceptual framework drawn from Knight's typologies was useful in explaining the observed relationships in the present research.

Chapter 3 explained the method employed for studying the hypothesized relationship. A multiple regression model with main effects was designed to understand the predictive power of internationalization of faculty in research on faculty research productivity when all other effects are held constant. Furthermore, interaction effects of gender, academic rank, discipline, and institution type were tested through different multiple regression models designed separately for the Brazil and China samplings.

Chapter 4 presented the findings from the analysis. Gender, academic rank, discipline, and institution type were used as control variables to determine the direct relationship between the dependent and major predictor variables. The standard regression models explained 19% and 18% of the variances in faculty research productivity in Brazil and China, respectively. The results of this study contribute to an understanding of faculty international research activities at higher education institutions with respect to productivity and outcomes. Additionally, the findings have the potential to lead scholars, policy makers, administrators, and institutions to

make better decisions for improving faculty outcomes in a time of growing internationalization. Thus, Chapter 5 provided further explanations and implications of the findings in relation to the relevant literature.

The analysis of the present research raised some important findings for higher education systems in Brazil and China. First, the findings of the standard multiple regression analysis showed that international dissemination is positively correlated with faculty research productivity in Brazil. Also, the findings indicated that the international dissemination of research in a different language and a foreign country is positively correlated with research productivity among Chinese faculty members. Regarding the observed relationships, one can draw an overall conclusion that international dissemination of research and international collaboration facilitates the communication of faculty members with the international scholarly community, provides inspiration for further publications in an international environment, and thus leads to higher research publication productivity.

Also, the findings of the multiple regression analysis revealed that international collaboration is positively and significantly correlated with faculty research productivity among Brazilian faculty members while it appears to have no statistically significant relationship with Chinese faculty research productivity. In fact, these significant and non-significant relationships in two different contexts indicate some important differences between Brazilian and Chinese faculty members.

There was no statistical correlation between international collaboration and faculty research productivity in China. This raises some concerns regarding the level of international collaboration among Chinese faculty members. In the preliminary analysis, this study found a high number of zero scores in the percentage of international publications among all publications

of faculty members in both samplings, which also affected the homogeneity of the residuals. The major report of the CAP survey confirmed that Chinese faculty has the lowest proportion of international research collaboration (10%) in comparison to all other CAP-participating countries (19 countries) across the world (Teichler et al., 2013). On the other hand, Teichler et al. (2013) also reported that 66% of Chinese research was international in scope, which is among the highest values in participating countries. It shows that Chinese faculty were highly interested in international issues and topics, although they rarely chose to collaborate with their peers in and out of the country.

There are various explanations of why Chinese faculty members were not interested in international collaboration while having international scope in their research. Potential issues may include language boundaries, the tendency to conduct individual research, and physical boundaries for collaborative works. Particularly, lack of proficiency in the language of the academic publication (most often, English) may hinder the faculty members from participating in academic networks with colleagues from other countries. Another possible explanation is that the reward systems, funding, and academic culture of collaboration may not encourage Chinese faculty to collaborate internationally.

Also, the analysis drawn from the regression with interaction terms revealed some interesting findings regarding the effects of factors including gender, academic discipline, and institution type on the observed relationships in Brazil and China. First, it is evident from the results that gender moderates the relationship between international collaboration and faculty research productivity in Brazil. This study revealed that male faculty who collaborate internationally in research produce more than female faculty who collaborate internationally in research in Brazil. One can refer this result to the relevant findings regarding female faculty in

academia. For instance, Fox and Mohapatra (2007) showed that female faculty has less access to international research networks than male faculty. Also, Teodorescu (2000) indicated that female faculty receive fewer financial support for their research than male faculty. Thus, female faculty may need special support to grow their international research network and collaboration.

Analyzing the interaction effects of some factors, this study also found that differences in academic discipline and institution type changed the relationship between the international dissemination of research in a different language and faculty research productivity in China. In other words, the observed relationship differed depending on the academic discipline and institution type in the Chinese sampling. Faculty who disseminated research in a different language at teaching-oriented institutions published more than those who disseminated research in a different language at research-oriented institutions in China. This result seems to be inconsistent with the literature in which faculty from research-oriented institutions are considered more productive in research than those from teaching-oriented institutions. One can draw a conclusion from this unexpected result that faculty at all types of Chinese institutions are expected to achieve all types of academic works, including both teaching and research. Thus, there is no clear distinction between teaching and research tasks of faculty members at higher education institutions. Although faculty at national public universities reported a higher number of research publications than those of regional public universities and local colleges China, there do not seem to be strong policies and expectations for faculty to be more productive in their research. This may not be the case for universities listed in Projects 211 or 985. However, the number of universities in those projects is limited and the CAP survey does not include any information regarding the institution names and tiers.

In fact, the higher education system in China traditionally has been teaching-oriented. Faculty members have often been expected to teach as their primary role. Also, the research activities have been mostly conducted by researchers at research institutes outside the universities. However, higher education has changed and expanded dramatically in the last decade in China. This shift has affected the traditional roles of faculty members and led them to be more heavily involved in research activities in addition to teaching. Chinese participants in the CAP survey reported that they spend almost half of their time on teaching (47%). Also, the percentages of faculty members whose interests lie primarily in research or primarily in teaching are very low (5% and 11%, respectively), while 84% preferred both teaching and research together as their mutual academic interests. In fact, these proportions indicate that it may be hard to distinguish the teaching and research roles of Chinese faculty through the existing data (Teichler et al., 2013).

In addition to discussions of the results, some nuances of research productivity measurement and categorization of covariates need to be explained in greater detail. In this study, faculty research productivity was measured by the number of articles published in an academic journal or a book in a given three-year period. Studies in the literature have suggested various methods of measuring faculty research productivity, including single item measurement, multiple-item measurement, weights, and citations (Braxton & Bayer, 1986; Fairweather, 2002; Hirsch, 2005, 2007; Jonkers & Tijssen, 2008; Rostan, 2012). Also, the CAP survey, on which this study is based, identified various types of productions including scholarly books, book edits, academic articles, research reports and monographs, conference papers, patents secured, computer programs written, artistic works, videos and films (Teichler et al., 2013). However, based on the CAP survey, the preliminary analysis suggested that the most appropriate

measurement of research productivity was the number of articles that faculty published. This is due to the fact that the most common and preferred form of publication among Brazilian and Chinese scholars was scholarly articles, as indicated in the preliminary analysis. The survey revealed high numbers of zero scores in all other types of publications, including books, research reports, and patents secured. Besides, articles have been the most common and acceptable type of publications to measure in studies, especially in comparative studies (Teodorescu, 2000). As a result, the number of scholarly articles published was used as an indicator of faculty research productivity for the purpose of this study.

Also, international collaboration was measured by the co-authorship with colleagues from other (foreign) countries, as has been done in many studies in the literature. However, collaboration is a much larger concept that may refer not only to authorship but also to types of collaboration such as collaborative grants and community projects. Collaboration may not necessarily result in a publication. Thus, one should acknowledge the nuances in international collaboration even though co-authorship is a well-recognized measurement of collaboration in the literature (Franceschet & Costantini, 2010).

5.2 Implications

The first major practical contribution of the present research is that it provides empirical evidence on the measurable outcomes of international activities of faculty in research for Brazil and China. This contribution is crucial because the other CAP-based studies have only examined the general distribution of those phenomena and the factors that influence internationalization of faculty (Huang et al., 2014). However, many of these studies have lacked advanced analyses

based on advanced statistical models for the proposed relationships. Thus, this research study contributes significantly to both internationalization of higher education and faculty productivity literature because it provides empirical evidence for the relationships between them.

Understanding the importance and impact of the international research activities at the individual faculty level will allow national and institutional policy makers to justify further support for faculty internationalization based on faculty productivity and development. For example, national and institutional policy makers will understand that those faculty involved in international research activities are more likely to produce scholarly works. This acknowledgment could lead to structural changes in faculty reward systems at higher education institutions in Brazil and China.

Also, the present research is especially pertinent at a time of increased internationalization of higher education in Brazil and China. Those countries have experienced significant changes in their higher education systems in the past few decades. Thus, the results are crucial not only because of the growing importance of internationalization but also because of the continuing emphasis on faculty research productivity in those systems.

This study also provides evidence supporting internationalization approaches other than mobility. Mobility has been the primary and dominant activity of internationalization. However, universities are increasingly looking for alternative strategies that are more comprehensive and outcome-based. Thus, internationalization at home has received significant attention over the years (Knight, 2012). There are some desirable effects and outcomes of international research activities that may not require high-cost mobility. Furthermore, while mobility continues to remain a primary activity of internationalization of higher education at all levels, it may not result in increased production of academic works. Thus, a sole focus on mobility and academic

exchange may not continue to receive support from university administrations and policy makers. This study has highlighted some essential international activities in research including international dissemination and international collaboration. Thus, the results may have practical implications for internationalization policies, faculty development, faculty reward systems, and promotion requirements.

Another important implication of this study is to underscore the importance of proficiency in other languages, especially in English, which is the lingua franca of international research. As addressed in the literature, language remains a critical factor that may either facilitate or prevent a faculty member's international involvement. English proficiency in research is key for some faculty as it provides them with a larger international network, participation in more international projects, and knowledge dissemination (Rostan et al., 2014). Overall, Brazil and China are non-English speaking countries although many scholars increasingly prefer English for their academic publications. As a result, faculty members from those non-English speaking countries may make greater use of national publication channels (Bentley, 2015). In comparison to other CAP-participating countries, Brazil and especially China have low levels of international activities. Although being non-native in English may remain as an obstacle for Brazilian and Chinese faculty members, higher proficiency in English can potentially remove most of the barriers in international research collaboration.

The final important implication of this study is related to the international academic network of faculty members. One can conclude from the results of this research that Brazilian faculty have larger international academic networks than Chinese faculty. Also, Brazilian faculty members may be receiving extended support from their higher education institutions or national institutions while Chinese faculty members may feel less obligated to grow their international

network by collaborating with their international peers. Proficiency at major languages including English enables faculty to build a larger international academic network over time. Furthermore, scholars with a larger international network are likely to be more heavily involved in international projects, grants, and funding opportunities. Thus, the international academic network remains a critical component of lower and higher involvement in research activities at the international level.

5.3 Conclusion

Faculty research at higher education institutions has had international scope and orientation. However, the growing emphasis on the internationalization of higher education has increased its importance in an age of institutional and economic competition. Although mobility between home and host countries for academic purposes has been viewed as a major activity of the internationalization of faculty, financial limitations have increasingly led institutions to emphasize internationalization at home. In this trend, international dissemination of research and international collaboration, which may not necessarily require mobility to increase individual and institutional visibility and grant opportunities, has received significant attention over time in addition to the development of an internationalized curriculum. Furthermore, institutions have increasingly expected significant returns and outcomes from their internationalization activities for reasons of sustainability and accountability. This study addresses the need to further support faculty members' international activities, particularly in research, and enhance faculty research productivity as an ultimate purpose of such international involvement in research. To respond to this need, this study used an existing international dataset—the Changing Academic Profession

(CAP)—which allowed the measurement of internationalization of faculty in research and faculty research productivity.

As the results of this study showed, Brazilian faculty members have disseminated their research and collaborated with their colleagues from other countries more than Chinese faculty members. Brazilian faculty members have tended to be more international concerning international research dissemination and international co-authorship. In contrast, although Chinese faculty members have tended to disseminate their research in a different language and a foreign country, they have rarely collaborated with their foreign colleagues located in other countries. Some possible explanations of these different tendencies may be understood by some relevant descriptive statistics provided in the CAP survey. In the major report of the CAP, Teichler et al. (2013) indicated that most of the Chinese faculty members preferred working on research individually (66%). Also, only one-third of Chinese faculty collaborated with their native peers in their home countries (33%). In contrast, Brazilian faculty members were more interested in collaboration with their peers in and outside their countries of origin. Only 39% of Brazilian faculty preferred working individually on research, while 60% collaborated with their native colleagues in Brazil. Considering these descriptive results in the context of the present research suggests that Chinese faculty members are highly domestic and individual-oriented in research while Brazilian faculty are relatively more open to international collaboration in research.

Distinguishing between the higher education systems of Brazil and China is important. They have very distinctive features, including diversity of institution types, international research orientation, and research productivity, although both have experienced a significant transition and change in their higher education systems in the last few decades. Some higher education

issues at the individual faculty level are experience in both countries, but their causes and effects differ dramatically. However, internationalization of faculty in research will continue to receive further attention in both countries, due both to the emphasis on internationalization and the increased importance of productivity for the global competitiveness of higher education institutions. Thus, the major results of this study have potential implications for both the Brazilian and Chinese higher education systems.

5.4 Policy Recommendations

The present research yields some recommendations for higher education institutions with national and international goals for greater outcomes, for faculty members who wish to improve their academic network and productivity, and for national or regional policy makers who are responsible for developing policies regarding faculty members as part of a comprehensive academic support system.

First, institutions should focus on enhancing the internationalization of faculty and research productivity. For higher education institutions in both Brazil and China, it is important to build a national and international reputation to attract highly qualified academic staff and students. In fact, recruiting faculty who are successful at research and have extensive international networks may help institutions grow their overall research quality, enroll more talented students, and improve their international visibility and collaborations at individual, departmental, and institutional levels. Thus, departments at higher education institutions need to focus on those who have publications in other languages and countries as well as research

collaborations with colleagues located in other countries. Institutions can design their hiring systems to screen for potential candidates based on their international research background.

At a time of outcome-based approaches towards resource allocation, higher education institutions increasingly demand measurable outcomes. This study suggests that the internationalization of faculty in research should be supported, especially when the involvement of faculty in international activities is expected to result in measurable and desirable outcomes.

Second, national policy makers need to address the internationalization of faculty in research as one aspect of faculty research productivity. Although there are various efforts at national levels to improve internationalization of higher education and faculty productivity, most of them do not consider these to be related phenomena. For instance, China has developed and implemented Projects 211 and 985 to advance the higher education institutions to become world-class universities in the country. Those projects support some selected HEIs for greater research capacity, international collaboration, and faculty development in research. However, they lack a comprehensive understanding of both internationalization of faculty in research and of faculty research productivity. In world-class universities, internationalization of higher education and research productivity are two integrated components.

For faculty members, the results of this study provide some practical recommendations. Even if institutional support does not exist for the faculty's international involvement in research, faculty members should enhance their international engagement in research for their productivity and development. Those involved in international activities in research will have the chance to engage in an international academic environment, grow their academic network, and join international research projects that often result in international publications. As a result, the

visibility of their academic works will increase, and they will have greater access to international grants and funding.

5.5 Limitations and Future Research

There are several limitations of this study, which are addressed as recommendations for future studies. First and foremost, this study is limited by its reliance on an existing survey—the Changing Academic Profession (CAP). The CAP data is a unique source, being a large-scale survey applied in 19 countries across the world. Regarding size and academic profession, it is the most relevant survey data to study the academic profession in a comparative perspective. However, while secondary large-scale datasets such as CAP provide researchers with well-designed data and the opportunity to study various issues at different levels and contexts, they limit the capacity of researchers when a manipulation of data and design is needed. The 2007 CAP survey included only a limited number of items that fit the purpose of this study. While it does address the issue of internationalization of faculty and research productivity, those data items reflect the situation in 2007. Internationalization of higher education is a highly dynamic phenomenon and is likely to have changed significantly since 2007. A new survey will soon be implemented in a number of countries, at which point researchers will have access to standardized surveys from three different years. Ultimately, this will allow researchers to analyze the changes in the internationalization of faculty members and faculty research productivity.

In this study, mobility was excluded because the primary purpose of this study was to highlight other less-emphasized aspects of the internationalization of higher education. Also, the preliminary analysis showed that there is a limited number of faculty in both Brazil and China

who obtained their highest degrees abroad. More importantly, those who hold a foreign doctoral degree have typically obtained them in neighboring countries. For example, Brazilian faculty members with foreign degrees have mostly received their PhDs from neighboring Latin American countries. As a result, all items referring to mobility, e.g. the source country of the highest degree, were not incorporated into the regression model of the study. However, future studies may consider including academic mobility as a control variable and/or interaction term into their statistical models. Such involvement may help understand how the observed relationships differ when mobility of faculty is a controlled variable.

The final important limitation of this study is that the CAP survey provides no detailed information about the institutions where faculty members work. Rather, it only references general institutional types, whether they are national, federal, regional, local, or private institutions. This limitation prevented a better stratification of institutions based on tiers. Nevertheless, the results of this study support a clear distinction between teaching institutions and research-intensive institutions. Future studies may consider a stratification based on the tiers of the institutions.

The new version of the CAP dataset called Academic Profession in the Knowledge-based Society has been collected from more than 30 countries in the world between 2017-2020. This study has not been able to acquire this new dataset as it has been in the process and not open to researcher outside the principal investigators. Future studies may consider having the opportunity to benefit from this new dataset to make comparative studies.

Appendix A Brazil Data Outputs

Durbin-Watson Test

```
. estat dwatson
```

```
Durbin-Watson d-statistic( 7, 556) = 2.04032
```

Variance Inflation Factor (VIF) Test

```
. vif
```

Variable	VIF	1/VIF
disseminat	1.63	0.613637
coauthor	1.35	0.738284
newdispline	1.17	0.852125
newgender	1.10	0.905053
newinstitut	1.04	0.957583
newacrank	1.01	0.993989
Mean VIF	1.22	

Cook's Distance Test

```
. sum c
```

Variable	Obs	Mean	Std. Dev.	Min	Max
c	556	.0020126	.0064427	3.80e-08	.1169623

DFBETA Test for All Independent Variables

```
. sum _dfbeta_1 _dfbeta_2 _dfbeta_3 _dfbeta_4 _dfbeta_5 _dfbeta_6
```

Variable	Obs	Mean	Std. Dev.	Min	Max
_dfbeta_1	556	.0000188	.0445164	-.2657439	.2777843
_dfbeta_2	556	-.0000405	.058628	-.5786384	.8023198
_dfbeta_3	556	.0000396	.0419403	-.1596649	.2402283
_dfbeta_4	556	.0000319	.0409338	-.2892309	.2307739
_dfbeta_5	556	1.50e-06	.0400399	-.1378855	.1809358
_dfbeta_6	556	-1.05e-06	.0402292	-.2594742	.1668184

Correlation between Variables

```
. pwcorr sqrtarticle disseminat coauthor newgender newacrank newdispline newinstitut, listwise sig st
> ar(5)
```

	sqrtar~e	dissem~t	coauthor	newgen~r	newacr~k	newdis~e	newins~t
sqrtarticle	1.0000						
disseminat	0.3689*	1.0000					
coauthor	0.2764*	0.5076*	1.0000				
newgender	0.1278*	0.3026*	0.1613*	1.0000			
newacrank	0.1220*	0.0142	0.0552	0.0129	1.0000		
newdispline	0.0779	0.3782*	0.1926*	0.1564*	0.0499	1.0000	
newinstitut	0.2192*	0.1945*	0.1377*	0.0262	-0.0118	0.1015*	1.0000

Partial and Semi-partial Correlations of Faculty Research Productivity, Brazil

```
. pcorr sqrtarticle disseminat coauthor newgender newacrank newdispline newinstitut
(obs=556)
```

Partial and semipartial correlations of sqrtarticle with

Variable	Partial Corr.	Semipartial Corr.	Partial Corr.^2	Semipartial Corr.^2	Significance Value
disseminat	0.2590	0.2418	0.0671	0.0584	0.0000
coauthor	0.0989	0.0896	0.0098	0.0080	0.0203
newgender	0.0266	0.0240	0.0007	0.0006	0.5333
newacrank	0.1290	0.1172	0.0166	0.0137	0.0024
newdispline	-0.0861	-0.0779	0.0074	0.0061	0.0433
newinstitut	0.1650	0.1508	0.0272	0.0228	0.0001

Regression Results for Brazil Data

```
. reg sqrtarticle disseminat coauthor newgender newacrank newdispline newinstitut, beta
```

Source	SS	df	MS	Number of obs	=	556
Model	173.043649	6	28.8406082	F(6, 549)	=	21.11
Residual	750.063	549	1.36623497	Prob > F	=	0.0000
				R-squared	=	0.1875
				Adj R-squared	=	0.1786
Total	923.10665	555	1.66325522	Root MSE	=	1.1689

sqrtarticle	Coef.	Std. Err.	t	P>|t|	Beta
disseminat	.0058856	.0009366	6.28	0.000	.3086184
coauthor	.0071837	.0030852	2.33	0.020	.1042537
newgender	.0654201	.1049542	0.62	0.533	.0252064
newacrank	.3334696	.1094218	3.05	0.002	.1175976
newdispline	-.2245331	.1108691	-2.03	0.043	-.0844024
newinstitut	.5038407	.1284981	3.92	0.000	.1541505
_cons	1.064273	.1539795	6.91	0.000	.

Regression Results with Interactions for Brazil Data

```
. reg sqrtarticle disseminat coauthor newgender newacrank newdispline newinstitut i.newgender#c.disseminat
> i.newacrank#c.disseminat i.newdispline#c.disseminat i.newinstitut#c.disseminat i.newgender#c.coauthor i
> .newacrank#c.coauthor i.newdispline#c.coauthor i.newinstitut#c.coauthor, beta
```

Source	SS	df	MS	Number of obs	=	556
				F(14, 541)	=	10.00
Model	189.760909	14	13.5543507	Prob > F	=	0.0000
Residual	733.34574	541	1.35553741	R-squared	=	0.2056
				Adj R-squared	=	0.1850
Total	923.10665	555	1.66325522	Root MSE	=	1.1643

sqrtarticle	Coef.	Std. Err.	t	P>|t|	Beta
disseminat	.0060657	.0034868	1.74	0.082	.3180615
coauthor	-.0076305	.0176123	-0.43	0.665	-.110738
newgender	.0599345	.1278463	0.47	0.639	.0230928
newacrank	.2594388	.1379444	1.88	0.061	.0914907
newdispline	-.3078875	.1286587	-2.39	0.017	-.1157355
newinstitut	.5506131	.1475219	3.73	0.000	.1684606
newgender#c.disseminat Male	-.0017914	.0019395	-0.92	0.356	-.0910367
newacrank#c.disseminat Senior Faculty	.0000933	.0018795	0.05	0.960	.0044826
newdispline#c.disseminat Hard disciplines	.0021673	.0026472	0.82	0.413	.1149147
newinstitut#c.disseminat Research Oriented Institutions	-.0012015	.0025593	-0.47	0.639	-.0623061
newgender#c.coauthor Male	.0175325	.0074532	2.35	0.019	.2323716
newacrank#c.coauthor Senior Faculty	.0105378	.0074725	1.41	0.159	.1382553
newdispline#c.coauthor Hard disciplines	.0107291	.0096219	1.12	0.265	.149817
newinstitut#c.coauthor Research Oriented Institutions	-.0165882	.0163348	-1.02	0.310	-.2382701
_cons	1.148621	.1790118	6.42	0.000	.

Partial and Semi-partial Correlations of Faculty Research Productivity with Interactions, Brazil

```
. pcorr sqrtarticle disseminat coauthor newgender newacrank newdispline newinstitut newgender#c.disseminat
> newacrank#c.disseminat newdispline#c.disseminat newinstitut#c.disseminat newgender#c.coauthor newacrank
> #c.coauthor newdispline#c.coauthor newinstitut#c.coauthor
(obs=556)
```

Partial and semipartial correlations of sqrtarticle with

Variable	Partial Corr.	Semipartial Corr.	Partial Corr.^2	Semipartial Corr.^2	Significance Value
disseminat	0.0746	0.0667	0.0056	0.0044	0.0825
coauthor	-0.0186	-0.0166	0.0003	0.0003	0.6650
newgender	0.0202	0.0180	0.0004	0.0003	0.6394
newacrank	0.0806	0.0721	0.0065	0.0052	0.0605
newdispline	-0.1023	-0.0917	0.0105	0.0084	0.0170
newinstitut	0.1584	0.1430	0.0251	0.0205	0.0002
0b.newgen~t	(dropped)				
1.newgend~t	-0.0397	-0.0354	0.0016	0.0013	0.3561
0b.newacr~t	(dropped)				
1.newacra~t	0.0021	0.0019	0.0000	0.0000	0.9604
0b.newdis~t	(dropped)				
1.newdisp~t	0.0352	0.0314	0.0012	0.0010	0.4133
0b.newins~t	(dropped)				
1.newinst~t	-0.0202	-0.0180	0.0004	0.0003	0.6389
0b.newgen~r	(dropped)				
1.newgend~r	0.1006	0.0901	0.0101	0.0081	0.0190
0b.newacr~r	(dropped)				
1.newacra~r	0.0605	0.0540	0.0037	0.0029	0.1591
0b.newdis~r	(dropped)				
1.newdisp~r	0.0479	0.0427	0.0023	0.0018	0.2653
0b.newins~r	(dropped)				
1.newinst~r	-0.0436	-0.0389	0.0019	0.0015	0.3103

Appendix B China Data Outputs

Durbin-Watson Test

```
. estat dwatson
```

```
Durbin-Watson d-statistic( 8, 1067) = 1.88137
```

Variance Inflation Factor (VIF) Test

```
. vif
```

Variable	VIF	1/VIF
newdispline	1.15	0.868988
pubdiff	1.11	0.902738
pubfore	1.07	0.937182
newgender	1.03	0.966206
newacrank	1.03	0.968822
newinstitut	1.03	0.969264
coauthor	1.01	0.994022
Mean VIF	1.06	

DFBETA Test for all Independent Variables

```
. sum _dfbeta_1 _dfbeta_2 _dfbeta_3 _dfbeta_4 _dfbeta_5 _dfbeta_6 _dfbeta_7
```

Variable	Obs	Mean	Std. Dev.	Min	Max
_dfbeta_1	1,067	-9.82e-06	.0337488	-.1501441	.1702686
_dfbeta_2	1,067	-.0000113	.030182	-.2098312	.3019953
_dfbeta_3	1,067	-.0000255	.0311224	-.8008015	.4236919
_dfbeta_4	1,067	-6.93e-06	.0286282	-.1450987	.1040258
_dfbeta_5	1,067	-5.75e-06	.0276438	-.1871996	.1088295
_dfbeta_6	1,067	8.64e-06	.0306329	-.1547085	.1364363
_dfbeta_7	1,067	-4.76e-06	.031053	-.1427217	.2152189

Cook's Distance Test

```
. sum c
```

Variable	Obs	Mean	Std. Dev.	Min	Max
c	1,067	.000924	.0029741	2.35e-10	.0819249

Correlation between Variables

```
. pwcorr sqrtarticle pubdiff pubfore coauthor newgender newacrank newdispline newinstitut, listwise sig st
> ar(5)
```

	sqrtar~e	pubdiff	pubfore	coauthor	newgen~r	newacr~k	newdis~e
sqrtarticle	1.0000						
pubdiff	0.1775* 0.0000	1.0000					
pubfore	0.1950* 0.0000	0.0097 0.7523	1.0000				
coauthor	-0.0303 0.3223	-0.0556 0.0696	-0.0358 0.2422	1.0000			
newgender	0.2042* 0.0000	0.0570 0.0629	0.0351 0.2526	-0.0123 0.6886	1.0000		
newacrank	0.2903* 0.0000	0.0868* 0.0045	0.0527 0.0854	-0.0172 0.5746	0.1410* 0.0000	1.0000	
newdispline	0.2145* 0.0000	0.2711* 0.0000	0.2172* 0.0000	0.0065 0.8324	0.1084* 0.0004	0.0949* 0.0019	1.0000
newinstitut	0.1458* 0.0000	0.1230* 0.0001	0.1025* 0.0008	-0.0324 0.2901	0.0737* 0.0160	0.0218 0.4771	0.0326 0.2875

Partial and Semi-Partial Correlations of Faculty Research Productivity in China

```
. pcorr sqrtarticle pubdiff pubfore coauthor newgender newacrank newdispline newinstitut
(obs=1067)
```

Partial and semipartial correlations of sqrtarticle with

Variable	Partial Corr.	Semipartial Corr.	Partial Corr.^2	Semipartial Corr.^2	Significance Value
pubdiff	0.1081	0.0982	0.0117	0.0096	0.0004
pubfore	0.1493	0.1365	0.0223	0.0186	0.0000
coauthor	-0.0124	-0.0112	0.0002	0.0001	0.6873
newgender	0.1500	0.1371	0.0225	0.0188	0.0000
newacrank	0.2539	0.2372	0.0645	0.0563	0.0000
newdispline	0.1175	0.1069	0.0138	0.0114	0.0001
newinstitut	0.1072	0.0974	0.0115	0.0095	0.0005

Regression Results for China Data

```
. reg sqrtarticle pubdiff pubfore coauthor newgender newacrank newdispline newinstitut, beta
```

Source	SS	df	MS	Number of obs	=	1,067
Model	558.144447	7	79.7349209	F(7, 1059)	=	34.03
Residual	2481.10089	1,059	2.34287148	Prob > F	=	0.0000
				R-squared	=	0.1836
				Adj R-squared	=	0.1782
Total	3039.24534	1,066	2.85107443	Root MSE	=	1.5306

sqrtarticle	Coef.	Std. Err.	t	P>|t|	Beta
pubdiff	.0048456	.0013699	3.54	0.000	.1033603
pubfore	.0096065	.0019545	4.92	0.000	.1409672
coauthor	-.0024415	.0060638	-0.40	0.687	-.0112126
newgender	.5151539	.1043185	4.94	0.000	.1394865
newacrank	.899338	.1052643	8.54	0.000	.2409966
newdispline	.4102833	.1065335	3.85	0.000	.1147049
newinstitut	.4149798	.1182486	3.51	0.000	.0989695
_cons	1.073032	.1222756	8.78	0.000	.

Regression Results with Interactions for China Data

```
. reg sqrtarticle pubdiff pubfore coauthor newgender newacrank newdispline newinstitut i.newgender#c.pubdiff
> ff i.newacrank#c.pubdiff i.newdispline#c.pubdiff i.newinstitut#c.pubdiff i.newgender#c.pubfore i.newacra
> nk#c.pubfore i.newdispline#c.pubfore i.newinstitut#c.pubfore i.newgender#c.coauthor i.newacrank#c.coauth
> or i.newdispline#c.coauthor i.newinstitut#c.coauthor, beta
```

Source	SS	df	MS	Number of obs	=	1,067
				F(19, 1047)	=	15.19
Model	656.729466	19	34.5647087	Prob > F	=	0.0000
Residual	2382.51587	1,047	2.27556435	R-squared	=	0.2161
				Adj R-squared	=	0.2019
Total	3039.24534	1,066	2.85107443	Root MSE	=	1.5085

sqrtarticle	Coef.	Std. Err.	t	P>|t|	Beta
pubdiff	.0004361	.0037325	0.12	0.907	.0093032
pubfore	.0038165	.00544	0.70	0.483	.0560042
coauthor	.0029541	.0126224	0.23	0.815	.0135664
newgender	.4586558	.1377475	3.33	0.001	.1241887
newacrank	.9751115	.1372827	7.10	0.000	.2613017
newdispline	.1179097	.1287546	0.92	0.360	.0329646
newinstitut	.7958325	.1844273	4.32	0.000	.1897999
newgender#c.pubdiff Male	-.0012207	.0028912	-0.42	0.673	-.0238136
newacrank#c.pubdiff Senior Faculty	-.0050757	.0028915	-1.76	0.079	-.0996554
newdispline#c.pubdiff Hard disciplines	.0152055	.003138	4.85	0.000	.307741
newinstitut#c.pubdiff Research Oriented Institutions	-.0112741	.0031883	-3.54	0.000	-.1487831
newgender#c.pubfore Male	.0031648	.0040964	0.77	0.440	.040034
newacrank#c.pubfore Senior Faculty	.0040742	.0041789	0.97	0.330	.0522891
newdispline#c.pubfore Hard disciplines	.0011085	.0047376	0.23	0.815	.0151104
newinstitut#c.pubfore Research Oriented Institutions	-.0010197	.0045797	-0.22	0.824	-.0083712
newgender#c.coauthor Male	-.0024752	.0164673	-0.15	0.881	-.0087955
newacrank#c.coauthor Senior Faculty	-.0070288	.0140913	-0.50	0.618	-.0232631
newdispline#c.coauthor Hard disciplines	.0005131	.0163397	0.03	0.975	.0020387
newinstitut#c.coauthor Research Oriented Institutions	.0359411	.044033	0.82	0.415	.0238819
_cons	1.157033	.1495459	7.74	0.000	.

Partial and Semi-partial Correlations of Faculty Research Productivity with Interactions, China

```
. pcorr sqrtarticle pubdiff pubfore coauthor newgender newacrank newdispline newinstitut newgender#c.pubdi
> ff newacrank#c.pubdiff newdispline#c.pubdiff newinstitut#c.pubdiff newgender#c.pubfore newacrank#c.pubfo
> re newdispline#c.pubfore newinstitut#c.pubfore newgender#c.coauthor newacrank#c.coauthor newdispline#c.c
> oauthor newinstitut#c.coauthor
(obs=1067)
```

Partial and semipartial correlations of sqrtarticle with

Variable	Partial Corr.	Semipartial Corr.	Partial Corr.^2	Semipartial Corr.^2	Significance Value
pubdiff	0.0036	0.0032	0.0000	0.0000	0.9070
pubfore	0.0217	0.0192	0.0005	0.0004	0.4831
coauthor	0.0072	0.0064	0.0001	0.0000	0.8150
newgender	0.1024	0.0911	0.0105	0.0083	0.0009
newacrank	0.2144	0.1944	0.0460	0.0378	0.0000
newdispline	0.0283	0.0251	0.0008	0.0006	0.3600
newinstitut	0.1322	0.1181	0.0175	0.0139	0.0000
0b.newgen~f	(dropped)				
1.newgend~f	-0.0130	-0.0116	0.0002	0.0001	0.6729
0b.newacr~f	(dropped)				
1.newacra~f	-0.0542	-0.0480	0.0029	0.0023	0.0795
0b.newdis~f	(dropped)				
1.newdisp~f	0.1481	0.1326	0.0219	0.0176	0.0000
0b.newins~f	(dropped)				
1.newinst~f	-0.1086	-0.0968	0.0118	0.0094	0.0004
0b.newgen~e	(dropped)				
1.newgend~e	0.0239	0.0211	0.0006	0.0004	0.4399
0b.newacr~e	(dropped)				
1.newacra~e	0.0301	0.0267	0.0009	0.0007	0.3298
0b.newdis~e	(dropped)				
1.newdisp~e	0.0072	0.0064	0.0001	0.0000	0.8151
0b.newins~e	(dropped)				
1.newinst~e	-0.0069	-0.0061	0.0000	0.0000	0.8238
0b.newgen~r	(dropped)				
1.newgend~r	-0.0046	-0.0041	0.0000	0.0000	0.8805
0b.newacr~r	(dropped)				
1.newacra~r	-0.0154	-0.0136	0.0002	0.0002	0.6180
0b.newdis~r	(dropped)				
1.newdisp~r	0.0010	0.0009	0.0000	0.0000	0.9750
0b.newins~r	(dropped)				
1.newinst~r	0.0252	0.0223	0.0006	0.0005	0.4146

Appendix C The Changing Academic Profession Survey

The Changing Academic Profession: Questionnaire

A. Career and Professional Situation

A1. For each of your degrees, please indicate the year of completion and the country in which you obtained it.

Degree	Year	Earned in country of current employment		If no, please specify country
		Yes	No	
First degree [NATCAT]
Second degree (if applicable) [NATCAT]
Doctoral degree (if applicable) [NATCAT]
Post-doctoral degree (if applicable) [NATCAT]

A2. Please, identify the academic discipline or field of your...

Check one in each column			
Highest Degree	Current Acad. Unit	Current Teaching Area	
1.	1.	1.	Teacher training and education science
2.	2.	2.	Humanities and arts
3.	3.	3.	Social and behavioural sciences
4.	4.	4.	Business and administration, economics
5.	5.	5.	Law
6.	6.	6.	Life sciences
7.	7.	7.	Physical sciences, mathematics, computer sciences
8.	8.	8.	Engineering, manufacturing and construction, architecture
9.	9.	9.	Agriculture
10.	10.	10.	Medical sciences, health related sciences, social services
11.	11.	11.	Personal services, transport services, security services
12.	12.	12.	Other (please specify)
13.	13.	13.	Not applicable

A3. How would you characterize the training you received in your doctoral degree? (If you do not hold a doctoral degree, please go to question A4)

Check all that apply	
1.	You were required to take a prescribed set of courses
2.	You were required to write a thesis or dissertation
3.	You received intensive faculty guidance for your research
4.	You chose your own research topic
5.	You received a scholarship or fellowship
6.	You received an employment contract during your studies (for teaching or research)
7.	You received training in instructional skills or learned about teaching methods
8.	You were involved in research projects with faculty or senior researchers
9.	You served on an institutional or departmental (unit) committee

A4. Since your first degree, how long have you been employed in the following? [If "0," so indicate]

Full time	Part time	
.....	Higher education institutions
.....	Research institutes
.....	(Other) Government or public sector institutions
.....	(Other) Industry or private sector institutions
.....	Self-employed
.....	Higher education institutions

A5. By how many institutions have you been employed since your

First degree	Highest degree	
.....	Higher education institutions or research institutes
.....	Other institutions (including self-employment)

A6. Please indicate the following

.....	Year of your first full-time appointment (beyond research and teaching assistant) in the higher education/research sector
.....	Year of your first appointment to your current institution (beyond research and teaching assistant)
.....	Year of your appointment/promotion to your current rank at your current institution
.....	For how many years have you interrupted your service at your current institution for family reasons, personal leave or full-time study? [if "0," so indicate]

A7. How is your employment situation in the current academic year at your higher education institution/research institute? [Check one only]

<input type="checkbox"/>	Full-time employed	<input type="checkbox"/>	Part-time with payment according to work tasks
<input type="checkbox"/>	Part-time employed,% of full-time	<input type="checkbox"/>	Other (please specify)

A8. Do you work for an additional employer or do additional remunerated work in the current academic year?

1.	No
2.	In addition to your current employer, you also work at another research institute or higher education institution
3.	In addition to your current employer, you also work at a business organization outside of academe
4.	In addition to your current employer, you also work at a non-profit organization or government entity outside of academe
5.	In addition to your current employer, you are also self-employed
6.	Other (please specify)

A9. How would you describe your current institution?

Check one only	
<input type="checkbox"/>	NATCATs to identify: a) Higher education institution or research institute and b) type of higher education institution and c) type of research institution

A10. What is your academic rank (if you work in a research institutions with ranks differing from those at higher education institutions, please

choose the rank most closely corresponding to yours?)			
1.	NATCAT	5.	NATCAT
2.	NATCAT	6.	NATCAT
3.	NATCAT	7.	NATCAT
4.	NATCAT	8.	Other (please specify)
A11. What is the duration of your current employment contract at your higher education institution or research institute? [Check only one]			
<small>Check only one</small>			
1.	Permanently employed (tenured)		
2.	Continuously employed (no preset term, but no guarantee of permanence)		
3.	Fixed-term employment <i>with</i> permanent/continuous employment prospects (tenure-track)		
4.	Fixed-term employment <i>without</i> permanent/continuous employment prospects		
5.	Other (please specify)		
A12. What is your overall annual gross income (including supplements) from the following sources?			
.....	Your current higher education institution/research institute [NATCAT: Currency and number of boxes]		
.....	All other concurrent employers [NATCAT: Currency and number of boxes]		
.....	Other income (e.g. self-employment) [NATCAT: Currency and number of boxes]		
A13. During the current academic year, have you done any of the following?			
<small>Check all that apply</small>			
1.	Served as a member of national/international scientific committees/boards/bodies		
2.	Served as a peer reviewer (e.g. for journals, research sponsors, institutional evaluations)		
3.	Served as an editor of journals/book series		
4.	Served as an elected officer or leader in professional/academic associations/organizations		
5.	Served as an elected officer or leader of unions		
6.	Been substantially involved in local, national or international politics		
7.	Been a member of a community organization or participated in community-based projects		
8.	Worked with local, national or international social service agencies		
9.	Other:		
A14. Within the last five years, have you considered a major change in your job? And did you take concrete actions to make such a change? [If yes, check all that apply in both columns A and B. If no, so indicate in column A and skip to B1]			
Considered	Concrete action taken		
1.	1.	To a management position in your higher education/research institution	
2.	2.	To an academic position in another higher education/research institute within the country	
3.	3.	To an academic position in another country	
4.	4.	To work outside higher education/research institutes	
5.		No, I have not considered making any major changes in my job	
B. General Work Situation and Activities			

B1. Considering all your professional work, how many hours do you spend in a typical week on each of the following activities? (If you are not teaching during the current academic year, please reply to the second column only.)						
Hours per week when classes are in session	Hours per week when classes are <i>not</i> in session					
.....	.....	Teaching (preparation of instructional materials and lesson plans, classroom instruction, advising students, reading and evaluating student work)				
.....	.....	Research (reading literature, writing, conducting experiments, fieldwork)				
.....	.....	Service (services to clients and/or patients, unpaid consulting, public or voluntary services)				
.....	.....	Administration (committees, department meetings, paperwork)				
.....	.....	Other academic activities (professional activities not clearly attributable to any of the categories above)				
B2. Regarding your own preferences, do your interests lie primarily in teaching or in research?						
<small>Check only one</small>						
1.	Primarily in teaching	3.	in both, but leaning towards research			
2.	In both, but leaning towards teaching	4.	Primarily in research			
B3. At this institution, how would you evaluate each of the following facilities, resources, or personnel you need to support your work?						
Excellent	1	2	3	4	5	Poor
						Classrooms
						Technology for teaching
						Laboratories
						Research equipment and instruments
						Computer facilities
						Library facilities and services
						Your office space
						Secretarial support
						Telecommunications (Internet, networks, and telephones)
						Teaching support staff
						Research support staff
						Research funding
B4. Please indicate the degree to which each of the following affiliations is important to you.						
Very Important				Not at all important		
1	2	3	4	5		

D1. How would you characterize your research efforts undertaken during this (or the previous) academic year?		
Yes	No	
1.	1.	Are you working individually/without collaboration on any of your research projects?
2.	2.	Do you have collaborators in any of your research projects?
3.	3.	Do you collaborate with persons at other institutions in your country?
4.	4.	Do you collaborate with international colleagues?
D2. How would you characterize the emphasis of your primary research this (or the previous) academic year?		
Very much		Not at all
1	2	3
4	5	
		Basic/theoretical
		Applied/practicaly-oriented
		Commercially-oriented/intended for technology transfer
		Socially-oriented/intended for the betterment of society
		International in scope or orientation
		Based in one discipline
		Multi-/interdisciplinary
D3. Have you been involved in any of the following research activities during this (or the previous) academic year?		
<small>Check all that apply.</small>		
1.	Preparing experiments, inquiries etc.	
2.	Conducting experiments, inquiries etc.	
3.	Supervising a research team or graduate research assistants	
4.	Writing academic papers that contain research results or findings	
5.	Involved in the process of technology transfer	
6.	Answering calls for proposals or writing research grants	
7.	Managing research contracts and budgets	
8.	Purchasing or selecting equipment and research supplies	
D4. How many of the following scholarly contributions have you completed in the past three years?		
<small>(Number completed in the past three years)</small>		
.....	Scholarly books you authored or co-authored	
.....	Scholarly books you edited or co-edited	
.....	Articles published in an academic book or journal	
.....	Research report/monograph written for a funded project	
.....	Paper presented at a scholarly conference	
.....	Professional article written for a newspaper or magazine	
.....	Patent secured on a process or invention	
.....	Computer program written for public use	
.....	Artistic work performed or exhibited	
.....	Video or film produced	
.....	Others (please specify):	
D5. Which percentage of your publications in the last three years were		
.....	published in a language different from the language of instruction at your current institution	
.....	co-authored with colleagues located in the country of your current employment	
.....	co-authored with colleagues located in other (foreign) countries	
.....	published in a foreign country	

.....	On-line or electronically published					
.....	Peer-reviewed					
D6. Please indicate your views on the following:						
Strongly Agree				Strongly Disagree		
1	2	3	4	5	6	
					Restrictions on the publication of results from my publicly-funded research have increased since my first appointment	
					Restrictions on the publication of results from my privately-funded research have increased since my first appointment	
					External sponsors or clients have no influence over my research activities	
					The pressure to raise external research funds has increased since my first appointment	
					Interdisciplinary research is emphasized at my institution	
					Your institution emphasizes commercially oriented or applied research	
					Your research is conducted in full-compliance with ethical guidelines	
					Research funding should be concentrated (targeted) on the most productive researchers	
					High expectations to increase research productivity are a threat to the quality of research	
					High expectations of useful results and application are a threat to the quality of research	
D7. In the current (or previous) academic year, which percentage of the funding for your research came from						
.....	Your own institution		.....	Business firms or industry	
.....	Public research funding agencies		.....	Private not-for-profit foundations/agencies	
.....	Government entities		.....	Others:	
D8. In the current (or previous) academic year, which percentage of the external funding for your research came from						
.....	National organizations/entities		.....	International organizations/entities	
E. Management						
E1. At your institution, which actor has the primary influence on each of the following decisions (please check only one column on each decision)?						
Government or external stakeholders	Institutional managers	Academic Unit managers	Faculty committees /boards	Individual faculty	Students	
						Selecting key administrators
						Choosing new faculty
						Making faculty promotion and tenure decisions
						Determining budget priorities
Government or external stakeholders	Institutional managers	Academic Unit managers	Faculty committees /boards	Individual faculty	Students	
						Determining the overall teaching load of faculty
						Setting admission standards

						for undergraduate students
						Approving new academic programs
						Evaluating teaching
						Setting internal research priorities
						Evaluating research
						Establishing international linkages

E2. How influential are you, personally, in helping to shape key academic policies?

Very Influential	Somewhat Influential	A little Influential	Not at all Influential	Not applicable	
					At the level of the department or similar unit
					At the level of the faculty, school or similar unit
					At the institutional level

E3. By whom is your teaching, research, and service regularly evaluated?

Check all that apply					
Your teaching	Your research	Your service			
1	1	1			Your peers in your department or unit
2	2	2			The head of your department or unit
3	3	3			Members of other departments or units at this institution
4	4	4			Senior administrative staff at this institution
5	5	5			Your students
6	6	6			External reviewers
7	7	7			Yourself (formal self-assessment)
8	8	8			No one at or outside my institution

E4. At my institution there is...

Strongly Agree					Strongly Disagree					
1	2	3	4	5	1	2	3	4	5	
										... A strong emphasis on the institution's mission
										... Good communication between management and academics
										... A top-down management style
										... Collegiality in decision-making processes
										... A strong performance orientation
										... A cumbersome administrative process
										... A supportive attitude of administrative staff towards teaching activities
										... A supportive attitude of administrative staff towards research activities
										... professional development for administrative/management duties for individual faculty

E5. Please indicate your views on the following issues.

Strongly Agree					Strongly Disagree					
1	2	3	4	5	1	2	3	4	5	
										Top-level administrators are providing competent leadership
										I am kept informed about what is going on at this institution
										Lack of faculty involvement is a real problem
										Students should have a stronger voice in determining policy that affects them
										The administration supports academic freedom

E6. To what extent does your institution emphasize the following practices?

Very much					Not at all					
1	2	3	4	5	1	2	3	4	5	
										Performance based allocation of resources to academic units
										Evaluation based allocation of resources to academic units
										Funding of departments substantially based on numbers of students
										Funding of departments substantially based on numbers of graduates
										Considering the research quality when making personnel decisions
										Considering the teaching quality when making personnel decisions
										Considering the practical relevance/applicability of the work of colleagues when making personnel decisions
										Recruiting faculty who have work experience outside of academia
										Encouraging academics to adopt service activities/entrepreneurial activities outside the institution
										Encouraging individuals (businesses, foundations etc.) to contribute more to higher education

F. Personal Background

F1. What is your gender?

1. Male	2. Female
---------	-----------

F2. Year of birth

..... Year

F3. What is your familial status?

1. Married/partner	2. Single
3. Other: (please specify).....	

F4. If married/partner, is she/he employed?

1. Yes, full-time	2. Yes, part-time
3. No	

F5. Is your spouse/partner also an academic?

Yes	No
-----	----

F6. Do you have children living with you?

1. Yes, 1 child	3. Yes, 3 or more children
2. Yes, 2 children	4. No

F7. Did you ever interrupt your employment in order to provide child or elder care in the home?			
1	Yes	2	No
.....	If yes, for how many years?		
F8. What is your parents' highest, and if applicable, partner's highest education level?			
	Father	Mother	Partner
1.	1.	1.	Entered and/or completed tertiary education
2.	2.	2.	Entered and/or completed secondary education
3.	3.	3.	Entered and/or completed primary education
4.	4.	4.	No formal education
5.	5.	5.	Not applicable
F9. What was/is your nationality/citizenship and your country of residence?			
	Citizenship		Country of Residence
At birth	.....		.....
At the time of your first degree	.....		.....
Currently	.....		.....
	(please specify)		(please specify)
F10. What is first language/mother tongue?			
.....	(please specify)		
F11. Which language do you primarily employ in teaching?			
1.	First language/mother tongue		
2.	Other (please specify).....		
F12. Which language do you primarily employ in research?			
1.	First language/mother tongue		
2.	Other (please specify).....		
F13. How many years since the award of your first degree have you spent...			
.....	...in the country of your first degree		
.....	...in the country in which you are currently employed, if different from the country of your first degree		
.....	...in other countries (outside the country of your first degree and current employment)		

Appendix D IRB Exempt Approval Letter



University of Pittsburgh *Institutional Review Board*

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
<http://www.urb.pitt.edu>

Memorandum

To: Veysel Gokbel
From: IRB Office
Date: 11/10/2016
IRB#: [PRO16100282](#)
Subject: Internationalization and Academic Productivity

The above-referenced protocol has been reviewed by the University of Pittsburgh Institutional Review Board. Based on the information provided to the IRB, this project includes no involvement of human subjects, according to the federal regulations [§45 CFR 46.102(f)]. That is, the investigator conducting research will not obtain information about research subjects via an interaction with them, nor will the investigator obtain identifiable private information. Should that situation change, the investigator must notify the IRB immediately.

Given this determination, you may now begin your project.

Please note the following information:

- If any modifications are made to this project, use the "**Send Comments to IRB Staff**" process from the project workspace to request a review to ensure it continues to meet the determination.
- Upon completion of your project, be sure to finalize the project by submitting a "**Study Completed**" report from the project workspace.

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

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