Doctoral Dissertation

A Study on the Relationship between Research Ability and Mindset of Cambodian Faculty Members and Their Research Outputs: A Perspective from Fifteen Higher Education Institutions

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We hereby recommend that the dissertation by Mr. EAM PHYROM entitled "A Study on the Relationship between Research Ability and Mindset of Cambodian Faculty Members and Their Research Outputs: A Perspective from Fifteen Higher Education Institutions" be accepted in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY.

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Eam Phyrom

DEDICATION

Generally, to all sharp-thinking Khmer intellectuals, devoted Khmer monks, and passionate Khmer guru, who, either in the civilized past or on-the-move present, have shaped all fundamental principles of the Khmer origin of knowledge, system of social institutions, and way of life.

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SUMMARY

Introduction: This study sought to examine trends and correlates of research outputs of Cambodian faculty members. It pursued this main purpose by embracing a mixed-methods perspective through three dimensions (i.e. external, institutional, and individual dimension) of research environment of Cambodian higher education sector. Both the mixed-methods analyses and the multi-dimensional framework are comprehensive and pragmatic approaches to understanding educational phenomena. This study could possibly attain both practical and conceptual merits as it tried to offer a right-timing response to the currently increased attempts of Cambodian government and its higher education institutions to promote research culture and capacity and to the challenges they have been facing, while also fulfilling some empirical gaps of previous local literature on the topic of research output production. The precise missions of this dissertation were to answer four related research questions:

- *Research question 1*: How productive are Cambodian faculty members in terms of research outputs during their service at their current higher education institutions?
- *Research question 2*: How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members towards research activities and production?
- *Research question 3*: How supportive is research environment (i.e. institutional environment and external environment) in Cambodian current higher education context? and
- *Research question 4:* What factors (of external, institutional, and individual dimensions) explain research outputs produced by Cambodian faculty members in their current higher education context?

Methods: The use of mixed-methods approach meant that data for analyses of these four research questions were of two main types. First, *qualitative interview data* were collected from 50 key informants – i.e. 5 policy makers, 11 university or research unit leaders, 31 faculty members, and 3 external stakeholders. Analyses of the qualitative interview data basically comprised the *thematic analysis method*, using three levels of coding that aimed to generate common themes for each research question. The second portion of data was *quantitative survey data* set based on self-reported questionnaire's responses of 483 faculty members from 15 higher education institutions in the country. The quantitative analysis measured statistical trends of research outputs, research orientation, and research environment; explored patterns of relationship between these key constructs and respondents' demographic traits; and finally employed *zero-inflated negative binomial regression models* to identify (among the research orientation and research environment predictor variables) the direct and moderated correlates/determinants of research outputs of Cambodian faculty members. Each of the four research questions was systematically addressed, using both these quantitative and qualitative accounts.

Key findings: The study concluded:

- that, in the midst of their increased awareness about research role of an academic and the research function of higher education institutions, the number of *Cambodian researchers and their research outputs have still been limited*
- that *individuals' research ability (i.e. research production competence and research experience) and their research mindsets* were explanatory of the variation and production of research outputs among Cambodian faculty members, and
- that *three major challenges (*with regards to *academic culture, research institutionalization, and research resources)* have been utterly experienced by Cambodian faculty members and higher education institutions despite increased research promoting mechanisms.

Discussions:

Limited researchers and research outputs: Previous local literature generally presumed low research activities and capacity of Cambodian higher education institutions. The current study reached a similar conclusion but offered some objective indications to attest such claims. From the quantitative analyses, some detected negative trends of the research output production in Cambodian higher education sector included: having limited number of research-engaged faculty members (for example, only 7.87 percent of survey respondents reporting "published journal articles with international publishers" during their services); producing a low average of composite research output score (i.e. producing around 3.24 outputs (SD = 6.67) during their services at their current institution); producing fewer international research outputs (about 34 percent of the total 1,565 outputs reported in this study); and having more research activities and outputs engaged or produced by only faculty members from certain fields and particular institutions. The study's qualitative data further accentuated the dependency of research funding and the inadequate relevance of existing research activities and outputs. Around sixty to seventy percent of the fifty interviewees claimed that existing research activities were more donors-driven (either through consultancy or collaborative projects) and less purely academic and/or scientific research works. Previous studies on research culture and capacity of developing countries generally highlighted these limited, niched, and dependent tendency of research activities and research outputs – especially, in terms of finance, infrastructure, and human resources.

Research outputs as a function of research ability and mindset: Despite low, research outputs of some kinds have obviously been produced by Cambodian faculty members. The main question that most relevant local literature has not addressed is what drives those research-engaged Cambodian faculty members to produce their research outputs. This current study quantitatively and qualitatively explored this particular question and detected that their research ability (i.e. having strong research

production competence and having high research experience) and their practical research mindset (i.e. seeing research as a growth opportunity and showing cognitive and behavioral orientation and perseverance to be advanced in an academic area) are key determinants that both differentiated Cambodian research-productive faculty members from research-unengaged ones and explained why some of them produced more research outputs.

- **Research ability:** Statistical analyses suggested that a one-unit increase in research production competence generated an expected increase of research outputs by a factor of 1.55 (i.e. 55 percent change); a one-unit increase in research experience generated an expected positive change by a factor of 1.47 (or a 47-percent change) in research outputs. Likewise, the study identified a clear huge gap in terms of research production competence and research experience between faculty members who reported high research output production and those who produced fewer or did not produce research outputs at all. That is to say, 71.22 percent of the faculty members with high research production competence reported at least one research output, compared to only 28.78 percent of those with low research production competence, and 62.93 percent of faculty members with high research experience reported at least one research output, compared to only 37.07 percent of the low-research-experience ones. In the qualitative analysis, more than 90 percent of the interviewees emphasized that having research ability is a key criterion for them and other faculty members to engage in research projects at their current institutions. Certain theoretical concepts from literature in the area of research productivity – such as the concepts of research self-efficacy and research training environment, the concept of cumulative advantages and reinforcement, and the importance of background knowledge – tend to support the current study's findings. In practical terms, these findings implied that only the fittest faculty members can survive in the research world of Cambodian higher education sector whereby research resources and culture have been very limited and donors-dependent.

- **Research mindset:** A high percentage of the fifty interviewees (i.e. 84%) raised opinions that reflected the idea of practical research mindset as a main factor pushing research engagement and production. Faculty members who were productive in research outputs generally viewed research as an opportunity to grow and as something generative, whilst those who did not engage in research viewed research more as complicated works and less generative – especially, when research benefit was compared to that from teaching. Practical research mindset also involved the fact that faculty members showed cognitive orientation and experience towards research literacy and mastery in their particular areas. In many cases of the interview, research-active faculty members believed or showed that they are research-preferring, goal-oriented, hard-working, and disciplined as they thrive to reach the advanced

or expert level in their fields. In the bivariate quantitative analysis, faculty members who produced at least one research output rated higher than their zero-research-output counterparts did in terms of emotional research orientation (a mean score of 4.16 vs 3.84) and behavioral research orientation (a mean score of 3.15 vs 2.67). Previous literature discussing the concepts of research orientation, academic self-understanding, and academic mindset offered some explanations on why this notion of practical research mindset may influence research output production in the Cambodian context. A local study on this topic also pointed to a similar idea of "virtue" as the reason for research engagement of some faculty members in one top-ranking university in Cambodia.

- **Moderating characteristics:** Research ability and mindset are abstract constructs. In more realistic senses, the scores of research outputs – as well as research production competence and research experience – were generally differentiated between older and younger faculty members, between doctoral and non-doctoral degree holders, between overseas and local graduates, between faculty members from city-based universities and those from province-based universities, and between faculty members from public institutions and those from private institutions. In further moderation analyses, the effects of research production competence and/or research experience on research outputs might turn insignificant in the separate analysis of only the science-majored faculty members, of only the faculty members from province-based universities, of only the faculty members from private universities, of only the faculty members of the young-age group, and of only those within the old-age group. While such patterns could be due to the smaller sample size of these groups in the study's samples, these fluctuated significant patterns somehow reflected the particularity or distinctiveness in terms of effects on research performance shaped by different individual conditions, disciplines, and institutional types of Cambodian higher education. Also, it should be noted that the effect of research production competence on the count variation of research outputs turned insignificant in the separate analysis of only local research outputs, while the effect of research experience turned insignificant in the separate analysis of only international research outputs.

Reflection into challenges at higher dimensions: These findings that signified the effects of research ability and research mindset on research outputs tended to draw attention on perhaps an overlooked perspective towards why some faculty members in Cambodia could produce research outputs while they were based in the research environment that has not been very supportive. That being said, most previous studies looked at the issues from the large research-inactive portion of the overall population of Cambodian faculty members, whilst the current study inclined to look at the issues more from the slight research-active pie. The study's findings emphasized individual factor influences since it

focused on research output production, while most previous local studies seemingly pointed to macro-level problems of structural, cultural, and/or political dimensions as those works focused on overall research culture and capacity. So, the findings of this study and most of the previous ones were not necessarily contradictory; it was just about using different lenses to look at the issue. In actuality, the qualitative results from this current study detected three major challenges at the macro-level of Cambodian current research support environment: 1. the muted academic cultures (from the culture of profession to the culture of system), 2. the inefficacy of research institutionalization (for example, the lack of established research centers, centers of excellence, or academic journal outlets at universities), and 3. the well-acknowledged inadequacy of research resources (from financial resources to time). These major themes and their specific elements were widely discussed by previous local and regional studies in certain ways. However, as guided by its major findings that underscored the individual influences on research output production, the current study strongly echoed the vitality of individual quality to respond to the current problems of research production in Cambodian higher education sector.

Conclusions and implications: After all, the main result of this study is the argument that Cambodian faculty members who have strong research ability and right research mindset are more research productive. There are two conceptual implications from these findings: first, individual research ability and mindset have to be cultivated to increase Cambodian academia's research output production; and, second, research-capable human resources have to be retained and motivated to lead and transform the research function of Cambodian higher education institutions. Two action-oriented strategies can be considered from this study's conceptual implications. First, it is the need to develop *differentiated research-based and researchers-led graduate education*. These graduate programs will produce the next generation of research-competent and research-minded academics to fulfill the big hierarchical gaps between the majority of teaching-oriented faculty members and the very limited number of research-productive academics. Second, it is the need to reform or establish *systemic research institutions* (such as research centers or centers of excellence or publication outlets) at least at certain Cambodian already research-inclined universities. These institutions have to be truly research-functional, managerially professional, disciplinarily specialized, with strong academic collegiality, and with independent and sustainable resources-creating and resources-managing mechanisms. The graduate education programs and the systemic research centers should be run by diversifying sources of research support from both academic and non-academic sectors and led by professionally research-capable academics. Handling these capable individuals properly may contribute to solving current higher-dimension problems of Cambodian research culture and capacity.

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CHAPTER 1: INTRODUCTION

This study aimed to examine trends and correlates of research outputs of Cambodian faculty members by using different dimensions of research support environment of Cambodian higher education as a conceptual framework. To understand why it is crucial to study research outputs and research support environment in Cambodia, it is necessary to decipher the current practical and intellectual movements on the seemingly inter-related areas of *innovation and knowledge systems*, *research and development (R&D)*, and *higher education and academic profession* within this global era of knowledge society. A brief elaboration about these broad themes commenced this introduction section. The chapter subsequently continued to clarify research problems, significance of this study, research focuses, conceptual framework, research methodology, and eventually the whole study's organization. The last section offered a brief synthesis of this introduction chapter. Basically, this introduction section offered a complete depiction of the whole study.

1.1. Research background

1.1.1. Practical and intellectual movements on areas related to innovation and research systems

Issues of science and innovation systems, higher education and academic profession, and research and knowledge production have currently gained strong momentum. These inter-related areas are inspiring because their intellectual movements have dynamically taken places within both the practical and the academic domains and at both the international and the local levels (as reflected through, for example, published works by Meek and Suwanwela in 2006, Sanyal and Varghese in 2007, and UNESCO Science Reports in 2005, 2010, and 2015). These important themes have engaged international experts and practitioners (from OECD, UNESCO, and WB)[1], academic thinkers (in many disciplines, from such general ones as educational sociology and psychology to such specialized ones as scientometrics and bibliometrics), and policy makers (of numerous nations). Meek and Suwanwela (2006) asserted: *a number of trends and issues have conspired to bring questions of "knowledge production," "research policy" and "research management" to the fore on the higher education policy agenda's of many countries*. In broad senses, global knowledge society and economy, technological advancement and innovation (especially, in information and data science), positive impacts of research and development from STEM[2] areas, internationalization of higher education and university ranking, and increased

[1] UNESCO = United Nations Educational, Scientific and Cultural Organization; OECD = Organization for Economic Co-operation and Development; WB = World Bank
[2] STEM = Science, Technology, Engineering, and Mathematics

access to distance education and MOOC platforms[3] have been among those key forces that explain the increased importance of research and knowledge production. Bokova (2015)[4] highlighted that *the number of researchers and publications worldwide increased by over 20% during the period from 2007 and 2014*.

Policy and practical movements: International agencies have already strategized and implemented certain approaches to ensure further advancement of R&D in developed countries and to promote R&D contribution from developing countries, noticeably in academic sectors. Such attempts can be reflected through, for example, the UNESCO forum on Higher Education, Research, and Knowledge (2001-2009) (Arimoto, 2006; Ellis, Polcuch, & Pathirage, 2009) and the WB-UNESCO-joined Task Force on Higher Education in Developing Countries in 2000. The 2017 United Nation's World Data Forum is likely to offer more aspiring perspectives for these current inter-related and inter-disciplinary international movements towards achieving sustainable development. Subsequent UNESCO Science Reports (2005; 2010; 2015) made it very clear that, for the universal ideal of sustainable development to be achieved, the roles of R&D in science, technology, and innovation have to function not just in developed countries but also in other parts of the world.

In Indonesia in 1988, "*about 5 percent (US$6.5 million) of the International Bank of Reconstruction and Development (IBRD) Loan for Higher Education Development Project (HEDP) was designed for a competitive university research grant of a 1-year type*," Koswara and Tadjudin (2006). The World Bank has similarly strategized its development plan in education and higher education sectors in some other developing countries, particularly in Cambodia in 2010 through the Higher Education Quality and Capacity Improvement Project (HEQCIP). In African and Arabic regions, various practical attempts have also been put into actions. Altbach (2016) mentioned that there had been initiative in Africa "to build the research capacity of key African academic institutions in Kenya, Mozambique, Ghana, and several other countries" (p. 174). An example of those instigations is perhaps the endeavor to establish the so-called Brain Gain Initiative[5]. Clearly, attempts to promote research culture and capacity (RCC) and research performance have been made by developing countries, and as such their research activities and outputs have been increased to a certain degree across time. Based on data from Thomson Reuters' Web of Science, UNESCO (2010) indicated that English-language scientific articles by authors from some selected countries in Southeast Asia and Oceania from 1998 to 2008 obtained a total growth rate of 101.7 percent or a 7.3 percent annual growth rate (p. 441). Altbach (2003) and Wildavsky (2010) noted that certain universities in some developing countries have strengthened their research performance quite actively though Sanyal and Varghese (2007) and

[3] MOOC = Massive Open Online Course
[4] See UNESCO Science Report: Towards 2030 (2015)
[5] See UNESCO's publication titled "Brain Gain Initiative: Linking African and Arab Region universities to global knowledge (2013)

Altbach (2003; 2016) himself acknowledged that the gaps are still huge in terms of research capacity, research performance, and other academic conditions between the two worlds: the core (the developed world) and the periphery (the developing world).

Intellectual and academic movements: Along with the more practical international and national movements, the intellectual and academic movements on these topics (of innovation and knowledge systems, academic profession, and research production) have also become more energetic than ever before, extending its long historical development in the Western world. Studies on innovation systems and knowledge measurement have currently been placed on academic spotlights (see, for example, Nelson, 1993; Lundvall, Intarakumnerd, & Vang, 2006; Ferretti & Parmentola, 2015). Often taking a holistic and systemic perspective, academics in these areas generally frame their studies by looking at roles of governments, industries or enterprises, and universities in promoting innovation and creating knowledge through research. New academic terms such as Local Innovation System (LIS), National Innovation System (NIS), and Technological Innovation System (TIS) have been developed. Focuses on indigenous knowledge have also gained momentum (see, for example, Thaman, 2006; Kapoor & Shiza, 2010). More into the academic world, some major knowledge-oriented undertakings on the issues of "academic profession" – for example, the Carnegie Foundation initiated Changing Academic Profession surveys (CAP surveys) – have engaged many key thinkers in the areas of higher education research.

Under these broad themes, the issue of research productivity[6] of faculty members at higher education institutions has become more critical. Researchers generally pointed to the origin of studies on research productivity in developed nations since 1940s or 1950s (Creswell, 1985), referring to some works of earlier thinkers of science – such as psychologist Anne Roe (1953), sociologist Robert K. Merton (1973), and sociologists Stephen Cole and Jonathan R. Cole (1967). Certain leading educational scholars and thinkers – such as Burton R. Clark and Ernest L. Boyer – may have started discussing academic profession as a specific and important theme in the United States during those periods of time. Now the topic and its related themes (i.e. academic profession and research output production) have been brought into more serious international attentions. Currently, research studies in these areas have concentrated on both quantity and quality of research outputs (as measured by publication count or such sophisticated instruments as impact factors and h-index). Such trends of focus can be understood through many practical reasons. For one thing, the quantitative and qualitative measures of research performance are needed because the cost of research funding for higher education institutions has increased and so governments have to be critical in selecting the right research projects to fund, obviously the ones with ensured quality and impact (Bazeley, 2010).

[6] The terms research productivity and research performance have been used interchangeably in many studies to refer to both the quantity and quality of research outputs.

Likewise, academic careers may need such quantity and quality measures to make some formal and logical decisions – from staff recruitment and promotion to departmental and institutional ranking.

Like the international movements, the academic movements to understand innovation, academia, and research production have already engaged academic thinkers from developing countries. The earlier mentioned CAP survey (that engaged mostly developed countries in its first endeavor) involved some developing nations in its second stage. Some Asian countries were involved in 2011 for a new project of academic profession in Asia, led by the Japanese team (Teichler, Arimoto, & Cummings, 2013, p. 19). Some more Latin American and European countries have also been engaged in this second stage. Moved by the intangible concept of global brain race[7], attempts to improve research culture and capacity have clearly emerged in developing nations as they desire to catch up with the fast-growing global knowledge and innovation, especially in the areas of science and technology.

Unlike the trends of developed countries, however, central policy and academic approaches and discussions in developing nations have not been as much about research performance or research productivity, but more about building research culture and capacity (RCC) or research support environment (as reflected in various studies, for example, Sanyal & Varghese, 2007; Liefner & Schiller, 2008; Savage, 2011). Such tendencies are not hard to explain. Higher education sectors of developing and least-developed nations do not obtain a strong historical, cultural, and structural background in scientific and academic research, and as such they have scarce research outputs or products to actually measure and investigate.[8] By understanding research culture and capacity of their higher education institutions in the first place, these developing countries have been looking to establish a right framework that can systemically promote research performance in the future. Whereas attempts to do so are appreciable, the actual processes to build and/or strengthen research culture and capacity are generally easier said than done. Many countries have remained far behind the global rapid advancement in their engagement in research and production of knowledge.

Bringing background issues to a conclusion: Discussions about these entangled issues of innovation systems, academic profession, and research production in any country cannot go without understanding these earlier elaborated international movements and intellectual momentum. As a reflection from these overarching background information into the current study, it is not inapt to claim that the time is just right for Cambodia to begin to take a serious look into its academic profession conditions, its research support environment, its faculty members' research attitude, and their research outputs from a more academic, objective, and comprehensive perspective.

[7] The term was used by Ben Wildavsky in his 2010-published book basically to refer to the global competition based on knowledge, research and development, and technological innovations, etc.
[8] Many other factors explaining such a low magnitude of research productivity in those countries were explained in literature review section.

1.1.2. Cambodian research environment from practical and academic perspectives

Practical perspectives: In Cambodia, promoting research culture and capacity has been quite recent. The Cambodian higher education sector had gone thirty years (from 1979 to 2009) after its genocidal and warring time without any official policy or action to promote research production of its higher education institutions.[9] Two previous key turning points of Cambodian higher education development – namely, the introduction of privatization in 1997 and the introduction of the quality assurance body around 2003 – did not shed any light on promoting research culture and capacity. It was until July 2010 that Cambodian Ministry of Education, Youth, and Sport (MoEYS) issued its first research policy and strategies (2011-2015) in education sector[10] in response to the global and regional trends. Various research-promoting activities were consequently supported by a portion of the World Bank's total funds (around 23 million USD) for the so-called Higher Education Quality and Capacity Improvement Project (HEQCIP) 2010-2015.

Before this research policy in education sector, the status of Cambodian research and development in all sectors – in terms of total expenditure – remained much lower than that of most countries in the region (see Figure 1.1.). As a percentage of its Gross Domestic Product (GDP), according to UNESCO data, Cambodia spent only about .05 percent on research and development in all sectors in 2002, adding to the fact that the GDP of the country was already low (an estimated 4.28 billion USD in 2002 by the World Bank). Un and Sok (2014) revealed in their current study that Cambodian government's expenditure on the overall education sector in 2012 was about 1.8 percent of the country's GDP, with only 0.1 percent of the GDP[11] dedicated to the higher education sector, not to mention the exact expenditure for the research component. Such financial burden is not a surprise, actually, considering this country's war-torn past which has done too much destruction and so led to the fact that the country has many prioritized areas to invest in – not just education.

Literature also makes it clear that Cambodian higher education institutions have functioned mainly as teaching and learning places (Chet, 2006; Chen, Sok, & Sok, 2007). Figure 1.2., based on the same earlier-mentioned UNESCO database on Cambodian R&D (2002), also indicated that the percentage of researchers in higher education sector and of research performed therein shared the smallest portion among that of other key sectors. Faculty members define themselves more as an instructor than as an academic researcher (Kwok et al., 2010). The whole concept of research may once have been equated superficially to the idea of simple searching for information by some inexperienced faculty members.

[9] The war actually continued until early 1990s.
[10] See Research Policy in Education Sector (July 2010) and Research Master Plan (2011-2015)
[11] The 2015 estimate by the World Bank is 18.05 Billion USD

The current higher education sector has also comprised a very small number of doctorates – i.e. fewer than 1,000 faculty members (or less than 10%) as of 2015 (see Figure 1.3.).

While the negative eyes on Cambodian research environment have been commonplace, some current positive lights have to be acknowledged. The earlier mentioned research policy and strategies set up some seven key strategies with its ambitious goals to build a strong research culture in Cambodian higher education institutions. In the same line, one of the key strategies of 2014-issued Cambodian Higher Education Vision 2030 is to *"ensure that academic staff and students, especially postgraduates, contribute to improving the research and development culture in Cambodia to serve national development needs."* The Education Congress Report (2014) described that cooperated research and innovation capacity development for higher education institutions (through the earlier-mentioned HEQCIP) had involved 24 higher education institutions with 45 research topics.

A series of new policies in Cambodia, besides these research policy and strategies, have been formulated – counting, the teacher policy in 2013, the 2015-2025 industrial development policy in 2015, and the STEM policy in 2016 (see MoEYS, 2013; 2016; Royal Government of Cambodia, 2015). These policies require a strong foundation of research and development capacity at least in certain key areas and sectors. For example, the teacher policy implies the need for clear professional development and academic profession. The industrial policy implies the need for research and development skills and resources. The STEM policy, as well, implies the needs for scientific and academic culture. All of them have to be built on a strong foundation of research culture and capacity in the country's higher education sector. Still, the question to ask is what actually have been done and achieved in terms of research promotion and performance so far? And what remain to be done?

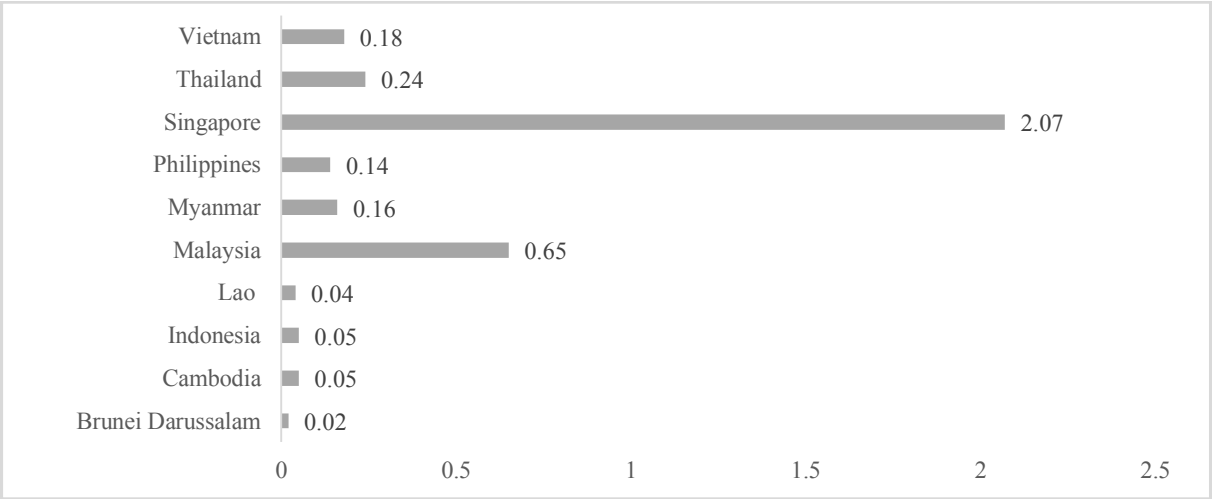


Figure 1.1. ASEAN countries' gross domestic expenditure on R&D as a percentage of GDP in 2002 (Source: UNESCO's Institute for Statistics), except Indonesian data (in 2001)

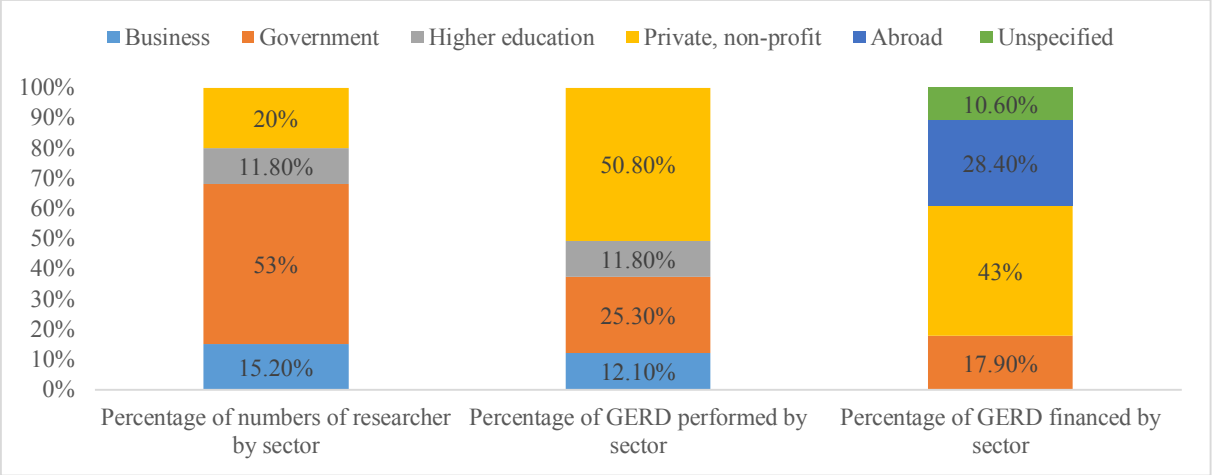


Figure 1.2. Cambodian certain R&D indicators in 2002 by sectors (UNESCO)[12]

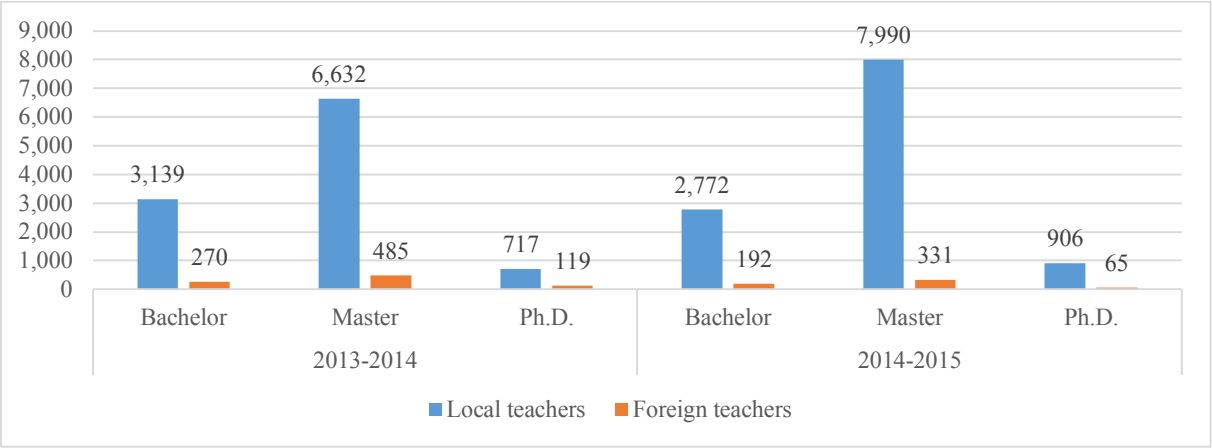


Figure 1.3. Distribution of teachers at higher education institutions by degrees 2013-2015 (Source: MoEYS's Congress Report, 2016)

Academic perspectives: The earlier-mentioned international movements and those local new policies may have spawn a number of research studies on research culture and capacity and knowledge creation of Cambodian higher education sector (see, for example, Peycam, 2010; Brooks & Monirith, 2010; Kwok et al., 2010; Peycam 2011; Kitamura & Umemiya, 2013; Eng, 2014; Cambodian Institute for Cooperation and Peace, 2016). In fact, some of these research works are based more on practical and policy-oriented framework and rigors. Some other studies lightly touched upon the research issues within their general discussions about Cambodian higher education (see, for example, Chet, 2006; Chen, Sok, & Sok, 2007; Sam, Zain, & Jamil, 2012; Kitamura, Umemiya, & Osawa, 2015; Un & Sok, 2015). In overall, the literature on research and knowledge production of Cambodian academia has been very recent and so remained scarce and scattered. There have been fewer than twenty pieces of research studies in total, most of which were published within the last decade.

[12] Note: GERD = Gross Domestic Expenditure on Research and Development; 2002 is the only year with most available data. (Source: UNESCO's Institute for Statistics)

An extensive review of these previous local studies generally reflects a negative conclusion about research activities and research culture of Cambodian faculty members and higher education institutions. Challenges of research culture and capacity of Cambodian higher education institutions are always discussed in multiple aspects: from the problem of academic profession and working conditions (as in Kwok et al., 2010; Kitamura & Umemiya, 2013), the macro-problem of structure and system (as in CICP, 2016), the problem of politics (as in Eng, 2014)[13], and to the notion of individual's virtue (as in Brooks & Monirith, 2010). Other challenges are also raised in those previous works, but, in general, most of those studies similarly acknowledge the lack of financial and infrastructural research resources as the challenges. Peycam (2010; 2011) uniquely discussed Cambodian academic knowledge production in relation to its cultural and historical meaning. The study viewed Cambodian intellectual works as more oriented towards "ethnographically relevant subjects" and its intellectualism more influenced by the "French orientalism."

1.2. Research problems

International movements and local actions have influenced and explained the inter-related themes of academia, higher education, research, and knowledge in Cambodia in some ways. Yet, many questions and knowledge gaps remained uninvestigated, especially, themes related to research output production and performance. While responding in overall to the global attention on the important roles of research and higher education sector and fulfilling the limited local literature of Cambodian research-related areas, this current study was conducted based on some specific research problems:

- **Little understanding about conditions of research-active faculty members:** From the individual level perspective, very little has been known and done to know about the truism of research-active and research-productive academics in Cambodia since most previous studies tend to concentrate on the negative aspects of higher education in general. Reportedly, some faculty members have engaged in certain types of research projects or collaborations (Kwok et al., 2010), but their real research outputs' characteristics and quality remain scarcely known. Also, not much has been discussed about attitudinal and behavioral traits towards research of Cambodian academics in general as well as of those research-active groups – traits such as their experience, their competence, their motivation, their conception, and their mindsets about research. Academically-rigorous studies on pattern analyses between those research traits and demographic characteristics of Cambodian faculty members should be conducted because results out of such analyses may offer deeper understanding on the ways of thinking and behaving of Cambodian academic men. Some previous local studies tend to conclude these concepts by using only qualitative perspectives, not statistical or psychometric perspectives.

[13] Eng (2014) focused on research in general, not specific to that of the higher education sector.

- **Correlates/determinants explaining Cambodian faculty members' research outputs:** The most important problem inspiring the conduct of the current study is that almost none of the previous studies has rigorously explained why some faculty members could be research-productive in their current research-unfriendly higher education context. What characteristics differentiate the major research-unengaged faculty members from the minor research-engaged ones has not been much discussed so far (except, for example, a study by Kitamura & Umemiya, 2013), especially from academic perspectives. Most previous studies tried to observe negative features of macro-level challenges of research culture and capacity in the country's higher education sector in general. Almost none seemingly offered perspectives on the niched research-active group of Cambodian faculty members.

- **The need for more objective measurement of research outputs:** From the construct validity perspective, Cambodian research outputs and research performance have not been measured with objective indicators or instruments. Conclusion about "low and limited" research activities and production have been vibrantly claimed, but "how low" has not been clearly and objectively investigated. Almost none of those previous studies directly measured specific research output indicators of Cambodian faculty members – except the work by Kitamura & Umemiya (2013) using indicators from the survey of the Changing Academic Profession (CAP)[14] (version 2006). The lack of objective understanding of research outputs, amidst the vigorous international discussion on research and innovation production and measurement in developed and developing countries, can be a serious knowledge gap for Cambodian higher education managers, policy makers, and academics.

  It should be noted that the issue of research output measurement is not so simple. The practice varies from studies to studies: by discipline, by temporal scope, by weighting approaches (which may vary further according to authorship, characteristics of publishers, etc.). Quantity of research outputs is one thing; its quality is another big topic for discussion. The question for this current study to handle is "what should be counted as research outputs for the particular context of Cambodia and how to measure them properly?" Should the study count local research outputs published in Cambodian language? Should the study exclude non-peer-reviewed research products? Should the study include consultancy works based, to some extent, on research knowledge and skills? Should the study weight equal the research products of science and those of social science? Can the study measure citation of those previous research works? Should the study focus on research outputs of the whole period of services or specify the time frame for just a particular period? These are just some critical questions that

[14] See Teichler, Arimoto, and Cummings (2013) on The Changing Academic Profession, with the actual questionnaire attached as an appendix.

need to be seriously considered by studies focusing on research outputs and performance of faculty members in a developing country.

Raising all the above problems of studies on research environment and research outputs in Cambodian higher education context does not imply that previous works are not useful. All of those works are critical and valuable in their own ways. But academic research always attempts to extend the literature and the current study is of no exception. These previous empirical gaps truly call for further studies that should give a more in-depth analysis and add more knowledge to the existing literature. That was what the current study tried to do; it sought to respond in certain ways to the specific problems raised.

1.3. Rationales and significances: responding to the research problems

This current study endeavored to understand not only the characteristics of research environment and research outputs on the surface but also to investigate the connected underlying root causes of research outputs in the Cambodian higher education sector in a systematic and wide-ranging views. Basically, the current study involved three specific, related thematic areas (i.e. research outputs of Cambodian faculty members, research orientation of Cambodian faculty members, and research support environment of Cambodian higher education sector). It focused on trends, patterns, and correlates/determinants (i.e. relationship) of these themes.

While some previous studies have handled these issues in certain ways – for instance, on factors influencing research culture and capacity and on characteristics of research environment – the current study was unique in its own ways:

- *The study was unique in its conceptual framework.*[15] The study adapted the ecological framework and fit it into existing and well-built exploratory or explanatory models in the area of research productivity. Because the adapted theory was multi-dimensional, the current study could offer a comprehensive look from academic perspectives into the context of research output production and research environment of Cambodian faculty members and their higher education sector.

- *The study was unique in its methodology.*[16] It tried to objectively measure research output production of Cambodian faculty members, not just to conclude the trend based on individuals' perceptions. The study also drew on mixed data sets, employing rigorous statistical, qualitative,

[15] See section 1.5. below and Chapter 3
[16] See section 1.6. below and Chapter 3 and 4

and mixed-methods analyses of those data sets. The uses of psychometric measures to operationalize latent variables – such as research attitudinal orientation and research motivation – offered new perspectives to describe and explain Cambodian faculty members' attitude and behavior towards research.

The discussions of the research problems above also pointed to some prospective contributions this current study is likely to contribute to the process of building research culture and capacity and promoting research performance of Cambodian higher education sector. The following points briefly highlighted those possible practical as well as academic contributions:

- The study can inform policy by offering ideas to the Scientific Research Department for its future strategic plan as well as providing a reflection for the HEQCIP's completed research-promoting activities (2011-2015). In many ways, the Quality Assurance body of the country should also benefit from this current study as its factual results may give these policy makers some philosophy to rethink their current higher education quality assuring mechanisms.

- The study can more directly inform practices at higher education institutions as its results on research orientation of faculty members may give guidance on how to improve professional academic culture, research-oriented leadership, and some administration practices. Faculty members' understanding of research experience and competence, for example, may also influence their ways of working towards increasing research outputs in the future.

- The study should add values to knowledge gaps by offering a picture of conceptual framework for studies on research output production in developing country context (which is perhaps quite distinctive from developed countries' context of higher education). The current study's research design, based on mixed-methods approach and pragmatism philosophy, may be one of fresh endeavors to study this academic research lineage (as most previous ones have been dominantly quantitative).

Broadly speaking, to realize Cambodian research policy and visions, it is necessary to begin by investigating deeply into the context of research production and research environment of Cambodian higher education sector. That was basically what the study tried to achieve. It is necessary because regardless of whether a country is a developed or a developing society, the importance of scientific and academic research for that nation's development in the contemporary knowledge society is obvious in many ways: from how research responds to gaps in policy and practice to how it extends theory and knowledge, from physical innovations it produces to conceptual products it formulates, and from the

ways it critically sharpens the thinking of researchers themselves to the ways it pragmatically helps humanity realizing the truth.

1.4. Research focuses: purpose, questions, and objectives

1.4.1. Research purposes and the main question

The study aimed to *critically examine trends and correlates* of *research outputs* by *holistically conceptualizing* different dimensions of research support environment of Cambodian faculty members in their current higher education setting. Three main related thematic areas were focused: research output production, research orientation, and research support environment. The study basically tried to answer two big questions: what it is like to talk about research output production and what factors explain the production of those research outputs of Cambodian faculty members. The terms *"to holistically conceptualize"* and *"to critically examine"* implied systemic and ecological approach of the current study. It emphasized that the study looked at the big framework through different dimensions of the research support environment, the detailed elements (i.e. variables) of those dimensions, and the relationship among those variables and dimensions. By so doing, this study could both explore and explain different thematic and correlational perspectives of variables or constructs influencing research output production of Cambodian faculty members in a way that ensured conceptual lucidity.

1.4.2. Specific research questions

This current study could be understood as a combination of four related minor studies. That being said, the precise missions of this study were to answer four related research questions:

- *Research question 1*: How productive are Cambodian faculty members in terms of research outputs during their service at their current higher education institutions?
- *Research question 2*: How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members towards research activities and production?
- *Research question 3*: How supportive is research environment (i.e. institutional environment and external environment) in Cambodian current higher education context? and
- *Research question 4:* What factors (of external, institutional, and individual dimensions) explain research outputs of Cambodian faculty members in their current higher education context?

Simply speaking, research question 1 focused on trends of research output production of Cambodian individual faculty members (as measured by 13 types of research output indicators). Research question 2 focused on research orientation of those faculty members (i.e. research experience, research competence, research attitudinal orientation, and research motivation). Research question 3 focused on research support environment (resources, facilities, leadership, external support, etc.). And research question 4 focused on determinants or correlates of research outputs production. Research question 4 was the core focus of this study, which brought all elements of the other three research questions into concluding analyses. This last question responded directly to the main purpose of the study.

These four questions were related in two perspectives. From a *practical perspective*, the above four research questions were coherently connected in a way that, to explain what factors influence research outputs of Cambodian faculty members (the research question 4), it was necessary to dig deeply into understanding the research support environment (the research question 3), to grasp the research orientation of individual dimension (the research question 2), and to observe the trends of research outputs of individual faculty member (the research question 1). From a *theoretical perspective*, the four research questions coherently linked together under the multi-dimensional "ecological framework." This study, after all, was exploratory (as it answered the question "what" and "how") and explanatory (as it answered the question "why" or "what factors") at the same time, using both the qualitative and quantitative data (see Figure 1.4.).

1.4.3. Specific research objectives

Research objectives herein could be understood as focused aspects of the data analyses, which specifically answered each of the four research questions. Each research question was answered by basically three objective aspects: the quantitative trends, the quantitative patterns, and the qualitative perceptions.

Research question 1 focused on research output production of individual faculty members. Thus, the objective of this first research question was to measure and examine the quantitative trends and quantitative patterns of research outputs of Cambodian faculty. The trends of research outputs referred to both the frequency of research-productive faculty members and the exact number of different types of research outputs produced by Cambodian faculty members during their services at their current institutions. The quantitative patterns of research outputs referred to how research outputs were differentiated by different faculty members' demographic variables and their institution's demographic variables. The qualitative perceptions referred to "common themes" raised by the participants in response to the interview questions about research activities and production trends. To be specific, the objective of this first research question was to present the following findings:

- *Quantitative trend analyses of research output indicators* (i.e. specific research output indicators, composite research output indicators, indicators by place of production, etc.)
- *Quantitative pattern analyses of research output indicators* (i.e. the relationship between research outputs and individual and institutional demographic variables)
- *Qualitative thematic analyses of research activities and production:* (i.e. common interviewees' answers to such questions as "What is your overall perception towards the current trends of research activities and performance of Cambodian faculty members? What is it like to talk about research activities in Cambodian higher education sector?"

Research question 2 focused on research orientation of individual faculty members. In specific terms, the objective of the second research question was to measure the quantitative level of research experience, research competence, research attitudinal orientation, and research motivation of Cambodian faculty members. This question's objective also tested the patterns of relationship between these four variables of research orientation with individual and institutional demographic variables. The qualitative analyses basically drew common themes from such interview questions related to experience, competence, attitude, and motivation of Cambodian faculty members. So, the second research question aimed to present the following findings:

- *Quantitative trend analyses of research orientation variables* (i.e. general and specific trends of research experience, research competence, research attitudinal orientation, and research motivation.)
- *Quantitative pattern analyses of research orientation variables* (i.e. the relationship between research orientation variables and individual and institutional demographic variables)
- *Qualitative thematic analyses of research orientation* (i.e. common interviewees' opinions to such questions as "How do you perceive your own level of research experience?... research competence?... research attitude?... research motivation? What is your overall perception towards the research experience, research competence, research attitude, and research motivation of Cambodian faculty members?"

Research question 3 focused on research support environment at external and institutional levels. The objective of the third research question was to measure the quantitative trends of some general institutional research environment, research resources and facilities, departmental leadership, research support from ministry level, and research support from external sources. Like the second research question, it also quantitatively tested the patterns of relationship between those research support environment variables with individual and institutional demographic variables. The qualitative analysis of the third research questions was to draw common themes from open-ended interview questions

related to research support environment of Cambodian higher education sector. Therefore, research question 3 would yield the following results:

- *Trends analyses of research support environment variables* (i.e. general research support environment, research support from ministry, and research support from donors, etc.)
- *Patterns analyses of research support environment variables* (i.e. the relationship between research support environment variables and individual and institutional demographic variables)
- *Qualitative thematic analyses of research support environment* (i.e. common interviewees' answers to such qualitative questions as "What is it like to talk about research support environment of Cambodian higher education sector? Are you satisfied with the current levels of support from different external sources (i.e. government, ministries, institutions, donors, professional society, private sector, civil society)? Why and why not?

Research question 4 aimed at determining key factors associated with research outputs of Cambodian faculty members. The objective of this last question was the main focus of this study. First, the study identified explanatory factors of the composite weighted research output score of Cambodian faculty members at their current institutions. Second, the study identified the explanatory factors that affected the composite weighted international research outputs score. Third, the study identified the explanatory factors that affected the composite weighted local research production score. Next, the study conducted moderation analyses of these explanatory relationships by separating different disciplines, different institutional orientation, different locations, and different age groups. The qualitative side of this objective presented the common themes on two aspects: factors pushing research engagement/output production and factors obstructing research engagement/output production. This simply suggested that the expected findings of the objective of research question 4 would be:

- *Regression model for composite weighted research output score*
- *Regression model for composite weighted international research output score*
- *Regression model for composite weighted local research output score*
- *Various moderated regression models for composite weighted research output score*
- *Thematic analysis of factors pushing research engagement/output production and of factors obstructing research engagement/output production* (i.e. common answers to such interview questions as "What do you think are main factors inhibiting research engagement or production of Cambodian faculty? Why are you engaged and productive in research activities and outputs? What do you think are reasons of other faculty being research productive?"

All these specific objectives that aimed to yield specific findings, both quantitative and qualitative, offered detailed information and notions for each research question. They would be presented in the finding section: Chapter 5, Chapter 6, Chapter 7, and Chapter 8 respectively. In each chapter, the findings would be presented in similar style: starting with the quantitative trends, followed by the quantitative patterns, and followed then by qualitative themes. Certain comparative case analyses were conducted in each finding chapter to provide additional explanation, yet these minor analyses were not part of the core objectives of this study.

1.5. Brief conceptual framework: the logical flow of the current study

Conceptual framework here illustrated the main theoretical and conceptual principles on which this current study was based and how it systemically related to the study's research objectives, research questions, and main research purpose. This section contained only a brief explanation.[17]

Conceptual framework of this study was based on the so-called ecological framework. Ecological framework, according to Kemp (2011), *"... is a broad, overarching paradigm or metatheory, bridging several fields of theory and research, and orienting practitioners and researchers to the importance of integrative, multilevel, and multidimensional approaches to person-environment relationships."* Bronfenbrenner (1979; 1994) perhaps produced the most cited and adopted ecological framework model or the ecological system theory that basically comprises various major dimensions: micro-system, meso-system, exo-system, macro-system, and/or chrono-system. The ecological framework generally embraces multi-level, multi-layered domains or dimensions. Those domains or dimensions have been flexibly selected and formulated according to the context of the study as well as the perspectives of researchers. Some ecological framework models adapted in education research areas, for example, contained such domains as non-cognitive domain, academic domain, environmental domain, and campus ethos domain (Wood, Harris, & Xiong, 2014). Other ecological models could be in the form of a combined model. For example, Clark and Ivankova (2016) adopted the socio-ecological framework by combining works from previous authors – such as Bronfenbrenner (1979; 1994) and McLeroy, Biebeau, Steckler, and Glanz (1988) – and used that model to explain *the interwoven dynamic relationships that exist between individual and environment factors (p.14).*

The ecological framework, adapted by this current study, was used to both explore and explain research output production of Cambodian faculty members, looking at aspects within the three dimensions of research environment. So, it was not merely a model for quantitative testing but also a

[17] Further explanations were offered in Chapter 3: Conceptual and Methodological Frameworks.

model for qualitative exploration into the related themes of research outputs, research orientation, and research environment of Cambodian higher education sector.

Previous studies on establishing explanatory models of research productivity or research performance have detected many different factors associated with research outputs. Significant factors could vary within the context of disciplines, overall social environment, institutional characteristics, and individual traits (see, for example, Creswell, 1985; Shim, O'Neal, & Rabolt, 1998; Dundar & Lewis, 1998; Bland et al., 2005; Bland et al., 2006; Chen, Gupta, & Hoshower, 2006; Kim, Pedersen, & Cloud, 2007; Shin & Cummings, 2010; Pruisken & Jansen, 2015). Some of these and other studies may frame the models with more specific thematic dimensions – such as leadership dimension (Bland et al., 2005, 2006), governance dimension (Pruisken & Jansen, 2015), and family support and professional society support dimension (Shim, O'Neal, & Rabolt, 1998). Regardless of what models, they all are related in some ways to person-environment dimensions. Thus, in this current study, the multi-dimensionality of its ecological framework fit well into the conceptual and theoretical contexts of these academic studies in the fields of research productivity, research performance, or, more generally, academic performance. The current study's conceptual framework involved basically three major dimensions of Cambodian research environment (i.e. external dimension, institutional and departmental dimension, and individual dimension). The following figure (Figure 1.4.) showed visually the three dimensions of the Ecological Framework in this current study and how each dimension related to each research question the study tried to answer.

With this Ecological Framework as the skeletal structure, this study fit conceptually to the current *theoretical contexts* in the area of research productivity and also co-existed logically with the principles of *pragmatism* of mixed-methods research approach it would employ (explained in the next section). The study fit into the theoretical contexts of research production area because it adapted and combined key predicting factors (i.e. variables) from previous theories and models commonly used by researchers in the area of research productivity (i.e. variables from Bland et al. model, Expectancy Theory, Social Cognitive Theory, Planned Behavior Theory, and Socialization Model) into its three-dimensional ecological framework. As for the methodological framework, the current study employed the separate quantitative analyses, separate qualitative analyses, and mixed-methods analyses, making it methodologically different from previous solely quantitative or solely qualitative works. Both the ecological framework and the mixed-methods analysis are pragmatic approaches to understanding educational phenomena. (Again, please refer to Chapter 3 for the detailed explanation of this conceptual framework.)

Research Questions

[RQ1] *Research outputs*:	[RQ2] *Research orientation:*	[RQ3] *Research environment*:
How productive are Cambodian faculty members in terms of research outputs during their service at their current higher education institutions?	How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members towards research?	How supportive is Cambodian research environment (i.e. institutional environment and external environment) in its current higher education context?

[RQ4] ***Factors influencing research outputs:***

What factors (of external, institutional, and individual dimensions) explain research outputs of Cambodian faculty members in their current higher education context?

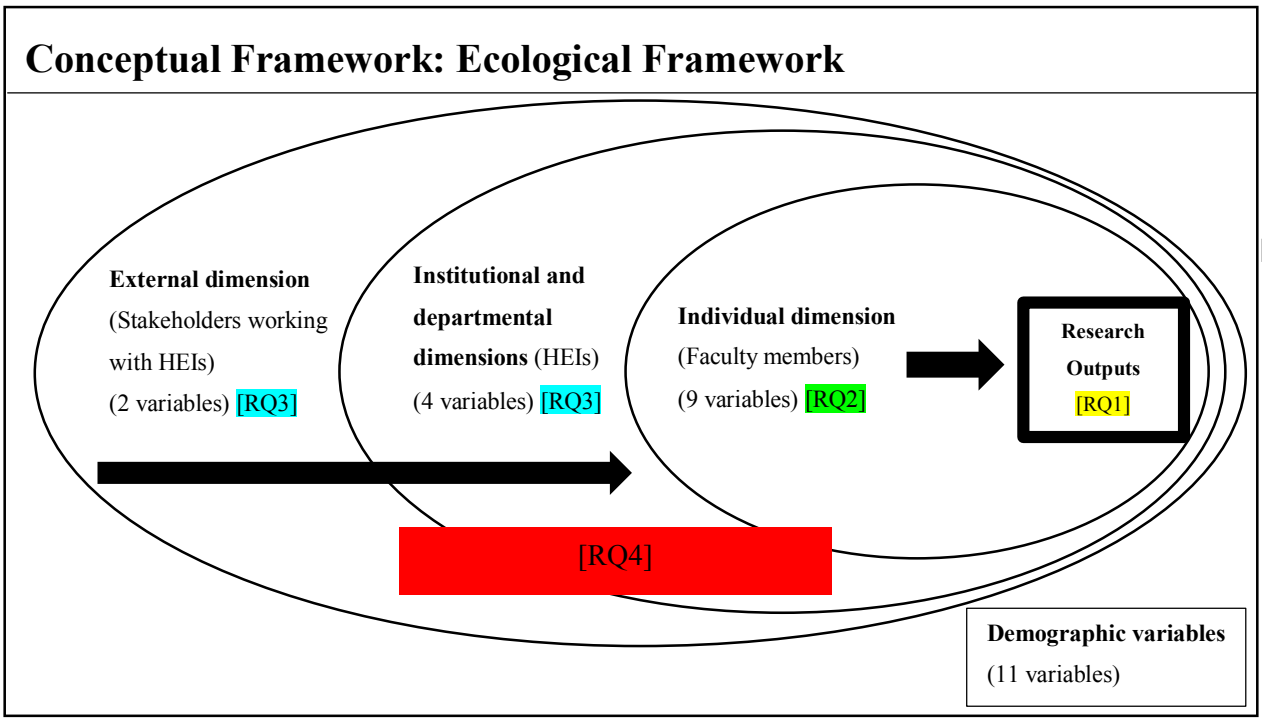


Figure 1.4. Conceptual framework of the current study and its coherence with research questions

1.6. Brief research methodology: the strategic approaches of the current study

In this section, the researcher explained how to methodologically achieve what the study aimed to achieve by briefly explaining the data used and specific methods for data treatment and analyses.

The basic methodological paradigm governing this study was pragmatism. The essence of pragmatism is to do what works – for you (Hunt, 2008, p.16). Rather than seeing the differences between the epistemological positivism and constructivism and the ontological objectivism and subjectivism, pragmatism (as guided by John Dewey) views the detachment of these two philosophical stances as illogical and so argues that both of them do not need to be contradictory and that they can work together. Based on this philosophy of pragmatism, the current study adopted the convergent mixed-methods design to analyze its data. The procedure of this current study flowed respectively from the comprehensive literature review and instrument development stage, to the qualitative interview and pilot study stage, to the quantitative instrument development stage[18], to the questionnaire survey stage, to the separate data analyses stage, to the integrated data analyses stage, and, finally, to the conclusion and writing stage (see Figure 4.1. in Chapter 4). The use of mixed-methods approach based on pragmatism suggested that the data for the analyses of this study came in two main types:

- First, *qualitative interview data* was collected from 50 key informants – including 5 policy makers, 11 leaders of university and/or research unit, 31 faculty members, and 3 external stakeholders. Only 6 percent of them was female, and 32 percent was not research-engaged. Most interviewees aged from 31 to 40 years old (56%). Analyses of the qualitative interview data basically comprised *thematic analysis* method, using the 3-dimension ecological framework as guiding principles. The procedure of the thematic analysis in this study involved transcribing recorded interviews, coding the transcripts at three levels, categorizing the codes-based themes that specifically answer each research question, and finally quantifying the third-level themes and calculating the percentage. Some comparative case analyses of different stakeholders in the interview were conducted in each finding chapter just to provide additional explanation. They were not part of the core objectives of this study.

- The second portion of data was the *quantitative survey data* set based on questionnaire's responses of 483 faculty members from 15 universities in the country. The quantitative data looked at the statistical trends and patterns of relationship among variables of the 3-dimension ecological framework. Participants were male dominated (77%), mostly non-Ph.D. degree holders (87.4%), and mostly younger academics (with average age of 36.67 years old). They also come from a variety of institution, comprising both public and private universities, province-based and city-based universities, and universities under different ministerial governance. In the quantitative analyses, the study first statistically described trends of all independent variables at the three dimensions (viz. external, institutional, and individual dimensions) and the trend of the 13 research production indicators (i.e. the dependent variable)

[18] It should be noted that the qualitative and quantitative data designs were only allowed to influence each other at the minimum level. In the convergent design, both were supposed to be used in comparative perspective.

of Cambodian faculty members during their services at their current institutions. Then the study employed various bivariate statistical tests of difference and correlation to analyze patterns between demographic variables and key variables of the three dimensions. Finally, the study employed main and moderated z*ero-inflated negative binomial model*s to capture significant relationships between those selected independent variables of each dimension and research output scores.

Table 1.1. Research methods by specific research objectives

Research questions	Specific objectives	Specific research questions answered	Analytic methods		Expected forms of results to be presented
			Quantitative	Qualitative	
Research question 1	Trends and characteristics of researchers and research outputs	How engaged and productive are Cambodian faculty members in research?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	3-level coding thematic analysis and quantification of qualitative data (and some comparative case analyses)	Frequency, percentage, graph, cross-tabulation and qualitative tables
Research question 2	Trend of research orientation variables	How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	3-level coding thematic analysis and quantification of qualitative data (and some comparative case analyses)	Frequency, percentage, graph, and qualitative table
	Patterns of research orientation variables with demographic variables	Are research experience, competence, attitudinal orientation, and motivation differentiated by demographic attributes?	Independent sample t-test and one-way ANOVA (according to the number of attributes of each demographic variable)		Table of statistical difference and significance
Research question 3	Trend of research support environment variables	How supportive is Cambodian research environment?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	3-level coding thematic analysis and quantification of qualitative data (and some comparative case analyses)	Frequency, percentage, graph, and qualitative table
	Patterns of research support environment variables with demographic variables	Are rating on research environment variables differentiated by distinctive demographic attributes?	Independent sample t-test and one-way ANOVA (according to the number of attributes of each demographic variable)		Table of statistical difference and significance
Research question 4	Factors influencing research outputs	What factors explain research outputs of Cambodian faculty members?	Zero-inflated negative binomial regression models and moderation analyses (and other bivariate regression analyses)	3-level coding thematic analysis and quantification of qualitative data (and some comparative case analyses)	Table of correlation; table of coefficient significance; model fits statistics; and qualitative tables

- At the discussion stage, the joint-display matrix of mixed-methods research was conducted to interpret and compare the study's separate analyses of quantitative and qualitative findings. It aimed to offer an overall summary of specific findings as well as to figure out possible gaps for further studies.

The Table 1.1. above explained the systematic and comprehensive analytical framework of this study in an explicit way. It presented the specific data analysis methods, the specific research questions, the specific research objectives, and the types of expected results to be presented in the finding chapters. This table also showed how these aspects were systemically related in a way that lucidly achieve the current study's main purpose.[19] The separate analyses of each data sets as well as the mixed-methods analysis allowed the study's strategies to be flexible and all-encompassing with the available data sets.

1.7. Research organization: overall scope, key terms, and writing structure

1.7.1. Overall scope of the study

The whole scope of the study could be explained from the lenses of its conceptual coverage, institutional and disciplinary coverage, and selected participants in this study. Likewise, it could be understood from the reversed discussion of what the study was not about.

- **Conceptual coverage:** As for the conceptual framework, this current study covered all of the three major dimensions (i.e. external, institutional, and individual dimensions) which have been detected to have influences on research output production in many higher education settings. Each dimension had its own particular factors or independent variables (see Chapter 3 and Chapter 4). For example, the external dimension in this study looked into specific variables, such as support from ministry and support from external sources, etc.; the institutional and departmental dimension contained such variables as institutional availability of research-capable members, institutional resources and facilities, departmental leadership, etc.; and the individual dimension comprised such variables as research experience, research competence, research attitudinal orientation, and research motivation. Most of these variables were measured by psychometric indicators. Besides these predictor variables of each of the three dimensions, demographic variables of individual participants (i.e. gender, age, terminal degree, etc.) and of selected institutions (i.e. location, orientation, governance) were also

[19] Please refer to Research Methods Chapter (Chapter 4) for detailed explanations on how the data sets were practically processed, treated, and analyzed.

included as controlled variables for the analyses. As for the dependent variable, research output score was measured by 13 indicators, treated in different ways.

- **Institutional and disciplinary coverage:** Higher education in Cambodia can be classified into academy, universities, institutions, schools, and centers. They are under 15 different governing ministries. This current study selected only 15 organizations (falling into the university and institution category). These selected higher education institutions in this study vary in many aspects. Given their size, capitals, and number of students, most of these institutions can be regarded as medium to top ranking institutions in the country. There were both private and public institutions, both the city-based and province-based institutions, and both the institutions under MoEYS and those not under MoEYS. Most of these institutions are comprehensive sorts of universities that provide degree programs in many disciplines; some are specialized institutions – focusing solely on, for example, the fields of agriculture or fine arts or health.

- **Participants in the study:** Faculty members are the subject for both the quantitative and the qualitative analyses. More to the qualitative parts, university management and research unit leaders, policy makers, and research-related stakeholders were involved. It should be clearly stated that faculty members here refer generally to those people having the instructing roles at those selected universities/institutions. Because Cambodian universities have been very teaching-oriented, in general, most of them do not have clearly defined researcher roles or even academic ranking. During the data collection, some institutions, not under the MoEYS, have already adopted the academic ranking system, and one institution has had researcher position, however. Still, faculty members selected were basically those who at least engage in the instructing or teaching roles and were not necessarily defined or classified as associate professors or professors. The study comprised both part-time and full-time faculty members and research-engaged and research-unengaged ones. There are faculty members graduating abroad and those locally. Most of them major in social science or related fields.

Finally, it should be stated clearly what the study was not about. First, the study did not include foreign faculty members teaching at those selected institutions, so, basically, all faculty members included were Cambodian. The study also did not select vocation-oriented higher education institutions under the Cambodian Ministry of Labor and Vocational Training. The study did not directly center on the theme of research culture and capacity, but it touched upon this area indirectly as it attempted to do analyses on the overall research support environment of the higher education sector. The study did not center on the theme of research engagement or research involvement, as measured by rating scales of various research activities. This particular topic was dealt with in the researcher's

Master's Thesis. This current dissertation, on the other hand, focused on exact research output (such as published books, published journal articles, obtained research grants, etc.). Despite the fact that the study focused on research outputs as counted by the number of publications or grants, it did not measure citation of those products through online academic databases – such as Scopus or ISI's Web of Knowledge – as done in previous studies in the area of bibliometrics or scientometrics. Doing so was basically impossible for the studied context where research products have been new endeavors, perhaps published locally, and still not very much standardized or internationalized.

1.7.2. Key terms

The list below defined some key terms in this current study. It offered explanation from theoretical or practical definitions as well as notified how the current study defined those terms, so that there would be a balance between theoretical benchmarks and practical feasibility.

- **Research:** The OECD Frascati Manual (2015) defined research and experimental development (R&D), in broad sense, as comprising *"creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new application of available knowledge"* (p.44). It classified three types of research: basic research, applied research, and experimental development (p.45). Research, in the current study, covered those research projects, scholarly works, as well as consultancy works, which are based on natural or social science research methodology.
- **Research outputs:** addresses only the quantity of the various products without any effort to elicit information that might be used for an in-depth assessment of academic productivity, for example, co-authorship and publication in select journals (Teichler, Arimoto, & Cummings, 2013, p. 146). Research outputs range from books, books chapters, articles, technical notes to other types of academic publications and engagement. Research outputs, in the current study, used 13 types of research output indicators. (Please refer to Table 3. 1.).
- **Research productivity/Research performance:** Research productivity refers to the products of performing research activities (Wootton, 2013). In construct-validity sense, like research performance, it can refer to both the quantity of research outputs or products (as measured by number of publications) and research quality or impacts (as measured by citations). Some studies differentiate between the two, however. Because the current study does not focus on the quality aspect, it employs the term "research output," or sometimes "research output production."
- **Research involvement/Research engagement/Research experience:** These three terms are not necessarily the same but somehow conceptually similar. Wylie-Rosett et al. (1990) used the 4-level research continuum (implementation of research initiatives, conduction of research,

translation of research to practice and application of research to practice) to conceptualize involvement in research activities (as cited in Byham-Gray, Gilbride, Dixon, & Stage, 2006). Research engagement, a similar term, as used by Borg (2010), covers both engagement in research (i.e. by doing it) as well as engagement with research (i.e. by reading and using it). Research experience can also be used to mean research engagement in certain technical ways. Tools such as Research Spider (Smith, Wright, Morgan, Dunleavey, & Moore, 2002) and some indicators in the CAP survey (Teichler, Arimoto, & Cummings, 2013) reflect how research experience are operationally measured.

- **Research capacity and culture (RCC):** is an emerging conceptual research area. The RCC tool (see, for example, Holden, Pager, Golenko, & Ware, 2012) has been designed and developed to measure the abstract and concrete environmental and/or infrastructural situation with regards to research of an institution or a context. It aims to see how supportive, how oriented, and how capable those institutions or contexts are towards research. Research support environment, used in this study, can be co-existing with the idea of research culture and capacity and so incorporates some important types of research supporting elements – such as policy, finance, facility, network, collegial support, etc. However, the way research support environment variables were measured in this study was not fully comprehensive as in the work of Holden, Pager, Golenko, and Ware (2012).
- **Research orientation:** in Bland et al. model (2005), the individual dimension contains the term "research orientation." However, in general, it seems that the literature has not formulated objective measures for this construct. In this current study, the term "research orientation" was defined in a broader sense; it covered four constructs: research experience, research competence, research attitudinal orientation, and research motivation (which were explained in details in Chapter 3 and 4).
- **Mixed-methods approach:**[20] refers to the use of both quantitative and qualitative data, the analysis of which has to be done in a way that the two types of data can be integrated or compared to engender common conclusions. Just having qualitative and quantitative data, without proper integration analyses, does not make certain studies a mixed-methods one. Mixed-methods design in the current study was a convergent design – though some elements from the pilot study interviews were exploited to derive tools for measuring quantitative constructs.
- **Pragmatism:**[21] is the philosophical ground pioneered by American philosophers – such as John Dewey and William James. The philosophy values things that work. In education, this philosophy tries to rationalize the goals of educational concepts and strategies that aim at connecting the theory and practice (which were explained in details in Chapter 3 and 4).

[20] See Clark & Ivankova (2016) for definitions and further reference.
[21] See Biesta & Burbules (2003) for further reference.

- **Thematic analysis:**[22] refers to a common analytical method for qualitative data, which generally involves the process of coding at three levels to come up with the final themes that answer particular open-ended interview questions. Thematic analysis in this study stands in-between the phenomenological approach and the grounded-theory approach of the qualitative research methodological streams.
- **Zero-inflated negative binomial regression:**[23] is the statistical model used to study the relationship between predictors variables and the dependent variable (that has a count distribution). It is similar to Poisson model and the general Negative Binomial Regression Model. The zero-inflated negative binomial regression is used with the count data whose distribution has the variance value larger than its mean score (i.e. over-dispersion). The zero-inflated negative binomial regression produces two models: the count model, which predicts the count data (including both the zero and the non-negative integers), and the inflated model, which predicts the membership of the excessive zero group.

1.7.3. Structure and styles of the dissertation's writing

This study was both an exploratory and explanatory study on research output production and research support environment of Cambodian faculty members. The researcher tried to employ classic and academic styles of writing, using writing principles that aimed for structural and textual coherences. Where applicable, the study drew on very conversational tones. There were 10 chapters (see Figure 1.5. below) coherently and systematically organized as follows:

- **Chapter 1** dealt with the introduction of the current study, explicating what problems and issues leading to this study and why the study was necessary for the contemporary Cambodian higher education. It presented the background, research problems, research significances, research objectives, research questions, as well as key terms in the study.
- **Chapter 2** dealt with the literature review of relevant themes, including innovation and knowledge systems, academic profession, research environment, and research productivity explanatory models and factors. It also discussed previous literature on Cambodian research environment and performance. This chapter tried to organize and clarify major existing theoretical, empirical, and contextual thoughts on the study's focused topics of research output production and research environment.
- **Chapter 3** presented the detailed conceptual and methodological frameworks, while responding to the gaps identified in the literature discussions. It explained how previous

[22] See Guest, MacQueen, & Namey (2011) for further reference.
[23] See Hilbe (2011) for further reference.

models in the area of research productivity may fit into the multidimensionality of the Ecological Framework and the mixed methods paradigm of pragmatism.

- **Chapter 4** presented the detailed research methods employed in the study. It started with the overall research procedure and moved on to explain specific research design and methods of qualitative study and further to the details of quantitative studies. It also discussed the mixed-methods integration methods.
- **Chapter 5** presented detailed findings and syntheses of the research question 1 on how productive were Cambodian faculty members. It basically illustrated the quantitative trends, the quantitative patterns, and the qualitative themes of Cambodian researchers and research outputs.
- **Chapter 6** presented detailed findings and syntheses of the research question 2 that focused on research orientation of Cambodian faculty members. It illustrated the quantitative trends, the quantitative patterns, and the qualitative themes on research experience, research competence, research attitudinal orientation, and research motivation of Cambodian faculty members.
- **Chapter 7** answered research question 3, that is, what the research support environment is like in Cambodian higher education sector. It basically presented the quantitative trends, the quantitative patterns, and the qualitative themes of such as variables as general institutional research support, availability of research-capable faculty members, institutional research resources, external support from ministry, and external support from donors.
- **Chapter 8** presented the findings of the main research question: what factors are explanatory of research outputs of Cambodian faculty members. It also discussed qualitative opinions of interviewees on both the pushing factors and the obstructing factors that influenced research output production of Cambodian faculty members while they are working in their current institutions.
- **Chapter 9** offered more in-depth discussions of the study as well as some critical thoughts on how this study was consistent or contradictory with previous research works. This section contained the discussion of the joint-display matrix to compare quantitative and qualitative data sets. This chapter also provided some implications and suggestions for Cambodian higher education institutions in their journey of research promotion.
- The final chapter, **Chapter 10**, brought all the findings and discussions into a final conclusion, reflecting back to the research problems and practical backgrounds of the Cambodian research conditions.

In the four chapters of findings for each research question, the author structurally organized the writing into four main components: the introduction, the quantitative finding, the qualitative finding, and the synthesis. Other chapters, besides the four finding chapters, were organized in a similar way, starting

with the introduction and explanation, followed by presentations of the main components and contents, and finalized by a synthesis. Given the current study's comprehensive scope of data and analyses, such a structural organization that aimed for sematic and syntactic coherence was necessary.

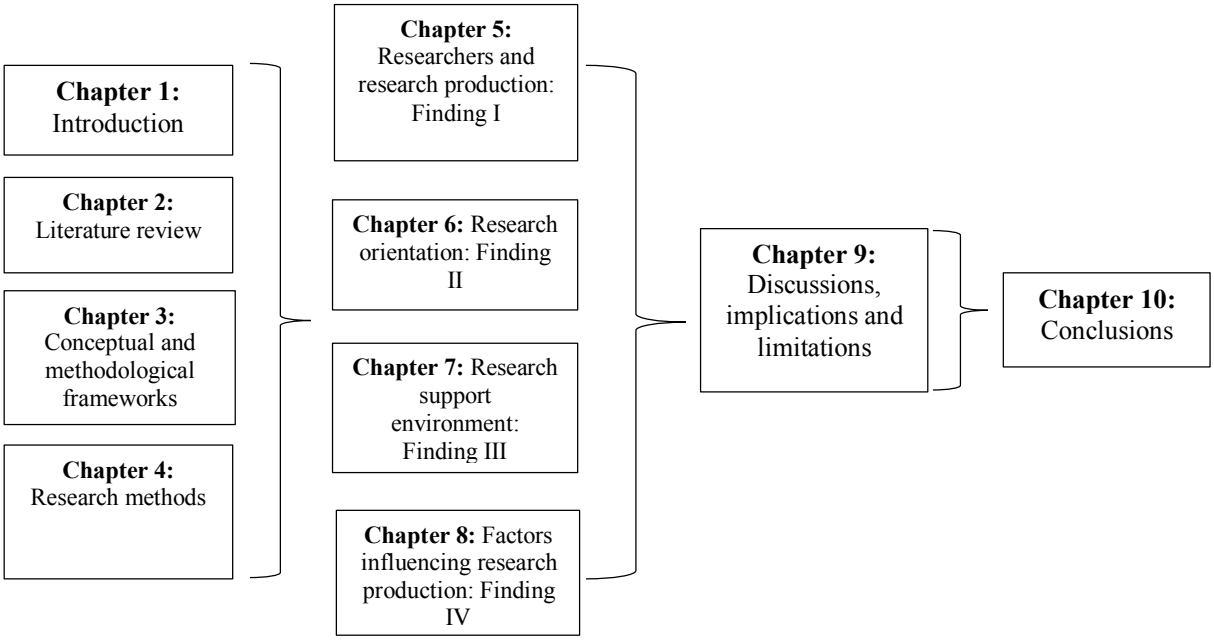


Figure 1.5. Flow chart of the organization of main chapters in the dissertation

1.8. Synthesis of the introduction to the whole study

In sum, this current study was conducted in response to the increased local attention to promote research culture and capacity in Cambodia. Its intent was also to offer some academically-based thoughts on practical problems the Cambodian government and stakeholders have been facing in their attempts to urge higher education institutions and faculty members to engage and produce research outputs. The study was conducted at the time the recent movements of leading international and regional organizations have critically emphasized the roles of innovation, science, knowledge, and R&D to contribute to sustainable (and human) development.

Most previous studies have neither tried to measure research outputs of Cambodian academics nor to understand the factual conditions of research-active faculty members. So, what the current study did was to examine research outputs of Cambodian faculty members and identify correlates (of the external, institutional and departmental, and individual dimensions) of those reported research outputs. The three-dimensional ecological framework offered the study a systemic and holistic power to both explore and explain not only the focused topic of research output production but also the relevant topics of individual research orientation and institutional research support systems. The study

developed four specific research questions which enquire on: 1). research output production of Cambodian faculty members, 2). research orientation of Cambodian faculty members, 3). research support environment of Cambodian higher education institutions, and 4). correlates of research outputs of Cambodian faculty members. The study drew on mixed-methods approach to explore and explain each of these focused themes in a systematic and pragmatic senses. These inter-related research questions all boiled down into clarifying what it is like to talk about research outputs of Cambodian faculty members and what determines those outputs. Based on all the systematic, pragmatic, and multi-dimensional perspectives, the study, in a broad sense, hoped to identify some practical gateways towards promoting scientific and scholarly research environment of the Cambodian academia, the case of which may meaningfully apply to other developing countries' context.

CHAPTER 2: LITERATURE REVIEW

The introduction section briefly discussed some background and research problems leading to the conduct of the current study. This chapter offered more detailed elaboration and discussion of those background areas and problems by reviewing some historical, theoretical, conceptual, empirical, and practical contexts of the two focused constructs (i.e. research support environment and research output production). Figures 2.1. below indicated the hierarchical flow of the presentation of this chapter, starting from the big picture of innovation, science, knowledge, and research systems as reflected through policy and practices, moving to the fields and roles of higher education and academic profession, and narrowing down further to the areas of research productivity or research performance (measurements, conceptual models, and correlates/determinants). Later sections described some obvious characteristics of Cambodian higher education and academic profession and further discussed Cambodian research support environment and research performance as reflected from previous studies. A synthesis of the whole literature was presented at the end to close the chapter.

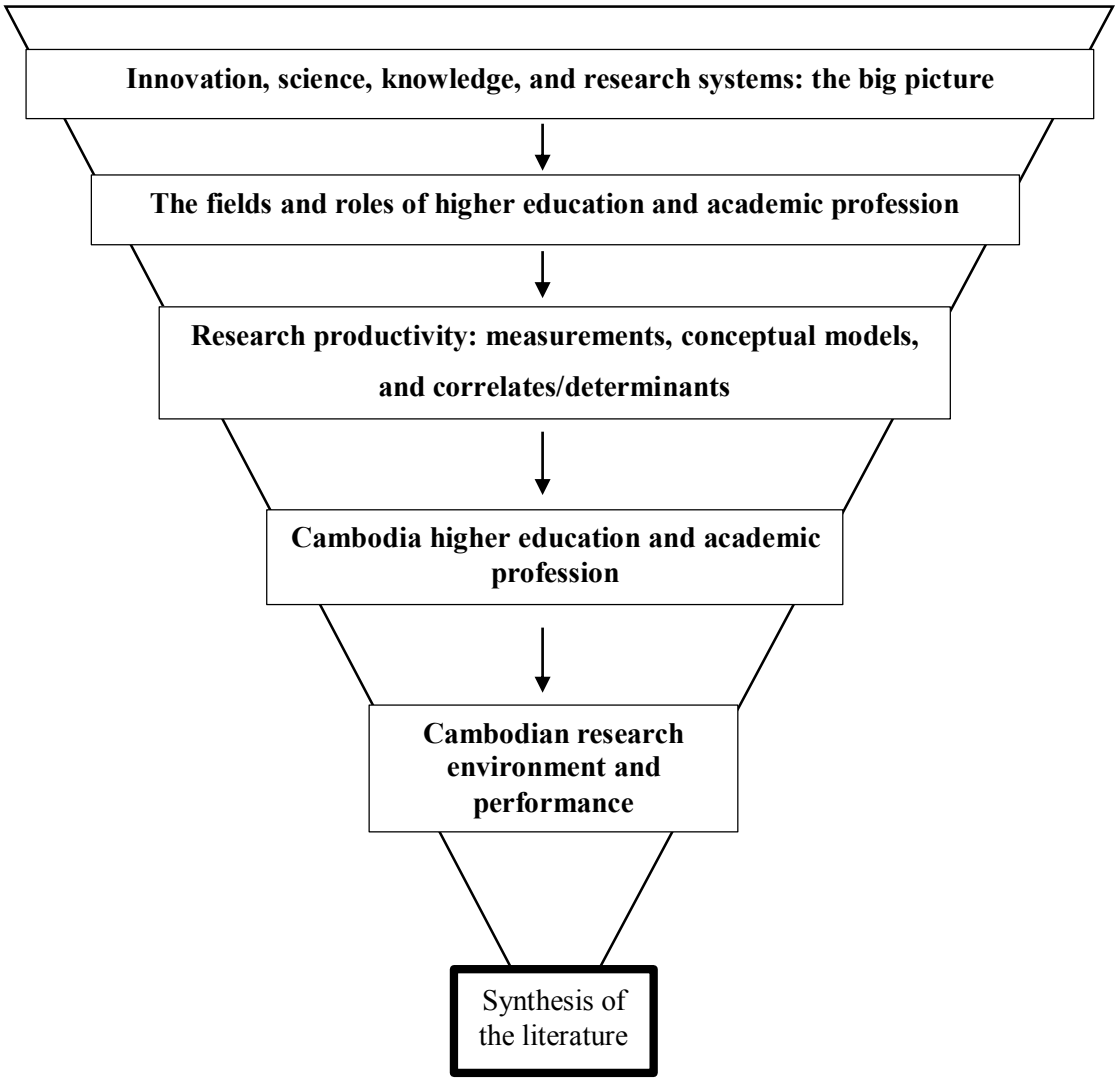


Figure 2.1. Diagram of the flow of the literature review

2.1. Innovation, science, knowledge, and research systems: the big picture

Innovation, science, knowledge, and research systems as an inter-related multi-dimensional, multi-layered structure: International and national institutions, developed and developing countries, and academic and non-academic sectors alike have paid much attention on culture and systems of innovation, science, knowledge, and research (as reflected, for example, through the works of Meek & Suwanwela, 2006; Sorlin & Vessuri, 2007; Meek, Teichler, & Kearney, 2009). These multiple stakeholders have intentionally created or unintentionally inspired some forms of these systems in their localities, nations, regions, or even globally. These movements are both multi-stakeholder and multi-layered.

Studies on innovation systems generally utilize a multi-stakeholder and multi-disciplinary framework to reflect into the inter-related roles of governments, industries or enterprises, and universities (Nelson, 1993; Lundvall, Intarakumnerd, & Vang, 2006). For such reasons, innovation, science, knowledge, and research systems of a nation can generally be understood by classifying them into two dimensions or sectors: academic (generally at universities) and non-academic (such as by industrial firms and service) sectors (see Thorp & Goldstein, 2010; Ferretti & Parmentola, 2015). All of these institutions and systems aim at innovatively adapting or creating new scientific knowledge and new products or technology. All engage in "learning" and "research" of some forms. The academic sector produces knowledge and innovative conceptual models at universities, academies, or higher learning institutions. They are originally bound for "academic (scientific and scholarly) research" or "knowledge for knowledge." The non-academic sector, on the other hand, performs research activities in non-academic independent research institutes, research centers, industrial research and development sections, or non-governmental organizations and is oriented more towards "applied research" and/or "experimental development." Though academic research has long been differentiated from industrial research and development (R&D), the boundary between academic and applied research has become less significant. Currently, researchers and practitioners have started to use the term R&D to refer to both R&D in industrial sector and R&D in university sector because the collaborations among governments, industries, and universities to promote research performance have been more energetic recently. More universities have started to connect with industrial firms to obtain funding for research, while industrial firms can exploit research outputs from universities (or from joint collaborations with universities) for their own industrial benefits and advancement. These connections are either bilateral or generally facilitated and supported by the government.

The multi-layered structure is also obvious for innovative and knowledge-based institutions and socio-cultural environment to function properly in the knowledge society – the society whose current agenda has been around issues of sustainable development. That is to say, systems of innovation and

knowledge can interactively exist at many social levels. Regional Innovation System (RIS), National Innovation System (NIS), and Local Innovation System (LIS) have become critical topics for discussion and have also been developed into academic areas of study. Countries without such systems or with failed systems are likely to be left behind in terms of both human and economic development because the roles of knowledge (created by those systems) have been the most valued asset for the contemporary human civilization. Institutions around the world have transformed or been transformed to become the "learning institutions" in order to adapt to the rapid globalization of the knowledge economy. This metaphor of "Knowledge Society" and "Knowledge Economy" can attain great achievement only through systemic, multi-layered, and multi-dimensional development and collaboration. UNESCO (2005) reported: *If we take it for granted that there is a real substance to the concept of knowledge societies, there is all the more reason for governments, industry, and other actors to take their role in this global movement very seriously.* Local innovation systems may influence particular groups of stakeholders, which can further influence national innovation systems, which will further impact the regional and global systems at large. All of these mechanisms will contribute to the holistic, inclusive, and sustainable development.

International support movements: Internationally supported movements (led by OECD, UNESCO, and WB, etc.) on these and related areas have been markedly increased as these international agencies try to link these critical themes (i.e. innovation, science, knowledge, and research) to their ideal for sustainable national, regional, and universal development. The best place to start talking about these international endeavors in promoting research and knowledge is perhaps the 2002 UNESCO's World Conference on Higher Education (focusing on Research and Development). Led by various scholars and policy makers in areas of science and research and higher education development, this forum placed great emphases on the role of universities in knowledge creation and innovation to contribute to making the knowledge society real. The forum produced certain key reports, some of which centered on research in developing countries (see, for example, Meek & Suwanwela, 2006; Sanyal & Varghese, 2007) as well as developed countries (see, for example, Vessuri & Teichler, 2008). The main themes of those reports evolved around the gaps between the increased attention on science, the increased attention on availing and sustaining human and financial resources for research and development, the academic culture, the differences between higher education systems between the core and the peripheries, the indigenous knowledge systems, the role of data in the new information society, and so on.

More practically, UNESCO has renovated its statistical database system (of innovation, science, and research themes), so that data and information about these critical themes become much more professional and accessible (see UNESCO's Institute of Statistics website). Other leading global institutions such as OECD, World Bank, and World Trade Organization (WTO) have also developed

their own database systems and tools – from the development of Knowledge Assessment Methodology (KAM) to the Innovation Indicators. At the time of writing this dissertation, the United Nations launched the UN World Data Forum, held in Cape Town, South Africa, from 15th to 18th January 2007, which would obviously mark a new turning point of the world of data, science, and research and development. Other increased endeavors from the global perspectives also count the emergence of many academic area – for example, scientometrics, bibliometrics, and infometrics (see, for example, Hood & Wilson, 2001).

Like many other global phenomena, such knowledge-oriented movements have posed widespread pebble effects. Initiatives have been made by those core international agencies, and consequences have started to scatter from the core to regions, to nations, and further to institutions in various parts of the world. Policies and actions in may nations have been taken to catch up with these international movements. Until now, the issues of innovation, science, knowledge, and research systems have resonated beyond the developed countries' boundaries and emerged as a big concern for policy makers, leaders of higher education institutions, and academic researchers in many developing nations.

Regional and national support movements: Regional and national promotion endeavors on research and development can be visualized through the issuing of policies – such as science policy, innovation policy, industrial policy, and even research policy. The regional endeavors and the mobility of academics have contributed a lot to the changing academic profession and research activities in many countries. Regionally speaking, even the so-called Bologna process can be considered a big movement of European countries, which partly aims to promote the impacts of European research and higher education and to enhance the intellectual power of Europe.

Actual establishment of infrastructural systems has also been initiated. Many countries have tried to create US-modeled research universities. Some have innovatively established and enhanced their science or industrial parks that engage industries, governments, and universities together. The creation of research centers, centers of excellence, centers for advanced studies inside universities or as independent institutions have also become popular practices in many countries. Countries, like France and Russia, on the other hand, have their own forms of long-established national research institutions detached from the universities – namely, the national research centers and the academy (Neave, 2002; Sanyal and Varghese, 2007). Still, their systems are also meant to create knowledge out of research. In certain places, specific science and research promoting projects have been initiated by the government – such as the case of the 211 and 985 projects of China to transform certain higher education institutions in the country into specialized and world-class universities.

Until now, China has the most researcher in the world (reportedly 1,484,040 researchers, compared to the second comer, the US, with 1,265,064 researchers) and the second largest investor in R&D (i.e. 333,521,614 of GERD ('000, PPP$), compared to the first comer, the US, with 453,544,000 of GERD ('000, PPP$)) (UNESCO, 2015). Other BRICS countries are also obvious examples of increased investment in R&D (see, Altbach, 2016). According to Fact Sheet (2015, No. 36) of UNESCO's Institute of Statistics (UIS), though the trend of R&D investment has declined from 56.7% in 2007 to 48.3% in 2013 in North America and Western Europe, the trend has increased from 30.6% in 2007 to 38.3% in 2013 in East Asia and the Pacific. Other regions have kept the statistics stable from 2007 to 2013 (Central and Eastern Europe around 4 percent, South and West Asia also around 4 percent, Latin America and the Caribbean around 3.5 percent, Arab states around 1 percent, Sub-Saharan Africa around .7 percent, and Central Asia around .1 percent). Bokova (2015)[24] also highlighted that *the number of researchers and publications worldwide increased by over 20% during the period from 2007 and 2014*. All of these practices and mechanisms are obvious general explanations of the global attention and movements on research support environment.

In a more specific perspective, there is also introduction of research assessment and evaluation models in order to properly assess, evaluate, and fund research projects. The British and Australian Research Assessment Models – such as the Research Evaluation Exercises (REEs) and the Research Excellence Framework (REF) – have been widely studied and discussed in various empirical studies (see, for example, Bornmann, Haunschild, & Marx, 2016; Johnston & Reeves, 2017). These instruments offer frameworks for practical research evaluation and assessment, so that investments in research yield efficient and practical results.

While all these mentioned activities are common in developed countries and emerging economies, there have also been some kinds of international-donors-supported kick-starting projects to promote research culture in developing countries – for example, the World-Bank-funded HEQCIP project in Cambodia and the similar one in Indonesia as well as some endeavors of African countries. In Indonesia in 1988, "*about 5 percent (US$6.5 million) of the International Bank of Reconstruction and Development (IBRD) Loan for Higher Education Development Project (HEDP) was designed for a competitive university research grant of a 1-year type*," Koswara and Tadjudin (2006). The World Bank has similarly strategized its development plan in education sectors in some other developing countries, particularly the HEQCIP in Cambodia in 2010. Dy (2015) in the prelude education edition of Cambodia Development Resource Institute (CDRI) claimed that *"... funding and technical guidance under the project [i.e. HEQCIP] has spurred research in many HEIs."* In African and Arab regions, there have also been various practical attempts, an example of which is the endeavor to

[24] See UNESCO Science Report: Towards 2030 (2015)

establish the so-called Brain Gain Initiative[25]. Altbach (2016) mentioned that there had been initiative in Africa "to build the research capacity of key African academic institutions in Kenya, Mozambique, Ghana, and several other countries" (p. 174). Many emerging economies and developing countries have already reformed their higher education and academic profession systems in order to catch up with the developed system of higher education in terms of research production. Though their resources are generally limited, those institutions generally focus on technology transfer and STEM researches as their key priority.

From a comparative "center and periphery perspective," it is obvious still that the gap between support environment in developing and least-developed countries and that of the developed countries are huge and hard to bridge. A number of past studies also attempted to investigate and conceptualize research characteristics and academic capabilities of faculty members in developing and least-developed countries (e.g. Sanyal & Varghese, 2007; Liefner & Schiller, 2007). Most of these studies highlighted various problems: lack of human capital; lack of infrastructure and resources; donors-driven research activities; language problems; questions of international visibility of research outputs; and problems with academic profession in general (Meek & Suwanwela, 2006; Sanyal & Varghese, 2007; Savage, 2011; Altbach, 2016). They also offered some frameworks for consideration to policy makers and practitioners at higher education institutions. For example, Sombatsompop and co-researchers (2011) proposed the ASEAN citation index framework for countries in South-East Asia to systematize their citation framework and so increase visibility and consistency of their research outputs.

In sum, research support environment can be established at many sectoral dimensions (from such non-academic sectors as industry to such academic sectors as higher education institutions), at many social layers (from local level to regional level), and with many different kinds of strategies that fit into local conditions (from imitating the American research universities to creating Science and Industrial Parks and to attempts to create citation indexes). The gaps in terms of innovation, science, knowledge, and research systems and support between developed and developing countries are still huge and sloped towards the developed contexts (Sanyal & Varghese, 2007). Some positive increments in policy and funding support have been noted in general, however. In many ways, research support environment is neither just about having the abstract principles nor physical infrastructure alone. Both have to function together. Lessons from the literature make it clear that, without proper, interconnected mechanisms to handle those physical issues and structural problems and clear visions and directions, the idea of promoting research systems and production in peripheral countries can be very challenging.

[25] See UNESCO's publication titled "Brain Gain Initiative: Linking African and Arab Region universities to global knowledge (2013)

2.2. The fields and roles of higher education and academic profession

Through research, academic sectors – generally represented by universities, academy, and/or other higher learning forms of institutions – have contributed actively to innovation, knowledge, and science production. Into its key functions of research, teaching, and services, higher education sector and academic profession have been an effective forum for academic, policy-oriented, and practical thinking.

Higher education and academic profession as a research area: For the academic field and issues of higher education in general, there have been many areas and sub-areas of research. The major ones perhaps comprise research about sociology of higher education, research about economics of higher education, research about internationalization of higher education, and research about institutionalization of higher education. Of course, there are more research themes and areas, but framing the huge field of higher education research this way can probably help simplifying its complexity. Various empirical studies based on Carnegie Foundation's CAP survey implied the increased interest on higher education research. The trend is conceivable because globalization seems to play critical role in the higher education sector and academic profession, as reflected through many obvious international movements and academic collaboration across borders. Academic profession is one of the key areas of higher education research (Tight, 2003; Gumport, 2007). More specifically, academic profession is generally studied and discussed within the sub-field of sociology of higher education (which contains basically four well-researched sub-areas) (Gumport, 2007, p. vii). Clark's analyses of academic professions and cultures traced several important lines of inquiry that had not been addressed until 1980s: issues around power and control in higher education, bureaucracy and rationalization, normative and cultural dimensions of higher education, and the academic profession (Rhoades, 1998, as cited in Gumport, 2007, p. 114).

Key academic journal outlets – such as Springer's Minerva, Oxford University Press's Research Evaluation, Oxford Academic's Science and Public Policy, and Springer's Scientometrics – are some of the long-established specialized academic journals in these areas on which they have continued to offer more empirical, conceptual, and theoretical knowledge. They focus on various themes, counting (but not limited to) science policy and production; higher education R&D; research production, performance, and impacts; science and knowledge measurement; academic culture and profession; teaching and research nexus; and other relevant themes. These thematic areas have also concerned many leading institutions that focus on excellence of higher education studies – from the Center for Studies in Higher Education (in the United States) to the Society for Research into Higher Education (in the United Kingdom) to Research Institute for Higher Education (in Japan). The business of

scholars and researchers encompasses from attempts to measure and evaluate research and academic outputs to their endeavors to conceptualize or theorize academic and higher education culture and systems in certain localities or various parts of the world.

Noticeable frameworks for thinking in this area of academic profession include concepts developed by various key figures – such as Clark, Boyer, Altbach, and Cummings (from United State); Teichler, Enders, Perkin, and Neave (from European countries); and Akira, Meek, and Shin (from Asian countries) – just to count a few. Their claims for origin of higher education systems and research functions generally start with or involve the discussions of the Humboltian philosophy of university. These scholars initiated and have continued to offer conceptual frameworks and ways of thinking of academic profession in the contemporary knowledge society. Boyer's philosophy, for instance, suggested four academic perspectives as vital for the balance of education and research: the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching (Boyer, 1990). Academic profession, as discussed by Burton R. Clark (1983), comprised four dimensions from the stakeholder perspectives: the government, the academic market place, higher education institutions, and buffer institutions. His four academic cultures (i.e. the culture of discipline, the culture of academia, the culture of enterprise, and the culture of system) covered key aspects of the academic world. In the same line, Arimoto (2015), as he reflected into the academia from the larger social perspectives, has conceptualized and proposed structural relationship of three angles: social changes (i.e. society), national policy (government), and paradigm (knowledge). His works have also evolved around the teaching-learning-research nexus. From the governance perspective, Pruisken and Jansen (2015) also offered an overarching framework, through European lenses, focusing on multiple levels that affect the three academic performance dimensions – teaching, research, and services. Their framework included the governance mechanism (at macro, meso, and micro level) as well as the dimensions of resources and competencies.

Also, it is undeniable that the practical and theoretical aspects of academic profession have started to converge in recent years because key researchers have collaborated in some joint international projects, an example of which was the "Changing Academic Profession" in 2006. This project was actually a continuation of studies on academic profession supported by the Carnegie foundation in 1992. This big project involved many countries in the globe, using survey to measure and describe the current conditions of various themes of academic profession, incorporating themes on the three academic functions (i.e. teaching, research, services) as well as demographic and working conditions of faculty members of participating institutions and countries (i.e. workloads, satisfaction, governance, management, etc.). Based on a comparative perspective, those studies have detected some major trends and specific characteristics of academic profession in different countries. In general, the gaps of academic works and outputs between developed and developing countries are huge in almost all

elements: from academic freedoms to outputs to resources.[26] Other UNESCO, WB, and OECD publications[27] and key works of Altbach (2003; 2013; 2016) generally supported these arguments. Findings of those CAP-surveys-based studies, seemed to conclude that academic conditions in the world in general has been facing more challenges – say, in terms of salaries, workloads, and academic freedoms. For the research components, these studies also notified that North American and European countries still take the lead in research productions while some developed Asian countries and BRICs have increasingly been more competitive in research supports and production.

Higher education institutions as a place for intellectual and academic activities: Certain attempts have been made to classify higher education systems. From the perspective of Martin Trow's higher education development framework, the three-stage system (from elite to mass and to universal higher education) has been acknowledged and highly referred to until to date. The current development of higher education has still run on this predicted track (Trow & Burrage, 2010). Other scholars have looked at various higher education and research models in more nationally-originated senses, so classifying them into, for instance, the Humboltian German system, the British system, the French system, the Russian system, the Anglo-Saxon model, and the new American model. Relevant to the general higher education system is the research system or function. Neave (2002) and (then cited by) Sanyal and Varghese (2007) classified research and research training systems into three groups: 1). The French research model that has national research centers playing key research roles, 2). The Russian research model that has academy playing key research roles, and 3) the UK or US research university models. These issues of systems of higher education and those of research were raised and discussed in some classic works by Burton R. Clark and authors of his edited volumes (see, for instance, Clark, 1986; 1987).

Specific roles or functions of higher education institutions have also been discussed. Shin, Arimoto, Cummings, and Teichler (2014) in the preface of their edited book on "Teaching and Research in Contemporary Higher Education: Systems, Activities, and Rewards" mentioned that academic profession issues could be traced back to the earlier conflicting trends of focus between research orientation (at certain early universities in Europe) and teaching orientation. In general, the question of whether a higher learning institution is or should be a place for what kinds of activities has always been discussed in the lineage of academic studies in the area of higher education development and academic profession. As earlier mentioned, Ernest L. Boyer's "Scholarship Reconsidered" (1990) used to bring such debatable issue into perspective in the United States, suggesting the four types of scholarship (i.e. the scholarship of discovery for research, the scholarship of teaching and learning for

[26] See the many published volumes of The Changing Academy series by Springer
[27] See, for example, Guy Neave (October, 2002) on research and research training systems, Meek and Suwanwela (2006) on higher education, research, and knowledge in the Asia-Pacific region, and Altbach and Salmi (Eds) (2011) on academic excellence

educational activities, the scholarship of integration for synthesis of knowledge across time and spaces, and the scholarship of application for practical engagement and outreach activities) as an approach to balance between teaching and research. Burton R. Clark (1980), in more general and comprehensive senses, classified academic cultures into four categories: the culture of profession, the culture of disciplines, the culture of enterprises, and the culture of system. Roles of academic institutions in his discussion seemed to accept the roles of teaching, research, and other academic activities as natural to the academic institutions. The research area of teaching-research nexus has thus gained stronger attention recently.

The Carnegie Foundation backed Changing Academic Profession survey in 1991/2 classified universities into three groups: the teaching-oriented group, the research-oriented group, and the half-teaching-half-research group. These controversies could be the rationales that sparked the interest to open what they called "the black box" of teaching and research activities of the academics. That being said, the survey aimed to understand what it is like to talk about research and teaching activities of academics in various countries. The current Changing Academic Profession survey (2006/7), based on the previous framework, has identified such European countries as Germany, Italy, Dutch, Finland, Portugal, and Asia's South Korea to be research-oriented systems; such Latin American countries as Mexico, Brazil, Argentina, South Africa (Africa), and Malaysia (South-east Asia) to be teaching-oriented system; and such countries as United States, Canada, England, and Australia to be the teaching-and-research-balanced system (Shin, Arimoto, Cummings, & Teichler, 2014). The same edited work also noticed that the trend and orientation towards the research stream have been more dynamic.

Regardless of what kind of systems, across time and spaces, university and higher learning institution are naturally places for both intellectual, academic, and educational activities. The level of focuses may vary but these substances and elements have to exist. In developed countries, research, education, and services/citizenship at higher learning institutions may happen in different scales and scopes, pursue different visions, and/or go towards different directions. The truism still is that the tripartite functions always exist in certain ways. Developed nations also establish strong research systems in non-academic environment – such as, at state institutions, private enterprises, industry, and civil society sectors. In developing countries, the idea of research and science may be quite recent, but, similar to the developed context, the idea of indigenous intellectualism and scholarship may not be new (though perhaps forgotten for some reasons).

Academic men as a key player in research and knowledge creation: Along with the functions of institutions, individual academics have to perform their main roles which basically include research, teaching, and services (or outreach and collegiality) (Dilts, Haber, & Bialik, 1994). History makes it

clear that, at certain points of time, teaching roles and research roles of academics have been debated. These issues have still been discussed in most higher education contexts. Faculty members based in the German modeled universities are more likely to prefer research to teaching, while those based in the Latin American modeled universities may prefer teaching to research. Services or the third role may or may not be actively engaged by faculty members in certain countries. But the current trend of globalization and internationalization of higher educations have already brought academic men into the same track that involves these three roles.

Academic men have their tribes and territory, and they have their own approaches and philosophy in order to define their own identity and roles (Becher & Trowler, 2001; Felt, 2009). These functions/roles of higher education workers revolve around the issue of academic identity and academic profession (see, for example, Becher & Trowler, 2001). For Altbach (2013) in his co-edited work, academic profession is *"the life of the mind ... since academic institutions cannot perform well without a committed, well-trained, and stable academic profession."* Academic profession was regarded as the key profession (Perkin, 1696, as cited by Clark, 1987; Perkin, 1990). It is a key profession because it creates and develops other professions.

In general, academics are oriented towards science and scholarship and, of course, towards truth-based knowledge creation – regardless of what discipline they are in or how they define themselves. They engage in research activities and produce research-based knowledge. They transfer knowledge and expertise to the next generation. Their contributions to the academic and practical knowledge have to be acknowledged. "*The idea of disciplined intellectual activity, embodied in institutions, is the most valuable element of the moral culture of a nation. These intellectual institutions have as their tasks the cultivation of science and scholarship (Wissenschaft) in the deepest and broadest sense. It is the calling of these intellectual institutions to devote themselves to the elaboration of the uncontrived substance of intellectual and moral culture, growing from an uncontrived inner necessity"* Wilhelm von. Humbolt (1810) was quoted in Merniva (1970) publication on University Reform in Germany. Understanding academic profession and academic roles can give academics a clear conceptual maps and philosophy for their academic journey.

2.3. Research productivity: measurements, conceptual models, and correlates

This section moved closer to the very focus of this current study by discussing how research productivity has been measured, what theoretical and conceptual frameworks have been developed to explain factors affecting research productivity, what key empirical determinants have been detected, and what issues have remained a critical topic for debates among and exploration by scholars in this

particular area. It should be noted that various terms, such as research performance and research production, have been used to refer to research productivity in previous studies. The term research productivity generally refers to both the quantity and quality of research outputs produced and have to be distinguished from other similar tools (for instance, the concept of research involvement and the tool for measuring research culture and capacity).

2.3.1. Research productivity measurements

Defining and measuring research are not easy. The current OECD Frascati Manual (2015) defined research and experimental development (R&D), in broad sense, as comprising *"creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new application of available knowledge"* (p.44). It classified research into three main genres: basic research, applied research, and experimental development (p.45). OECD's definition – from its earlier versions of Frascati Manual – has perhaps been the most adopted definition of research for practical purposes, which Kyvik and Lepori (2010) regarded as oriented more towards the idea of industrial research and development. These categorizations have been adopted by such countries as Australia, Japan, Singapore, and the U.S. (Amsden, Tschang, & Goto, 2001).

For academic studies, publication counts, citation counts, and peer-ratings have been common measures of research productivity or research performance (Creswell, 1985). Different studies may use more indicators (for example, obtained research grants, conference presentation, or doctoral supervisions) according to their focuses and contexts (see, for example, Dundar & Lewis, 1998; Ramsden, 1999; Mezrich & Nagy, 2007; Wootton, 2013). As quoted by Ramsden (1999), Harris (1990) classified research performance evaluation into four categories: impact (a measure of influence of a research work generally measured by citation counts), quality (measured through peer review by expert value judgment), importance (measured through peer review by expert value judgement taking time into consideration), and quantity (measured by numbers of publication or produced pages). Bazeley (2010) offered a more thorough conceptualization of research performance of two basic components (research activity and performing-making visible), various dimensions (such as engagement, practice, dissemination, etc.), and a number of specific indicators for each dimension. What is clear from previous studies on research performance measurement is that the quantitative and qualitative aspects have always been considered (e.g., Jordan, Meadoo, & Walters, 1988; Waworuntu & Holsinger, 1989; Wood, 1990; Harris & Kaine, 1994; Landry, Traore, & Godin, 1996; Dundar & Lewis, 1998; Tein, 2000; Chen, Gupta, & Hoshower, 2006; Anunobi & Emerole, 2008; Bazeley, 2010; Hardre, Beesley, Miller, & Pace, 2011; Jung, 2012; Daizen & Kimoto, 2013; Edgar & Gear, 2013).

The temporal scope and other technical considerations, such as weighting and authorship, have also been relevant aspects for consideration.

Besides publication count, citation count, peer-rating, and those relevant measures, more research productivity measurement tools or tools that cover research performance have been developed in the last decades – ranging from those developed academically to those developed for practical purposes. Just to count in overall, academically-employed tools include impact factors, h-index, integrated approaches, etc. More practical ones may be guided by such indicators used in the UK Research Assessment Exercise (RAE), the OECD's Frascati manual, the CAP surveys, and even the World Bank's Knowledge Assessment Methodology (KAM). Some of these practical tools do not focus directly on research productivity but include it as a relevant part for whole measurement.

It should be noted that using impact factor and h-index is a modern method of measuring research outputs and quality of those research outputs, in the field of scientometrics and bibliometrics (see, Andrés, 2009; De Bellis, 2009; Vinkler, 2010). Various citation indexes were developed – counting Science Citation Index (SCI), Social Science Citation Index (SSCI), and Arts and Humanities Citation Index (AHCI). These updated measurement tools are provided by academic databases, such as the ISI Web of Knowledge of Thomson Reuter, the Scopus of Elsevier, the Google Scholar of Google, and even the Microsoft Academic Databases. The previous two have been popular databases among academics; many previous studies in the area of scientometrics use one of them for analyses (see, for example, Vinluan, 2011). These approaches are appropriate for both individual-level and group-level measurements. Currently, a more integrated approach combining some of these modern and classic methods (for example, counting together the publications, citation, impact factor, and h-index) has been a new endeavor and under the process of development (see, for example, Iyengar, Wang, Chow, & Charney, 2009).

The issues of measurement and definition of research productivity are controversial within different thematic, disciplinary, technical, and national and institutional contexts.

- First, there have been many similar themes and so tools related to measurement of research. Those tools include research performance, research assessment, research evaluation, research engagement, research involvement, research culture and capacity, research experience, etc. (see, for example, Smith, Wright, Morgan, Dunleavey, & Moore, 2002; Byham-Gray, Gilbride, Dixon, & Stage, 2006; Holden, Pager, Golenko, & Ware, 2012). Such many themes with their own tools generally represent different (but similar) constructs, and so they can be confusing. This is not to mention other predicting variables' constructs – such as research self-efficacy, research outcome expectation, research intention, research attitude, research interest, research

training environment, etc., (see, for example, Bieschke, Herbert, & Bard, 1998; Holttum, & Goble, 2006; Kanh & Scott, 1997; Gelso, 2006) – which can further complicate studies in these related areas of research performance or productivity.

These related themes and tools come into being for different rationales, and one reason for can be due to different disciplines. In broad senses, almost all academic fields of study involve research works because academics have to publish and advance knowledge. So, the issue of research productivity is multi-disciplinary. Noticeably, there have been some disciplinary fields that more actively engage in studying or utilization of research measurement tools: for example, the field of information and library science, the field of economics of higher education, the emerging field of bibliometrics, scientometrics, and infometrics, the field of clinical or counselling psychology, and the field of health. Those established areas use different tools to measure their research production or productivity according to the nature of their academic publication or production. Research productivity, for example, may be preferred by academics who are interested in observing the trends of publications in particular areas or by higher education management or administrators who seek to appraise the outputs of their faculty members to determine whether academic promotion is possible. Bibliometrics, scientometrics, and infometrics (and more currently cybermetrics) may emerge from the information science or library science areas in which librarians may want to know which journal or which databases to subscribe. Research assessment may be a concept preferred by governments or funding agencies with aims to determine who and what areas to fund. Despite, different terms and different tools, most of these tools are related and have benefited each other in some ways.

- As earlier mentioned, other problems for consideration in measuring research productivity include the problem of weighting (related to output type, authorship, and quality), time, and level of focus, etc. Some researchers suggested a specific formula by giving different weighted values to each indicator, based on the number of authors or the type of research outputs or the quality of research outputs (for example, whether it is peer reviewed or not). A published book might be multiplied by a weight of 3, a published journal by 2, a proceeding by 1, etc. Ramsden (1999) weighted national research grants by a value of 2 and other public research funding and funding from industry by a value of 1. Shin and Cummings (2010) used four indicators with different weights (i.e. book + domestic journal article + international journal article + SCI[28] journal article*3) to measure research productivity, as their study focused on Korean universities where typical academics might produce locally-published, non-refereed

[28] SCI = Institute of Scientific Information (Shin & Cummings, 2012)

journal articles or books. Many previous works limited the temporal scope to 2 or 3 or 5 years (see, for instance, the CAP survey). A clear timeframe is an effective method for unbiased comparison of quantity and quality of research products among different individuals. The level of focus – referring to whether researcher productivity is measured in terms of individual productivity, departmental productivity, institutional productivity, or national productivity – can be another issue for research productivity measurement (see, for instance, Teodorescu, 2000). Properly comparing research outputs across institutions or nations can be a challenging task to do.

After all, among other indicators, counting the number of publications, counting the number of citations, and counting both the number of publications and citation have long been employed as typical ways to measure research productivity or research outputs (e.g. Creswell, 1985; Dundar & Lewis, 1998; Shin & Cummings, 2010). Counting the number of publication – with proper weighting – has been the most employed method because it is applicable and feasible in many contexts of study and for the measurement of the individual level.

2.3.2. Research productivity conceptual models

Research productivity is a theme within the area of academic profession, and the academic profession is one within the larger field of sociology of higher education. Consequently, most conceptual and explanatory models of research productivity can be understood from various perspectives of social science (such as sociology or social psychology or other psychology fields) (Creswell, 1985). Researchers generally pointed to the origin of studies on research productivity in developed nations since 1940s or 1950s (Creswell, 1985), referring to some works of earlier thinkers of science – such as psychologist Anne Roe (1953), sociologist Robert K. Merton (1973), and sociologists Stephen Cole and Jonathan R. Cole (1967). Because sociological and psychological theories are generally structural or hierarchical, different dimensions (or levels or factors) are always studied to understand or measure effects on research productivity. The big picture of these dimensions can include cognitive-psychological, individual, departmental, institutional, familial, and even social dimensions. Different authors from different disciplines and based in different contexts prefer to conceptualize their models differently, selecting some of those social and psychological dimensions.

Also, these conceptual models of research productivity can be both an explanatory or an exploratory model. That being said, it can be used for testing or for exploring – though most of previous studies focused on the explanatory function by using statistical model as a way to test the effects. It is important to also note that variables or determinants of each larger dimension can be measured in the forms of psychometric scales (for example, research self-efficacy, research output expectation,

research motivation, research interest, research attitude) or more behavioral and econometric scales (for example, exact amount of time spent on research, exact amount of time spent on teaching, exact amount of funding, exact number of faculty members, etc.).

Following are the discussions of eight main theories and models used by key researchers who academically seek to identify or conceptualize factors influencing research productivity or research performance: 1) Creswell's review framework, 2) Bland et al. model, 3) Vroom's expectancy theory based model, 4) Planned behavior theory based model, 5) Scientist-practitioner model, 6) Social cognitive theory model, 7) Socialization model, and, currently, 8). Pruisken and Jansen model. These models are either those originally designed and developed to understand research productivity or those borrowed from other theories (e.g. the planned behavior theory and the expectancy theory).

1) Creswell's review framework: John W. Creswell (1985) conducted an extensive review of literature to conceptualize factors explaining research performance and to examine how research performance has been measured in previous works. With regards to his first purpose to identify factors affecting research productivity, the results of the review concluded four conceptual dimensions of influencing factors of research performance, within which the author discussed a considerable number of specific correlates/determinants (i.e. variables within each dimension). The four conceptual dimensions are:

- **Psychological-individual influences:** According to Creswell (1985), research-productive faculty have different psychological and individual characteristics from those who are less research-productive. Variables based on his explanation include innate intelligence, inner motivation, personality traits, and background characteristics.
- **Cumulative advantage:** Creswell (1985) explained that faculty who perform well in terms of research outputs will acquire higher opportunity (and rewards or resources) to advance their productivity even further. Cumulative advantage is based on sociological, rather than psychological, explanations. Empirical studies based on this explanation may look at graduate training experience, employment at prestigious institution, and resources available for research.
- **Reinforcements:** Similar to cumulative advantage, the concept of reinforcement refers to the receiving of feedbacks or recognitions from successful published works or other academic achievements, which encourage academics to produce more. Faculty tend to be more productive when their previous successful works are well recognized (Creswell, 1985). Unlike cumulative advantage, reinforcement is based more on psychological explanation, rather than sociological explanation. Researchers based on this explanation generally look at citations, early publications, or informal recognition as key variables.

- **Disciplinary norm:** As the term suggests, disciplinary norm refers to the fact that the environment of each academic discipline can affect research output production through both the codification of knowledge and the differences in research activities of each discipline.

2) Bland et al. Model: The second comprehensive model to predict faculty's research productivity is the Bland et al. model. Carole J. Bland and his co-researchers, based on their lineage of many publications, developed what was then named after the main author, the "Bland et al. model," in 2002. The Bland et al. model is a derivative from their previous studies – for example, Bland & Schmitz (1986) and Bland & Ruffin (1992). The Bland et al. model proposed that individual dimension, institutional dimension, and leadership dimension influence faculty members' research output production. The model also specified variables or constructs within each dimension. These dimensions and variables may interact among each other. This model has been adopted and tested in various studies, such as Bland et al. (2005), Bland et al. (2006), and Hedjazi & Behravan (2011). Following are specific variables or constructs of each dimension in the model, based on Bland et al. (2005):

- **Individual characteristics:** socialization; motivation; content knowledge; basic and advanced research skills; simultaneous projects; autonomy and commitment; orientation; and work habits
- **Leadership characteristics:** highly regarded, able scholars; research oriented; assertive-participative in leading style; fulfilling criteria roles as manager, fund-raiser, keeping goals visible, and assuring presence of individual and institutional characteristics
- **Institutional characteristics:** resources; rewards; sufficient work time; clear coordinating goals; size/experience/expertise; mentoring; culture; communication; research emphasis; recruitment and selection; positive group climate; communication with professional network; assertive-participative governance; brokered opportunity structure; and decentralized organization

Bland et al. model conceptualized that individual characteristics and leadership characteristics directly influence institutional characteristics. It argued that well-prepared individuals are recruited to work in research-conductive environment and that strong leadership also leads to a research-conductive environment. Then, the model projected that such research-conductive environment pose further influences on research and academic productivity – such as articles, books, patents, prestige, grants, awards, highly-motivated and satisfied faculty, and artistic accomplishments.

3) Expectancy Theory: Third, research performance can be explained by Vroom's Expectancy Theory of motivation. Chen, Gupta, and Hoshower (2006) employed this theory to understand factors that motivate business faculty members to do research. The Expectancy Theory was developed by

Victor H. Vroom in 1964, assuming that people always evaluate the outcome of their behaviors and subjectively assess the likelihood that each of their possible outcomes will lead further to various outcomes (Chen, Gupta, & Hoshower, 2006). In this empirical study, the authors used the Expectancy Theory in the following ways.

First, the researchers studied the motivation variable, as measured by psychometric items, by calculating the product of the importance of research rewards (A_k) and the likelihood of receiving that rewards (I_k). Then, the researchers tried to observe the correlation between this product term with research production score. More comprehensively speaking, the expectancy-theory-based model employed by Chen, Gupta, and Hoshower (2006) included attractiveness or importance of research rewards, probability that research production will impacts achievement of rewards, motivation for research, and institutional and demographic factors (such as tenure status, year in academia, gender, academic rank, time spent on research, and discipline). This model after all argued that motivation predicts productivity.

4) Planned Behavior Theory (PBT): The fourth model to be discussed is Planned Behavior Theory, adopted by Sue Holttum in her three co-authored studies to explain research intention and research productivity. Icek Ajzen developed the Planned Behavior Theory in 1991. This theory focuses on the "intention" construct and how the intention of participants relates to their productivity. The Planned Behavior Theory maintained that attitudes on certain social phenomenon, perceived behavioral control, and subjective norms directly impact the behavioral intention and the behavioral intention further affects the actual behavior (Ajzen, 1991; France, France, & Himawan, 2007). In other words, the behavioral research intention is assumed to mediate between research antecedent variables (i.e. research attitudes, perceived behavioral control on research activities, and subjective norm on research activities) and the actual research productivity. Previous empirical studies that employed this theory to study research productivity included Holttum and Goble (2006); Wright and Holttum (2012); and Eke, Holttum, and Hayward (2012). These studies basically centered on the context of the United Kingdom.

5) Scientist-Practitioner Model: Fifth, originated in the field of psychology, Scientist-Practitioner Model put focus on the practice of training researchers (i.e. research training environment) to become not just a researcher but also a practitioner in their own academic field (see, for example, Gelso, 2006). Most studies employing the Scientist-Practitioner Model adopted or adjusted the Research Training Environment Scale, along with other psychological variables, to investigate how satisfied graduate students or researchers (especially, in the fields of clinical and counselling psychology) are towards their training environment during graduate education and to examine effects of these variables on research productivity (see, for examples, Krebs, Smither, & Hurley, 1991; Gelso, Mallinckrodt, & Judge, 1996).

6) Social Cognitive Theory: Sixth, to explain research productivity and its relationship with other variables, researchers in the field of psychology also preferred to use Social Cognitive Theory (see, for example, Phillips & Russel, 1994; Bieschke, Herbert, & Bard, 1998). Social Cognitive Theory focused on three correlated dimensions (i.e. behavior, external environment, and cognitive and other personal factors) to understand social behaviors (Wood & Bandura, 1989). This model was developed by Albert Bandura. Previous empirical studies employing the Social Cognitive Theory (such as Gelso, Mallinckrodt, & Judge, 1996; Lambie & Vaccaro, 2011; and Rezaei & Zamani-Miandashti, 2013) focused on explanatory factors that include research self-efficacy, research outcome expectation, research training environment, and personality types. Research self-efficacy and research outcome expectation scales have been of strong interest for researchers in this area. In general, these variables were found to be directly or indirectly related to research production in many empirical studies in the field of psychology in the developed countries' contexts.

7) Socialization Model: Various studies drew on Socialization Model to explain research productivity (see, for example, Shim, O'Neal, & Rabolt, 1998; Kim, Pedersen, & Cloud, 2007). According to Shim, O'Neal, and Rabolt (1998), this Socialization Model was developed by Moschis and Churchill in 1978. It consisted of three main dimensions: antecedent variables, socialization agents, and socialization outcomes. This model, as used by Shim and his co-researchers (1998), specifically argued that four supporting aspects of the social agent dimension – i.e. institutional/administrative supports, collegial support, family support, graduate school support – directly affect faculty's attitude toward research. That faculty's attitude towards research further directly influences faculty's research productivity. Unlike previous more-psychologically-oriented theories and models, the Socialization Model seemingly looked at the bigger social dimensions – such as family support and professional society support – which generally function outside of the institutional dimension. The key elements of the path diagram of the socialization model to explain research productivity (by Shim, O'Neal, & Rabolt, 1998) included:

- **Institutional/Administrative support (x1):** the first independent variable in the model
- **Collegial support (x2):** the second independent variable in the model
- **Family support (x3):** the third independent variable in the model
- **Graduate school support (x4):** the forth independent variable in the model
- **Attitude toward research (y1):** the mediating variable in the model (and also a dependent variable, when analyzed without research productivity)
- **Research productivity (y2):** the main dependent variable in the model

Each of these variables were measured by attitudinal and psychometric scales, except the research productivity indicators. The correlations among variables in this study were hypothesized in the

following ways: first, the institutional/administrative support, collegial support, family support, and graduate school support are correlated among themselves; second, each of them poses direct effects on attitude towards research; and, finally, attitudes towards research poses further direct effect on research productivity.

8) Pruisken and Jansen Governance Framework: This framework has been quite recent. Because theoretical and conceptual models in the area of academic profession and research productivity may vary from context to context and are based on different dimensions or theoretical domains, increasing attempts to develop a more comprehensive, multi-dimensional framework in this area have emerged. The Pruisken and Jansen Framework was one of them. It was a comprehensive and multi-dimensional framework for understanding academic performance. Basically, the framework conceptualized that the three-dimension governance system – i.e. the macro, the meso, and the micro systems – influence research resources and competencies dimension, which further influences the academic performance dimension and indicators. Then, through the "empirical and normative evaluation of assumed effects" of the performance dimensions, the reciprocal influences are posed back to the governance mechanism dimension (Pruisken & Jansen, 2015). It can be adopted to explain not only research productivity but also other academic performance (such as teaching and services). The key elements of the Pruisken and Jansen Framework (2015) incorporated:

- **Governance mechanisms**
    - **Macro** (state/science system): state regulation, external guidance (by public stakeholders and/or by intermediary agencies), and (Quasi-) market
    - **Meso** (organizations): competition for resources, academic self-organization, hierarchical self-management, collective action supported by scientific entrepreneurs
    - **Micro** (shop-floor-level): networks/horizontal coordination, intellectual coordination by scientific communities via competition for reputation, and competition for resources
- **Resources and competencies**
    - **Resources:** financial resources and equipment, personnel, and time
    - **Competencies:** competitiveness, innovativeness, decision-making ability, and communication skills
- **Performance dimensions**
    - **Research:** publications (number, citations) and scientific originality and quality
    - **Graduate teaching:** doctorates and state doctoral theses
    - **Third mission:** relevance, technology transfer, patents/patent citations, and income from royalties and patents

This kind of framework generally aims to provide a complete picture on the focused issue, while involving many detailed portions for analyses.

Other person-environment conceptual frameworks: Other researchers (many of them, actually) who work to understand factors affecting research output production or research productivity adopt a less-theoretical conceptual framework, which can generally be understood as individual-institutional conceptual framework or person-environment conceptual framework, as the two main dimensions in their studies (e.g. Dundar & Lewis, 1998; Shin & Cummings, 2010; Jung, 2012; Quimbo & Sulabo, 2014). Some studies referred to the two dimensions: personal (individual) dimension and structural (environmental) dimension. This two-dimension framework is a basic and common-sense model to explore or explain social phenomenon. This common framework is generally considered not reaching the level of a theory, however. But most of those previously discussed theories or models include these two dimensions: individual (person) and structural (environment) factors. Regardless of whether the focus of a research study is on research production, research impact, research performance, research involvement, the two domains (i.e. individual and environmental domains) or an extension of them (for instance, individual, interpersonal, departmental, institutional, social dimensions) are common frameworks for correlational or explanatory studies in social science areas in general and research performance in particular.

Bringing conceptual models of research productivity to a conclusion: One possible conclusion through the reviewing of these conceptual models of research productivity can be the fact that these models are generally multi-dimensional, multi-level, pragmatic, and, in some ways, multi-purposive. They are multi-dimensional or multi-level because they always include either person, institution, department, family, or society dimensions. They are pragmatic because they can be developed from particular disciplines (say, psychology) or can be developed based on the actual context of a research study. They are multi-purposive because they can be both used to explore or to explain research productivity. While most theories, models, and frameworks on factors affecting research productivity look into the person-environment relationships, none of previous studies seems to officially employ or refer to a well-used ecological framework in the field of social work or sociology (except the Pruisken and Jansen (2015) governance framework that tends to adopt this concept). Still, it is presumable that most of previous models have some ecological substances due to its multi-dimensional, multi-level, pragmatic, and multi-purposive characteristics. The Ecological Framework, in a more definite sense, comprehensively incorporates all social dimensions to explain a particular social phenomenon by critically investigating its multi-level and multi-dimensional aspects (Kemp, 2011).

2.3.3. Research productivity correlates/determinants

Previous empirical studies on factors affecting research productivity did not only employ various dimensions discussed above as a framework but also tested the effects of specific variables within those dimensions on research productivity (see, for example, Kanh & Scott, 1997; Babu & Singh, 1998; Dundar & Lewis, 1998; Teodorescu, 2000; Shin & Cummings, 2010). Most of these studies used quantitative, correlational approach. Empirical factors (or determinants or correlates) associating with or affecting research productivity can be classified in various ways, but this study discussed these factors through the lenses of the its three-level ecological framework: from individual dimension (consisting of individual demographic features and individual psychological traits), from institutional dimension (consisting of institutional tangible demographic characteristics and institutional intangible environmental/cultural aspects), and from external dimension (i.e. external support from various sources). The discussions below focused on these specific variables and their effects revealed in previous literature.

2.3.3.1 Individual dimension correlates

From the extensive review of the literature, among the three dimensions, individual dimensions tend to be the one that comprises the most significant predictor variables and explains the highest variances in research productivity. Significant individual dimension's variables can be further classified or grouped in different ways. For example, Teodorescu (2000) classified individual dimension into individual ascriptive (i.e. gender and age) and individual achievement (such as quality of graduate training program, tenure status, year at current institution, academic rank, hours spent on research). Dundar and Lewis (1998) grouped individual factors into innate ability (such as gender, personality, age, and IQ) and personal environmental attributes (i.e. quality and structure of graduate training and culture of employing department). These kinds of classification are common among general studies that focus on research productivity and are not based in a particular discipline.

Researchers from particular disciplines – for example, psychology-discipline research works by Kanh and Scott (1997), Bieschke, Herbert, and Bard (1998), and Gelso, Mallinckrodt, and Judge (1996) – are more likely to incorporate multi-item psychometric variables/measures of individual dimension into the analyses. Those variables include personality type (e.g. Holland personality type), research self-efficacy, research outcome expectation, research interest, and research attitude).

Because of such many different ways of predictor variable classifications, it is convenient to group individual factors (or correlates/determinants) into "individual demographic and professional variables" and "individual psychological and cognitive variables."

Demographic and professional variables: This category included all genres of individual non-psychological traits: personal, professional, and ascriptive variables. Age, gender, employment type, academic discipline, time spent on research, and terminal degree were among variables of this "demographic and professional domain," detected to have significant relationship with research productivity or performance.

- **Age:** The earlier studies in the area of research productivity paid a close attention to the relationship between age of faculty members and their productivity. Most studies found significant relationship between younger age and research productivity (e.g. Over, 1982; Levin & Stephan, 1989; Weiss & Lillard, 1982; Tunner & Mairesse, 2003, as cited in Gonzalez-Brambila & Veloso, 2004). Such studies could argue that young professors tend to thrive to grow in their fields to gain tenure or promotion. Other studies suggested possible curvilinear relationship between age and productivity (as discussed in Creswell, 1985; Blackburn, Behymer, & Hall, 1978; Cole, 1979; Kyvik, 2010). That being said, age may positively correlate with productivity up until certain point of time after which the productivity may start to decline. Levin and Stephan (1991), for example, concluded that research productivity of younger scientists is higher than their older counterparts; but, considering other attributes, values, or working environment of older faculty members, they might have more productivity. Some other studies found no relationship between age and productivity.
- **Gender:** Gender also gained much attention in classic studies on research productivity. Male faculty are generally found to be dominating in academic productivity (Blackburn, Behymer, & Hall, 1978; Cole, 1979; Long, 1992). Blackburn, Behymer & Hall (1978), particularly, found that men were three times more likely to publish articles than women, both in the analysis of productivity during their careers and within a two-year time period, irrespective of academic areas. The correlation between sex and productivity might became more plausible in such areas as engineering and natural science whereby number of female faculty members is generally minor (Dundar & Lewis, 1998).
- **Employment type:** Academic rank has been among the frequently tested variables in relation to research productivity or research performance. Many studies found that professors published more papers than their junior faculty members (Blackburn, Behymer, & Hall, 1978; Creswell, 1985; Teichler, Arimoto, & Cummings, 2013). Bland, Center, Finstad, and Risbey (2006) studied the impact of appointment type on productivity of full-time faculty members and detected a statistically significant relationship between the two. Such relationship has been explained by strong existing academic network of the senior-ranking academics and their cumulative experience, which might allow them to have more research opportunity.
- **Academic discipline:** Different disciplinary areas may determine or moderate the effects of some variables on research output production (see, for example, Jung, 2012; Daizen & Kimoto,

2013). Daizen and Kimoto, 2013, argued that certain fields provide more opportunity to co-author their work and so publish more research outputs. Teichler, Arimoto, and Cummings (2013) found also that discipline may be related to the choice of teaching or research at universities, descriptively postulating that 62 percent of academics in science and engineering fields prefer research to teaching, compared to only 56 percent of academics in social science and humanities. Generally, academic discipline was not treated as an independent/predictor variable but as a moderator variable (see, for example, Shin & Cummings, 2010).

- **Time spent on research**: Time spent on research, relative to time spent on teaching and other academic activities, can be a robust determinant of research productivity of faculty members (Kyvik, 2010). As faculty members allocated more time on research activities, less time would be spent on teaching and other academic activities, and so research outputs would increase (as inferred, for example, in Brocato & Mavis, 2005; Chen, Gupta, & Hoshower, 2006; Ito & Brotheridge, 2007; Jung, 2012).
- **Terminal degree:** Academic degree – whether a person obtain a Ph.D. or not – was detected to have some significant effects on research productivity (e.g. Sulo, Kendago, Kosgei, Tuitoek, & Chelangat, 2012). Advanced academic degree, according to Teichler, Arimoto, and Cummings (2013), strongly influenced research roles of faculty members across countries in the analysis of the CAP survey. In relation to terminal degree, the idea of quality graduate training program has been discussed. Academics who were trained in quality graduate program may gain strong inputs for their research productivity (see, for example, Dundar & Lewis, 1998; Ramsden, 1999). A study focusing on Mexican researchers found that country where a Mexican faculty members graduated his/her terminal degree is associated with his/her higher or lower productivity in research (Gonzales-Brambila & Veloso, 2007). Long (1978) argued that prestige of graduate program does have significant, but short-lived, effect on research performance within the first six years. Quality graduate program may play important roles in shaping individual research experience, attitude, and competence of faculty members.

Psychological, cognitive, attitudinal, and perceptual variables: This category included various key attitudinal and behavioral variables of the individual dimension (theoretically measured by psychometric scales). These variables generally emerged out of the field of psychology or those that used psychometric measures to test particular constructs. Most variables were measured with multi-item Likert-typed scale tools and tested by some kinds of statistical latent variable analyses and Cronbach's Alpha to ensure construct validity and reliability. This section explained some well-experimented variables of this kind: research self-efficacy, research attitude, research outcome expectation, research interest, research intention, research training environment, and personality types. The significant relationships between these variables and research productivity have been detected as well as rejected by different studies.

- **Research self-efficacy:** Research self-efficacy refers to confidence of a faculty member to perform a variety of research works – including, but not limited to, research methods skills, statistical skills, and research publication and writing skills. Research self-efficacy is generally used to reflect one's competence in research activities – from those various skills to background knowledge in a particular research area. Previous studies (mostly in the field of psychology) detected the significant relationship between research self-efficacy and research productivity (e.g. Gelso, Mallinckrodt, & Judge, 1996; Kanh & Scott, 1997; Vaccaro, 2009; Lambie & Vaccaro, 2011; Pasupathy & Siwatu, 2014). Research self-efficacy may also influence other variables – such as intention to engage in or produce research activities (Eke et al., 2012), research attitude, or research interest – in a way that can further enhance or promote research productivity.
- **Research training environment:** Gelso, Mallinckrodt, & Judge (1996) detected significant relationship between rating on research training environment and research output production. As earlier mentioned, proper training environment influences one's research attitude and competence. Research training environment partly reflects the concept of research experience. In previous studies, research experience was measured by some kinds of tools or items related to how active a faculty member is in research activities. Tools like Research Spider (by Smith, Wright, Morgan, Dunleavey, & Moore, 2002) and some indicators in CAP survey (2006) aim to test such concept of research experience.
- **Research attitude:** Research attitude tends to refer to both the cognitive attitudes and the behavioral attitudes of the participants. A 6-item scale was used to measure research attitudes in the study of Shim, O'Neal & Rabolt (1998), as adopted from Yoakum (1993). The study found that research attitude is related to research production. Research attitude items were in certain ways related to the construct of research interest. Research interest is another perceptual variable generally designed to identify participants' perceptual inclination towards particular research activities or aspects (see, Vaccaro, 2009). Previous studies – like Biechke, Herbert, and Bard (1998) and Blackburn, Behymer, and Hall (1978) – discussed about research interest in relation to research productivity. Similarly, other studies (CAP survey; Bland et al., 2005; 2006, for instance) used other comparable constructs – such as research preference and research orientation – to refer to whether or not faculty members like research roles more than they do with other academic tasks. These kinds of constructs may also reflect attitude in a sense.
- **Research outcome expectation**: Bard, Bieschke, Herbert, and Eberz (2000) detected significant relationship between research outcome expectation and research interest. Research outcome expectation was also generally measured by a psychometric scale with multiple items. Those items were similar to items used to measure research motivation construct by Chen,

Gupta, and Hoshower (2007). Research outcome expectation and research motivation tended to focus on attitude towards rewards from research activities.

- **Research intention** refers to the desire, plan, and want of an individual to engage in research within a particular period of time in the future. From the Planned Behavior Theory perspective, the concept of intention relates strongly to performance. Holttum and Goble (2006) and Eke, Holttum, and Hayward (2012) found that research intention is correlated with research performance.
- **Holland personality type scale** and **Rossenett self-esteem scale** are generally used to measure an individual's personality traits. Previous studies employed these kinds of tools to test whether different types of personality traits are related to research performance. Mallinckrodt and Gelso (2002) detected significant findings of the Holland personality type on research productivity. The same pattern was identified in a study by Galassi, Books, Stoltz, and Trexler (1986). Studies that found personality type to be significantly related to research production may contain that some kinds of innate characteristics or cognitive and attitudinal orientation may influence how one performs his/her jobs or how strategic or diligent one is.

2.3.3.2 Institutional and departmental dimension correlates

Individual dimension variables, in many cases, have been detected to have strong predicting effects on research performance. Institutional dimension, on the other hand, also contains variables that are important for the explanation of research performance. Creswell (1985) and Jung (2012) explained that institutional factors are necessary and more practically improvable for attempts to promote research activities at a particular academic institution. Variables – such as departmental size, amount of funding available, number of books in library, institutional orientation (i.e. public or private), available institutional policies, institutional prestige, etc. – have been generally used to study institutional effects on research performance. These variables are measured either by objectively econometric indicators (such as counted number of faculty members to measure faculty size, amount in US dollars to measure funding, counted number of books to measure academic resources) or by psychometric indicators. For example, Kim, Pedersen, and Cloud (2007) used a multi-item Likert-type scale to measure chair's supports (i.e. institutional leadership) in the same way that Shim, O'Neal, and Rabolt (1998) used a multi-item five-point Likert-type scale to measure institutional collegial support (i.e. support from colleagues in research activities). Other exemplary pioneering works of institutional dimension's variables measured by psychometric indicators are those pieces of concepts or items developed by Bland and his co-researchers (Bland & Ruffin, 1992; Bland et al., 2005; 2006). Dundar and Lewis (1985) sub-categorized the institutional variables into two groups: *institutional structure and leadership* and *departmental culture and working condition* – each consisting of various institutional measures.

To make it easy to understand influences of institutional dimension on research performance, it is wise to group these variables into two classes: the general psychical characteristics and the abstract characteristics of an institution.

General physical institutional variables: Demographic variables – such as institutional orientation (public university vs private university), departmental/institutional size (large vs small department), and other physical characteristics and resources – can be considered institutional variables in this group. Faculty members working in public and those working for private universities may not engage or perform research activities in the same manner. Jordan, Meador, and Walters (1988) found that private institutions are more research productive than their public counterparts. Certain studies, however, found that public universities tend to have more research-active and productive faculty members as they have stronger relationship with government and so may obtain more funding. Departmental size or of size of an academic program, as usually measured by number of faculty members within a department or an institution, may also correlate with research productivity. Observing the effect of social supports agents on research productivity, Shim, O'Neal and Rabolt (1998) found a significant effect of faculty size on both the socialization process (research attitude) and the socialization outcome (research productivity). Dundar and Lewis (1998) and Jordan, Meador, and Walters (1988) similarly detected and discussed positive relationship between larger department size and higher research outputs. According to Blackburn, Behymer, and Hall (1978), departmental size also was but a poor predictor of research productivity. Jordan, Meador, and Walters (1988) called such size-related effect the "synergistic effect of large size."

Physical resources such as infrastructure and funding are important. Johnston (1994), one among earlier researchers in the field of research productivity, emphasized the effect of resource concentration on research productivity, asserting that *"Large, well-funded, and well-led research groups produce more publications, of higher impact…"* In the same way, Freedenthal, Potter, and Grinstein-Weiss (2008) suggested a number of elements an institution should consider in order to increase research outputs, which includes allocation of enough time, funding and technical expertise, assistance and training. Solu and his co-authors (2012) also detected the significant effect of funding on high research productivity. Funding is actually important to fuel and sustain research activities at higher education institutions. Problems with finding have been discussed and pointed to a lot by researchers working on developing countries' contexts (Salazar-Clemena & Almonte-Acosta, 2007; Sanyal & Varghese, 2007; Kwok et al., 2010; Savage, 2011; Sombatsompop et al., 2011).

Abstract characteristics of institutions: Intangible institutional characteristics – counting culture, vision, values, policy, strategies, leadership, etc. – are vital elements of institutions in general and higher education institutions or research institutions in particular (see, for example, Bland et al., 2005,

2006; Shim, O'Neal, & Rabolt, (1998). Most of the suggested 12 characteristics in Bland and Ruffin (1992) and the extended 15 characteristics in later studies of Bland and his co-researchers contained these abstract quality of higher education institutions, believed to pose influences on research performance. Bland and Ruffin (1992) offered 12 environmental themes to consider in order to understand conditions of research culture and capacity at a certain institution and so to take actions to promote research performance. The 12 constructs included: 1) clear goals that serve a coordinating function, 2) research emphasis, 3) culture, 4) group climate, 5) assertive participative governance, 6) decentralized organization, 7) communication, 8) resources, 9) size, age, and diversity, 10) rewards, 11) recruitment and selection, and 12) leadership. In a later study in 2005, Bland, Center, Finstad, Risbey, and Staples extended their institutional dimensions (along with measurement scales) from 12 to 15 variables: 1) recruitment and selection, 2) clear coordinating goals, 3) research emphasis, 4) culture, 5) positive group climate, 6) mentoring, 7) communication with professional network, 8) resources, 9) scientific work time, 10) size/experience/expertise, 11) communication, 12) rewards, 13) brokered opportunities, 14) decentralized organization, 15) assertive participative governance. These institutional constructs (developed in the lineage of studies by Bland and his co-researchers) tend to offer a comprehensive picture of institutional factors that explain not only research support environment but also research performance.

Clark (1980) claimed that academic cultures come in four forms (i.e. the culture of discipline, the culture of academia, the culture of enterprise, and the culture of system). Research culture is perhaps an important element of the whole concept of academic culture and is an important area of research, generally referred to as "research culture and capacity" (see, for example, Holden, Pager, Golenko, & Ware, 2012). A research-productive institution has to build and procedurally enhance this abstract, intangible sense of research culture. Issues such as tradition of academic pursuits, ways of designing academic works, academic value system, and institutional strategic principles have to be research-oriented in the first place to ensure higher research production. Generally, such abstract characteristics of institutional cultures is hard to measure and take time to build. Still, as Creswell (1985) and Jung (2012) and other researchers in developing countries' contexts put it, institutional factors can be very practical gateways towards developing a strong research culture and improve research performance.

2.3.3.3 External dimension correlates

Besides individual and institutional dimensions, external dimension can be an important – but perhaps a less focused – exploratory or explanatory aspect of research performance, especially when the emphasis is on individual-level research outputs. Industry-university linkage, family influence on faculty members' academic performance, graduate school support, and government intervention or support have been among the basic concepts about external dimension influences on research

performance of academics (see, for example, Waworuntu & Holsinger, 1989; Landry, Traore, & Godin, 1996; Kyvik & Teigen, 1996; Galbrandsen & Smeby, 2005; Kim, Pedersen, & Cloud, 2007). Aarrevaara and Dobson (2013) claimed that the principal external stakeholder in most higher education system is the government. For research and academia to function in the contemporary globalized society, roles of government, industry, and universities are important (as reflected through the works of Clark, 1983; Thorp & Goldstein, 2010; Ferretti & Parmentola, 2015; Arimoto, 2015; Pruisken & Jansen, 2015). Studies, especially those on developing countries, noticed as well that multi-lateral and bi-lateral donors have been an important player in supporting higher education as well as research works in those contexts (see, Albatch, 2003; Sanyal & Varghese, 2007). Similarly, Sam and Dahles (2015) believed that one important stakeholder in Cambodian higher education is external donors. Hence, in many practical settings, the external dimension (outside of the scope of institutional, departmental, and individual dimensions) should not be ignored in studies trying to explain performance of higher education institutions and research institutions. Through literature review, external dimension influence or support on higher education institutions or research performance can perhaps be seen as ranging from the very structured to the less structured support, according to particular contexts.

More structured external support: in a broad sense, structured external support is reflected through a planned or systemic support: from government provision, professional society connection or graduate school support, industry linkage, and other different types of external-donor assistance or collaboration (e.g. from multi-lateral international development agencies, bilateral donors, civil society, foundations, etc.). These support mechanisms are more structured and systemic; they are basically a planned and organizationally directed process. Such things have currently gained strong attention in national development policies and strategies of numerous countries. A study of effect of university-industry collaboration on research productivity suggested that, regardless of the types of universities, collaboration does contribute to the augmentation in research productivity of academics therein (Landry, Traore, & Godin, 1996). Galbrandsen and Smeby (2005) also detected significant effects of funding from industry on research performance of faculty members in terms of both scientific publications and entrepreneurial results. The government support can be reflected in some studies observing the difference in terms of amount of funding obtained from the government each fiscal year (see, for example, Waworuntu & Holsinger, 1989). These kinds of investigation aim to see whether institutions with more government support tend to perform better in research production compared to the less-supported counterparts. Kim, Pedersen, and Cloud (2007) studied the effects of social support on research productivity of textiles and apparel faculty and founded that there was a positive correlation between professional society and government support and research productivity of faculty members of the focused discipline. Shim, O'Neal, & Rabolt (1998) studied the effects of perceived graduate school support and research attitudes and research performance and also came to conclude

the significant effects. Evident from these studies made it clear that planned support systems from different stakeholders are important to spin the wheel of research performance at universities.

Less structured external support: The edited work of Bassett (2005) on "Parenting and Professing: Balancing Family Work with an Academic Career" truly offered some serious thinking on how family influences the working life and environment of academics in general. Family characteristics might indirectly affect a particular academician in his/her choice whether to involve in research or not. Lazarsfeld and Thielens (1958), as cited in Creswell (1985), found out that higher research producers are generally officers in professional organizations and come from high socioeconomic families. In some other studies, a negative relationship between family factors and research outputs was detected. Kyvik and Teigen (1996) claimed that child care is correlated with low research productivity. Numbers of children might negatively affect the time for an academician to spend on research activities. Likewise, this scenario can be interacting with gender, as female academicians in certain cultures have to spend more time at home aside from their academic activities to look after kids or families. From another perspective, family motivation might also affect research productivity in a way that all academic works might not necessarily be achieved at universities/institutions but at home. An understanding spouse with appropriate level of knowledge might motivate or help their partners to work to get more research outputs produced. Waworuntu and Holsinger (1989), on the other hand, studied the effect of number of kids on research production of Indonesian academics, finding no significant relationship. For some reasons, family factors have currently become less studied factors to explain research productivity perhaps because these factors are not supposed to be directly influencing the level of performance of research but to be affecting other intermediary variables. After all, family support can be very unsystematic and is not structured; it is more about individual family conditions.

2.4. Cambodian higher education and academic profession

What have been discussed above were mostly in the context in developed countries. In developing countries, the research environment is generally characterized by the lack of human capital, the lack of infrastructure and resources, the donors-driven research activities, the language problems, the questions of international visibility of research outputs, and the problems with academic profession, etc. (e.g. Meek & Suwanwela, 2006; Sanyal & Varghese, 2007; Savage, 2011; Altbach, 2016). This section turned to take a closer look at higher education, academic profession, and research environment of Cambodian context.

Cambodian higher education and knowledge system: The introduction section offered some information about research conditions of the current Cambodian higher education setting. This section

extended the details of those highlighted explanations. Many previous studies chose to look into Cambodian education and higher education sector from the temporal and historical perspectives. They generally classified Cambodian education into six eras (see Table 2.1.). Such classifications (as reflected in Table 2.1.) are generally based on political turning points, simply implying that the higher education sector in the country is always heavily influenced by the political power.

Table 2.1. Timeline of Cambodian higher education development

Period	Political era	Characteristics
(Before 1863)	Before French colonization	The traditional higher learning
(1863 – 1953)	During French colonization	The initiation of modern higher education
(1954 – 1970)	The Sihanouk's Sangkum regime	The growth of modern higher education
(1970 – 1975)	The Lon Nol's Khmer Republic regime	The beginning of decline
(1975 – 1979)	The Genocidal Regime	The complete destruction
(1979 – today)	The Post-Genocidal Regime	The revival stage

- **Before French Colonization:** The best way to describe the six higher education eras in Cambodia (as shown in the Table above) is to use specific term to describe them. The "before French colonization" can be seen as the traditional education system, where pagoda or monasteries (due to the Buddhist culture) allowed male students to study to obtain knowledge and skills (perhaps incorporating such subjects as Khmer literature, numeric literacy, carpentry, astrology, ethics, and Buddhist texts). It seems that the modern ideas of science (i.e. physics, biology, chemistry) did not exist at that time. Girls at that time tended to be more educated at home in traditional ways, with some guided texts related to conducts or rules for woman to obey and some housekeeping skills. Earlier than the Buddhist culture, the Khmer civilization was influenced by the Indian Vedic culture and Hinduism, as reflected by the many forms of ancient temples built to represent or relate to Hindu gods. Both the Hinduism and the Buddhism have formed the vein of Cambodian culture, philosophy, knowledge, and religion.

  Many foreign authors generally deemed that Cambodian modern higher education is introduced by the French. Yet, some Cambodian authors (e.g. Sam et al., 2012) tried to dissect the pre-French-colonization era, mentioning (but not discussing) ancient universities of Cambodia during the time of the Angkorean era when the country was known as the Khmer empire (lasting from 8 to 13 century A.D.). The authors highlighted that Cambodian (i.e. the Khmer) created their own academic institutions since its early civilized history (though perhaps not in the form of modern universities). They claimed two ancient universities existed during the Angkorean civilization. Despite the lack of accounts from Western scholars to acknowledge the existence of ancient Khmer universities, it is baseless to reject the idea. The

capability to construct Ancient temples and to formulate a well-developed social structure of the Khmer culture at that time (as supported by current anthropological works) makes it hard to believe that academic institutions and ancient thinkers did not exist. The renown Khmer researcher, Keng Vannsak, called this group of ancient thinkers the Baku (ជាគ្រូ), the Khmer word with a similar meaning to the term "intellectuals."

- **During French colonization:** The French came to colonize Cambodia in 1863 upon the request of Khmer King Ang Doung trying to use the power of the French avoid Cambodia being divided and annexed by the Vietnamese and the Thai (or Siam at that time). Cambodia had lots of good and bad memories with the French. Education wise, the French started to introduce the modern education system in schools as an attempt to educate Khmer administrators to work for their colonizing government. It should be noted that education in pagoda/monasteries still existed vibrantly during the colonization as the Khmer scholars attempted to protect their culture and tradition from being westernized. It was until late French colonization period (i.e. in 1940s) that the real modern higher education institutions started to take place.

- **After French colonization:** After the country's independence in 1953, the system has gone through various ups and downs (from the booming in Sihanouk regime to the complete downfall in the genocidal era, to the slowly reviving during the Vietnamese occupation, and to the current condition). The current higher education system of Cambodia has experience some major turning points: first, the task force of higher education and the introduction of privation in 1997; second, the introduction of quality assurance framework with the creation of the Accreditation Committee of Cambodia in 2003; and third perhaps the introduction of research policy and action plan with the supporting HEQCIP project since 2010.

  For its present condition, Cambodian education system, taken as a whole, can be classified into two streams: the academic stream and the vocational stream. For the academic stream, the country adopts the 6-3-3-4 system: 6 years for elementary school, 3 years for junior high school, 3 for senior high schools, and 4 years for higher education.

  According to the latest official statistics based on MoEYS's 2015-2016 Congress Report, there are 118 Higher Education Institutions (HEIs) (46 are state HEIs and 72 are private HEIs). Among these, there are at least five types of higher education institutions: universities, institutes, centers, schools, and academy. Together, they are under the governance of 15 ministries or institutions, 71 of which are under MoEYS. The total number of enrolled students as of 2015 academic year is 227,385 in crude number – 24,970 students (or about

11%) are associate degree students, 182,987 students (or about 80%) are bachelor degree students, and 19,428 students (about 9%) are Master's and doctoral students. In 2014-2015 academic year, the number of teachers hosted by the whole higher education sector is 12,256 faculty members – with 2,964 faculty members (about 24%) holding bachelor degree; 8,321 faculty members (about 68%) holding Master's degree, and 971 faculty members (about 8%) holding doctoral degree.

Cambodian academic profession: The concept of academic profession is fresh and rarely discussed in Cambodian higher education context. To talk about academic profession from the current Changing Academic Profession survey, it is necessary to look at various thematic concepts – including (but not limited to) teaching, research, services and administration, collegiality, internationalization, academic freedom, academic leadership, workloads. Teaching has been the main defined role of Cambodian higher education institutions. The conditions of other academic functions and themes (such as research, internationalization, professional academic leadership and management, etc.) are perhaps similar to those of most developing countries. They are new concepts and the development of these have been in transitions. The idea of collegiality and mentorship may exist in certain institutions but not as a norm or a system of Cambodian universities. Professional society exists but generally is characterized by the lack of support, and so those institutions are not very active. Academic leaders are generally senior faculty members with long experience working in their particular higher education institutions. The idea of specialized or professionalized academic leaders are probably not yet valued. The concept of managerial university remains unfamiliar to most institutions. Kwok et al. (2010) maintained that Cambodian academic profession is not yet in a good shape and so needs to be seriously promoted.

2.5. Cambodian research environment and performance: previous works

The review of local research works focusing on Cambodian research culture and capacity suggested that they can be classified into two groups in terms of scope of their conclusions on what factors explain research production of Cambodian higher education institutions. The first category came up with a comprehensive conclusion, arguing that there are multiple dimensions and factors affecting research production, from cultural to financial to individual factors (see, for example, Kwok et al., 2010; CICP, 2016). The second group focused only on a specific dimension – for example, cognitive dimension or political dimension (see, for example, Brook & Monirith, 2010; Eng, 2014). These two groups are not necessarily controversial in terms of the meaning of their conclusions, however.

Factor influencing research culture and capacity in Cambodia: Whether the previous studies were comprehensive or specific in terms of focuses or whether they used qualitative or quantitative methods,

the big picture of their findings on factors affecting research activities of Cambodian higher education sector could be synthesized into five major aspects: financial, cultural, motivational, cognitive, and political factors, deemed to affect research production in Cambodia in general.

- First, the structural lack of funding for research activities is acknowledged to be the main factor affecting research production in Cambodia (e.g. Kwok et al., 2010; CICP, 2016). The government's budget package for research at higher education institutions is almost nil, and the largest percentage of government's funding goes to primary and secondary education. Higher education institutions generally survive with students' fees, which are claimed to be used mainly for administrative and salary purposes (Chet, 2006). Even public universities are allowed to become financially autonomous – meaning, they can accept fee-paying students. Otherwise, the operational budgets from the government may not be even enough for the general administrative and salary expenses. Some universities reportedly have faculty members conducting research, but most of their research funding come from external donors or collaborators (Kwok et al., 2010). Very little government-supported or university-self-financed research projects exist. This financial deficiency and other structural lack of enough supports at higher education institutions – for instance, research resources, research facilities, and academic profession – obviously influence the process of building research culture and limit the practical validity of the current research policies. Almost no study in the past denies the effects of this structural problem.

- Second, lots of previous studies and public discourses pointed to the lack of scientific culture in the country. Cultural factor can mean a lot even though most of those previous works did not specify its scope. It can refer to the lack of scientific inquiry in teaching methods. Students do not ask questions and always learn passively in a traditional way (Chet, 2006). Likewise, academics spend most of the time teaching (Sam et al., 2012), and they are not likely to base their teaching on academic research works. If they do, they may perform some little searching on the internet to get materials of some kinds to just support their lectures. Cultural factor can also refer to the fact that most people in the country do not like reading. Even the production of written works – not to mention the academic ones – are relatively lower than the written products of other nations. Even people who may love reading find it hard to locate abundant published written works in their own language. Low research culture can also be reflected through the low quality of graduate training programs in the country as most programs are oriented towards course works. That is why MoEYS comes up with the policy to promote graduate program in the country in response to the attempt to promote research culture. All of these cultural aspects are fueled by the traditional focuses on only teaching and learning as the main function of higher education institutions. Though the cultural issues sound convincing,

some scholars reject the idea. They believe that some of these cultural characteristics exist almost everywhere in Asia (where research capacity is fairly strong). So, they come to conclude that these cultural factors do not actually pose substantial effects on Cambodian research capacity and productivity.

- Third, the motivational factors come into play (CICP, 2016). Research participants, in some previous studies, tended to show little interest in research because they believe teaching can yield them higher incomes, with relatively fewer meticulous tasks. Research takes time and involves lots of works for faculty anywhere in the world. But, in developed contexts, the returns to research seem to be appropriate and satisfied by researchers. Though most of Cambodian faculty believe that they value research (Brooks & Monirith, 2010) and see it as a means to help their country develop, the majority of faculty still do not want to even dream to be a researcher, based on the reasons of no financial and other kinds of incentives or motivation (CICP, 2016).

- Fourth, the cognitive and psychological factors, which probably include virtue and attitude towards research, are discussed by some previous studies (e.g. Brooks & Monirith, 2010; Paycam, 2010, 2011; CICP, 2016). These studies tried to argue that some Cambodian faculty truly value research, and that is why some research projects and publications have been produced. Brooks & Monirith (2010) called it a virtue-related reason. This kind of findings contradicts with the viewpoints of administrative officials at higher education institutions or common senses of Cambodian academics in general (CICP, 2016) as they think faculty do not see research as important. That is why most of them continue to focus on teaching and do not develop their competency in research. It is, after all, interesting to give a serious analysis on this contradictory vantage points.

- The final aspect raised by few previous studies on research production in Cambodia is the political factors. Political factors, however, seem to be less discussed in previous studies for some reasons. Those studies focusing on this factor still seem to have a good reason to support their conclusion on why political factors may constrain research production. Eng (2014) claimed that the political culture of patron-client in Cambodia makes it hard for researchers to express their viewpoints (if the ideas are against that of their leaders or their superiors). In a similar way, the produced research results can be harmful for researchers, especially when those findings negatively affect the political benefits of certain groups. CICP (2016) also raised concerns over the negative political impacts on researchers' data collection or respondents' cooperation process, basically in public institutions. That is to say, the lack of trust in the researchers' confidentiality statements make most subjects of the study reluctant to

participate in research. While it may be a good dimension to observe, politics-related variables are just not feasible for many researchers.

There are definitely other factors detected in previous studies, ranging from the missing generation factor (which puts blame on the fact that Cambodian scholars who were supposed to be active researchers now were almost all killed in the genocidal regime) to the lack of professional society that works to create and promote knowledge in the country. However, the five factors mentioned above – the structural lack of funding, the lack of scientific culture, the low motivational environment, the virtue-related factor, and the political issues – seem to dominate all other reasons.

Some issues of previous studies: Some issues should be raised to identify possible areas for improvement of academic and practical knowledge around the issues of research and knowledge in Cambodia. Following was a description of some limitations and gaps.

- There is also a clear lack of theoretical frameworks on research production in those previous studies of research environment in Cambodia. Most of them talk about research culture and capacity from common contextual understanding and tend to be more policy-oriented; there is no vibrant specification whether it is based on any theories of research engagement, research production, or research impacts. Previous psychological and sociological theories used by key researchers in the area of research production (or research performance) are generally ignored. Such gaps make previous studies, in a sense, fuzzy in scope and inadequate in academic rigor. Finally, speaking of research methodology, most studies use only qualitative approaches. Their conclusions may therefore be biased by subjective opinions of the authors because they generally do not well clarify how the researcher(s) analyze those qualitative data. To be more specific, most of those previous studies drew on qualitative and descriptive research methods, with the policy-oriented philosophy (see, for example, Kwok et al., 2010; Eng, 2014; CICP, 2016). The latest one (i.e. CICP (2016)) used qualitative and quantitative data, but the study was still descriptive and exploratory in overall.

- More on this methodological problem, the adoption of methodological paradigm is also controversial. The philosophy of previous studies tends to be either solely objectivist and positivist oriented or solely constructionist and interpretivist oriented. That being said, there is a lack of studies that really focus on pragmatist's mixed-methods approach. Because of the different philosophical orientation, the data used in the analyses also tend to orient towards a particular type, making the data not rich and supportive. Mixed data are rarely seen in the analysis of factors affecting research production though this method is increasingly important in the big-data society. "There is currently much enthusiasm and excitement for the use of

mixed methods research as a rigorous and effective means for addressing many of the research problems of interest today," Clark and Ivankova (2016), p. xxiii. Previous studies in the areas of research production truly lack perspectives from the increasingly-valued mixed-methods analyses in social science fields. Most studies in the developed countries' contexts are quantitative. Focusing too much on the quantitative aspects of research production in the developing or least-developed countries would apparently mean missing the detailed and big picture of the issue. The need to use rich data sources of different types are needed to both explore and test research production in the academia.

- Another problem is that most of previous studies, what is more, were conducted before the implementation of Higher Education Quality and Capacity Improvement Program (HEQCIP) that supported and funded research projects of Cambodian academics from 2011 to 2015 (except, CICP (2016)); current trends of research production have to be further and more thoroughly investigated, therefore. Otherwise, this kind of missing picture makes policy thinkers and stakeholders lose a chance to lessons-learn best practices of promoting research production from its own context.

2.6. Synthesis of the literature

In general, innovation and knowledge systems have become critical elements for economic, socio-cultural, and national growth. Non-academic and academic sectors alike are supporting pillars of the national innovation and knowledge systems. The role of the academic sector has long become a spotlight of attention in developed countries, as reflected by the increased support on higher education institutions and academics in engaging more actively and effectively in research and knowledge production. Major intellectual missions such as the multi-national CAP surveys have also attempted to conceptualize and comprehend academic profession and research performance of academics in many countries through a comparative perspective framework. Various issues of interest to both scholars and practitioners incorporate governance systems of higher education institutions, functions of academic institutions, academic salary, academic freedom, research performance, etc., just to count a few. These momenta happening within the global, knowledge, and data society have significantly influenced the changes of academic profession and research performance not only in developed (the core) but also in developing countries (the peripheries). Public science policies and models of science and research promotion have been put in places in many countries, from the attempts to follow American research university model, to the increased triangular collaborations among government, industry, and university, and to the specific research culture and capacity promoting projects.

As for the science and scholarly research production, the issues of measurement, explanatory models, and specific determining variables have also seriously concerned scholars and scientists across nations, disciplines, and institutions as well as those of international agencies. Still little has been studied and discussed on how research output production of developing country contexts should be measured and explained though attentions on such things have been considerably raised in recent discussions. Altbach (2016) puts it: *"... internationalization may be positive, but with homogenization we lose a concern for local and regional issues as well as ideas that may not be in the international mainstream..."* If, for example, research outputs of the developing countries' scholars were not measured appropriately, their real scholarly effects will be devaluated. On the other hand, theories and models used to conceptualize variables to predict research production vary from context to context, yet most of those developed-countries- based frameworks in their own right do not respond generally and fully to the context of research culture and capacity of developing countries. Also, through the literature, it is understandable that research production, like many other social phenomena, seems to be the outcome of a joint function of multi-dimensional, multi-layered elements. This universally intertwined environment-individual relationship with research production translates in different ways at different local contexts. It is therefore especially necessary to perform this kind of study using this kind of perspective in the developing context. All these identified issues call for more serious attention on and more studies of research production and its conceptual models in developing countries from a multi-dimensional and locally pragmatic perspectives.

In particular, academic profession and research capacity of Cambodian higher education have been perceived as still not in good shape. But, very little has been done to understand Cambodian research outputs or productivity. In the same manner, many previous perspectives were directed towards research-unengaged sides of the Cambodian academia; most did not thoroughly investigate the faculty members who were research active. Claims of factors affecting research performance from those previous studies varied by different perspectives of authors. Most of those works, however, were conducted more from practical and policy perspectives and not very much based on academic rigors. This truly called for further exploration and explanation of the current situation of research-engaged faculty members and their research outputs.

CHAPTER 3: CONCEPTUAL AND METHODOLOGICAL FRAMEWORKS

Responding to the conceptual and methodological problems of developing countries raised and discussed in the literature, the current study devoted this separate chapter to explain its conceptual and methodological frameworks. The aim was to make it clear on what stance the study was based. The chapter started by discussing the theoretical orientation of the multi-dimensional ecological framework. This first section also depicted the possible nexus between principles of the adapted ecological framework and those previous models of studies on research performance or productivity. Second, the study presented the concept of pragmatism, which was reflected throughout the mixed-methods approach it employed. The section after these two was most critical; it explained in details the systemic scope of this current study (i.e. the whole framework), the elements/parts (i.e. the different dimensions and key variables of each dimension in the framework), and the logic of the framework. Finally, like previous chapter, the study brought all the conceptual and methodological discussions into a brief synthesis.

3.1. Theoretical orientation: towards multi-dimensional Ecological Framework

From the literature discussion, two problems have emerged as concerns for developing countries' scholars in the area of research productivity or performance: first, the need for practical perspectives to establish explanatory models for research productivity in developing countries and, second, the less attention on using different or mixed data sets to explain and explore themes related to research productivity. One clear conceptual argument this current study tried to convey was that an educational phenomenon should be explored and explained through a multi-dimensional framework and a pragmatic research method. This particular section discussed why an ecological framework is suitable for the current study's purpose.

Ecological characteristics inferred from previous models explaining research productivity: The discussions of theories and conceptual models on the areas of research performance and research productivity have been going around many decades ago in developed nations (see, for example, the models or frameworks suggested by various authors, counting Creswell, 1985; Kanh & Scott, 1997; Shim, O'Neal, & Rabolt, 1998; Bland et al., 2005; 2006; Bieschke, Herbert, & Bard, 1998; Dundar & Lewis, 1998; Gelso, 2006; Shin & Cummings, 2010; Pruisken & Jansen, 2015). Eight of such key theories and models from developed contexts were discussed in the literature review section: the Creswell's review, the Bland et al. model, the Expectancy Theory, the Planned Behavior Theory, the Social Cognitive Theory, the Scientist-Practitioner model, the Socialization model, and the framework by Pruisken and Jansen. It has become clear that these models have some ecological characteristics in

them because they generally contain different and inter-connected dimensions. In developing countries, various conceptual discussions were also conducted and proposed currently by some researchers to explore and explain their own research contexts (including such studies as Meek & Suwanwela; 2006; Salazar-Clemena & Almonte-Acosta, 2007; Sanyal & Varghese, 2007; Savage, 2011; Sombatsompop et al., 2011). The conceptual formulation in the developing countries' studies always negatively points to such key problems as research quality, human capital, physical infrastructure, financial resources, government support, academic profession, publication visibility, and language issues. Some of these discussions also imply the nature of the multi-dimensionality of person-environment relationship that explains research performance. Although it is a truism that the multi-dimensionality or inter-connected characteristics exist in previous models and discussions in both developed and developing countries, the concept of ecological framework which has been increasingly acknowledged in social science and social work disciplines has not been well exploited to explore and explain the issues of research output production and research environment in developing countries' contexts – despite the fact that academic researchers and policy makers seem to conceptualize problems on research performance or research environment in such inter-related, multi-dimensional ways (see, for example, Salazar-Clemena & Almonte-Acosta, 2007).

What Ecological Framework is: Various terms have been used in the literature to refer to or to relate to the ecological framework – for instance, the term ecological system theory (Bronfenbrenner, 1979; 1994; Heise, 1998), the term socio-ecological model in the fields of social studies (see, Wood, Harris, & Xiong, 2014; Clark & Ivankova, 2016), the term social ecological model in the fields of social works and health (see, Bronheim, 2014), or the term ecological approach (as in McLeroy, Steckler, & Bibeau, 1998). This current study employed the term ecological framework to cover these various same or similar terms used. Basically, the idea of the ecological framework can be defined or synthesized, using the explanation of Kemp (2011), as follows:

> *In the social sciences, ecological theories, research, and intervention models focus on the complex, dynamic, and reciprocal relationships between human organisms and a range of environmental contexts, from family and immediate milieu to larger sociocultural, political, and institutional arrangements. Conceptually, ecological framework is a broad, overarching paradigm or metatheory, bridging several field of theory and research, and orienting practitioners and researchers to the importance of integrative, multilevel, and multidimensional approaches to person-environment relationships.*

Clark and Ivankova (2016) similarly described the "socio-ecological model" as: *A conceptual framework that explains the dynamic interrelations that exist among various individual and environmental factors and forms the basis for our conceptual framework for the field of mixed*

methods research. They argued that the socio-ecological framework, which is the derivative from the basic ecological framework, *"recognizes and explains the interwoven dynamic relationships that exist between various individual and environmental factors, such as personal, interpersonal, organizational, community, and societal contexts,"* (p. 14).

Most studies using the ecological framework or a similar extended framework generally argued that the origin of this model was kicked started by the study of Bronfenbrenner (1979) on the Ecology of Human Development as he tried to employ the ecological system theory from the natural science discipline to understand the social science area of human development (see, for example, Corcoran, 1999; Corcoran, Franklin, & Bennett, 2000; Voisin, et al., 2006).

Why the Ecological Framework fits into this current study: One reason that explains why the ecological framework is suitable for social or educational research studies is because it is practical and impactful. It is practical and flexible because its dimensions can vary according to the context of the study and fit into most disciplinary fields and areas. It is impactful because it can be used both to explore and explain a phenomenon and even to create a practical framework for actions.

Previous studies based on ecological or social-ecological frameworks differed slightly or significantly from one to another – regardless of whether the difference was due to disciplinary, temporal, social, spatial, or applicable characteristics (Binder, Hinkel, Bots, & Pahl-Wostl, 2013). Heise (1998) basically adopted the Bronfenbrenner's framework of the ecological system theory and focused on four level: personal history, microsystem, exosystem, and macrosystem. McLeroy, Steckler, and Bibeau (1998), on the other hand, divided its adopted ecological approach into five levels (i.e. intrapersonal, interpersonal processes and primary groups, institutional factors, community factors, and public policy) to study and propose an action framework for health promotion interventions. The Centers for Disease Control and Prevention (2013) used the Social Ecological Model (SEM) as a conceptual framework to understand factors influencing health and wellness, and that framework consisted of five levels: individual, interpersonal, institutions and organizations, community, and structures and systems. In the study by Bronheim (October, 2014) of National Center for Cultural Competence, the so-called NAPPSS Social-Ecological Model containing 6 layers was developed: infant caregivers, influencers, organizations, safe sleep and breastfeeding experts/leadership, public policy, and society. Clearly, the ecological framework is a practical and flexible tool. Corcoran, Franklin, and Bennett (2000) asserted that *the ecological systems can be used as a framework with which to organize the different perspectives and efforts, most of which do not have theoretical frameworks of their own.*

In the education sector, Wood, Harris, and Xiong (2014), for instance, adopted the socio-ecological framework – called Community College Socio-Ecological Outcomes, developed by Minority Male Community College Collaborative – to study student success. The framework contained three domains: input domain, socio-ecological domain, and output domain. That being said, the study embedded the ecological framework as a process domain into the input-output production function framework. *The input domain* included background and defining factors (such as age and language) and societal factors (such as stereotypes and economic conditions). *The socio-ecological domain* included four sub-domains: the non-cognitive domain, the academic domain, the environmental domain, and the campus ethos domain. Finally, *the output domain* included student success (i.e. achievement, persistence, attainment, etc.). Other previous studies (e.g. Swick, 1999; Petrides & Guiney, 2002; Colluci-Gray, Barbiero, & Gray, 2006) employed the ecological framework to explain other different topics in the field of education.

It is clear from these previous studies that the ecological framework (or the ecological model or the ecological approach) is an impactful and flexible tool fitting into different contexts and fields of study. In other words, the utilization of this model has been geared towards what pragmatically works. Context-specific understanding and problem solving approaches have been valued, without question. Kemp (2011) put it this way: *"Recently, interest has been growing in holistic, justice-centered, and non-Western ecological frameworks."* Altbach (2016) similarly asserted: *"... Internationalization may be positive, but with homogenization we lose a concern for local and regional issues as well as ideas that may not be in the international mainstream..."* Such ideas have also been supported strongly by the current intellectual movements on indigenous knowledge systems (see, for example, Thaman, 2006). Of course, direct borrowing of a theory or model has no longer been a common practice in academic or applied research because a particular theory or model can be developed from the basis of a totally different context with distinctive culture, politics, environment, and practices.

All things considered, the three sources of theoretical and practical knowledge discussed above tend to support the use of a comprehensive, multi-dimensional, and flexible ecological framework to explore and explain research production and research environment of developing countries' context. From an exploratory perspective, the ecological framework can be a guiding principle or a window to reflect into the context of the study. From an explanatory perspective, variables and factors specific in each dimension of the ecological framework can be contextually operationalized and statistically analyzed to make them valid and plausible in examining existing reality of the focused issue.

The framework in this study hence consisted of the external dimension, the institutional dimension, and the individual dimension. The current study aimed to develop this three-dimensional conceptual framework by incorporating some key variables developed based on instruments from the eight

previously discussed models of research productivity and some context-specific variables synthesized from the pilot study. Based on the flexibility of the ecological framework, first, this study could use these context-specific instruments to quantitatively measure variables of each dimension and then test relationship among these variables in attempt to explain research output production of Cambodian faculty members. At the same time, the study could use its adapted ecological framework dimensions to qualitatively explore the contextual and practical issues related to the focused topics of research output production, research orientation, and research support environment.

3.2. Methodological orientation: towards Pragmatism of mixed-methods approach

The paradigm (i.e. philosophy) of this current study was based on pragmatism. To understand why pragmatism was appropriate for the study and why it related to the mixed-methods research and possibly to the ecological framework, it is necessary to discuss its history, its definition, and its principles of truth and knowledge. But, before diving into exploring this emerging and increasingly-valued methodological paradigm of the educational discipline, a little discussion should be given to the philosophy underlying qualitative and quantitative research methods.

Debates between qualitative and quantitative paradigms: Generally, the philosophical epistemology and ontology underlying the quantitative approach are the so-called positivism and objectivism. This kind of natural-science-oriented philosophy maintains that reality exists external to human beings, and so, to obtain the true knowledge, research should be based on objective measurement with proper hypothesis testing approaches. Consequently, systematic, deductive, and scientific mechanisms generally dominate research works employing this positivist philosophy. On the other hand, the philosophical epistemology and ontology underlying the qualitative approach are interpretivism and constructivism, which believe that personal opinion, contextual reality, and subjective knowledge create true meaning. Researchers guided by this kind of philosophy see reality as originated in inner subjective experience of human beings, and so they tend to employ more exploratory, ethnographic, or phenomenological approaches.

What is pragmatism? Basically, pragmatism refers to what works. Pragmatists, therefore, consider the separate stances the quantitative and qualitative researchers define truth (based on external or internal reality) do not necessarily matter. Pragmatism used in this current study was oriented towards that philosophy – basically, the John Dewey's version of pragmatism – in which the differences between the mind and matter or between the philosophy of interpretivists and positivists do not matter. While idealism is originated in German and realism in England, pragmatism is originated in the United State and has been the most recent philosophical stance. Leading American pragmatists include

William James, John Dewey, and Charles Sanders Peirce. They created their own versions of pragmatism (Biesta & Burbules, 2003). Because pragmatism focuses on what works, its truth is perhaps based more on the practical outcomes or effects of activities or analyses and on the practicality of the contexts being investigated.

What is mixed-methods research? Mixed-methods research is considered a third paradigm, third methodological movement, third approach, or third research communities (Clark & Ivankova, 2016, p. 10). On the epistemological paradigm of mixed-methods research, Creswell (2015) asserted:

> *"A core assumption of this approach is that when an investigator combines statistical trends (quantitative data) with stories and personal experiences (qualitative data), this collective strength provides a better understanding of the research problem than either form of data alone."*

While Clark and Ivankova (2016) defined mixed methods research as:

> *"A process of research in which researchers integrate quantitative and qualitative methods of data collection and analysis to best understand a research purpose. The way this process unfolds in a given study is shaped by mixed methods research content considerations and researchers' personal, interpersonal, and social contexts."*

Why pragmatism is related to mixed-methods research? Of course, the basic philosophy of the mixed-methods approach has yet to be well developed. However, Creswell (2015) presumed that pragmatism has been perceived to give the closest conceptual link with mixed-methods research. In a summary of the impacts of pragmatism on education research, Biesta and Burbules (2003) (p. 108) also argued that multiple tools are needed for research works based on pragmatism: "*Pragmatism provides us a new way to think of the object of knowledge… This perspective may influence, for example, the choice of research methods, emphasizing the use of multiple tools of enquiry to gain different perspective on the problem at hand.*" In this sense, pragmatism does not just adhere to any one direction of the philosophy of positivism or that of constructivism. Neither does it conform to the perspectives from objectivism or relativism alone. Rather, it tries to draw benefits from these two conceptual stances. Biesta and Burbules (2003), as they interpreted John Dewey's writing of pragmatism, made it clear that, despite pragmatism sees knowledge as a construction, the construction of pragmatism's knowledge is not based solely on human mind (as argued by interpretivists). The construction of pragmatism is based on the organism-environment interaction (Biesta & Burbules, 2003, p. 11), and it does not start from the separation of mind and space. From the points of view of pragmatism on educational research, other positive significances of using this paradigm include:

- *Pragmatism offers a different way to conceive the relationship between knowledge and actions…*
- *Pragmatism offers a different way to think of the relationship between theory and practice, and more specifically, the relationship between educational theory and educational practice…*

Biesta & Burbules (2003) (Page 108)

Pragmatism and mixed-methods approach in this current study: One of the significances of this current study was the employment of pragmatism philosophy in its mixed-methods research approach, equally drawing on both the qualitative and the quantitative data sets.

There are three basic types of mixed-methods research design – namely, convergent design, explanatory sequential design, and exploratory sequential design – and three advanced mixed-methods designs – that is, intervention design, social justice or transformative design, and multistage evaluation design (Creswell, 2015). This current study's design was closest to the convergent design genre. The study gave equal weights to both the qualitative analyses and the quantitative analyses. Though some parts of the quantitative instruments were developed and designed based on qualitative interview during the piloted stage, the analyses of the two types of data in this study were not meant to use one type of data to sequentially enhance the other type of data. The convergent design focused more on comparing the two data sets as they answer the same research questions. Joint-display matrix was used at the interpretation stage of this study by placing the quantitative and qualitative results side by side to detect if both are complementary or contradictory results. According to Clark and Ivankova (2016), mixed-methods analysis can offer a better, more complete findings on a particular research question as it provides *"complementary and corroborating evidence about the research problem of interest."* This leads to the belief that using data based on both paradigms (qualitative and quantitative) can enrich the quality of a research study, given that the analyses of each approach are valid and reliable.

Likewise, pragmatic perspectives were employed thoroughly in this study to make it achievable and valid. It was employed in the study's measurement, in adopting the conceptual framework, in research procedure design, and in data interpretation. As for measurement, for example, research output production was measured by the 13 types of research output – i.e. six local indicators, six international indicators, and one neutral indicator. The temporal scope of the measured research outputs was set to "during the service in their current institution," rather than during the past two- or three-year period as done in previous studies. Measuring research outputs within a two- or three-year period in a country where faculty members are mostly instructors and research is still a new role can yield too few reported research outputs for the aimed correlational data analyses. This is understandable because most faculty members in the studied context have yet to consider research publication or production as one of their core roles to play in the academia.

Also related to measurement issue, another pragmatic idea employed was on why the study did not measure only peer-reviewed research outputs. Measuring only peer-reviewed research output in the studied context would also likely provide not enough data for analyses. If the question was "How many peer-reviewed articles you have published in the past two years?" This kind of question may not be appropriate because those faculty members who have never engaged in academic research may find it hard to understand the point and so may offer invalid data for analyses. Rather the questionnaire in this study asked: "How many internationally published journal articles you have published during your service at the current institution?" Such a simpler question was more comprehensible by faculty members, as the pilot study suggested. The researcher has to acknowledge that this kind of measurement did not satisfy the standard benchmark for measuring research productivity. While the standard benchmark set for measuring research outputs (e.g. peer-reviewed outputs, citation counts, etc.) are more objective indicators, Shoemaker, Tankard, and Larsosa (2004) cautioned the idea of the too objective measurement, calling for attention on the "meaning space of a concept." From pragmatic perspectives, a too-strict measurement – such as using citation count – of research outputs in the Cambodian context would not be feasible for its current situation because the research existing products may use local languages and/or not published in high-impact factor journals indexed in Scopus or Web of Knowledge databases.

After all these discussions about pragmatism and mixed-methods research, it is presumable that the pragmatic philosophy is consistent with the mixed-methods approaches, and both are fitting for the ecological framework adapted by this current study.

3.3. Conceptual framework of the current study: elements and logic

Elements of the three-dimension conceptual framework: The current study divided its adapted ecological framework into three dimensions: 1. *External dimension* which referred to the environmental contexts outside of the higher education institution setting – including perceptions on support from ministry and support from external sources; 2. *Institutional and departmental dimensions* which referred to the environmental contexts inside the institution setting – including perceptions on general institutional supports, availability of research-capable faculty members, research resources and facilities, and departmental leadership; and 3. *Individual dimension* which referred to individual characteristics and perceptual traits on research orientation (i.e. research experience, research competence, research attitudinal orientation, and research motivation). Besides these three dimensions, demographic variables were included into the model as controlled variables. This three-dimensional ecological framework was used both to explain relationship among the quantitative variables and to explore themes in the qualitative analyses. See Figure 3.1. below ([RQ] = Research Question).

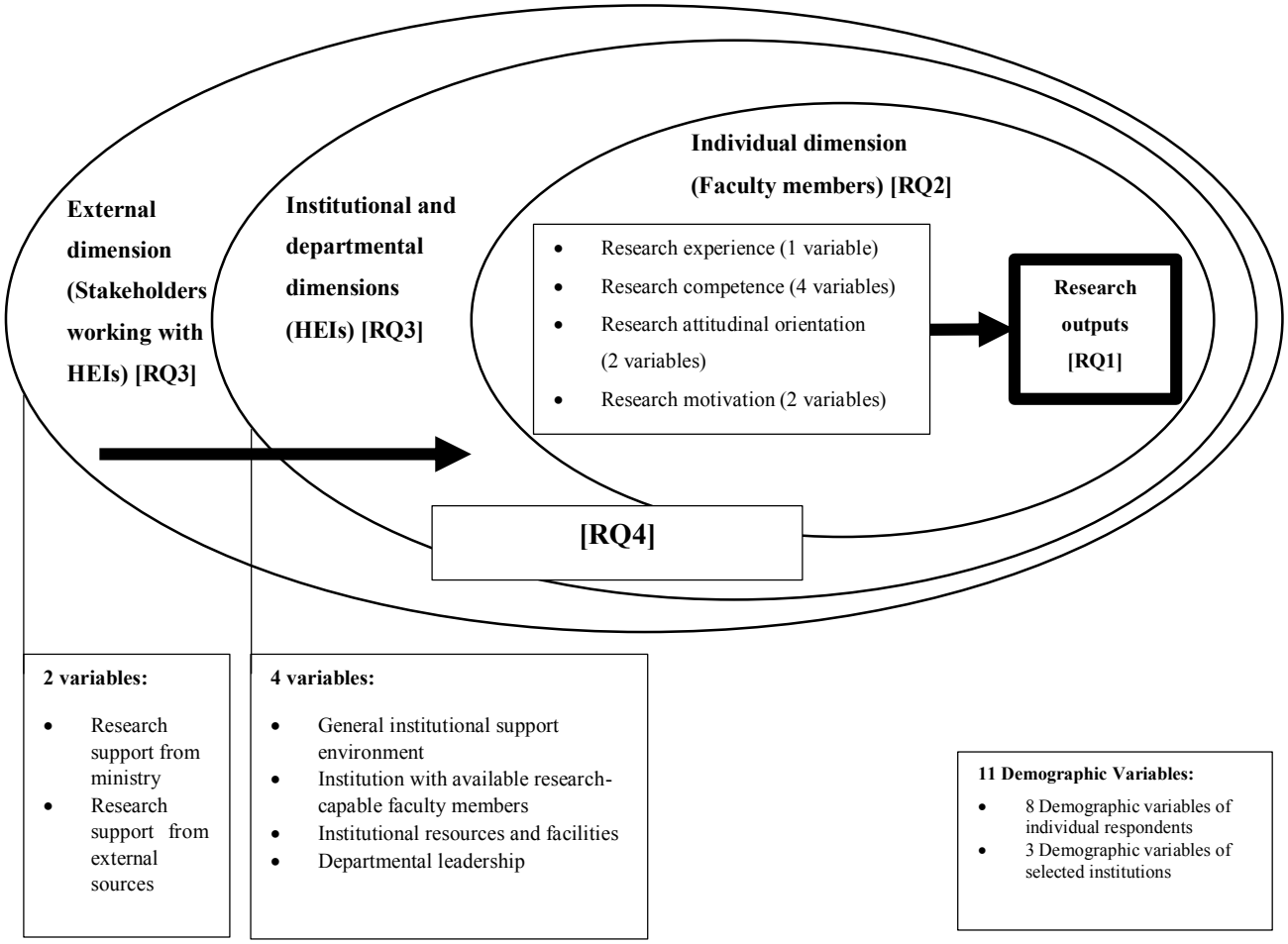


Figure 3.1: Conceptual framework explaining research output production of the current study

It should be noted again that the current study used its ecological framework to quantitatively test the specified variables as well as to explore the qualitative themes.

- **Quantitative dependent variable:** For quantitative analyses, within the individual dimension, the dependent variable (i.e. research outputs) was measured. Research output indicators in this study encompassed 6 international research output indicators and 6 local research output indicator (See Table 3.1.) The rationales behind using both international and local indicators could be reflected through Altbach's argument in his 2016-published book, "Global Perspective on Higher Education," on page 145: "*The evaluation of academic merit should not depend solely on the rankings of the SCI or other exogenous agencies and thus be left to judgement by foreigners. While local evaluation may not be easy, it is necessary. An appropriate mix between local and international publication will help nurture an active research community."* The original number of indicators in this study was 15 indicators in total, but two were dropped due to its problem of construct validity. Only 13 indicators were used in the analyses. These 6 research outputs (both the international and local ones) included

published authored books, published book chapters, published journal articles, published conference proceeding, academic conference presentation, and obtained research grants. "Written research and consultancy report" was also counted as another indicator of research output production in the Cambodian context since most research-inclined faculty members engaged in research activities through these kinds of consultancy works (see Table 3.1.).

Generally, the measure of research productivity took into consideration various principles, such as temporal mode, authorship, and weighting. Temporally speaking, the study measured research outputs "during their services at their current institution." The researcher did not inquire deeply into the issue of authorship because the questionnaire was already long and complex. Adding further complications into the questionnaire would decrease the return rate. As for weighting, each type of product was weighted differently. "Published research articles with international publishers," for example, was multiplied by 4, whilst "obtained international research grants" was multiplied by 2 only. See Table 3.1. below and refers to Chapter 4 for further discussion on quantitative variables and measures.

Table 3.1. Thirteen indicators of research outputs

International research production (6)		**Local research production (6)**		**Neutral type of research production (1)**	
IB	Published books with international publishers (*4)	**LB**	Published books with local publishers	**CL**	Written research reports or consultancy reports for donors (*2)
IA	Published research articles with international publishers (*4)	**LA**	Published research articles with local publishers		
IBC	Published book chapters with international publishers (*3)	**LBC**	Published book chapters with local publishers		
ICP	Published international conference proceeding (*3)	**LCP**	Published local conference proceeding		
ICPre	Presented paper at international conference (*2)	**LCPre**	Presented paper at local conference		
IRG	Obtained international research grants (*2)	**LRG**	Obtained local research grants		
Note: (* Weights)					

- **Quantitative independent variables:** The total number of independent variables (excluding the demographic variables) in the four sections of the questionnaire comprised basically nine key constructs (which were further classified into specific variables after the Principle Component Analyses). Each of these constructs contained from 3 to 14 items, measured by a 0-5 point Likert scale. Variables such as research attitudinal orientation, research competency, research intention, research motivation, and research production were developed based on previous studies (with some adjustments to fit the studied context) as well as on results from the pilot study. Most of these variables were of psychometric and perceptual measures.

Table 3.2. Details of independent variables in the study

Dimensions	Key constructs (items)	Item descriptions	Factors loaded	Sources
Individual dimension	Research experience (6 items)/0-5 Likert Scale (0 = Never, 5 = Always)	I have experience working with various research or consultancy projects; I have experience writing project reports or research reports; I have experience writing research papers for publication; I have attended and/or presented my research papers at academic conferences; I have thoroughly reviewed published research articles related to my field of expertise; I engaged actively in research during my graduate education (e.g. in research design, data collection, data analysis).	1	Developed based on some items of the Research Spider by Smith et al. (2002) and on the pilot study's qualitative interview
	Research competence (14 items)/0-5 Likert Scale (0 = Totally incompetent, 5 = Excellent)	Writing research grant proposal to apply for funding; Writing scientific research paper for publication; Presenting research paper at academic conference; Finding and synthesizing relevant literature effectively; Designing research study (e.g. designing questionnaire, developing conceptual framework, designing experiment); Collecting research data using proper instruments (e.g. interview, observation, focus group discussion); Analyzing quantitative data using statistics (e.g. test of difference, regression, factor analysis); Analyzing qualitative data using qualitative approaches (e.g. thematic analysis, content analysis, grounded theory); Using quantitative data analysis software (e.g. SPSS, STATA, SAS, Matlab, R); Using qualitative data analysis software (e.g. Nvivo, Atlas.ti, MAXQDA); Using referencing software (e.g. Endnote, Mendeley, Zotero); Using advanced computing office skills (e.g. advanced tools in Word, in Excel, in Access, in PowerPoint); Managing project and financial activities (e.g. project planning, financial planning, project evaluation); Communicating fluently in academic English (i.e. both in verbal and written forms).	4	Developed based on Research Spider by Smith et al. (2002), Research self-Efficacy Scale-Revised by Greeley et al., (1989) (as cited in Vaccaro, 2009); and Shortened Research Self-Efficacy Scale by Kanh & Scott (1997)
	Research attitudinal orientation (9 items)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	I clearly understand the values and benefits of research; I am highly committed to becoming a successful researcher; I am very much interested in doing research; I love sharing knowledge and experience; I love writing and always try to understand how to become a good writer; I love thinking about new ideas and ideas that bring improvement. I teach fewer courses and/or fewer hours; I can persevere hard and meticulous research works and challenges; I have a strong research network, both within and outside of the institution and both locally and internationally.	2	Developed based on Research Attitude items in Shim, O'Neal, & Rabolt (1998) and Research Interest in Kim, Pedersen, & Cloud (2007)
	Research motivation (10)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	Achieving recognition and appreciation from students, peers, and university's leading members; Contributing new knowledge to the field as well as helping the society; Getting new research knowledge, skills, and experience; Enhancing networks and future collaboration; Getting a good job related to research in the future; Advancing professional expertise in the field; Having newer, clearer, and deeper knowledge and know-hows useful for teaching students; Getting better and appropriate salary raises; Getting an administrative assignment or	2	Adjusted from shortened Research Motivation Scale in Chen, Gupta, & Hoshower (2006)

		promotion; Getting commissions or other financial rewards.		
Institutional and departmental dimension	Departmental leadership (6 items)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	My department leaders are highly regarded researchers in their field with strong research skills and competence; My department leaders truly understand the values of and benefits from research; My department leaders are very supportive of my efforts in research; My department leaders offer constructive comments and feedbacks which help me perform my best; My department leaders fulfill their leadership roles very well, with clear guidance and visions; My department leaders seriously consider my opinions when they have to make important decisions.	1	Developed based on Chair's Support items in Kim, Pedersen, & Cloud (2007) and items in Bland et al. (2005)
	Institutional research support (12 items)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	My current institution has established clear research policy and research strategic/action plan; My current institution does not only have research policy but also implement research activities efficiently; My current institution offers great motivation in terms of financial rewards if staff conduct research; My current institution comprises a satisfactory salary scale conforming to the working conditions; My current institution is ready to or have plan to create a position for researcher; My current institution has good and active research collaboration with other institutions (e.g. foreign universities, NGOs); My current institution provides adequate and necessary supports when staff want to engage in research activities; My current institution offers sufficient time to spend on research activities; My current institution offers great motivation in terms of non-financial rewards if staff conduct research; My current institution comprises professors and academics with high research competence and skills; My current institution comprises professors and academics with high research experience who can mentor other staff to do research; My current institution has research-capable and experienced leading members that are open for research activities.	2	Developed based on conceptual themes of Bland & Ruffin (1992); items in Shim, O'Neal, & Rabolt (1998); and items in Kim, Pedersen, & Cloud (2007)
	Research resources and facilities (7 items)/ 0-5 Likert Scale (0 = Non-existent, 5 = Excellence)	Research funding from my institution itself; Research funding from other sources; Library and documents (e.g. academic databases, books, journals, archives); Technology to support research (e.g. computer, internet, instructional technology); Research support staff; Research unit in the institution itself; Research facilities and equipment (e.g. labs, experimentation tools)	1	Adjusted from Bland et al. (2005)
External dimension	Research support from ministry (4 items)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	My current institution receives clear research policy and strategic guidelines from the ministry in charge; My current institution receives enough local research capacity training from the ministry in charge; My current institution receives enough overseas fellowship, scholarship, or training from the ministry in charge; My current institution receives enough research funding from the ministry in charge.	1	Developed from pilot study's qualitative interview
	Research support from external sources (3 items)/ 0-5 Likert Scale (0 = Totally disagree, 5 = Totally agree)	My current institution obtains enough research funding from external donors or collaborating institutions; My current institution receives enough supported research facilities from external donors or collaborating institutions; My current institution receives enough research training from external donors or collaborating institutions.	1	Developed from pilot study's qualitative interview

- **Quantitative demographic variables:** As earlier mentioned, another quantitative element in the conceptual framework was the controlled demographic variable box, which contained individual demographic variables (i.e. gender, age, terminal degree, terminal degree countries, position, etc.) and institutional demographic variables (i.e. institutional orientation, institutional location, and institutional governance). These demographic variables were tested in all the four research questions to explore their patterns of relationship with research output production, research orientation (i.e. research competence, research experience, research orientation, and research motivation), and perception on research support environment (i.e. general institutional environment, research resources and facilities, and departmental leadership, etc.). In research question 4, these variables were used as controlled and moderating variables.

- **Qualitative exploratory framework:** This conceptual framework was, in the first place, quantitatively oriented, with specific variables defined and relationships hypothesized. This suggested that the framework was used for testing, as seen in previous positivists' quantitative works. Guided by its pragmatic mixed-methods approach, however, the current study's three dimensions were also used as a guiding framework to code and explore the qualitative data. So, this conceptual model was not just for testing but could also be seen as an exploratory conceptual window to reflect into the focused themes: i.e. research output production, research orientation, and research support environment. So, this study was both an exploratory and an explanatory work. Its framework was used both for testing and exploring. (See section of qualitative analyses in Chapter 4 for further explanation about the 3-level coding of the qualitative data).

Logic of the conceptual framework: One perspective to make sense of the current study's conceptual framework is to reflect into its four research questions. In this study, its four research questions were coherently related in a way that, to explain what factor influence research production of Cambodian faculty members (the research question 4), it is necessary to dig deeply into understanding perceptions of faculty members on current research support environment of the external and institutional dimensions (the research question 3), grasping the research orientation of individual dimension (the research question 2), and visualizing (the connection of these dimensions in the research question 2 and 3 with) trends of research outputs of individual faculty members (the research question 1).

- **Research question 1** asked "How productive are Cambodian faculty members in terms of research outputs during their service at their current higher education institutions?" In Figure 3.1. above, one could identify the focus of this first question in the box of research production,

which was the core dependent variable of the study. It basically focused on measuring research outputs, using the 13 items.

- **Research question 2** asked "How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members towards research?" In Figure 3.1. above, one could identify focuses of this second question in the box inside the individual dimension's circle, which was composed of research experience, research competence, research attitudinal orientation, and research motivation constructs. They were independent variables in this study.
- **Research question 3** asked "How supportive is Cambodian research environment (i.e. institutional environment and external environment) in its current higher education context?" In the figure of the conceptual framework above, one could identify focuses of this third research question in the two boxes linked to the external dimension and the institutional and departmental dimensions. The external dimension box contained research support from ministry and research support from external sources. The institutional and departmental dimensions contained general institutional environment, availability of research-capable faculty members, institutional resources and facilities, and departmental leadership.
- **Research question 4** asked "What factors (of external, institutional, and individual dimensions) explain research outputs of Cambodian faculty members in their current higher education context?" In Figure 3.1. above, research question 4 covered the whole framework that contained external dimension's variables, institutional and departmental dimensions' variables, individual dimension's variables as well as the research output (i.e. the dependent variable).

Though research question four was the main focus of the study, the analyses of other research questions offered detailed descriptions of trends and patterns of each focused topic. The study devoted the whole Chapter 5 for the detailed description and analyses of the dependent variable (i.e. research outputs), Chapter 6 for the detailed description and analyses of research orientation of individual faculty members, and Chapter 7 for the detailed descriptions and analyses of the institutional and external dimensions of research support environment of Cambodian higher education sector. After all these detailed analyses, the study analyzed the relationship among variables (from the first, second, and third research questions) and research outputs in Chapter 8. What is more, the study did not only dig deeply into these aspects using the quantitative data, but it also drew on inputs from the qualitative interviews.

After all, the observed three dimensions (viz. external, institutional, and individual dimensions) were basic but core components of the ecological framework in this current study. Many thinkers viewed these three dimensions as practically applicable and relevant. Kaufman, Herman, and Watters (2002) asserted that: "*strategic planning, in its most powerful use, identifies results based upon an ideal*

vision, which generate the three-level framework: societal, organizational, and individual/small group." This current study used these three dimensions as a window to investigate systemically and specifically into each element of the focused research questions, based on both the quantitative data and the qualitative data. Such systemic and critical investigations would offer a holistic perspective to the issues being investigated – that is to say, the issues of research outputs, research orientation, and research support environment of Cambodian faculty members and their higher education sector.

3.4. Synthesis of the conceptual and methodological frameworks

All of the earlier discussed methodological and conceptual characteristics were both a systemic and systematic undertaking to achieve the main purpose of the study: to understand the trends and correlates of research output production of Cambodian faculty members. Pragmatic educational thinkers generally have a conviction that education research should not be conducted solely within the realm of theoretical and philosophical knowledge and neither should it be conducted on the basis of practical experience alone (without a clear theoretical framework). It should be conducted in the "pragmatic" way, the way that interconnects between the theoretical and conceptual framework and the real practical and contextual experience, all aiming at effectively offering the best dynamic and creative solutions to educational problems of different forms that always emerge from time to time. So, pragmatic educational research works should collectively compromise both the positivist and the constructivist worldviews and not separate them.

The holistic ecological framework and the paradigm of pragmatism were the bases of the conceptual and methodological stances of this current study. The former was appropriate for the current study because research output in the studied context has been conceptualized to be influenced by different levels and shaped by different factors. Also, it allowed the study to explore as well as to explain the focused themes. The latter was appropriate because it offered a flexible, contextually-valid, and feasible framework for the collection, analyses, and interpretation of this study's datasets. Specifically put, this is to say that this current study employed a three-dimensional framework (i.e. external, institutional, and individual dimensions) and followed the mixed-method's convergent design (which gave equal weights to both the qualitative analyses and quantitative analyses). The study, therefore, could bring all its four specific research questions into a connected whole.

CHAPTER 4: RESEARCH DESIGN AND METHODS

Previous three chapters explained what the current study is about; this chapter explained the question "how." Four elements of research design and methods were discussed: 1) the overall research design, 2) the detailed research design and methods of qualitative data, 3) the detailed design and methods of the quantitative data, and, finally, 4) the mixed-methods integration methods. The sub-sections that followed explained these four elements. This chapter then concluded with a brief synthesis.

4.1. Overall research design

This study drew on the philosophy of pragmatism and mixed-methods approaches to answer its four focused research questions. Many studies in the field of social science have called for research design and methods that are rigorous, valid, and verifiable. *"Across all levels of analysis, studies that are methodologically ambitious, with large number of cases and subjects, would be most welcome,"* Bastedo (2007). Such ambitious methods do not necessarily include only quantitative analyses. Enders (2004) put it: *"... In higher education… Further qualitative work is needed, particularly work that uses different levels of analysis..."* Given the importance of both the quantitative and the qualitative approaches, the use of mixed methods that involves both sets of data are generally appropriate for comprehensive, multi-dimensional studies that take a systemic perspective on the issues being investigated.

Creswell (2014) asserted that it is important for mixed-methods researchers to draw a clear research procedure diagram. Mixed-methods approaches embrace precise ways that combine or integrate the qualitative and quantitative paradigms, approaches, designs, and methods together to understand the complex nature of social reality. This can avoid design framework which is disorganized. A clear procedure diagram also offers a roadmap for a study on how to proceed from the research design to the data analyses to the interpretation of results. The process of data collection of the current study was developed based on the so-called "convergent design" of the mixed-methods approach – with different stages of data collections, analyses, and interpretation. This study design made a little adjustment from the expected theoretical concept of convergent design thanks to the feasibility of the researcher's conditions and the context of the study. See Figure 4.1. below for the research procedure diagram of this current study.

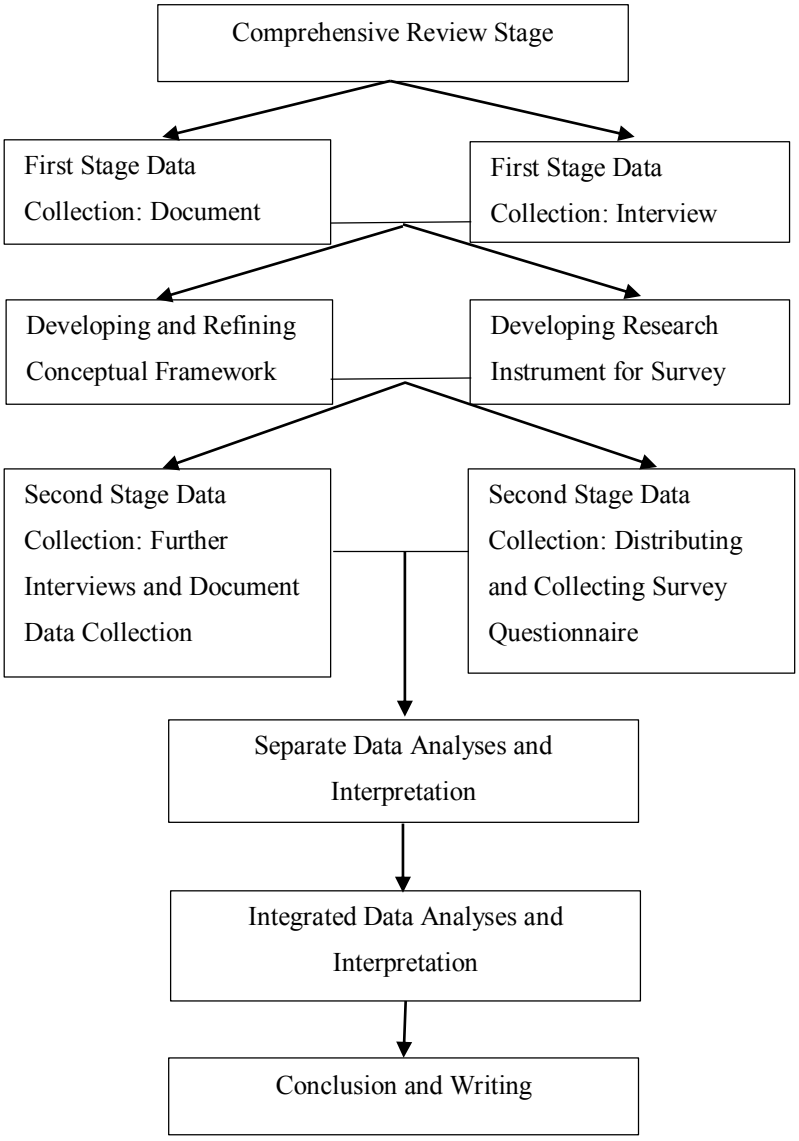


Figure 4.1. Overall mixed-methods research procedure of the current study

In overall, there were seven main stages of the whole research procedure. The first stage involved the comprehensive review of published literature on research production and research culture and capacity across time and spaces. After this first stage, the researcher moved on to the data collection stage. The first sub-phase of the data collection stage involved the collection of qualitative interview data and some existing qualitative document data from the selected universities (from 4th February 2015 till 26th March 2015). This phase also involved the pilot testing of the next-phase survey questionnaire and some qualitative interview with regards to the questionnaire. The third stage involved the process of refining and developing the questionnaire survey and refining the main conceptual framework. In actuality, in the convergent design, the qualitative and quantitative data of the mixed-methods design should be collected simultaneously or in a way that one does not influence another. Though the current

study did the collection separately and at different stages, the first stage interview did not structurally influence the second stage questionnaire survey. Only certain quantitative items were developed according to practical opinions of the participants during piloted interviews. The researcher was interested to test some contextual variables deemed to influence research output production in the Cambodian context. The qualitative and quantitative analyses did not, after all, influence one another. The fourth phase of the data collection focused on the quantitative data, as earlier mentioned. The main tool was a survey questionnaire set. Most of these variables in the questionnaire employed psychometric measures.

The various stages after the data collection included the separate data analyses stage, the integrating data analyses stage, and the conclusion and writing stage. Various qualitative (i.e. thematic analyses and case analyses) and quantitative methods (i.e. descriptive statistics, tests of difference, simple linear regression, simple logistic regression, and zero-inflated negative binomial regressions) were employed to obtain separate quantitative and qualitative responses to each of the four research questions. At the integrated data analysis stage, the joint-display matrix was used to compare the quantitative and the qualitative results. This process was conducted in the discussion part. After the detailed separate data analyses and the integrated data analyses, the researcher drew conclusions for this comprehensive study and completed the writing of this dissertation. The discussion and the conclusions were geared towards answering the main questions of what it is like to talk about research output production of Cambodian faculty members and what explain those outputs.

4.2. Qualitative designs and methods

4.2.1. Participants and institutions

Participants recruited for the interviews were of four different categories – policy makers, university management, faculty members, and external stakeholders – totally comprising 50 interviewees. The first category was named policy maker group which included policy makers from Department of Higher Education (DoH), Department of Scientific Research (DSR), and Education Research Councils (ERC), all affiliated to MoEYS. Five key informants in this group accepted the request for interviews: two from DoH, two from DSR, and 1 from ERC. The second category was called the faculty member group. This category consisted of 20 faculty members from nine universities, all of whom had some levels of research engagement at their institutions and 11 research-unengaged faculty members from the same universities. The third group was the university management group. This category comprised 11 respondents from various positions at the management level of the selected universities – namely, rector, dean, vice-dean, or research unit manager. The final category was called the external

stakeholder group. This group contained only 3 participants from one non-academic research institution in Cambodia. Other two institutions (of this external stakeholder group) did not accept the interview requests. Table 4.1. and 4.2. below showed the detailed code of each case and the demographic characteristics of the interviewees.

Table 4.1. Interviewees' detailed information

Transcript Number	Case Code	Institution	Gender	Research Status	Interview Date
1	F1U4E	U4	Male	Research-Engaged	January 24, 2015
2	F2IUU	IU	Male	Unengaged	February 1, 2015
3	M3U12E	U12	Male	Research-Engaged	January 30, 2015
4	F4U11U	U4	Male	Unengaged	February 9, 2015
5	P5DHE	DH	Male	Research-Engaged	February 9, 2015
6	M6U4E	U4	Male	Research-Engaged	February 10, 2015
7	F7U1E	U1	Male	Research-Engaged	February 17, 2015
8	P8ERE	ER	Male	Research-Engaged	February 17, 2015
9	F9U11U	U11	Male	Unengaged	February 19, 2015
10	F10U3E	U3	Male	Research-Engaged	February 22, 2015
11	F11U3U	U3	Male	Unengaged	February 22, 2015
12	M12U1E	U1	Male	Research-Engaged	February 22, 2015
13	F13U3E	U3	Male	Research-Engaged	February 23, 2015
14	F14U1E	U1	Male	Research-Engaged	February 23, 2015
15	M15U3E	U3	Male	Research-Engaged	February 23, 2015
16	M16U3U	U3	Male	Unengaged	February 20, 2015
17	E17CDE	CD	Male	Research-Engaged	February 25, 2015
18	F18U3U	U3	Male	Unengaged	February 25, 2015
19	M19U1U	U1	Male	Unengaged	February 26, 2015
20	P20DHE	DH	Male	Research-Engaged	February 26, 2015
21	F21U12U	U12	Male	Unengaged	March 2, 2015
22	F22U12U	U12	Male	Unengaged	March 2, 2015
23	M23U12E	U12	Male	Research-Engaged	March 3, 2015
24	F24U12E	U12	Female	Research-Engaged	March 3, 2015
25	F25U12E	U12	Male	Research-Engaged	March 3, 2015
26	M26U12U	U12	Female	Unengaged	March 4, 2015
27	F27U4E	U4	Male	Research-Engaged	March 10, 2015
28	M28U7U	U7	Male	Unengaged	March 11, 2015
29	F29U7E	U7	Male	Unengaged	March 11, 2015
30	F30U7E	U7	Male	Research-Engaged	March 11, 2015
31	M31U2E	U2	Male	Research-Engaged	March 11, 2015
32	M32U6E	U6	Male	Research-Engaged	March 10, 2015
33	F33U6E	U6	Male	Research-Engaged	March 12, 2015
34	E34CDE	CD	Male	Research-Engaged	March 12, 2015
35	F35U6E	U6	Male	Research-Engaged	March 13, 2015
36	P36SRE	SRD	Male	Research-Engaged	March 13, 2015

37	F37U8E	U8	Male	Research-Engaged	March 13, 2015
38	M38U9U	U9	Male	Unengaged	March 14, 2015
39	F39U4E	U4	Male	Research-Engaged	March 15, 2015
40	F40U4E	U4	Male	Research-Engaged	March 15, 2015
41	F41U4E	U4	Male	Research-Engaged	March 15, 2015
42	F42U9U	U9	Male	Unengaged	March 16, 2015
43	P43SRE	SRD	Male	Research-Engaged	March 16, 2015
44	F44U1E	U1	Male	Research-Engaged	March 16, 2015
45	F45U1E	U1	Male	Research-Engaged	March 16, 2015
46	E46CDE	CD	Male	Research-Engaged	March 17, 2015
47	F47U4E	U4	Female	Research-Engaged	March 17, 2015
48	F48U4E	U4	Male	Research-Engaged	March 20, 2015
49	F49U9U	U9	Male	Unengaged	March 23, 2015
50	F50U2U	U2	Male	Unengaged	March 22, 2015

4.2.2. Sampling and samples

Two qualitatively-oriented sampling approaches were employed to recruit interviewees: purposive sampling and snow-ball sampling. Twenty-one respondents were individually contacted through e-mail. The current researcher had some knowledge about these respondents; some of them had previous academic connections with the researcher. Other eighteen respondents out of the total fifty were assigned by the management of each university at where the researcher sent request to conduct research. The remaining eleven interviewees were recommended by these earlier individually-recruited and institutionally-assigned respondents during the interview in a snowball way. Only 3 participants were female. Because some of them were in management positions, 24 percent of these qualitative samples have others roles beside teaching. The majority of them were aged from 31 to 40 years old. 68 percent were research-engaged, while the other 32 percent had no research experience. Most of these participants were interviewed face to face (i.e. 92 percent); four of them engaged through Skype call; one of them was interviewed through phone call. And one special case was interviewed by a third person (who assisted the researcher in the data collection) due to the overlapping time of interview appointments.

Table 4.2. Demographic variables of interviewees

Variables	Attribute	Frequency	Percentage
Gender	Female	3	6%
	Male	47	94%
Roles	More than teaching	12	24%
	Teaching	28	56%
	Missing	10	20%

Age	<=30	8	16%
	31-40	28	56%
	41-50	7	14%
	>=50	7	14%
Categories	Policy makers	5	10%
	University Management	11	22%
	Faculty member	31	62%
	External stakeholder	3	6%
Research status	Research-unengaged	16	32%
	Research-engaged	34	68%
Medium	Assistant	1	2%
	Face-to-face	46	92%
	Phone call	1	2%
	Skype call	2	4%

4.2.3. Qualitative interview instrument

The researcher formulated specific interview guides for each interviewee group. Four pieces of interview guides were developed. Each of the four different interview guides were divided into two parts: the core part and the specific part. The core part consisted of three aspects (i.e. 1) general information such as name, age, position, degree, etc.; 2) institutional information such as goals and strategies on research, systems of research, finance and funding, governance and management of research activities, research production, etc.; and 3) research conditions of higher education institutions in Cambodia such as opinion on current conditions, opinions on factors affecting research production, future trend, etc.). The specific part consisted of different aspects for each group (e.g. confidence and skills, orientation, production, time management, and research intent – some aspects of this part were only inquired to respondents who are research engaged faculty members). Overall, these interview guides and questions sought to identify respondents' personal opinions on their research production, institutional research supports, challenges they face, and their suggestions on how to increase research production in Cambodian higher education sector.

In overall, the main qualitative interview questions were guided by the following groups of questions that reflected the four specific research question of this current study:

- What is your overall perception towards the current trends of research activities and research performance of Cambodian faculty members? What it is like to talk about research output production in Cambodian higher education context? (for research question 1)
- How do you perceive your own level of research experience?... research competence?... research attitudes?... and research motivations? What is your overall perception towards the

research experience, research competence, research attitudes, and research motivation of Cambodian faculty members in general? (for research question 2)

- What is it like to talk about research support environment of Cambodian higher education sectors? Are you satisfied with the current levels of supports from different sources (i.e. government, ministries, donors, professional society, private sector, civil society)? Why and why not? (for research question 3)
- What do you think are main factors inhibiting research engagement or production of Cambodian faculty? Why are you engaged and productive in research activities and outputs? What do you think are reasons of other faculty being research productive? (for research question 4)

Other related questions were enquired according to the category of stakeholders and the information provided. Appendix 1 showed the guide for faculty member group that occupied the biggest percentage in the qualitative sample.

The interviews were semi-structured in approach and were conducted in Khmer language. It took an average of one hour (with some variations from 10 minutes for participants who had little time to 2 hours for those who wanted to share more ideas and had much time). Most participants allowed the use of voice recorder, whereas three of them did not. Due to the nature of the semi-structured approach, the researcher could always be flexible with the interview. Where possible, the researcher asked in-depth, confirmed, or detailed questions to the interviewees.

4.2.4. Data analyses

The qualitative data analyses followed the conventional procedure of qualitative thematic analyses coded at three levels. After obtaining the recorded interviews of all the 47 respondents (because 3 respondents did not permit voice recording, and one of them just allowed half of their interview to be voice-recorded), the researchers listened to all the 47 voice-recorded interview episodes and read all the field notes. The researchers listened several times to all the interviews to synthetize with the contents of the interviews. Then the researcher started to transcribe all the 47 interviews. It took more than 4 months to finish all the transcripts. Not all the transcripts were fully transcribed due to the irrelevance (or out-of-the-topic talk) of the contents. After finishing the transcripts, the researcher started the 3-level coding process. The coding was not in the original language of the interview – i.e. the researcher did the interview in Khmer language (the native language in Cambodia) but transcribed in English (to save time). Despite so doing, the researcher tried to always keep the original contents from the interviewee close to its most exact meaning in the translated language.

To provide a clear framework of this qualitative analysis in the study, the research adopted the triangular representation of qualitative coding stages synthesized by Hahn (2008) in his book "Doing Qualitative Research Using Your Computer: A Practical Guide". In Hahn's triangle of synthesized qualitative coding practice, there are four levels:

- **Level 1 coding:** initial coding or open coding (Large quantities of raw qualitative data are focused and labelled during Level 1 Coding)
- **Level 2 coding:** focused coding or category development (Level 2 coding reexamines level 1 codes and further focuses the data
- **Level 3 coding:** axial/thematic coding (previous coding is studied to develop highly refined themes
- **Level 4 coding:** theoretical concepts (if indicated) emerge from saturated categories and theme

Hanh (2008) made it clear that level 4 coding may or may not be conducted according to the purpose of the study and the feasibility. Most studies using thematic analyses or general qualitative coding conducted three levels of coding. Though these three stage coding are basic procedures in many qualitative analyses, the names used to refer to each stage of coding are generally different according to different authors. So, as Hanh suggested, the study refers to level 1, level 2, and level 3 coding to make things clear.

The current study followed this three-level coding procedure. As stated in the introduction chapter, each of the research question in this study involves basically the three-level coded thematic analysis. First, the researcher started the level 1 coding (i.e. the open or initial coding). This stage involved basically coding of the direct wording of the participants from the transcripts, using mostly the gerund form. The coding frame was the relevant theoretical and empirical concepts related to the focused research question through the three-dimension ecological framework. However, the researcher was flexible to include the original ideas out of the context of the study. Next, the researcher did the level-2 coding (i.e. focused coding or category development) with an aim to identify major categories synthesized from all the level-1 direct codes. The final stage of coding was the level-3 coding (i.e. thematic coding) whereby the more abstract themes were drawn from the level-2 coded categories. At this stage, the researcher also read the transcripts back and forth to locate further codes and to confirm existing categories. Important quotes that reflected the identified level-2 and level-3 themes were identified. This 3-stage coding process (and the constant comparison techniques) were the finally formulated "emerging common themes" for each of the four research questions.

After conducting these three levels of coding to figure out common themes (or, simply put, answers) for each specific research question, the research quantified these level-3 common themes of each research question by assigning dichotomized quantitative codes to each of the 50 participants. The dichotomized codes included "1" if the participant raised opinions related to the level-3 themes and "0" if s/he did not raise opinions related to that particular level-3 theme. This kind of practice provided the overall quantitative data for the qualitative themes for each research question. However, such process can be criticized because it can inflate the frequency and percentage of the identified theme. Generally, content analysts and thematic analysts quantify the codes at level 2 (the sensitizing concepts) (see, for example, Silverstein, Auerbach, Grieco, & Dunkel, 1999). But because of time constraint, the researcher of this current study decided to quantify the qualitative themes at level 3 (the theoretical constructs) this way.

The researcher furthered the analyses by conducting some case descriptions of individual interviewees as well as institutions to reflect the practical conditions, characteristics, and patterns of their opinions. Because of time constraint, such case analyses also did not reach the level of pure phenomenological methods by which critical observations and discussions of each case are seriously and deeply focused. These case analyses in the study only aimed to provide additional information to the thematic analyses.

4.2.5. Credibility and trustworthiness

The best way to start with the claim for validity and reliability is to explain the philosophy of qualitative research. The dominant epistemology and ontology of qualitative research are the interpretivist and constructivist philosophy, which believes that knowledge and reality are constructed by participants and reflected by the context of the study. Such ways of observing and analyzing focus on subjective and mental truth. Thus, qualitative data in this study had the quality to enrich the quantitative analyses. The presence of different groups of interviewees gave a comparative power to the researcher to observe the overall trends of thinking and common practices of research outputs production and research orientation at all levels – i.e. individual, institutional, and external dimensions – in Cambodian current higher education settings.

The critique on qualitative coding can be that the coding as a solo process done by the researcher himself may imply subjective biases. The researcher would not reject this criticism, while proclaiming that no qualitative research study would avoid subjectivity and emphasizing the fact that this was a doctoral dissertation which could not be done in group. The researcher tried, at the stage of level one or open coding, to use real words of the respondents to avoid too much abstract concepts at that very earlier stage. This could reduce researcher's own thinking on the qualitative data. The integration

techniques of mixed-methods in this study may offer some other indicators to prove the reliability of the qualitative analyses.

Highlights of qualitative analysis procedure for each research question
Data collected → Data transcribed → Code level 1 (codes) → Code level 2 (categories) → Code level 3 (common themes) → Final level-3 themes and quotes from transcripts identified for each research question → Quantifying level-3 codes (using percentage and frequency) by applying a dichotomous code (0 or 1) for whether the participant raised or implied that level-3 common theme or not.

4.3. Quantitative designs and methods

4.3.1. Pilot study to test quantitative instrument

Unlike the exploratory qualitative interview, the quantitative instrument needed to be pilot tested. The pilot study was conducted with two purposes: 1) to seek comments and test applicability of the questionnaire and 2) to observe the level of research output production of Cambodian faculty members and whether it is appropriate to inquire on this issue in the current Cambodian context. The participants in the pilot study were faculty members from 9 different universities (both public and private), and they also were from different disciplines (i.e. education, economics, finance, language, mechanical engineering, business, management, information technology, mathematics, and health). The total sample was 27 participants. Twelve participants were graduates from Cambodian universities, and the rest were graduates from overseas. The researcher contacted the respondents and asked to interview them for about 30 minutes to one hour. Then, the researcher asked them to complete and give comments to the piloted questionnaire. Only 8 people among the 27 agreed to engage in an in-depth discussion about the questionnaire contents with the researcher; the rest just filled in the piloted questionnaire.

A number of contents-related problems were raised by the piloted respondents. First, the questionnaire seemed to be a little long for respondents and the format of the questionnaire was too dense (with small letters). Second, the language used (Khmer language) was, in some senses, too technical and unclear for them. Some respondents who claimed that they have little research experiences found certain contents-related aspects of the questionnaire hard to answer – e.g. things related to journal articles, peer-reviewed characteristics, and academic research. Certain types of research outputs are not known to the Cambodian academics who have never experienced graduate education abroad; so, they suggested that some explanations should be added to clearly define each type of the research output.

Third, the contents of the questionnaire seemed to cover too much theoretical concepts of research production and practices in developed countries and somehow lacked the contextual reality. A respondent said, "There are some things I expect to see, but the researcher did not include, for examples, how much incentive is enough for faculty to become a researcher." Others raised the issues of research competencies saying that English ability and advanced computing skills (i.e. knowledge of technology uses to support research activities) should be included in the questionnaire. Another concern on the questionnaire format was the uses of different type of questions and/or scales. One respondent mentioned that some questions should be in Yes/No rather than in the Likert-Scale format. These comments showed the need for some corrections of the tool.

Answering to the question whether the research production items are applicable or not in the Cambodian context, most respondents believed that the questions are definitely valid because some Cambodian faculty members have publication experiences. However, they anticipated that the results would yield a very low record of research output production among Cambodian faculty members in general. The rest of what respondents raised – that is to say, research motivation, research values, research infrastructure, research supports from Ministry and donors, research funding, research experience are accepted by respondents as appropriate factors in the context of the study – were already included in the questionnaire. Necessary editing was conducted to refine the questionnaire before the actual distribution.

4.3.2. Participants, institutions, and disciplines

Participants: Participants in the quantitative part comprised basically the faculty members at Cambodian universities. A faculty member, in this study, refers to a Cambodian academic staff who at least teaches a session of class at a Cambodian higher education institution. Foreign faculty members teaching at Cambodian universities were not included in the study. Administrative staff were also not included in this study.

Institutions: Fifteen universities (out of the reported 118 higher education institutions as of 2016) were selected. Among the 15 universities (see Table 4.3. and 4.4.), three were private universities and four of them were located in four different provinces. These 15 universities consisted of institutions at different levels of ranking, from medium to top ranking institutions. Twelve institutions selected were public universities, yielding 85.5% of participants in this study; while the other three were private universities, representing 14.5 % of the sample size. Three universities were based only in the province (with the samples of 31.3 %); the other twelve institutions had their only main campus in Phnom Penh city (with the samples of 68.7%). Two of the ten universities were private universities with branches in provinces in the country – that is, U9 and U11 (see Table 4.4.) Three universities among the 15

universities were not under the direct supervision of Ministry of Education, Youth, and Sport (MoEYS), which represented about 16.1% of the sample in this study; the rest were under MoEYS.

Table 4.3. Characteristics of distributed and collected questionnaire

Code	Staff statistic	Distributed	Collected	Usable	Rate of return	Percentage (divided by N =483)
U1	271	225	96	95	42.22%	19.7%
U2	353	90	44	43	47.78%	8.9%
U3	462	67	20	20	29.85%	4.1%
U4	174	101	38	38	37.62%	7.9%
U5	334	50	31	31	62.00%	6.4%
U6	264	83	33	29	34.94%	6.0%
U7	707	50	30	28	56.00%	5.8%
U8	250	70	24	21	30.00%	4.3%
U9	1276	95	37	28	29.47%	5.8%
U10	297	50	27	27	54.00%	5.6%
U11	117	70	21	15	21.43%	3.1%
U12	104	50	24	23	46.00%	4.8%
U13	117	50	28	27	54.00%	5.6%
U14	125	50	47	46	92.00%	9.5%
U15	99	50	12	12	24.00%	2.5%
Total	4950	1151	512	483	41.96%	100%
Note: The staff statistic was extracted from the Excel database of higher education staff statistics (2019-2010) from Department of Higher Education – except U5 (which was from HRMIS record of 2011).						

- *Some general description about Cambodian universities:* The total number of faculty members hosted by the current Cambodian higher education, according to MoEYS's congress report in 2015, are 12,256 individuals, and the total number of higher education institutions are 118 (46 public and 72 private) under 15 ministries; There are 24,970 associate degree students, 182,987 bachelor degree students, 18,253 Master's degree students, and 1,175 Ph.D. degree students, according to the same congress report. In most Cambodian universities, universities generally obtain the so-called Foundation Year Department, established upon the recommendation of MoEYS in order to response to the needs of high-school graduates who may have difficult time with the adjustment and new learning experience in the higher education setting. Once students obtain the Foundation Year (i.e. the first year), they can start the second year of bachelor program in their enrolled institution or switch to other institutions from that second year (in most cases). Most universities offer at least bachelor degree; the Master's programs have been increased. And only certain universities offer Ph.D. degree, most of them are private institutions. Some universities also contain in themselves the so-called "research units" (see Table 4.4.), but only certain universities in the countries have their own journal outlets for some sorts for publications.

- *Some specific information about the selected universities:* U1 is one of the oldest comprehensive public university of the country and has been established since 1960. It offers almost all kinds of disciplines from humanities to social sciences to natural science and to engineering. The highest degree offered is doctoral degree (only in certain fields). U2 is another large public university in the country. It was established in 1983 with the focus on economics and areas related to business administration. This institution has currently comprised six faculties and one graduate school. The highest degree offered is doctoral degree. U3 also focuses on such fields as economics, public administration, management, and law. It was established since 1949 and has gone through various changes, so also considered being one of the oldest higher education institutions in the country. This university has currently been composed of four faculties, 2 graduate schools and 1 training center. The highest degree offered is Master's Degree. U4 is another long-standing higher education institution in the country. It was established in 1964. Some of its specialized disciplines of focus are science, technology, and engineering. It offers its educational programs and degrees through seven departments. The highest degree offered is Master's degree.

Table 4.4. Further characteristics of selected institutions

Code	Orientation	Location	Governance	Research unit/office	Research centers	Master's Program	Ph.D. Program	Journal outlet
U1	Public	Phnom Penh	MoEYS	✓	✓	✓	✓	✓
U2	Public	Phnom Penh	MoEYS	✓	?	✓	✓	✓
U3	Public	Phnom Penh	MoEYS	✓	✓	✓	-	-
U4	Public	Phnom Penh	MoEYS	✓	?	✓	-	✓
U5	Public	Phnom Penh	MoEYS	✓	-	?	-	-
U6	Public	Phnom Penh	Non-MoEYS	✓	✓	✓	-	✓
U7	Public	Phnom Penh	Non-MoEYS	✓	?	✓	-	-
U8	Public	Phnom Penh	Non-MoEYS	?	?	?	-	-
U9	Private	Phnom Penh	MoEYS	✓	?	✓	✓	✓
U10	Private	Phnom Penh	MoEYS	✓	?	✓	-	-
U11	Private	Phnom Penh	MoEYS	✓	?	✓	✓	-
U12	Public	Province	MoEYS	✓	✓	✓	-	?
U13	Public	Province	MoEYS	?	?	✓	-	-
U14	Public	Province	MoEYS	?	?	✓	-	-
U15	Public	Province	MoEYS	?	?	✓	-	-

Note: All or most of these institutions have the foundation year departments or sections. Research units/office in most cases work with students' assignment, and these two may be used to mean the same thing in most institutions. ***Sign meaning:*** ✓ = available; - = not available; and ? = not sure (during the period of data collection). ***Sources:*** institutions' websites and collected institutional documents during the data collection.

U5 is an institution focusing on the field of education and is under the umbrella of MoEYS. Its main function is to basically train teachers in almost all disciplines and academic fields. U6

focuses on the field of agriculture and related ones. It was founded in 1964 and has currently become more active in research works in its fields. It has ten faculties and one graduate school, offering Master's Degree as the highest degree in certain programs. U7 is another oldest institution in the country, offering degrees in the fields of medicine, health science, and related ones. At the time of data collection, it comprises of three main faculties and other subordinate sections. U8 focuses on the fields of arts and has been established since 1965. It has currently contained five faculties. U9, U10, and U11 are private universities; all seem to take the lead in hosting most number of students in the country. They are likely to fall into the kind of comprehensive universities, offering degree programs in many fields in social science, humanities, and even engineering. All are based in Phnom Penh city (but U9 and U11 also have braches in provinces). The highest degree offered by U10 is Master's degree, mostly in the fields of business administration. U9 and U11 offer both Master's and doctoral degree. U12, U13, U14, and U15 are all public province-based universities, and each of them is based in different province (two in the western parts and two in south-eastern parts of the country). Despite having different original focuses in terms of specialization, all of them now are more likely a comprehensive university, offering courses and degrees in a variety of fields (counting, for example, agriculture, social science, arts, humanities, and science). U12, U13, U14, and U15 all have basically five faculties. They all offer up to Master's degree. Most of them have one institute focusing on language studies.

Disciplines: Participants could originally be classified into three different major disciplines: 1) Natural science, technology, and engineering (i.e. Physics, Chemistry, Biology, Mathematics, Technology, Engineering, Computer Science, Medical Science, etc.); 2) Social science and interdisciplinary fields (i.e. Geography, Economics, Psychology, Education, Sociology, Cultural Anthropology, Social Works, Environment, Agriculture, Business Administration, etc.); and 3) Arts and Humanities (i.e. Arts, Philosophy, History, Theology, Language, Linguistics, etc.). However, the researcher coded them into only two groups to ease the analyses: 1 = science and related fields and 2 = social science and related fields. When it came to discipline coding, it was somehow complex. Some particular participants had more than two degrees in different fields, so the coding was based on the focused discipline or fields of their departments. As for the discipline or field of research outputs, some certain interdisciplinary fields were unclearly defined in the questionnaire – whether the research work was based in the field of social science or natural science. For example, research works of participants from the fields of agriculture and environment could be either very oriented towards natural science or towards social science. That was why the researcher dichotomized the code. The following table offered and overview of how the researcher classified different fields into the two levels of disciplines in this particular study.

Table 4.5. Discipline of respondents

Discipline	Majors/Subjects	Percentage
Social science, and related fields	Social science (general), social development, economics, rural development, sociology, political science, geography, psychology, business administration (related majors), public policy, international relation, management (general and related majors), finance, accounting, banking, tourism, and law (and other inter-disciplinary related majors) Education (general), educational leadership, education management, educational development, higher education development, educational planning, educational science, humanities, linguistics (general and related fields), English language, French language, pedagogy, philosophy, history, literature studies, media, cultural studies, social works, Asian studies, religion studies, and studies on human right Agriculture (general), agricultural economics, and natural resource studies (which are more social science oriented)	69.4%
Science and related fields	Biology, chemistry, physics, bio-chemistry, bio-physics, earth science, computer science, information technology, computer science, mathematics, and statistics Civil engineering, mechanical engineering, electrical engineering, environmental engineering, agricultural engineering, chemical engineering, computer engineering, geology, telecommunication, mine and energy, electronic engineering, meteorology, industrial engineering, (and related majors) Agricultural engineering, Agronomy, forestry, fishery, and animal-related agriculture fields (which are more natural science oriented)	30.6%

4.3.3. Data collection, sampling procedure, and samples

Data collection: The procedure of data collection started by a request made to the Ministry of Education, Youth, and Sport (MoEYS). After obtaining the MoEYS's permission, another request was sent to each university's management. There were three different ways universities cooperated with the researcher in the data collection process. Six universities allowed the researcher to distribute the questionnaires through an assigned personnel (generally in charge of academic affairs). Three universities asked the researchers to distribute the questionnaire directly to individual faculty members. And the other six universities allowed the researchers to meet and discuss with the department heads who would distribute the questionnaire further to faculty members. Despite the last practice (of the data collected through the facilitation of the department heads) could be criticized with regards to reliability, it was practically hard to avoid such situation in the studied context. Actually, the researcher requested the faculty members through an attached concept note (with instruction) and an envelope, so that the returned completed questionnaire could be sealed. This technique worked effectively, and most returned questionnaire were sealed.

The total number of questionnaire distributed was 1,151 sets (as of 11 December 2015), and the total number of questionnaire collected was 512 sets (as of 23 February 2016). Only 483 questionnaire sets were usable. Twenty-seven sets of the questionnaire were invalid due to three reasons – 15 containing missing data higher than 30 percent, 2 containing unengaged responses, and 10 questionnaires answered by non-target-respondents. In later stages, the other two cases of outliers were removed as the research outputs reported were too extreme and seemed to be inconsistent with the reported working years (see Table 4.6). The questionnaire was written in Khmer language. It should be noted that the consent form was not used, but the researcher attached a concept note (with instruction) to introduce the research study to the respondents.

Table 4.6: Characteristics of unusable data

Characteristics	Frequency
Total Distributed	1151
Total Collected	512
Total Usable	483
Respondents with missing > 30%	15
Non-respondents	10
Un-engaged respondents	2
Outliers	2

Note: Non-respondents means people who are not faculty; Un-engaged respondents refer to those who gave almost the same score to all items.

Sampling procedure: Because the majority of the universities were research-unengaged universities, the first stage of the sampling was purposive, with the aim of the researcher to recruit both research engaged and research unengaged universities. If random selection was done at this stage, it would be likely that the researcher could not obtain enough research-engaged faculty members to run the analysis of the research question four (that focused on what factors explain research outputs of Cambodian faculty members). Then, in the second stage after the institution selections, the participants of each institution were selected based on quota sampling: that is, an expected 60 percent of all faculty members from each university. But, in real data collections, the distribution of the questionnaires in certain universities did not reach the 60 percent benchmark. At certain selected institutions, it was difficult to approach individual faculty members to directly distribute the questionnaire – especially, part-time faculty members working in these selected universities because they generally just came to teach and did not stay long at the working places.

Samples: Table 4.7. below delineated the detailed characteristics of the 483 respondents (i.e. faculty members) participating in this current study. The majority of faculty members were male (77%), which somehow reflected the reality of gender distribution of the Cambodian faculty member population since the actual distribution was males-dominated. The age of faculty members ranged from 22 to 75, with the average of around 36 years old and a standard deviation of around 7 years old.

The majority of them (i.e. 63.8 percent) were from 31 to 45 years of age. About 11.2 percent reported having a Ph.D. degree as a terminal degree, which also reflected the true population characteristics.

Table 4.7. Demographic variables of respondents

Variables	Items	Frequency	Percentage
Institution orientation	Private	70	14.5%
	Public	413	85.5%
Institution location	Province	151	31.3%
	City	332	68.7%
Institution governance	Not MoEYS	78	16.1%
	MoEYS	405	83.9%
Gender	Female	101	20.9%
	Male	372	77.0%
	Missing	10	2.1%
Terminal degree	No Ph.D.	422	87.4%
	Ph.D.	54	11.2%
	Missing	7	1.4%
Terminal degree country	Cambodia	278	57.6%
	Foreign country	191	39.5%
	Missing	14	2.9%
Teaching role	More than teaching	132	27.3%
	Only teaching	321	66.5%
	Missing	30	6.2%
Discipline	Science and related fields	148	30.6%
	Social science and related fields	335	69.4%
Employment type	Part-timer	96	19.9%
	Full-timer	367	76.0%
	Missing	20	4.1%
Age	<=30 years olds	109	22.6%
	31-45 years old	308	63.8%
	>=46 years old	66	13.7%
Teaching hours	<=15 hours/week	250	51.8%
	>15 hours/week	233	48.2%

Note: There were a few more variables measured but not analyzed due to too many missing values. Age, teaching hours, and graduation years also contain missing values, but were replaced with their respective median scores. Please refer to Chapter 8 for further details about all quantitative variable characteristics of this study.

Most faculty members obtained Master's degree and there were faculty members whose terminal degree was bachelor degree – these two groups together (the non-Ph.D. group) accounted for 87.4 percent of the total sample. A large percentage of the sample size (i.e. 66.5 %) engaged only in teaching the main role at their current institution, while 27.3 percent engaged in more than teaching – such as being a dean, being a consultant, etc. Also, the majority of the samples were full-time faculty

members (76%) and obtained degrees in the field of social science and related ones (69.4%). The average teaching hours of the sample was a mean score of 17.58 hours per week and a standard deviation of 13.94 hours, suggesting that the hours of teaching varied strongly among faculty members. About 48.2 percent of the samples taught more than 15 hours per week.

Table 4.8., 4.9., and 4.10. revealed some cross-tabulated patterns of the participants in the study. Most Ph.D. degree-holding Cambodian faculty members were in their middle age (from 31 to 45). The same applied to those who reported obtaining degree from a foreign country, as 124 participants out of 191 participants who graduated from a foreign country were around the age of 31 to 45. In the sample, there were few Ph.D. degree holders working for private and city-based universities (i.e. only 3 faculty members for the private institutions and only 5 faculty members from the province-based institution). It is interesting to also note that, in the sample, the number of Ph.D. holders in both science and social science disciplines were almost equal (26 and 28, respectively). Faculty members graduating from a foreign country tended to fall more into the group who reported fewer than 15 hours of teaching (107 faculty members in the sample), while the locally graduating faculty members tended to fall more into the group reporting more than 15 hours of teaching (140 faculty members in the sample). Among the 54 Ph.D. holders, 36 held the degree from a foreign country and only 17 received their Ph.D. locally.

Table 4.8. Some cross-tabulations between age and other demographic variables

		Orientation		
		Private	Public	Total
Age	<=30	28	81	109
	31-45	37	271	308
	>=46	5	61	66
Total		70	413	483

		Location		
		Province	City	Total
Age	<=30	28	81	109
	31-45	110	198	308
	>=46	13	53	66
Total		151	332	483

		Teaching hours		
		<=15	>15	Total
Age	<=30	55	54	109
	31-45	164	144	308
	>=46	31	35	66
Total		250	233	483

		Degree		
		non-Ph.D.	Ph.D.	Total
Age	<=30	103	6	109
	31-45	260	41	301
	>=46	59	7	66
Total		422	54	476

		Degree country		
		Cambodia	Overseas	Total
Age	<=30	63	43	106
	31-45	177	124	301
	>=46	38	24	62
Total		278	191	469

		Discipline		
		Science	Social Science	Total
Age	<=30	49	60	109
	31-45	80	228	308
	>=46	19	47	66
Total		148	335	483

Table 4.9. Some cross-tabulations between terminal degree and other demographic variables

		Orientation		
		Private	Public	Total
Degree	non-Ph.D.	67	355	422
	Ph.D.	3	51	54
Total		70	406	476

		Location		
		Province	City	Total
Degree	non-Ph.D.	142	280	422
	Ph.D.	5	49	54
Total		147	329	476

		Governance		
		Not under MoEYS	Under MoEYS	Total
Degree	non-Ph.D.	63	359	422
	Ph.D.	12	42	54
Total		75	401	476

		Discipline		
		Science	Social Science	Total
Degree	non-Ph.D.	121	301	422
	Ph.D.	26	28	54
Total		147	329	476

		Teaching hours		
		<=15	>15	Total
Degree	non-Ph.D.	218	204	422
	Ph.D.	30	24	54
Total		248	228	476

		Position		
		Teaching and other roles	Only teaching	Total
Degree	non-Ph.D.	110	289	399
	Ph.D.	22	31	53
Total		132	320	452

Table 4.10. Some cross-tabulations between terminal degree country and other demographic variables

		Orientation		
		Private	Public	Total
Degree country	Cambodia	52	226	278
	Overseas	16	175	191
Total		68	401	469

		Location		
		Province	City	Total
Degree country	Cambodia	122	156	278
	Overseas	21	170	191
Total		143	326	469

		Discipline		
		Science	Social Science	Total
Degree country	Cambodia	66	212	278
	Overseas	80	111	191
Total		146	323	469

		Teaching hours		
		<=15	>15	Total
Degree country	Cambodia	138	140	278
	Overseas	107	84	191
Total		245	224	469

		Position		
		Teaching and other roles	Only teaching	Total
Degree country	Cambodia	77	184	261
	Overseas	51	134	185
Total		128	318	446

		Degree		
		non-Ph.D.	Ph.D.	Total
Degree country	Cambodia	259	17	276
	Overseas	155	36	191
Total		414	53	467

4.3.4. Quantitative instrument, variables, and measures

Quantitative instrument: The main instrument was a 6-page survey questionnaire. The questionnaire was piloted with 27 faculty members and refined before the actual distribution. The questionnaire contained four major sections:

- 1) individual research orientation section (i.e. research experience, research competence, research attitudinal orientation, and research motivation),
- 2) individual research output production section (consisting of 15 types of research outputs both published locally or internationally, and research intention items),
- 3) institutional research environment section (i.e. including the various characteristics of research support environment, the departmental leadership items, the research resources and facilities items, and the items measuring support from MoEYS and support from external sources), and
- 4) the final section that inquired on demographic information of the respondents and their institutions

These four sections responded to the three dimensions of the adapted ecological framework that ruled this current study (see Table 4.11.). Further information about these variables were explained in Chapter 3.

Table 4.11. Detailed variables in the conceptual framework

Demographic variables (11 variables)	**Independent variables of the 3 dimensions (15 variables)**	**Dependent variable**
• **Individual demographic variables** (1. Gender, 2. Age, 3. Terminal degree, 4. Terminal degree country, 5. Teaching role, 6. Employment type, 7. Discipline, and 8. Teaching hour) • **Institutional demographic variables** (1. Institutional orientation, 2. Institution location, 3. Institutional governance)	• **External dimension** (1. Support from ministry, 2. Support from external sources) • **Institutional and departmental dimensions** (1. General institutional research support, 2. Institutions with availability of research-capable members, 3. Departmental leadership, and 4. Institutional research resources and facilities) • **Individual faculty dimension** (1. Research experience, 2. Research competence, 3. Research attitudinal orientation, and 4. Research motivation). (These constructs were broken into different variables through Principle Component Analyses, all comprising 9 variables in total)	• **13 Research output indicators:** These indicators were composited the following ways for the main Zero-inflated negative binomial regression analyses: ▪ Weighted Composite score of research output indicators (13 indicators) ▪ Weighted Composite score of local research output indicators (6 indicators) ▪ Weighted Composite score of international research output indicators (6 indicators)
Note: In general, independent variables were measured by multi-item psychometric 6-point Likert scales.		

Variables: Table 4.11. illustrated the three functional groups of variables – i.e. the controlled demographic, the independent, and the dependent variables – for the quantitative analyses. It should be noted that, even though these variables of these functional groups were quantitatively operationalized and placed into the ecological framework as a model for testing statistical relationship, the three dimensions of the ecological framework were also used, in the qualitative study, as somewhat abstract guiding principles to explore the focused issues of research output production, research orientation, and research environment of Cambodian higher education from their subjective experience.

Measure of dependent variable: The focused dependent variable investigated was the research output indicators (as measured by a both locally published and engaged and internationally published and engaged research and research-related works). Originally, fifteen items were included: counting internally published books, internationally published journal articles, internationally published book chapters, internationally published conference proceeding, international conference presentations, internationally obtained research grants, locally published books, locally published book chapters, locally conference proceedings, local conference presentations, locally obtained research grants, and submitted research or consultancy reports, writing research proposal for grants, and supervising graduate students). The last two items were dropped from the analyses because most responses did not reflect the construct validity of the intended variable. Temporally speaking these 13 types of research output indicators were divided into two measures: 1) the 13 research outputs produced by the respondent during his or her services at their current institutions/universities and 2) the 13 research outputs produced by respondents while they were not working in their current institutions. By so doing, the researcher tried to exclude from the analyses any reported research outputs that were produced, for example, during the respondents' graduate education abroad.

International research production (6)		**Local research production (6)**		**Neutral type of research production (1)**	
IB	Published books with international publishers (*4)	**LB**	Published books with local publishers	**CL**	Written research reports or consultancy reports for donors (*2)
IA	Published research articles with international publishers (*4)	**LA**	Published research articles with local publishers		
IBC	Published book chapters with international publishers (*3)	**LBC**	Published book chapters with local publishers		
ICP	Published international conference proceeding (*3)	**LCP**	Published local conference proceeding		
ICPre	Presented paper at international conference (*2)	**LCPre**	Presented paper at local conference		
IRG	Obtained international research grants (*2)	**LRG**	Obtained local research grants		

Note: (* Weights). This table was presented and discussed already in Chapter 3: Conceptual and Methodological Frameworks.

It should be noted that the researcher also measured the period of services of the respondents (i.e. how long they have served their institution), so that the data can be standardized to see the research output trends per annum.

Measures of independent variables: Details about independent variables were discussed in the conceptual framework once already (Please refer to Chapter 3 for detailed explanations and sources). The following Table (4.12.) provided further detailed information about statistical treatments of the constructs, variables, and items by illustrating the internal consistency test values (i.e. Cronbach Alpha) that validated the construct of each variable. Principle Component Analyses, using Varimax rotation and the Eigen value > 1 benchmark, were conducted for each major construct – for example, research experience, research competence, research attitudinal orientation, institutional research support, etc. – within the three dimensions (i.e. individual, institutional and departmental, and external dimensions). The following explanations and Table 4.12. provided details of how constructs were conceptually defined, operationally measured, and validated:

- **Research experience:** conceptually referred to faculty members' levels of previous engagement or involvement in research activities during graduate studies or as working experience. This construct was measured originally by 6 items. It loaded only one factor (with the Eigenvalue of 3.33, the KMO statistics value of .832, and the Bartlett's test of sphericity significance value of less than .001). The variance explained was 55.55%. The Cronbach alpha value of .836 also indicated a good internal consistency among items.
- **Research competence** (measured originally by 14 items) loaded four factors: 1). ***Research production competence*** referred to faculty members' ability in writing, publishing, and presenting research works (measured by 3 items, having a .815 value of Cronbach alpha and an Eigenvalue of 1.029); 2). ***Research general competence*** referred to faculty members' ability in general research design, literature, data-handling, and quantitative and qualitative data analysis skills (measured by 5 items, having a .913 value of Cronbach alpha, and having an Eigenvalue of 7.41); 3). ***Research technological competence*** referred to faculty members' ability in using statistical, qualitative, and referencing software to manage and analyze research data (measured by 3 items, having a .804 value of Cronbach alpha, and having an Eigenvalue of 1.24), and 4). ***Research managerial competence*** referred to faculty members' ability in in various management skills from project management to financial management of research works (measured by 3 items, having a .747 value of Cronbach alpha, and having an Eigenvalue of 0.72). The KMO statistics of these research competence constructs was .913; The Bartlett's test of sphericity significance value was less than .001. And the variance explained was 74.32%.

- **Research attitudinal orientation (**measured originally by 9 items) loaded two factors: 1). ***Research emotional orientation*** referred to faculty members' emotion and feeling towards the values and interest in research works (measured by 6 items, having a .881 value of Cronbach alpha and an Eigenvalue of 4.62), and 2). ***Research behavioral orientation*** referred to faculty members' behavior and commitment towards the values and interest in research works (measured by 3 items, having a Cronbach alpha values of .541, and having an Eigenvalue of 1.13). The KMO statistics of the research attitudinal orientation variable was .885. The Bartlett's test of sphericity significance value was less than .001. And the variance explained was 63.83%.
- **Research motivation** (measured originally by 10 items) also loaded two factors: 1) ***Intrinsic research motivation*** referred to faculty members' perceptions on the importance and expectation of various intrinsic research rewards (as measured by 7 items, having a Cronbach alpha value of .926, and having an Eigenvalue of 6.01) and 2) ***Extrinsic research motivation*** referred to faculty members' perceptions on the importance and expectation of various extrinsic research rewards (measured by 3 items, having a Cronbach alpha value of .837, and having an Eigenvalue of 1.23). The KMO statistics of research motivation construct was .921. The Bartlett's test of sphericity significance value was less than .001. And the variance explained was 72.39%.
- **Institutional research support environment** (measured originally by 12 items) loaded two factors: 1) ***General institutional research support*** referred to perceptions on general institutional policy, strategy, motivation, working systems, and cultures to promote research activities and performance (measured by 9 items, having a .926 value of Cronbach alpha, and an Eigenvalue of 6.69), and 2) ***Institution with availability of research-capable members*** referred to perceptions on the condition of an institution whether it comprises research-capable faculty members and leaders to guide and assist research activities and performance (measured by 3 items, having a .852 value of Cronbach alpha, and an Eigenvalue of 1.31). The KMO statistics of institutional research support environment was .907. The Bartlett's test of sphericity significance value was less than .001. And the variance explained was 66.65%.
- **Departmental leadership** referred to perceptions on departmental leaders' attitudes, orientation, and competence in academic management and research profession (measured originally by 6 items) loaded only one factor (Eigenvalue = 4.52). The Cronbach alpha was .934, with the explained variance of 75.38%.
- **Research facilities and resources** referred to perceptions on institutional resources and facilities (such as funding, technology, academic resources, etc.) to support research activities and performance (measured originally by 7 items) loaded only one factor (Eigenvalue = 4.05). The Cronbach alpha was .875, with the explained variance of 57.89%.

- **Research support from ministry** referred to perceptions on various research supporting inputs or actions from the ministry governing the institution (measured originally by 4 items) loaded only one factor (Eigenvalue = 2.76), with a Cronbach alpha value of .848 and the variance explained was 68.97%.
- **Research support from external sources** referred to perceptions on various research supporting inputs or actions from external sources (such as donors, collaborators, etc.) (with originally 3 items) loaded only one factor (Eigenvalue = 2.58), with a value of .917 of Cronbach alpha. The variance explained was 85.83%.

Table 4.12. PCA's loaded components and their Cronbach's Alpha values

Variables	Items	Item descriptions	Cronbach's Alpha
Research experience	6	I have experience working with various research or consultancy projects; I have experience writing project reports or research reports; I have experience writing research papers for publication; I have attended and/or presented my research papers at academic conferences; I have thoroughly reviewed published research articles related to my field of expertise; I engaged actively in research during my graduate education (e.g. in research design, data collection, data analysis).	.836
Research production competence	3	Writing research grant proposal to apply for funding; Writing scientific research paper for publication; Presenting research paper at academic conference.	.815
Research general competence	5	Finding and synthesizing relevant literature effectively; Designing research study (e.g. designing questionnaire, developing conceptual framework, designing experiment); Collecting research data using proper instruments (e.g. interview, observation, focus group discussion); Analyzing quantitative data using statistics (e.g. test of difference, regression, factor analysis); Analyzing qualitative data using qualitative approaches (e.g. thematic analysis, content analysis, grounded theory).	.913
Research technological competence	3	Using quantitative data analysis software (e.g. SPSS, STATA, SAS, Matlab, R); Using qualitative data analysis software (e.g. Nvivo, Atlas.ti, MAXQDA); Using referencing software (e.g. Endnote, Mendeley, Zotero).	.804
Research managerial competence	3	Using advanced computing office skills (e.g. advanced tools in Word, in Excel, in Access, in PowerPoint); Managing project and financial activities (e.g. project planning, financial planning, project evaluation); Communicating fluently in academic English (i.e. both in verbal and written forms).	.747
Emotional research orientation	6	I clearly understand the values and benefits of research; I am highly committed to becoming a successful researcher; I am very much interested in doing research; I love sharing knowledge and experience; I love writing and always try to understand how to become a good writer; I love thinking about new ideas and ideas that bring improvement.	.881
Behavioral research orientation	3	I teach fewer courses and/or fewer hours; I can persevere hard and meticulous research works and challenges; I have a strong research network, both within and outside of the institution and both locally and internationally.	.541

Intrinsic research motivation	7	Achieving recognition and appreciation from students, peers, and university's leading members; Contributing new knowledge to the field as well as helping the society; Getting new research knowledge, skills, and experience; Enhancing networks and future collaboration; Getting a good job related to research in the future; Advancing professional expertise in the field; Having newer, clearer, and deeper knowledge and know-hows useful for teaching students.	.926
Extrinsic research motivation	3	Getting better and appropriate salary raises; Getting an administrative assignment or promotion; Getting commissions or other financial rewards.	.837
General institutional research support	9	My current institution has established clear research policy and research strategic/action plan; My current institution does not only have research policy but also implement research activities efficiently; My current institution offers great motivation in terms of financial rewards if staff conduct research; My current institution comprises a satisfactory salary scale conforming to the working conditions; My current institution is ready to build plan to create a position for researcher; My current institution has good and active research collaboration with other institutions (e.g. foreign universities, NGOs); My current institution provides adequate and necessary supports when staff want to engage in research activities; My current institution offers sufficient time to spend on research activities; My current institution offers great motivation in terms of non-financial rewards if staff conduct research.	.921
Institution with availability of research capable members	3	My current institution comprises professors and academics with high research competence and skills; My current institution comprises professors and academics with high research experience who can mentor other staff to do research; My current institution has research-capable and experienced leading members that are open for research activities.	.852
Research facilities and resources	7	Research funding from my institution itself; Research funding from other sources; Library and documents (e.g. academic databases, books, journals, archives); Technology (e.g. computer, internet, instructional technology); Research support staff; Research unit in the institution itself; Research facilities and equipment (e.g. labs, experimentation tools)	.875
Departmental leadership	6	My department leaders are highly regarded researchers in their field with strong research skills and competence; My department leaders truly understand the values of and benefits from research; My department leaders are very supportive of my efforts in research; My department leaders offer constructive comments and feedbacks which help me perform my best; My department leaders fulfill their leadership roles very well, with clear guidance and visions; My department leaders seriously consider my opinions when they have to make important decisions	.934
Support from ministry	4	My current institution receives clear research policy and strategic guidelines from the ministry in charge; My current institution receives enough local research capacity training from the ministry in charge; My current institution receives enough overseas fellowship, scholarship, or training from the ministry in charge; My current institution receives enough research funding from the ministry in charge.	.848
Support from external sources	3	My current institution obtains enough research funding or consultancy works from external donors or collaborating institutions; My current institution receives enough supported research facilities from external donors or collaborating institutions; My current institution receives enough research training from external donors or collaborating institutions.	.917
Note: Some variables – such as support from ministry and support from external sources – did not actually necessitate being tested with the principle component analysis because they basically obtained only three or four items.			

4.3.5. Data analyses

Data processing: Basically, there were several steps to manage the current study's data. First, after the collection of the questionnaire, the researcher checked the data manually and determined the finally approved coding schemes for each variable. Second, the researcher entered data into the basic spreadsheet database, i.e. Microsoft Excel. After the entry, the researcher did some exploratory data analyses using descriptive statistics (i.e. frequency, percentage, mean, standard deviation, skewness) to check certain errors during the data entry as well as to figure out missing values and outliers. Third, the researcher imported the clean, final Excel database into the specialized statistical software, SPSS (version 21), for further exploratory data analyses and some main data analyses. Descriptive statistics (i.e. frequency, percentage, counting, charts, cross-tabulation) were drawn from these analyses for reporting in this method chapter of the study. Principle Components Analyses (used to analyze the construct validity of the instrument, Cronbach alpha values (used to analyze the internal consistency reliability of the instrument), and basic statistical assumption testing (Pearson correlation r and tests of normality) were conducted in the SPSS software. Other data transformation and recoding were also done through the SPSS software. For the main Zero-inflated negative binomial regression, the Stata software (version 14) was used. Actually, SPSS software with embedded adds-on from R also has ability to analyze the Zero-inflated negative binomial model). However, the researcher decided to use the Stata software because it reported the Voung Test results to indicate whether the zero-inflated model fits with the data better than other Poisson or negative binomial models do.

Main data analysis methods: In Chapter 1, the presentation of the research approach already made it clear that each of the four research questions was answered by both the quantitative and the qualitative datasets. For the quantitative analyses, each research question took different statistical tests (see Table 4.14. below). Research question 1 was analyzed basically with descriptive statistics. Research question 2 and 3 were analyzed with descriptive statistics, independent sample t-test, and one-way ANOVA. After these analyses, the main quantitative analysis was conducted in research question four. It focused on variables at three dimensions (viz. external dimension, institutional and departmental dimension, and individual dimension) deemed to be associated with research output production. The zero-inflated negative binomial model was employed to capture the relationship between predictor variables and research output production scores (i.e. both the composite score and the composite score of local and international outputs).

- **Rationales for the ZINB:** The selection of zero-inflated negative binomial model was determined based on the shape of the data sets, that is, the count data, as represented by many faculty members reporting zero research outputs, so making the distribution skewed to the right. Also, the study used zero-inflated model because of the so-called "over-dispersion"

phenomenon (see Table 4.13.) whereby the value of the variance of the dependent variable (i.e. research output production) was much higher than that of the mean. Methodologically speaking, there exist other models that can be used for count and zero-excessed data – such as the zero-inflated poison regression or the Hurdle model. However, those models assume that the mean and the variance of the dependent variables are equal. So, these models cannot handle the over-dispersion characteristics of the current study's quantitative data set. Also worth noted was the fact that the ZINB yielded two models: the count model and the inflated model (to be discussed in Chapter 8), both of which provided the full picture of the explanatory factors of research outputs production of Cambodian faculty members.

Table 4.13. Underlying assumptions of Poisson and Negative Binomial Regression

	Poisson	**Negative binomial regression**
Type of outcome variable	Count or incidence rate	Count or incidence rate
Range of values	Non-negative	Non-negative
What is being modeled	Natural logarithm of outcome	Natural logarithm of outcome
Distribution of outcome	Dependent on the mean	Over-dispersed
Variance	Equal to the mean	Variance greater than the mean
Rate of event over time	Constant	Constant
Source: (Katz, 2011)		

- **Model specifications:** Before these main ZINB analyses, it should be noted that model specifications – i.e. which independent variables should be included in the models – have to be clearly defined. To do that, bivariate simple linear regression and simple logistic regression were conducted with each of the independent and the demographic variables (see Table 4.11.). For the bivariate simple linear regression, the dependent variable was the logarithmic composite weighted research output score of 208 faculty members who produced at least one research output. For the simple logistic regression, the dependent variable was the dichotomized research output (0 = no output; 1 = at least one output). These approaches aimed to test the criterion validity of the relationship between the specific independent and demographic variable and the respective dependent variable. Only variables significantly related to research outputs (both the dichotomized and the logarithmic research output scores) would be included in the main analyses to identify what factors have an effect or predict research outputs of Cambodian faculty members. It should also be noted that at there are three main separate model analyses of the relationship between the specified independent and demographic variables sets and the composite weighted research output score. Further moderation analyses were conducted after these main model composite analyses. (Please refer to the conceptual and mathematical model specifications and further discussions in Chapter 8).

Table 4.14. Quantitative data analysis methods

Research questions	Specific objectives	Specific questions answered	Specific methods	Expected findings
Research question 1	Trends and characteristics of researchers and research outputs	How engaged and productive are Cambodian faculty members in research?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	Frequency, percentage, graph, and cross-tabulation
Research question 2	Trend of research orientation variables (i.e. research experience, research competence, research attitudinal orientation, and research motivation)	How experienced, competent, attitudinally oriented, and motivated are Cambodian faculty members?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	Frequency, percentage, and graph
	Patterns between research orientation variables and demographic variables	Is rating on research experience, competence, attitudinal orientation, and motivation differentiated by demographic attributes?	Independent sample t-test and one-way ANOVA (according to the number of attribute of each demographic variable)	Table of statistical difference and significance
Research question 3	Trend of research support environment variables	How supportive is Cambodian research environment?	Descriptive statistics (i.e. frequency, percentage, mean score, and graphical displays)	Frequency, percentage, and graph
	Patterns between research support environment variables and demographic variables	Is rating on research support environment variables differentiated by distinctive demographic attributes?	Independent sample t-test and one-way ANOVA (according to the number of attribute of each demographic variable)	Table of statistical difference and significance
Research question 4	Factors influencing research outputs	What factors explain research outputs of Cambodian faculty members?	Zero-inflated negative binomial regression models and moderation analyses	Table of correlation; table of coefficient and its significance values; and model fits statistics
Note: In Research Question 4, before the main analyses, bivariate analyses were conducted to specify the model, using simple linear and simple logistic regressions. The mixed-methods integration technique was conducted in the discussion section, using the joint-display matrix, by showing key findings of each of these four research question side by side in the same table.				

4.3.6. Validity and reliability

These statistical models had a number of statistical assumptions. For the first three research questions, most of the variables were normally distributed, and so independent sample t-test and one-way ANOVA were appropriate for the statistical significant differences aimed at observing whether different demographic variable attributes showed different trends of research orientation and research support environment. For the research question four, analyses of zero-inflated negative binomial regression, using the Stata software, contained the Vuong Test, which was a theoretically accepted test to detect whether using this zero-inflated negative binomial model fit the data better than using other models of the same count-data family – such as Poisson regression or negative binomial regression. Missing data, outliers, and unengaged responses were evaluated and removed from the analyses, as earlier discussed. Also the fact that the use of Principle Component Analyses and Cronbach Alpha internal consistency tests to prove the validation of the psychometrically-measured independent variables was a common practice in quantitative and attitudinal scale analyses. Some other assumption tests (e.g. multi-collinearity and suppression effects) were conducted before running the main analyses, using the bivariate Pearson's correlation r matrix to reflect their existence. Variables that seemed to generate suppressor effects or create multi-collinearity in the models were removed from the analyses. Further discussions were detailed in Chapter 8.

Highlights of quantitative analysis procedure:
Data collected → Data errors and assumptions checked → Data recoded and transformed → Exploratory data analyses → Data reliability and validity analyses (with Principle Component Analyses and Cronbach Alpha tests) → Bivariate linear and logistic regression analyses → Zero-inflated negative binomial regression models (and further assumptions and model fit analyses) → Moderation analyses → Final patterns of relationship concluded.

4.4. Mixed-methods integration methods

As earlier mentioned, the study employed mixed-method approach, with the convergent design. Creswell (2015) and other researchers (such as Onwuegbuzie & Leech, 2006; Caracelli & Greene, 1993) pointed to a number of strategies to collect, analyze, and integrate data in mixed-method approaches. Those strategies vary according to the design selected, but they generally fall into several stages – including data reduction, data display, data transformation, data correlation, data consolidation, data comparison, and data integration (Onwuegbuzie & Leech, 2006). They also pointed to the difference between mixed-methods and multi-methods. The current study, in a more specific sense, was not only a mixed- but a multi-methods study because, for each of the qualitative and

quantitative dataset, more than one method was used. As for the mixed-method characteristics of this study, the current researcher used a data integrating technique, called Joint Display Matrix, to analyze and interpret the qualitative and quantitative data in this study together, after the separate analyses of each data set was conducted. In this study, the Joint Display Matrix did not reach its criticality due to time constraint. The study's Joint Display Matrix only brought the synthesized qualitative and quantitative results into a side-by-side comparison. Such integration aimed to do two things: first, it triangulated both types of the data to seek convergence or divergence; second, it sought to identify complementarity or fulfilling aspects that one type of data could not reveal.

The fundamental principle of mixed-methods research (according to Johnson and Turner, 2003, as cited by Clark and Ivankova, 2016) is the complementary strengths and the non-overlapping weaknesses of the approach through the so-called integration or mixing characteristics. Generally, the integration can be done at three stages: during the data instrument design and collection stage, during the data entry and analyses stages, and in the data interpretation stages. If the researchers integrate the quantitative and qualitative analyses at all stages, the integration is more a complete integration. If the researchers integrate at certain stages, say only in the interpretation stage, it is called a limited integration. In this current study, the integration technique of the mixed-methods analysis was conducted only at the interpretation stage (i.e. the discussion stage), while, in the finding sections, both the qualitative and quantitative findings were separately presented in details. Despite such "limited integration", in many practical cases as reflected by previous studies, such integration technique was an acceptable one. These integration analyses, in overall, provided an inclusive summary of the study findings and also revealed the gaps in this current study that further studies would benefit from. The use of this method made this current study different from most previous ones that used only one type of data set.

Highlights of mixed-methods analysis procedure
Qualitative and quantitative data analyzed separately based on each research question → Joint-display matrix discussed at the integration stage → Reflection of the mixed-method analysis into the main conclusions → Final discussions and conclusions

After all, this study's mixed-method design was the convergent design and the main mixed-method integration analysis was conducted in the discussion section through the joint-display matrix method, where qualitative and quantitative finding were put side by side in the same table. The using of the joint-display matrix was more of the attempt to pragmatically use the different type of data to complement each other, while also spotting the special cases of contradictions and gaps to offer critical discussions on the validity and reliability of the findings and on further studies.

4.5. Synthesis of the research designs and methods

After all, this current study employed two main types of data (with mixed and multiple analyses) that fit its comprehensive scope to achieve its research purpose.

First, *qualitative interview data* was collected from 50 key informants – including 5 policy makers, 11 leaders of university and/or research unit, 31 faculty members, and 3 external stakeholders. Only 6 percent of them was female, and about 32 percent was not research-engaged. Most interviewees aged from 31 to 40 years old (56%). Analyses of the qualitative interview data basically comprised *thematic analysis* method, using the 3-dimension Ecological Framework as guiding principles. The procedure of the thematic analysis in this study involved transcribing recorded interviews, coding the transcripts at three levels, categorizing the codes-based themes that specifically answer each research question, and finally quantifying the third-level themes and calculating the percentage. Some case analyses were conducted to offer more explanation to the main qualitative thematic analyses.

The second portion of data was the *quantitative survey data* set based on questionnaire's responses of 483 faculty members from 15 universities in the country. The quantitative data looked at the statistical trends and patterns of relationship among variables of the 3-dimension Ecological Framework. Participants were male dominated (77%), mostly non-Ph.D. degree holders (87.4%), and mostly younger and middle-aged academics (with the average age of 36.67 years old). They also came from a variety of institutions, comprising both public and private universities, province-based and city-based universities, and universities under different ministerial governances. In the quantitative analyses, the study first *statistically described* all the focused variables at the three dimensions (viz. external research supports, institutional and departmental research supports, and individual research orientation) and the trend of 13 research output production indicators (i.e. the dependent variable) of Cambodian faculty members during their services at their current institutions. Next, the study employed various difference and correlational statistical tests to analyze patterns between demographic variables and those focused variables of the three dimensions. Finally, the study employed *zero-inflated negative binomial model*s to capture the relationship between those independent variables of each dimension and the weighted composite and separate scores research output production indicators.

The mixed-methods integration was finally conducted in the discussion section, using the joint-display matrix to see the complementarity and controversy between the qualitative and quantitative data. This integration analysis basically aimed to fulfill the gaps of previous studies that tended to use only one type of data. These mixed and multiple methods for both data sets were pragmatic ways to offer the most informative, reliable, and values-adding explanations for the focused issues of this current study.

CHAPTER 5: RESEARCH OUTPUTS AND RESEARCH ACTIVITIES OF CAMBODIAN FACULTY MEMBERS: FINDING I

The lack of academic studies that measure research outputs of Cambodian faculty members is one main research problem leading to the conduct of this current study. This chapter offered findings (from a snapshot of 483 faculty members from 15 higher education institutions in Cambodia) to that particular research problem: how productive are Cambodian faculty members in terms of research outputs during their services in their current higher education setting? It is important to closely investigate the generic and specific trends of researchers and their research outputs as it gives a more objective understanding of what it is like to talk about research in Cambodian higher education in its current context. The presentation of this chapter started from the quantitative results (i.e. the trends and patterns of research outputs) and was followed by the qualitative results (i.e. perceptions and case analyses on the current research activities and performance of Cambodian faculty members). A short synthesis of the key findings was presented at the end of this chapter.

5.1. Quantitative results

5.1.1. Cambodian research-engaged faculty members: trends and patterns

This section presented the statistical results of Cambodian faculty members who produced research outputs and those who did not produce research outputs at all during their services at their universities/institutions. From the total sample of 483 faculty members, Figure 5.1. illustrated percentage of faculty members who produced at least one research output and the percentage of those who did not produce any research output at all. There were 13 research output indicators observed. The figure revealed that the number of faculty members who did not produce any research output was very high – for example, 97.31 percent of the 483 respondents had never produced book chapters with international publishers, 92.75 percent had never produced any books with international publishers, and 92.13 percent had never published any journal articles in international journal outlets. On the other hand, most faculty members reported engaging in presenting papers at local conference (22.15 percent), publishing books with local publishers (18.01 percent), and writing consultancy or research reports for donors (15.11 percent). Despite being the most-reportedly-produced research outputs, the percentage of faculty members who had never produced any of these three items [i.e. presenting paper at local conference, publishing books with local publishers, and writing consultancy report] are still very high (i.e. 77.85% in terms of presenting paper at local conference, 81.99% in terms of publishing books with local publishers, and 84.89% in terms of writing research reports for donors, respectively).

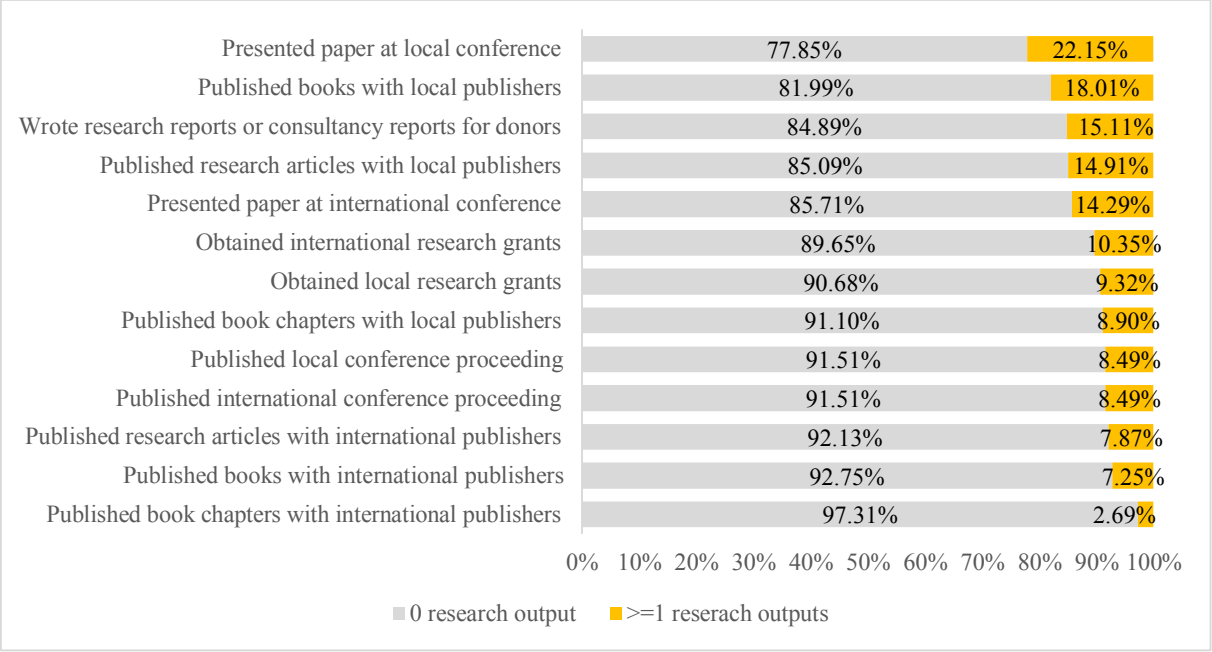


Figure 5.1. Percentage of faculty members producing and not producing each type of research output indicator

Offering further clarification, Table 5.1. indicated that there were hardly any individual having produced more than five research outputs during their services at their current universities/institutions. The table showed that the average score of each type of the observed research output indicator of Cambodian faculty members in the sample was less than 1 output during their services at their current universities/institutions.

Figure 5.2. offered some descriptive pattern analyses of researchers in different institutions. Universities/institutions in terms of number of faculty members who produced research outputs could be classified into three groups in this sample. That is to say, the first group (i.e. U1, U2, and U6) was institutions with faculty members reporting at least one research output more than faculty members who reported no research output at all. The second group (i.e. U3, U4, and U5) was universities/institutions with similar number of faculty members who produced research output and those who did not. The rest of the selected universities/institutions fell into the third group (i.e. U7, U8, U9, U10, U11, U12, U13, U14, U15) whereby faculty members reporting no research output outnumbered faculty members who produced at least one output. As described in the method section, the first category and the second category were basically public and city-based universities/institutions. This particular pattern of variation among universities implied that only certain institutions tended to have faculty members engaging in research activities. Further analyses in Chapter 8 would inferentially revealed these different patterns.

Table 5.1. Frequency, percentage, and mean score of faculty members producing each type of research output

Research output indicators	0	1	2	3	4	> = 5	N	Mean	SD
Published books with international publishers	448	19	9	2	2	3	483	0.15	0.73
	92.75%	3.93%	1.86%	0.41%	0.41%	0.62%	100%		
Published research articles with international publishers	445	24	7	2	2	3	483	0.14	0.61
	92.13%	4.97%	1.45%	0.41%	0.41%	0.62%	100%		
Published book chapters with international publishers	470	5	5	2	1	0	483	0.05	0.35
	97.31%	1.04%	1.04%	0.41%	0.21%	0.00%	100%		
Published international conference proceeding	442	23	10	5	1	2	483	0.15	0.58
	91.51%	4.76%	2.07%	1.04%	0.21%	0.41%	100%		
Presented paper at international conference	414	33	17	4	2	13	483	0.37	1.32
	85.71%	6.83%	3.52%	0.83%	0.41%	2.69%	100%		
Obtained international research grants	433	27	8	6	4	5	483	0.25	1.20
	89.65%	5.59%	1.66%	1.24%	0.83%	1.04%	100%		
Published books with local publishers	396	36	19	13	5	14	483	0.43	1.17
	81.99%	7.45%	3.93%	2.69%	1.04%	2.90%	100%		
Published research articles with local publishers	411	30	18	9	3	12	483	0.36	1.09
	85.09%	6.21%	3.73%	1.86%	0.62%	2.48%	100%		
Published book chapters with local publishers	440	18	8	6	4	7	483	0.24	1.01
	91.10%	3.73%	1.66%	1.24%	0.83%	1.45%	100%		
Published local conference proceeding	442	26	11	3	1	0	483	0.13	0.49
	91.51%	5.38%	2.28%	0.62%	0.21%	0.00%	100%		
Presented paper at local conference	376	46	30	11	11	9	483	0.52	1.33
	77.85%	9.52%	6.21%	2.28%	2.28%	1.86%	100%		
Obtained local research grants	438	27	12	3	2	1	483	0.15	0.55
	90.68%	5.59%	2.48%	0.62%	0.41%	0.21%	100%		
Wrote research reports or consultancy reports for donors	410	41	16	5	3	8	483	0.31	0.98
	84.89%	8.49%	3.31%	1.04%	0.62%	1.66%	100%		

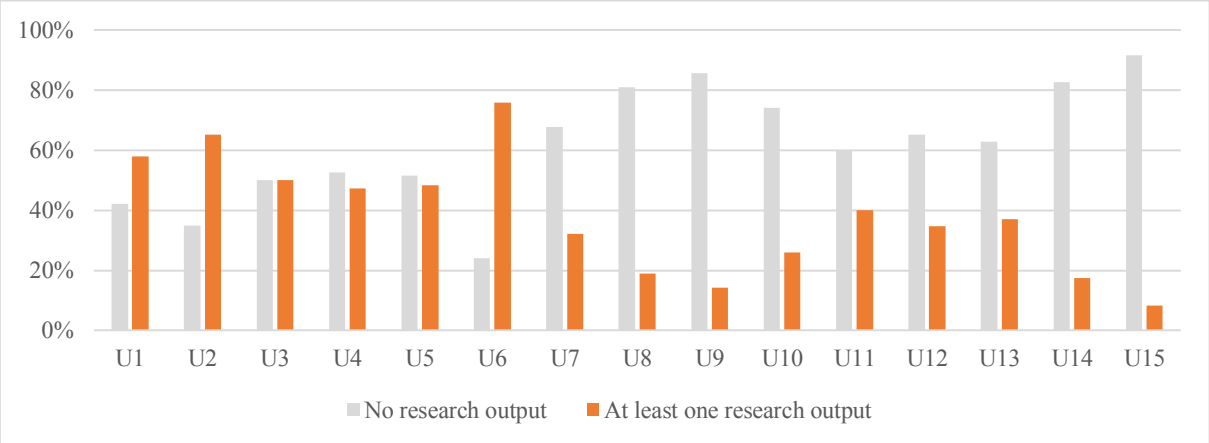


Figure 5.2. Percentage of faculty members producing or not producing research output by selected universities/institutions

5.1.2. Characteristics of exact research outputs: trends and patterns

Separate research output trends: The next finding presentation focused on the frequency and percentage of exact research output indicator counted. (The unit of analysis was the research output indicator). In the above section, the researcher emphasized the characteristics of faculty members who produced or did not produce research outputs; in this section, the researcher presented the statistical results of exact research output indicators reported by the 483 participants.

Table 5.2. Frequency and percentage of each type of research output indicator

Research output indicator	1	2	3	4	>=5	Total	Percentage
Published books with international publishers	19	18	6	8	21	72	4.60%
Published research articles with international publishers	24	14	6	8	16	68	4.35%
Published book chapters with international publishers	5	10	6	4	0	25	1.60%
Published international conference proceeding	23	20	15	4	10	72	4.60%
Presented paper at international conference	33	34	12	8	92	179	11.44%
Obtained international research grants	27	16	18	16	42	119	7.60%
Published books with local publishers	36	38	39	20	76	209	13.35%
Published research articles with local publishers	30	36	27	12	68	173	11.05%
Published book chapters with local publishers	18	16	18	16	47	115	7.35%
Published local conference proceeding	26	22	9	0	5	62	3.96%
Presented paper at local conference	46	60	33	44	67	250	15.97%
Obtained local research grants	27	24	9	8	5	73	4.66%
Wrote research reports or consultancy reports for donors	41	32	15	12	48	148	9.46%
Total	355	340	213	160	497	1565	100.00%

Table 5.2. showed that the total research outputs of the 483 respondents in this study's sample comprised a total of 1,565 research outputs. Figure 5.3. further showed that the five most reported research outputs were local products (except, international conference presentation) – namely, local conference presentation (15.97% of the total 1,565 exact research outputs), locally published books (13.35% of the total 1,565 exact research outputs), international conference presentation (11.44% of the total 1,565 exact research outputs), locally published journal articles (11.05% of the total 1,565 exact research outputs), and consultancy or research reports for donors (9.46% of the total 1,565 exact research outputs). International research outputs were not actively performed by Cambodian faculty members. Moreover, regardless of whether it was international or local research works, the most engaged type of research activities/outputs was conference presentation, covering 27.41 percent of the total reported research outputs (see Figure 5.4.). Besides the revealed tendency towards more local research outputs reported and more conference presentation as engaged activities/outputs, these figures also implied that certain types of academic publications (such as, journal articles and book chapters) were not commonly engaged by Cambodian faculty members.

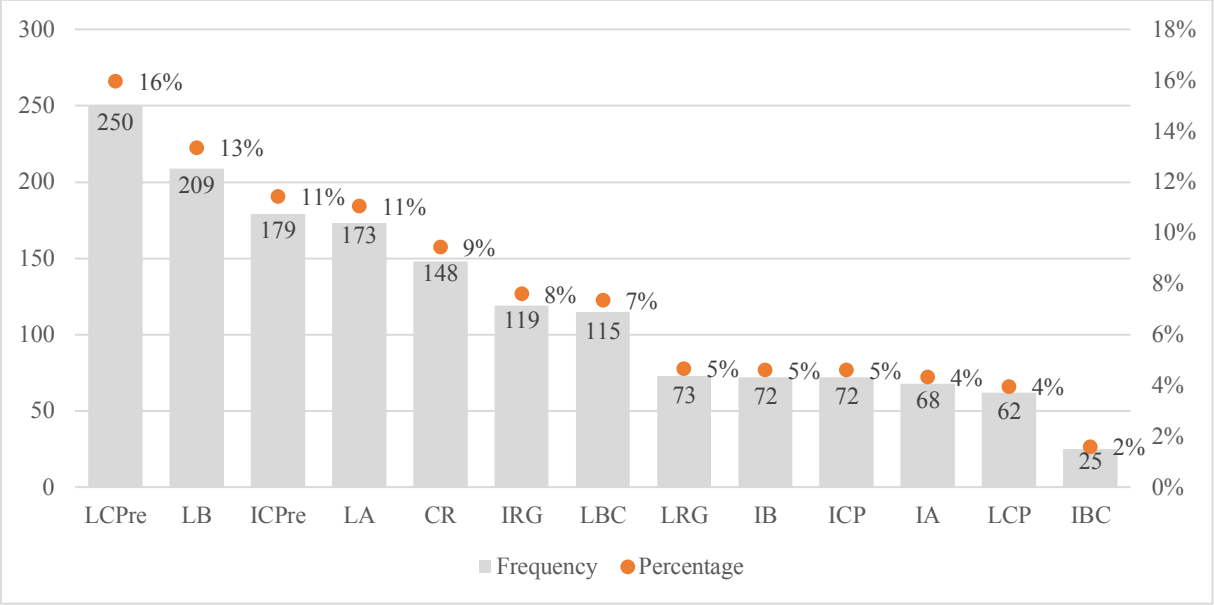


Figure 5.3. Total number and percentage of each indicator of research output[29]

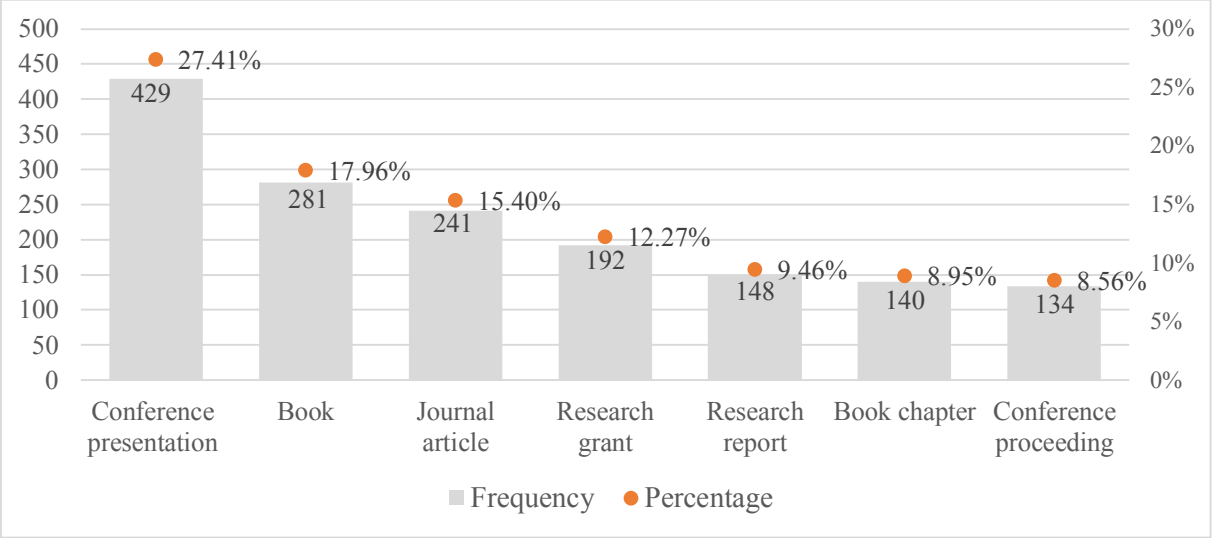


Figure 5.4.Total number and percentage of research output by specific type

Next, the finding illustrated the composite score of research output indicators by Cambodian faculty members. The composite score was calculated by summating all the 13 types of indicators together. There were 4 indicators of composite research output score presented in Table 5.3. – i.e. composite research output score, composite weighted research output score, composite research output score divided by duration of services (in years), and composite weighted research output divided by duration of services (in years).

[29] Note: IB = International Book; IA = International Journal Article; IBC = International Book Chapter; ICP = International Conference Proceeding; ICPre = International Conference Presentation; IRG = International Research Grants; LB = Local Book; LA = Local Journal Article; LBC = Local Book Chapters; LCP = Local Conference Proceeding; LCPre = Local Conference Presentation; LRG = Local Research Grants; and CR = Consultancy or research reports

Composite research output trends: Table 5.3. showed that the average score of composite research output was 3.24 (with a much larger standard deviation value of 6.67). The distribution was very much skewed to the right. This result indicated that, in average, the respondents in this study produced 3.24 research output during their services at their current institution. Table 5.3. showed further that Cambodian faculty members produced in average less than one research output per year of working (Mean = .404; Standard deviation = .904). Despite skewed to the right (with the value of standard deviation higher than the mean, such distributions of the study's sample, in some ways, offered the image of low and limited research outputs of faculty members in this study. And it also showed huge gaps (i.e. variation) between those who were not research engaged and those faculty members who were research productive (with the minimum of 0 research output to the maximum of 57 reported research outputs).

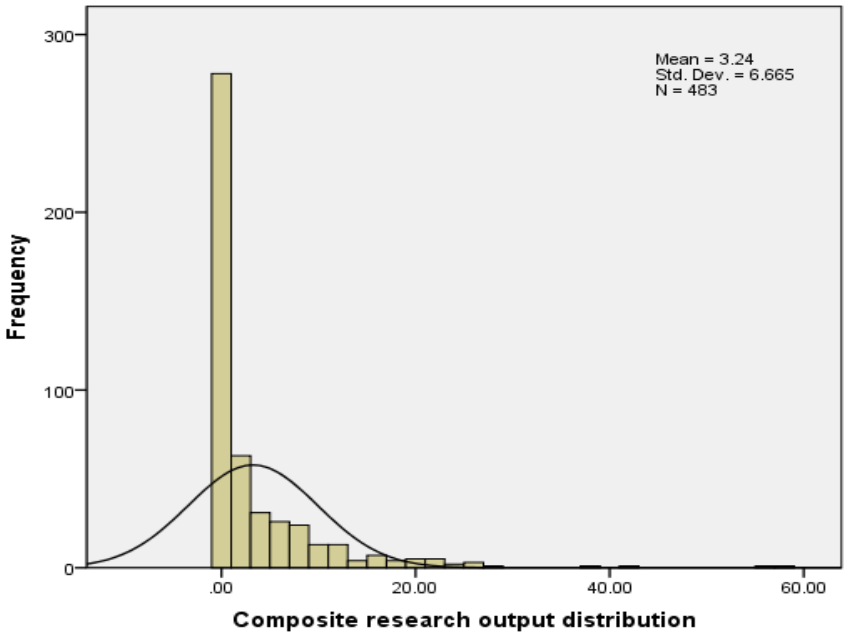


Figure 5.5. Distribution of original composite research output score

Table 5.3. Central tendency and variation of composite research output scores

Variables	N	Mean	Std. Deviation	Skewness	Kurtosis	Sum
Composite research output score	483	3.24	6.67	3.82	20.79	1565.00
Composite weighted research output score	483	5.24	11.19	4.14	24.54	2533.00
Composite research output (divided by number of working years as of 2016)	483	.40	.90	3.80	17.83	195.17
Composite weighted research output (divided by number of working years as of 2016)	483	.68	1.58	4.36	25.68	329.31

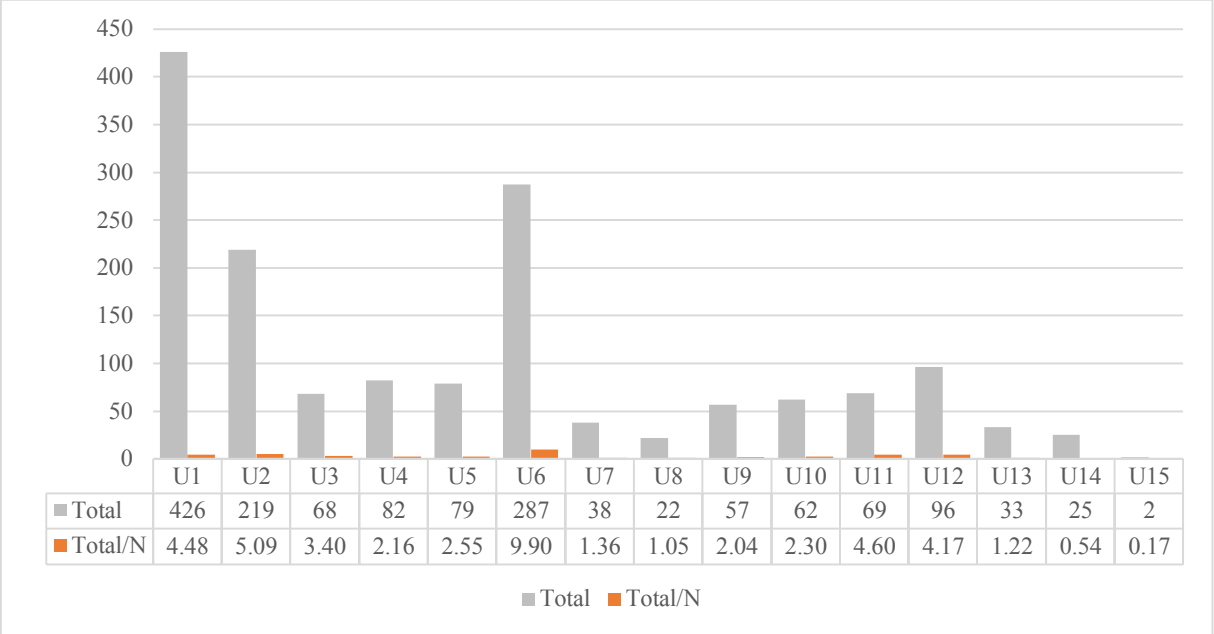
Research output of extreme cases: While the result revealed that, in general, research outputs were low, there were some outliers (i.e. the extreme cases) in the study's sample. The box below presented the detailed characteristics of two cases of these outliers: one case reported more than 40 outputs during his service at his institution and another case produced 9 international research outputs during his service at his current institution. Basically, these two proliferate researchers were active with international publications, were doctoral degree holders, graduated from a foreign country, taught fewer hours (only 3 or 4 hours per week), were full-timers, and worked at public, city-based universities (i.e. U1 and U6). One of them worked for more than 10 years and another more than 20 years at their institutions. Both rated high on individual research orientation variables (i.e. research experience, research competence, and research behavioral attitudes). However, in terms of institutional and external support environment variables, one of them tended to show strong satisfaction, while another showed the opposite opinion.

Table 5.4. Characteristics of extreme cases (i.e. highly productive faculty members) in the sample

Characteristics	Extreme case 601 characteristics	Extreme case 196 characteristics
Key research outputs	Published 6 international journal articles and presented at 3 international conferences	Published 5 international journal articles, published 1 book with international publisher, presented at 13 international conferences, and obtained 21 international research grants
Key demographic variables	U6; Agriculture; Male; Ph.D.; Overseas; Teaching and others; Science; Full-time; Age = 32; Employment year = 10 years; Teaching hours = 4 hours per week	U1; Social Science; Male; Ph.D.; Overseas; Only teaching; Social science; Full-time; Age = 44; Employment year = 20 years; Teaching hours = 3 hours per week
Rating on research experience	4.17/5	3.5/5
Rating on research production competence	3.33/5	3.67/5
Rating on behavioral research attitudes	3.33/5	4/5
Rating on research extrinsic motivation	4.67/5	3/5
Rating on perception on general institutional support	4.33/5	2.89/5
Rating on perception on research resources and facilities	4.71/5	2.71/5
Rating on perception on departmental leadership	4.67/5	3.67/5
Rating on perception on ministry support	4.25/5	2.75/5
Rating on perception on external support	3.67/5	2.67/5

Research outputs by institutions: Figure 5.6. showed that three universities (U1, U2, and U6) among the selected 15 institutions stood out in terms of exact total research outputs. The outputs of these 3 universities together covered around 60 percent of the total reported research outputs in this study. However, when divided by the sample size, U6's research outputs stood out – that is to say, one

faculty member from this university in average produced almost 10 research output. (It should be noted that this was the sample characteristics only and could not be generalized). Generally, these institutions were public universities. Two of them were under Ministry of Education, Youth, and Sport (MoEYS), and one of them was not under MoEYS. All of them were located in Phnom Penh city. The rest of the institutions reported much lower research outputs. Again, what could be learnt from this illustration was that the gap was huge between universities with higher research output production and those with lower research output production. In other words, only certain universities (generally, public and city-based ones) had more research-active and research-productive faculty members.



	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15
Total	426	219	68	82	79	287	38	22	57	62	69	96	33	25	2
Total/N	4.48	5.09	3.40	2.16	2.55	9.90	1.36	1.05	2.04	2.30	4.60	4.17	1.22	0.54	0.17

Figure 5.6. Frequency of research outputs by universities/institutions

Research outputs by place of production: Noticeably, the next analysis showed that international research output production was scarce as most reported research outputs were either local research products or consultancy and research report (except the trend of international conference presentation) (see Table 5.5. and Figure 5.7.). It should be noted that the composite international research output score was calculated by summating the six international output indicator together and the composite local research output indicator score was computed by summating all local research output indicators together. The mean score, the total frequency, and the percentage of exact international research outputs (Mean = 1.11, with 535 total reported research outputs, an equivalence of 34.19%) were lower than those of the local research outputs (Mean = 1.83, with 882 total research outputs, an equivalence of 56.36%). The rest were the reported consultancy or research reports (with the total research outputs of 148, an equivalence of 9.46%). These statistical characteristics offered more evidence to conclude that locally engaged research activities and locally published research outputs were dominant in Cambodian higher education context.

Table 5.5. Central tendency and variation of international and local research outputs

Variables	N	Mean	Std. Deviation	Skewness	Kurtosis	Sum
Composite international research output score	483	1.11	3.52	6.64	64.26	535.00
Composite local research output score	483	1.83	3.74	3.07	11.52	882.00
Composite weighted international research output score	483	2.81	7.91	4.62	27.37	1355.00
Composite weighted local research output score	483	1.83	3.74	3.07	11.52	882.00

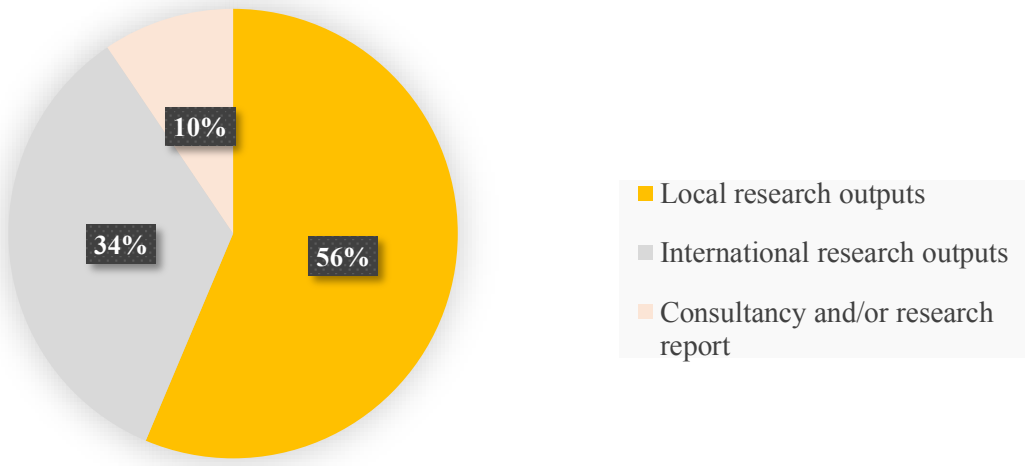


Figure 5.7. Percentage of research outputs by places of publication

Research outputs by disciplines: From the disciplinary perspective, the difference in research outputs was shown in Table 5.6. and Figure 5.8 below. It was obvious that most reported research outputs were produced by faculty members in the fields of social science and related ones (a total of 1,020 reported research outputs, an equivalence of 65.18% of the total 1,565 reported research outputs in this study), while only 545 (or 34.82%) were research products of faculty members from the field of natural science and related ones. The lesson from this finding was clear: research outputs in social science and related fields dominated the research output trends in science and related fields.

A quick synthesis of quantitative finding on characteristics of research-engaged faculty members and research outputs in the current higher education setting: It was clear from the descriptive analyses that the number of researchers and their research outputs tended to be still low and limited. When perceived from typological, institutional, disciplinary, and production places, the trend tended to be dependent and orientated towards particular attribute – namely, more of conference presentation works, more of local research outputs, more products from certain public and city-based institutions, and more of research outputs of social-science and related fields. This, however, should be understood within the scope of the sample of 483 faculty members of the 15 selected institutions in the country.

Table 5.6. Frequency of each type of research output indicators by disciplines

Items	Science and related fields	Social science and related fields	Total
Published books with international publishers	28	44	72
Published research articles with international publishers	32	36	68
Published book chapters with international publishers	6	19	25
Published international conference proceeding	34	38	72
Presented paper at international conference	80	99	179
Obtained international research grants	43	76	119
Published books with local publishers	69	140	209
Published research articles with local publishers	42	131	173
Published book chapters with local publishers	29	86	115
Published local conference proceeding	25	37	62
Presented paper at local conference	81	169	250
Obtained local research grants	23	50	73
Wrote research reports or consultancy reports for donors	53	95	148
Total	545	1020	1565
Percentage	34.82%	65.18%	100.00%

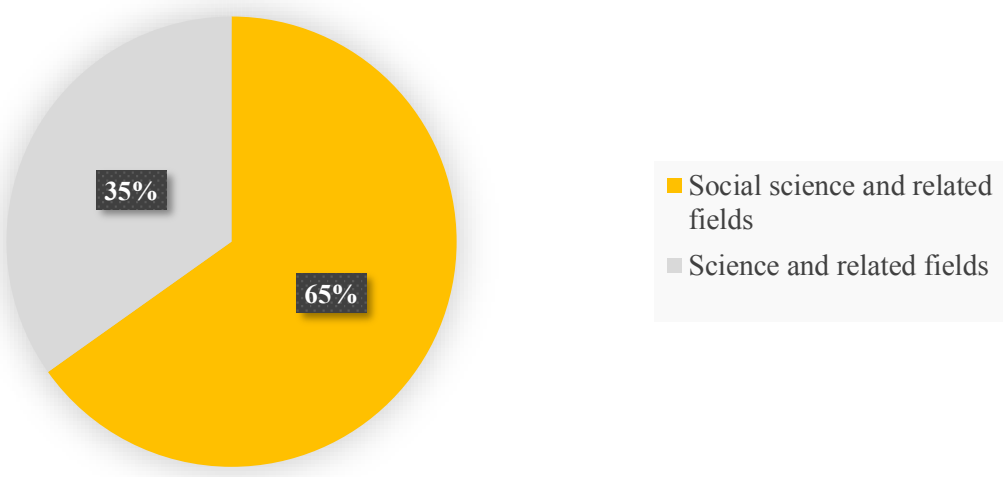


Figure 5.8. Percentage of research outputs by disciplines

5.2. Qualitative results

The main qualitative interview inquiry included one main question: "what is your overall perception towards the current trends of research activities and research performance of Cambodian faculty members," or "what is it like to talk about research performance in Cambodian higher education sector?" In the actual interview, other related questions were asked for clarification and for further information, using basically the semi-structured interview techniques. All those questions aimed to

generate generic perspectives of the interviewees towards the trends of research activities and performance of Cambodian faculty members and their higher education institutions. Findings were presented in three modes: 1). the emerging themes and sub-themes from the interview (i.e. the perceived trends of current research activities and research performance), 2). the transcript-based quotes from the interviewees, and 3). the quantified qualitative data of each level-3 theme in the form of frequency and percentage (see Table 5.7. below). Some further cases were illustrated just to offer some phenomenological experiences of the interviewees.

Thematic analyses: The emerging themes reflecting participants' perceptions towards the current trends of research activities and performance of Cambodian faculty members and their institutions (as shown in Figure 5.9.) came in three categories, with its own particular sub-themes (as shown in Table 5.7.). The first identified main theme was the general perception of "limited research performance but increased research awareness." About 80 percent of the 50 participants offered some opinions that reflected this major theme. The second main theme was "dependent and niched research activities," with 56% of the participants raising similar viewpoints supporting it. And the third main theme was 'less relevant research quality and impacts', with 76% of the interviewees discussing ideas related to this theme.

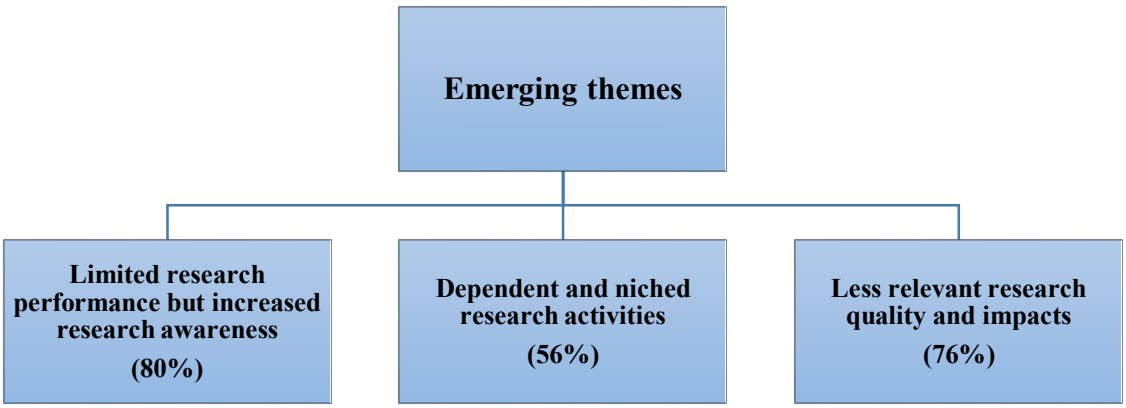


Figure 5.9. Emerging themes on perception towards research activities and performance of Cambodian faculty members and universities

The research performance and activities were perceived as still very limited as most participants (80%) raised this particular theme in certain ways as they reflected from their own working experience and their thinking about their peers' situation. The interviewees generally believed that Cambodian higher education institutions have been teaching-oriented and that research has not been a defined role for faculty members. However, they assumed that the awareness of research functions at higher education institutions and of faculty members has been promoted in certain ways, and this promoted awareness tendency is a recent phenomenon. Looking at the issue from a temporal perspective, most respondents

acknowledged that the research culture has changed in certain way in Cambodia as they reflected through the current research support from the HEQCIP program of the Department of Higher Education, MoEYS and from their belief that returned graduates educated in foreign universities have brought back research knowledge, skills, and experience to their current universities.

The second major theme indicated that most participants view Cambodian research activities and performance as a movement that is 'still very dependent'. It was seen dependent in three senses. First, they thought that research depends very much on research funding and assistance from external donors, without which there would be no or fewer research activities at Cambodian universities. Some research-experienced ones reported that research fund may come in the forms of research collaboration or consultancy works. Second, they thought that research depends only on certain research-capable groups of individuals or institutions, most of whom the interviewees believed to be graduates from a foreign country and doctoral degree holders. A large percentage of faculty members who have no research experience or networking during their graduate education are believed to be unlikely to obtain research grants or to have supporting groups to find those grants. Finally, the dependent trend referred to the fact that most research topics are oriented towards social science and related fields. Participants believed that most Cambodian scholars hold degree in these social science fields, and so, if they engage in research, they have to engage in research themes of their social science tracks. Advanced natural or physical science research projects need lots of investment, making research in these science and engineering fields very limited in the country. Even there have been research works in these fields at certain specialized institutions, those work are basically not advanced, cutting-edge ones. They are more of baseline or general-level science or technology research works.

The final major theme implied that research activities and outputs in Cambodia were not just limited in quantity, but those existing research activities tended to be less relevant and not contributing very significantly or vividly to the national or social development needs. In other words, some participants seemed to see little values added out of those limited research works currently being practiced. Some participants who engaged in research activities believed that their works were more to respond to the need of the donors or funders. Only in certain occasions with permissions from the donors could they actually submit those works for publications or presentations at conferences. The impacts of their research, therefore, were only contributory to a smaller group (generally funders or policy makers who were supported by the donors if the donors have further intention to distribute or share them). Also, researchers believed that those research works were more locally qualified than internationally qualified because, to think of the publications in academic high-impact-factor journals or presentation in high-quality academic conferences, faculty members have to spend a lot of time on polishing and refining their research outputs, which is not very much supportive by their current working conditions – in terms of time available and institutional motivation.

Table 5.7. Level-3 themes, Level-2 themes, and exemplary quotes on perception towards research activities and performance of Cambodian faculty members and higher education institutions

Common emerging themes at level 3	Categories at level 2	Selected transcript-based quotes	Frequency (Percentage) of level-3 themes
Limited research performance but increased research awareness	***Dominant teaching-oriented education system***	Now we play only the teaching roles mostly. Research can be possible only with commissions. We do not have system to divide salary for different roles… P5DHE (83)	40 (80%)
	Donor-driven research collaboration funding	Most research projects come from donors. We follow donors. There are some projects from the government. We cannot totally do what we want to research. If they do not give us fund… we do not have fund to do research. M32U6E (1)/ Research capacity, while still limited, can be handled, but the lack of career path is important… I sometimes want to ask them whether they actually want to be researcher or they want money? P5DHE (20)	
	Research activities and research policies as emerging topics	… Research is a new topic for health sector in Cambodia. I know clearly that it is hard to explain clinicians to understand research. Because I work with education, I understand its importance. Clinicians say it is not important. Actually, research gives them lots of benefits, but they think it is a mystery... they don't understand... M28U7U (21)	
	Increased research awareness and supports	Compared to four or five years ago, it is better… students now are required to do research to some degree… staff here also show interest in research… along with the projects offered by the World Bank and other institutions. P8ERE (4)/ For quantity, if we look at the scientific index, we are low compared to other nations. We are still very low. For the quality, we are also at a low level... though recently we could notice some changes. P5DHE (65)	
Dependent and niched research activities	***Consultancy-based, short-term types of research activities***	Mostly short-term projects. Generally, non-governmental organizations do their own research… and they just ask us to analyze and write reports or give consultations… we are just consultants. F14U1E (7)	28 (56%)
	Limited and very basic research in science fields	We can do it to some extent. We can only do what we can. Not advanced research. Some labs get funds from ADB and buy lots of materials… but to run an advanced research lab, we need even more materials. Generally, we buy it from Vietnam… we cannot find them here or it is too expensive... F33U6E (29)/ People continue to say we have to try hard from ourselves... that is not possible for natural science fields... if we don't have chemical substances or technological machinery ... that is hard to do research... M19U1U (8)	
	More research-active foreign graduates	I think mostly they are Ph.D. students studying abroad… foreign graduates engage more in research because they have language ability and network. P5DHE (67, 21)	

Less relevant research quality and impacts	***Research disconnected from social needs***	Say research in medical science… big countries have capability to do that, but in Cambodia we cannot reach that level yet... big countries take it as the life of their nation... we need to focus on what we can do, say, in the fields of humanities... a lot of factors that make us uncivilized... we need to research to figure out those factors... F37U8E (20)	38 (76%)
	Unstandardized local research products	In actuality, we lack everything… education… teaching… we don't know how many research works there, from small to big universities… they don't know much about research or anything… sometimes they claim that they do research, but whether it is real research with standard quality is the question. P20DHE (22)	
	Less academic research activities	Personally, research is very weak… even some private institutions like my institution that focuses on research remains limited. Research services are basically for profits through application for funding… academic research remains very weak... F9U11U (24)	

Case analyses: To exemplify how respondents, on an individual basis, practically perceived the trends of research production or performance of Cambodian faculty members and their institutions, it is necessary to look at specific case and their characteristics and opinions in overall. The researcher selected four interviewees whose overall opinions throughout the interview tended to reflect the common thematic categories discussed above. One of them was in the policy maker category, one from the faculty member category, one from the external stakeholder category, and another from the university management category (see Table 5.8). Such an analysis did not reach the level of a phenomenological analysis, but it could provide some specific understanding about specific interviewees and some comparative perspectives on different cases from different backgrounds. Most of these selected cases tended to show very similar perspectives towards the trends of research activities and research performance of Cambodian faculty members and higher education institutions.

A quick synthesis of the qualitative perspective on research activity and performance trends of Cambodian faculty members and their higher education institutions: the qualitative results in indicated that research is perceived as still very limited in general (despite increased awareness about the researcher role of faculty members). The majority of participants believed research activities and performance tended to be niched and dependent towards only individual and institutions with certain traits or characteristics. Likewise, the impacts from existing research activities were considered less relevant as the research works are more donors-driven. This qualitative results and the quantitative results on the question about research activities and performance trends seemed to show a convergent tendency.[30]

[30] It should be noted, however, that there were other raised viewpoints about research activities and performance trends, but this qualiative anlaysis was based on the common-theme approach, whereby only those repeated and conceptually similar opinions or themes were coded. Further discussions about these perceived trends would be elaborated in the discussion and limitation section.

Table 5.8. Case analyses of different kinds of stakeholders on their perception towards research activities and performance of Cambodian faculty members and higher education institutions

Case 1	Case 2	Case 3	Case 4
Institution: DH **Category:** Policy maker **Research status:** Engaged **Code:** P5DHE	**Institution:** ER **Category:** Faculty member and also policy maker **Research status:** Engaged **Code:** P8ERE	**Institution:** CD **Category:** External stakeholder and faculty member **Research Status:** Engaged **Code:** E45CDE	**Institution:** U12 **Category:** University management **Research status**: Unengaged **Code:** M27U12U
The interviewee was a philosophy-majored doctorate. He served as a consultant in one state institution. He generally believed that Cambodian higher education system is more teaching-oriented and research activities are more donors-driven kind of research. He also acknowledged that the government has implemented the HEQCIP program to promote research culture and capacity, but he thought the research engagement and the access to research training (offered by the current support) have been limited. The quality of research products is still less relevant to national development and, in a sense, is not guided by a clear vision in the first place. Very active researchers are generally those faculty members who could obtain funding from external donors. The funding is thing that attracts researchers more. He had a strong dissatisfaction with the fact that current research areas in Cambodia do not follow what the country actually needs but the current research is based more on the tendency of the international funding trends. Though he thought research products are increased due to Cambodian graduate students doing higher degree abroad, he was still not satisfied with the current level of research outputs of the country's academics.	This interviewee was both a faculty member and a newly recruited staff for one state institution. While being a faculty member, he engaged actively in research funded by foreign and local donors. This person was positive about the increased awareness about research among undergraduate students and among policy makers, but he still thought that research in Cambodian higher education is not well developed in terms of outputs and performance. He acknowledged that some universities in the country – such as ITC – are more active in research than other universities are. Also as a researcher on this particular topic himself, he understood that universities in Cambodia do not receive or have research funding package so far. Some have small ones. He anticipated that, to make research function work properly in Cambodia, participation from university leadership, competent individuals, and strong networks are key collective factors. These can help securing funding for research and so make research activities move forwards. And such mechanisms will generate research outputs. He was very critical about the understanding and willingness of university management to promote research at their institutions, emphasizing private universities.	This person worked as full-timer for a leading research institute in Cambodia. He has published quite actively as a graduate in a European university and at his current institution. He also used to work as a part-time faculty member at one leading university in Cambodia. He viewed research implementation at Cambodian universities as not at all in the academic research genres, basing his judgement from the international standard perspective. Like other interviewees, he realized that most of those research works are in the form of consultancy works and funded by external donors. He saw Cambodian research more functioning outside of the university sector, raising his own institute as the case as well as the cases of other civil society institution. He did not consider various local products that are not conducted on a systematic and scientific bases and that are not intended for international publications as academic research products. He was critical about the lack of research in science fields and the contribution of research into the societal development of the country, but he showed some positive notes about increased students' interest in research, as he reflected from his institution' research development program.	This person was a leading member in one university located outside of Phnom Penh. This participant believed that education system in Cambodia does not have research roots at all levels and that neither students and teachers seriously value research nor see research as beneficial for their careers. Most of them find it very difficult to understand, so they do not want to engage in research. This participant acknowledged that her university lacks enough research programs and capable researchers but stressed that the institution has done quite a lot to promote research since the time a previous research-oriented rector was leading the institution. She highlighted that the previous rector has done a lot in creating younger research-competent staff, though still small in number. Currently, the institution has institutionalized a research center that aims to take care of research projects from outside sources. Members of the center, faculty members, as well as students are encouraged to join activities of this new center. Most of her institution research outputs are all done for external donors in the form of consultancy or collaboration. In certain cases, the donors might want them to only collect data and/or involve in various design activities.

5.3. Synthesis of the results on Cambodian researchers and research outputs

From the quantitative side, in general, the study detected *limited research-active faculty members* and *low research outputs* of Cambodian faculty members from the 15 selected universities/institutions. The specific mean score of each of the 13 research production indicators ranged from 0.05 to 0.52 output during their services, and the overall mean score of composite research output indicators was 3.24 (SD = 6.67). Division of these composite research output score by the number of working years, Cambodian faculty members, recruited in this study, produced less than one research output per year (Mean = .404; SD = .905). One clearly observable trend was that most reported research products are local ones (56.36%) and that conference presentation tended to be the most engaged research activities reported (27.41%). The research products of social science and related fields together accounted for a higher number of research outputs (65.18%), compared to the disciplines of natural and physical science (34.82%). Certain universities (viz. U1, U6, U2) tended to account for more than fifty percent of the total 1,565 research products reported in the study. Considering the number of sample in the analysis, U6, however, showed the most productive tendency of research outputs compared to other institutions. All of these quantitative results implied that research activities and research output production at Cambodian universities are not yet active and that the gaps between research engaged and research unengaged institutions are huge.

From the qualitative side, the study found three emerging common themes for the analysis of participants' general perceptions towards the current trend of research performance and activities of Cambodian faculty members and their higher education institutions. About 80 percent of the 50 interviewees perceived the idea that can be synthesized as "limited research performance but increased research awareness." About 56 percent acknowledged the trend of "dependent and niched research activities," and around 76 percent perceived the current trend in terms of "less relevant research quality and impacts".

Research Question 1 Highlights: How productive are Cambodian faculty members?
• Limited researchers and research outputs but promoted research awareness • Niched and dependent research activities • More local products (such as local books, local research grants, local presentation, etc.) and more reported conference presentation activities • Lower STEM-related research outputs and more social-science and related fields products • More engaged by certain city-based and public universities' faculty members • Research as related to consultancy jobs and research collaboration (i.e. products generally in the form of report) and less relevant and applicable in terms of social needs

To conclude, Cambodian research-active faculty members, their research outputs, as well as the impacts of their research works are still limited, niched, and dependent, though the awareness about research roles of academics and higher education institutions have currently been increased and acknowledged.

CHAPTER 6: RESEARCH ORIENTATION (EXPERIENCE, COMPETENCE, ATTITUDE, AND MOTIVATION) OF CAMBODIAN FACULTY MEMBERS: FINDING II

Little is known about actual Cambodian faculty members' attitudes and behaviors towards research. This chapter focused on these aspects of individual faculty members' research orientation. Specifically, it attempted to answer the question: how oriented are Cambodian faculty members towards research engagement and production? Research orientation herein incorporated four main constructs: research experience (focusing on past engagement), research competence (focusing on research skills and knowledge), research attitudinal orientation (focusing on research activities), and research motivation (focusing on rewards from research activities) of Cambodian faculty members. These four constructs were factor-analyzed to prove its construct validity and further tested with Cronbach Alpha for its internal consistency (see detailed explanations in the research method chapter). This chapter started by presenting the quantitative trends and patterns. It then presented the qualitative perceptions and case studies. Finally, it offered a brief synthesis of all findings.

6.1. Quantitative results

6.1.1. Overall and specific trends of research orientation variables

Overall trends of research orientation variables: Figure 6.1. showed the overall quantitative trends of the four aspects of research orientation investigated: research experience (with one component), research competence (with four components), research attitudinal orientation (with two components), and research motivation (with two components). The components were generated from Principle Component Analyses. The overall trends were represented by mean score of each variable. In overall, on a scale from 0 (the lowest score) to 5 (the highest score)[31], research experience and research competence components of Cambodian faculty members were generally rated lower than average, suggesting that confidence in research knowledge, skills, and background of Cambodian academics remain limited. Research attitudinal orientation and research motivation components, on the other hand, tended to be rated from moderate to high level among faculty members (see Figure 6.1.). It indicated that faculty members in general have positive thinking towards research activities and research rewards. These statistical trends were analyzed from a general vantage point; it is necessary to glance more deeply into each specific indicator of each construct's components.

[31] For research experience, the 5-point scale comprises 0 = never and 5 = always. For research competence, the 5-point scale comprises 0 = totally incompetence and 5 = excellent.

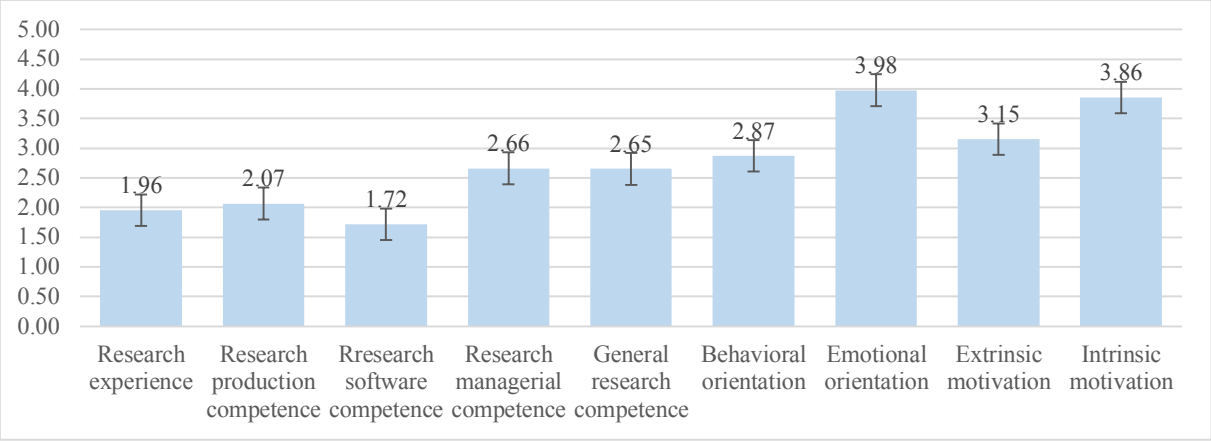


Figure 6.1. Mean scores of each research orientation variable

Research experience trends: On the Likert scale of 0 the lowest (i.e. never) to 5 the highest (i.e. always), research experience was measured by 6 items; the average score was low (Mean score = 1.96) – actually, lower than other research orientation variables (see Figure 6.1.). Among the six items, the one mostly rated negative included "having experience writing research papers for publication" as 85.51% of the participants chose one among the three negative answers (0 = never, 1 = rarely, or 2 = sometimes) (see Figure 6.2.). Other specific items with similar trends of negative rating included "having attended or presented research paper at academic conference" (80.75%), having experience writing project reports or research reports (75.98%), and having experience working with research or consultancy projects" (73.08%). On the other hand, "having experience reviewing published research articles related to one's field of expertise" tended to receive less negative rating (33.33% choosing among option (0 = never, 1 = rarely, and 2 = sometimes). And only about half of the participants reported "engaging actively in research during my graduate education". These trends indicated that participants have less experience engaging in certain research activities that lead to output production – such as writing paper for publications, presenting papers at conference, or writing research reports, etc.

Research competence trends: Like research experience, Cambodian faculty members generally gave low rating on various research competence variables and items (i.e. mean score of 1.72 in research software competence, 2.07 in research production competence, 2.65 in research general competence, and 2.66 in research managerial competence) (see Figure 6.1.). In more specific terms, research competence was measured by 14 items by a 0-5 scale (0 = totally incompetent; 5 = excellent) (see Figure 6.3.). Some specific indicators were rated very low, for example, the ability to use quantitative and qualitative software for data analysis, as 80.54 percent of participants chose among the three negative options (i.e. 0=totally incompetence, 1 = very poor, or 2 = poor) on their ability to perform this particular task. "Writing research proposal to apply for funding" – as well as other indicators of research production competence – also received more negative rating (61.28% of the samples). The

same applied to competence on managing research project and financial activities (49.07%). While, in general, faculty members tended to show less confidence in research competence, specific indicators – with regards generally to skills in research production and to the use of technology to help with research works.

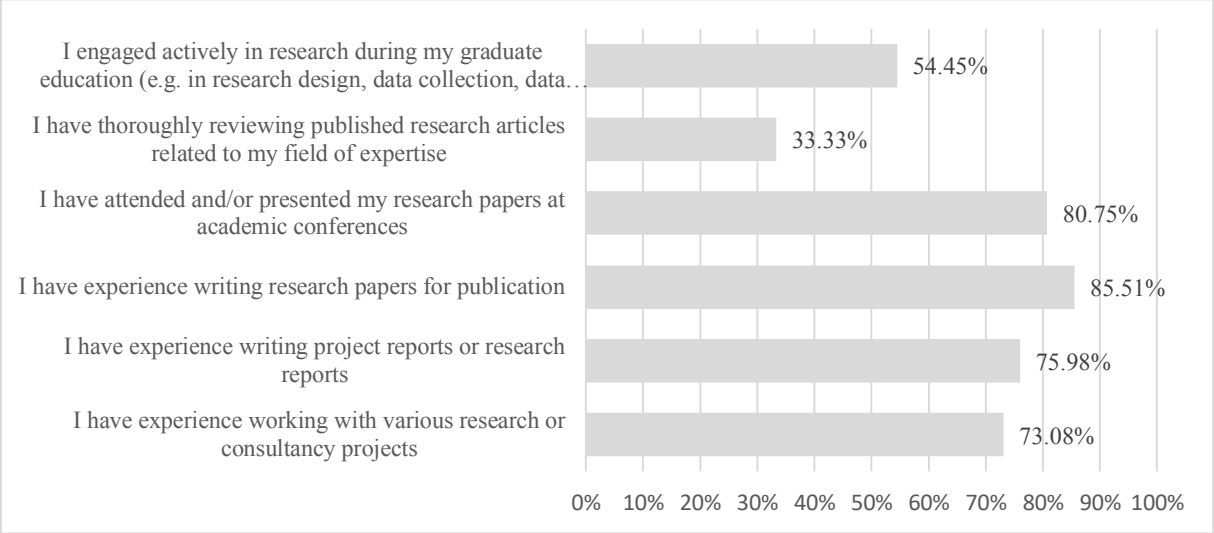


Figure 6.2. Combined percentage of respondents reporting 0=never, 1=rarely, and 2=sometimes on the 6 items of research experience

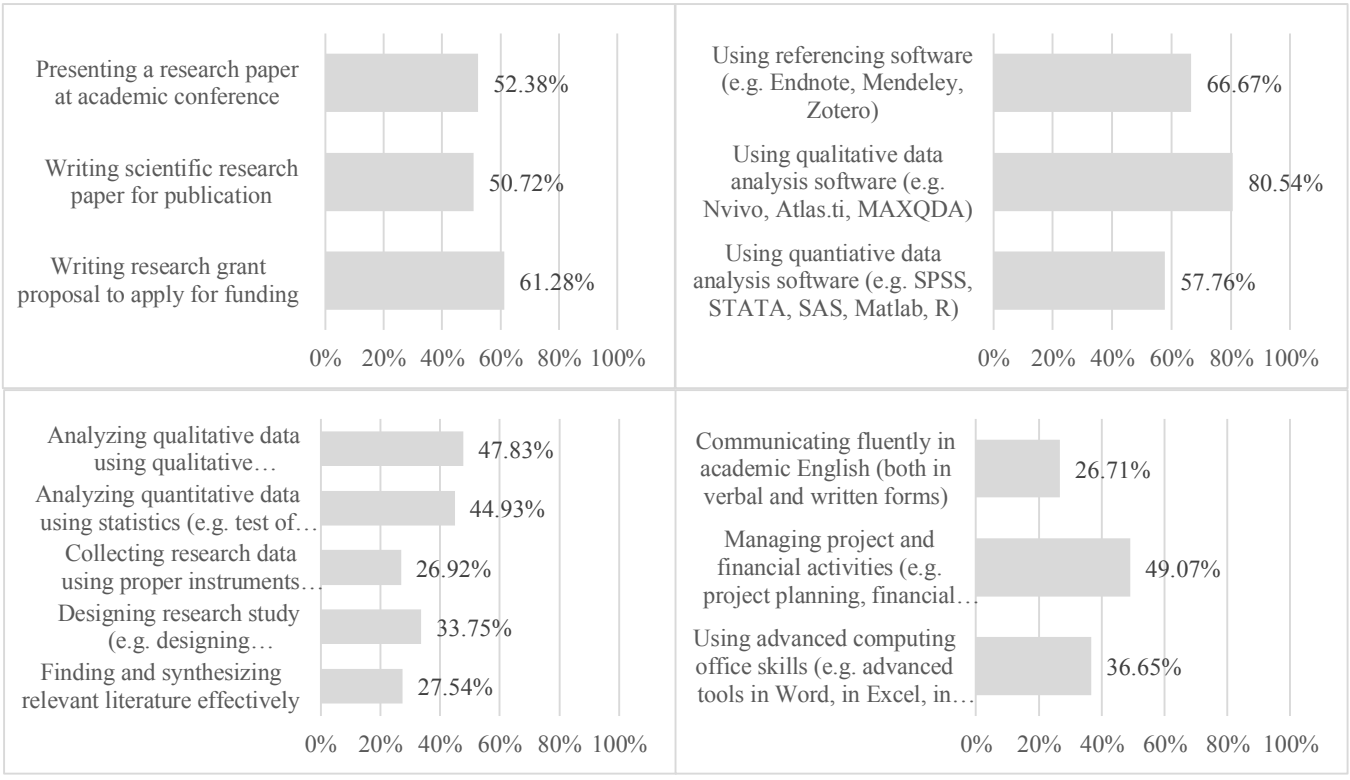


Figure 6.3. Combined percentage of respondents reporting 0=totally incompetent, 1=very poor, and 2=poor on the four components' 14 items of research competence

Research attitudinal orientation trends: Unlike research experience and research competence variables, Cambodian faculty members tended to posit from moderate to high tendency towards research attitudinal orientation (i.e. mean score = 3.98 for emotional research orientation, and mean score = 2.87 for behavioral research orientation, measured by a 0-5 point Likert scale, with 0 = totally disagree to 5 = totally agree). Even for specific items, in general, less than 10 percent of the participants gave low rating by choosing among three negative options (i.e. 0 = totally disagree, 1 = strongly disagree, and 2 = disagree) on almost all items of the emotional research orientation – from "I am very much interested in doing research" to "I love thinking about new ideas and ideas that bring improvement" (see Figure 6.5.). This simply meant that faculty members believe that they value research and have high interest in research activities. For the behavioral research orientation component, a higher percentage of participants chose among the three negative options – for example, 36.85 percent for "I teach fewer courses and/or fewer hours" and 49.48 percent for "I have a strong research network". The lower behavioral research orientation suggested that participants, while thinking or believing that they have positive emotional thinking towards research, are actually less behaviorally oriented towards research in terms of their real research practices, for example, in terms of trying to create network for research or in terms of trying to spend less hours teaching but more time on research.

Research motivation trends[32]**:** Research motivation overall statistic (as shown in Figure 6.1.) was also rated high in general (i.e. overall mean score = 3.86 for intrinsic research motivation and mean score = 3.15 for extrinsic motivation). Table 6.1. and Table 6.2. illustrated further details on the mean score for each item of the two components of research orientation. Generally, the average score for intrinsic motivation items ranged from 3.46 for "achieving recognition and appreciation from students, peers, and university's leading members" to as high as 4.08 for "having newer, clearer, and deeper knowledge and know-hows useful for teaching students" – on a scale from 0 (totally disagree) to 5 (totally agree). Participants tended to perceive extrinsic motivation items – such as "getting salary raised," "getting promotion," and "getting commissions or bonuses" – as less important indicators to motivate them to do research. When the researcher analyzed the data in terms of how they expect to experience these items of intrinsic and extrinsic motivation at their institution, the results remained quite positive, especially in terms of intrinsic motivation (as only about 10 to 20 percent of participants chose among the three negative options (0 = totally disagree, 1 = strongly disagree, or 2 = disagree).

[32] The case of research motivation analysis in this study could be confusing because the way of calculating research motivation was based on two concepts of motivation: motivation in terms of importance and motivation in terms of expectation (as adopted by the Expectancy Theory based measurement. These two constructs were summated to create the composite score of research motivation. The motivation rating was generally high in this study because participants seemingly gave more positive responses to the question on how they think those motivation indicators are important for them. When the researcher analyzed research motivation by looking at separate score of importance and expectation, a slight difference in the magnitude of the two concepts was noted (Mean score for the former = 3.85; Mean score for the latter = 3.44).

These results suggested that Cambodian faculty members perceive intrinsic and extrinsic research motivation indicators as vital elements to promote research activities at Cambodian higher education institutions.

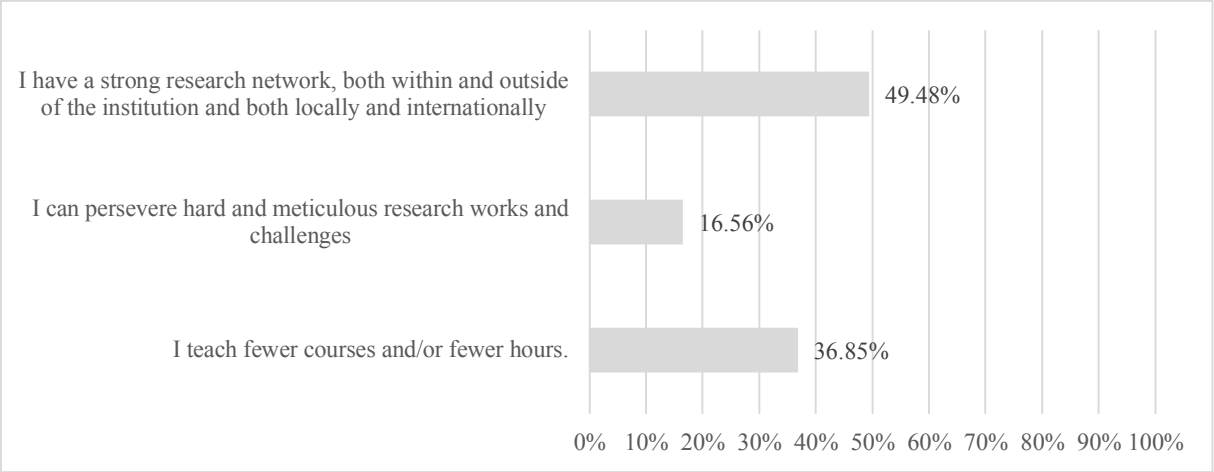


Figure 6.4. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 3 items of behavioral research orientation

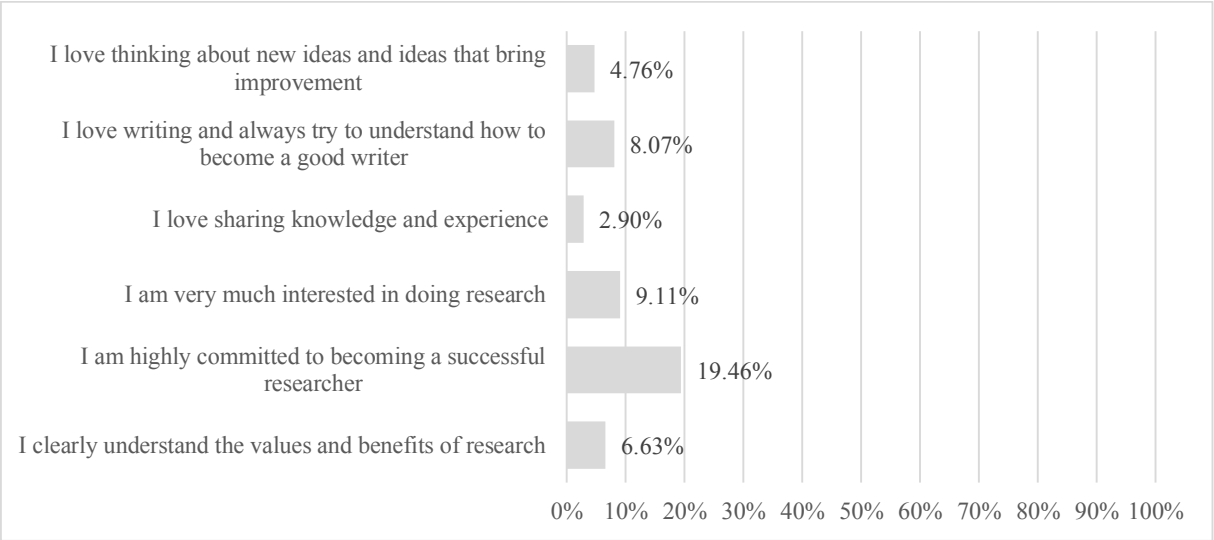


Figure 6.5. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 6 items of emotional research orientation

Table 6.1. Mean and standard deviation scores of calculated extrinsic research motivation

Items	Mean	SD
Getting better and appropriate salary raises	3.24	1.05
Getting an administrative assignment or promotion	2.97	1.07
Getting commissions or other financial rewards	3.24	1.04
Note: These items are computed and so individual percentage analyses are not possible since values are not ordinal but continuous.		

Table 6.2. Mean and standard deviation scores of calculated intrinsic research motivation

Items	Mean	SD
Getting new research knowledge, skills, and experience	4.01	0.92
Enhancing networks and future collaboration	3.70	0.89
Getting a good job related to research in the future	3.74	0.93
Advancing professional expertise in the field	4.04	0.88
Having newer, clearer, and deeper knowledge and know-hows useful for teaching students	4.08	0.87
Achieving recognition and appreciation from students, peers, and university's leading members	3.46	1.05
Contributing new knowledge to the field as well as helping the society	3.95	0.91
Note: These items are computed and so individual percentage analyses are not possible since values are not ordinal but continuous.		

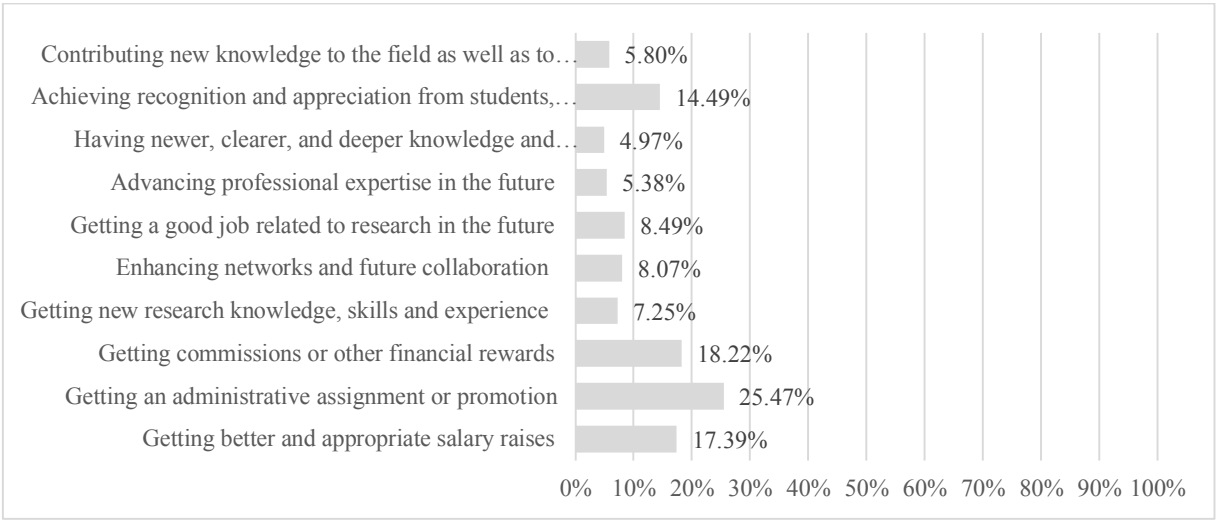


Figure 6.6. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the importance of the 10 research motivation items

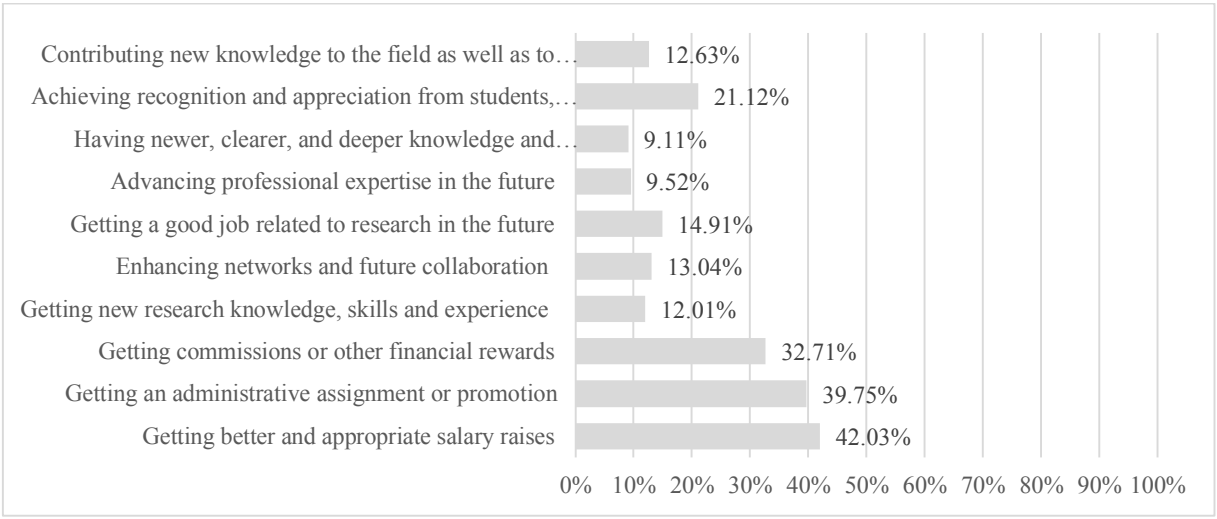


Figure 6.7. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the expectation of the 10 research motivation items

6.1.2. Patterns of research orientation variables

This section basically presented whether all he above discussed research orientation variables were differentiated by different demographic attributes of individual faculty members and their institutions.

6.1.2.1 Research experience patterns

Table 6.3. showed that faculty members from city-based universities had significantly higher research experience (mean score = 2.09) than their province-based counterparts (mean score = 1.67). In terms of individual demographic variables, Ph.D. holders tended to have higher research experience than their non-Ph.D. counterparts (the former's mean score = 2.78; the latter's mean score = 1.86). The same applied to the difference on research experience between overseas graduates (mean score = 2.38) and local graduate (mean score = 1.69).

Table 6.3. Research experience patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	1.83	0.86	-1.157	481	.248
	Public	413	1.98	0.99			
Location	Province	151	1.67	0.90	-4.441	481	.000
	City	332	2.09	0.98			
Governance	Not under MoEYS	78	2.08	1.00	1.193	481	.233
	Under MoEYS	405	1.94	0.97			
Gender	Female	101	1.91	0.81	-.650	471	.516
	Male	372	1.98	1.02			
Terminal degree	non-Ph.D.	422	1.86	0.92	-6.774	474	.000
	Ph.D.	54	2.78	1.06			
Terminal degree country	Cambodia	278	1.69	0.90	-7.934	467	.000
	Overseas	191	2.38	0.95			
Teaching role	Teaching and other roles	132	2.09	1.03	1.750	451	.081
	Only teaching	321	1.92	0.92			
Discipline	Science	148	2.11	0.97	2.285	481	.023
	Social Science	335	1.89	0.97			
Employment type	Part-time	96	2.06	0.91	1.014	461	.311
	Full-time	367	1.94	1.00			
Age	<=30	109	1.91	0.82	.341	482	.711
	31-45	308	1.99	1.02			
	>=46	66	1.91	1.02			
Teaching hours	<=15 hours	250	2.03	1.00	1.581	481	.114
	>15 hours	233	1.89	0.94			

Finally, disciplines also marked the difference in research experience. Faculty from the fields of science and related ones had an average score of 2.11, while their counterparts from the fields of social science and related ones had an average of only 1.89 in terms of research experience. Attributes of other variables – i.e. institutional orientation, institution governance, gender, teaching role, employment type, age, and teaching hours – were not statistically significantly different in terms of research experience (see Table 6.3).

6.1.2.2 Research competence patterns

It should be noted again that there were four main components of research competence – viz. research production competence, research general competence, research technological competence, and research managerial competence.

Table 6.4. Research production competence patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	1.73	1.22	-2.543	481	.011
	Public	413	2.13	1.20			
Location	Province	151	1.75	1.18	-3.988	481	.000
	City	332	2.21	1.20			
Governance	Not under MoEYS	78	2.12	1.27	.413	481	.680
	Under MoEYS	405	2.06	1.20			
Gender	Female	101	1.89	1.07	-1.689	471	.092
	Male	372	2.12	1.25			
Terminal degree	non-Ph.D.	422	1.95	1.17	-6.430	474	.000
	Ph.D.	54	3.04	1.19			
Terminal degree country	Cambodia	278	1.71	1.17	-8.268	467	.000
	Overseas	191	2.60	1.10			
Teaching role	Teaching and other roles	132	2.15	1.22	.876	451	.382
	Only teaching	321	2.04	1.19			
Discipline	Science	148	2.08	1.25	.108	481	.914
	Social Science	335	2.06	1.20			
Employment type	Part-time	96	2.14	1.18	.517	461	.605
	Full-time	367	2.07	1.22			
Age	<=30	109	1.94	1.12	1.502	482	.224
	31-45	308	2.14	1.26			
	>=46	66	1.95	1.14			
Teaching hours	<=15 hours	250	2.07	1.22	.082	481	.935
	>15 hours	233	2.06	1.21			

The researcher analyzed these components' patterns with demographic variables separately. First, research production competence of faculty members from public universities was significantly higher than that of faculty members from private university (2.13 for the former vs 1.73 for the latter). Research production competence of faculty members from city-based institutions also was significantly higher than that of faculty members from province-based institutions (2.21 for the former vs 1.75 for the latter). The average score of research production competence also varied between Ph.D. holders (3.04) and non-Ph.D. holders (1.95). Likewise, overseas graduates had a higher average score on research production competence than their local graduate counterparts (2.60 for the former vs 1.71 for the latter). Other variables were not significantly different among their attributes (see Table 6.4.)

Table 6.5. Research general competence patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.47	0.98	-1.546	481	.123
	Public	413	2.68	1.10			
Location	Province	151	2.34	1.05	-4.258	481	.000
	City	332	2.79	1.08			
Governance	Not under MoEYS	78	2.54	1.25	-.848	99.002	.399
	Under MoEYS	405	2.67	1.05			
Gender	Female	101	2.57	1.05	-.981	471	.327
	Male	372	2.69	1.09			
Terminal degree	non-Ph.D.	422	2.58	1.05	-4.368	474	.000
	Ph.D.	54	3.26	1.15			
Terminal degree country	Cambodia	278	2.38	1.09	-6.866	467	.000
	Overseas	191	3.05	0.96			
Teaching role	Teaching and other roles	132	2.69	1.06	.306	451	.760
	Only teaching	321	2.66	1.08			
Discipline	Science	148	2.57	1.17	-1.085	481	.278
	Social Science	335	2.69	1.05			
Employment type	Part-time	96	2.75	0.97	.865	461	.387
	Full-time	367	2.65	1.10			
Age	<=30	109	2.59	0.93	.650	482	.523
	31-45	308	2.69	1.12			
	>=46	66	2.56	1.16			
Teaching hours	<=15 hours	250	2.66	1.05	.156	481	.876
	>15 hours	233	2.64	1.13			

Table 6.5. reveals that research general competence (i.e. the ability to design research approaches, to do qualitative or quantitative analyses, or to find and synthesize literature) significantly varied between

faculty members from city-based universities (mean = 2.79) and province-based universities (mean = 2.34); between Ph.D. holders (mean = 3.26) and non-Ph.D. holders (mean = 2.58); and between overseas graduates (mean = 3.05) and local graduates (2.38). Other demographic variables' attributes were not statistically significantly different in terms of general research competence.

Table 6.6. revealed that research technological competence (i.e. the ability to use quantitative software such as SPSS or Stata or Matlab or the ability to use qualitative data such as Nvivo or MAXQDA) significantly varied between faculty members from city-based universities (mean = 1.82) and province-based universities (mean = 1.5); between Ph.D. holders (mean = 2.32) and non-Ph.D. holders (mean = 1.64); between overseas graduate (mean = 2.08) and local graduates (1.46); between science-majored faculty members (mean = 1.97) and social-science-majored counterparts (mean = 1.61).

Table 6.6. Research technological competence patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	1.51	1.16	-1.621	481	.106
	Public	413	1.75	1.14			
Location	Province	151	1.50	1.12	-2.901	481	.004
	City	332	1.82	1.14			
Governance	Not under MoEYS	78	1.73	1.17	.068	481	.946
	Under MoEYS	405	1.72	1.14			
Gender	Female	101	1.69	1.14	-.306	471	.760
	Male	372	1.73	1.14			
Terminal degree	non-Ph.D.	422	1.64	1.13	-4.226	474	.000
	Ph.D.	54	2.33	1.02			
Terminal degree country	Cambodia	278	1.46	1.09	-6.089	467	.000
	Overseas	191	2.09	1.11			
Teaching role	Teaching and other roles	132	1.75	1.08	.322	451	.748
	Only teaching	321	1.71	1.15			
Discipline	Science	148	1.98	1.16	3.321	481	.001
	Social Science	335	1.61	1.12			
Employment type	Part-time	96	1.84	1.00	1.144	461	.253
	Full-time	367	1.69	1.16			
Age	<=30	109	1.71	1.24	.565	482	.569
	31-45	308	1.75	1.13			
	>=46	66	1.59	1.04			
Teaching hours	<=15 hours	250	1.70	1.16	-.367	481	.714
	>15 hours	233	1.74	1.12			

Table 6.7. revealed that research managerial competence (i.e. the ability to manage and evaluate and plan project works or the ability to use advanced office software) significantly varied between Ph.D. holders (mean = 3.08) and non-Ph.D. holders (mean = 2.61) and between overseas graduates (mean = 2.98) and local graduates (2.46). The table also showed that age attributes were differentiated in terms of research managerial competence as faculty members with younger age tended to posit higher competence in research managerial works (2.81 for faculty members younger than or equal to 30 years of age, 2.67 for faculty members from 31 to 45 years old, and 2.35 for faculty aged 46 or older. Other demographic variables were not statistically significantly different among their attributes in terms of research managerial competence (see Table 6.7).

Table 6.7. Research managerial competence patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.60	1.10	-.521	481	.602
	Public	413	2.67	1.04			
Location	Province	151	2.56	1.03	-1.443	481	.150
	City	332	2.71	1.05			
Governance	Not under MoEYS	78	2.46	1.03	-1.834	481	.067
	Under MoEYS	405	2.70	1.05			
Gender	Female	101	2.53	1.03	-1.556	471	.120
	Male	372	2.71	1.04			
Terminal degree	non-Ph.D.	422	2.61	1.05	-3.103	474	.002
	Ph.D.	54	3.08	0.91			
Terminal degree country	Cambodia	278	2.46	1.04	-5.416	467	.000
	Overseas	191	2.98	1.00			
Teaching role	Teaching and other roles	132	2.70	1.02	.382	451	.702
	Only teaching	321	2.66	1.07			
Discipline	Science	148	2.65	1.13	-.102	481	.919
	Social Science	335	2.66	1.01			
Employment type	Part-time	96	2.80	0.99	1.199	461	.231
	Full-time	367	2.65	1.05			
Age	<=30	109	2.81	0.98	3.914	482	.021
	31-45	308	2.67	1.05			
	>=46	66	2.36	1.09			
Teaching hours	<=15 hours	250	2.73	1.04	1.439	481	.151
	>15 hours	233	2.59	1.06			

6.1.2.3 Research attitudinal orientation patterns

Table 6.8. below showed that emotional research orientation (i.e. the belief that faculty members value research, are interested in research, or love research and research-related activities) significantly varied between public universities' faculty members (mean = 4.03) and private universities' faculty members (mean = 3.69) as well as between overseas graduates (mean = 4.09) and local graduates (3.89). Unlike previous experience and competence components/variables, emotional research orientation did not show much variation between different participants' demographic attributes.

Table 6.8. Emotional research orientation patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	3.69	1.00	-3.187	481	.002
	Public	413	4.03	0.77			
Location	Province	151	3.97	0.91	-.114	481	.909
	City	332	3.98	0.77			
Governance	Not under MoEYS	78	4.00	0.64	.348	133.988	.728
	Under MoEYS	405	3.97	0.85			
Gender	Female	101	3.92	0.70	-.730	471	.466
	Male	372	3.99	0.85			
Terminal degree	non-Ph.D.	422	3.96	0.83	-1.364	474	.173
	Ph.D.	54	4.12	0.75			
Terminal degree country	Cambodia	278	3.89	0.87	-2.583	467	.010
	Overseas	191	4.09	0.73			
Teaching role	Teaching and other roles	132	3.96	0.82	-.063	451	.949
	Only teaching	321	3.97	0.82			
Discipline	Science	148	3.91	0.88	-1.273	481	.204
	Social Science	335	4.01	0.79			
Employment type	Part-time	96	3.94	0.74	-.662	461	.508
	Full-time	367	4.00	0.84			
Age	<=30	109	3.93	0.82	1.235	482	.292
	31-45	308	4.02	0.77			
	>=46	66	3.87	1.01			
Teaching hours	<=15 hours	250	4.01	0.84	.998	481	.319
	>15 hours	233	3.94	0.79			

On the other hand, behavioral research orientation referred to practical indicators, such as teaching less hours, having strong research network, and being able to persevere hard research tasks. These behavioral characteristics (according to Table 6.9) significantly varied in terms of institutional

orientation (i.e. public vs private), terminal degree (i.e. Ph.D. vs non Ph.D.), terminal degree country (Cambodia vs foreign country), and teaching hours (i.e. faculty teaching 15 hours or less vs those teaching more than 15 hours). Participants from public universities tended to have a significantly higher mean score on behavioral research orientation (2.91) than their private counterparts (2.63). Ph.D. holders tended to have a significantly higher mean score (3.14) than their non-Ph.D. counterparts (2.84). Overseas graduates showed a higher mean score of behavioral research orientation (3.01) than their counterparts of local graduate (2.76). Faculty members teaching about 15 hours or fewer hours generally gave higher rating on their behavioral research orientation (3.03), compared to their more teaching-active counterparts (2.71).

Table 6.9. Behavioral research orientation patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.63	0.92	-2.340	481	.020
	Public	413	2.91	0.93			
Location	Province	151	2.91	0.93	.568	481	.571
	City	332	2.86	0.94			
Governance	Not under MoEYS	78	2.87	1.04	-.064	481	.949
	Under MoEYS	405	2.87	0.91			
Gender	Female	101	2.84	0.94	-.368	471	.713
	Male	372	2.88	0.93			
Terminal degree	non-Ph.D.	422	2.84	0.92	-2.261	474	.024
	Ph.D.	54	3.14	0.99			
Terminal degree country	Cambodia	278	2.76	0.93	-2.859	467	.004
	Overseas	191	3.01	0.93			
Teaching role	Teaching and other roles	132	2.98	0.97	1.901	451	.058
	Only teaching	321	2.80	0.91			
Discipline	Science	148	2.84	0.98	-.561	481	.575
	Social Science	335	2.89	0.91			
Employment type	Part-time	96	2.90	0.77	.223	461	.824
	Full-time	367	2.88	0.97			
Age	<=30	109	2.82	0.84	.296	482	.744
	31-45	308	2.90	0.97			
	>=46	66	2.86	0.93			
Teaching hours	<=15 hours	250	3.03	0.90	3.882	481	.000
	>15 hours	233	2.71	0.94			

6.1.2.4 Research motivation patterns

Research motivation could be a unique focus of this study since its measurement was more theoretical, rather than just asking about whether someone was motivated or not in a practical sense. Motivation was measured based on the Expectancy Theory instrument used by Chen et al. (2007), which classified the construct of motivation into motivation (in terms of importance of the research reward indicators) and motivation (in terms of expectation of those research reward indicators). And the main construct motivation was calculated as a product of these two summated together and divided by 2.

Table 6.10. Intrinsic research motivation patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	3.72	0.83	-1.572	481	.117
	Public	413	3.88	0.76			
Location	Province	151	3.84	0.80	-.368	481	.713
	City	332	3.87	0.75			
Governance	Not under MoEYS	78	3.89	0.72	.440	481	.660
	Under MoEYS	405	3.85	0.78			
Gender	Female	101	3.99	0.66	1.876	471	.061
	Male	372	3.83	0.79			
Terminal degree	non-Ph.D.	422	3.85	0.78	-.025	474	.980
	Ph.D.	54	3.85	0.66			
Terminal degree country	Cambodia	278	3.80	0.80	-1.718	467	.086
	Overseas	191	3.93	0.73			
Teaching role	Teaching and other roles	132	3.86	0.71	.202	451	.840
	Only teaching	321	3.84	0.80			
Discipline	Science	148	3.83	0.88	-.462	481	.644
	Social Science	335	3.87	0.71			
Employment type	Part-time	96	3.89	0.73	.416	461	.677
	Full-time	367	3.85	0.78			
Age	<=30	109	3.78	0.67	2.996	482	.051
	31-45	308	3.92	0.77			
	>=46	66	3.70	0.90			
Teaching hours	<=15 hours	250	3.87	0.77	.423	481	.672
	>15 hours	233	3.84	0.77			

It is clear from Table 6.10. and 6.11. that none of the individual and institutional demographic variables were significantly differentiated in terms of intrinsic research motivation and extrinsic research motivation. This implied that the participants' perceptions towards motivation construct (say,

receiving peer recognition or gaining knowledge in one's field) did not vary much among participants and institutions selected in this current study. Likewise, the perception towards extrinsic returns on research (either in terms of salary or promotion) also did not vary much among participants selected in the study. In overall these characteristics of research motivation did not vary between different attributes of individual and institutional characteristics.

Table 6.11. Extrinsic research motivation patterns

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	3.08	0.73	-.739	481	.460
	Public	413	3.17	0.94			
Location	Province	151	3.16	0.85	.165	481	.869
	City	332	3.15	0.94			
Governance	Not under MoEYS	78	3.08	1.07	-.805	481	.421
	Under MoEYS	405	3.17	0.88			
Gender	Female	101	3.12	1.01	-.443	471	.658
	Male	372	3.16	0.88			
Terminal degree	non-Ph.D.	422	3.14	0.93	-.446	474	.656
	Ph.D.	54	3.20	0.79			
Terminal degree country	Cambodia	278	3.13	0.91	-.507	467	.612
	Overseas	191	3.17	0.92			
Teaching role	Teaching and other roles	132	3.18	0.91	.731	451	.465
	Only teaching	321	3.11	0.92			
Discipline	Science	148	3.06	1.08	-1.534	481	.126
	Social Science	335	3.20	0.83			
Employment type	Part-time	96	3.10	0.76	-.637	461	.525
	Full-time	367	3.16	0.95			
Age	<=30	109	3.22	0.76	.478	482	.620
	31-45	308	3.14	0.96			
	>=46	66	3.10	0.94			
Teaching hours	<=15 hours	250	3.18	0.85	.717	481	.473
	>15 hours	233	3.12	0.97			

6.2. Qualitative results

The main qualitative interview inquiry for research question two included a number of related open-ended questions: How do you perceive your own level of research experience?... research competence?... research attitude?... and research motivation? What is your overall perception towards research orientation of Cambodian faculty members in general? This part of the study was unique in its own sense since previous studies generally overlooked how much individual faculty members are oriented towards research activities (on an individual basis). The qualitative section aimed to offer more explanations on the quantitative findings. Like the previous finding chapter, the qualitative findings were presented in three modes: 1). the emerging themes and sub-themes from the interview (i.e. the trends of current research orientation of Cambodian faculty members), 2. the transcript-based quotes from interviewees, and 3. the quantified qualitative themes in the form of frequency and percentage of each level-3 themes (see Table 6.12.). Again, same cases were analyzed to offer additional information from participants' opinions.

Thematic analyses: Three emerging themes were drawn from the 3-level coding thematic analyses in attempts to understand perception towards research orientation of Cambodian faculty members. The three main themes incorporated: 1) Perceived big gaps in research competence and knowledge (between researchers and non-researchers (with around 72 percent of supporting interviewees); 2) Perceived inconsistency between emotional valuing and behavioral understanding of research (with about 50 percent of supporting interviewees; and 3) Perceived conflicting dilemma between teaching and research motivation (with around 74 percent of interviewees raising some ideas reflecting this concept).

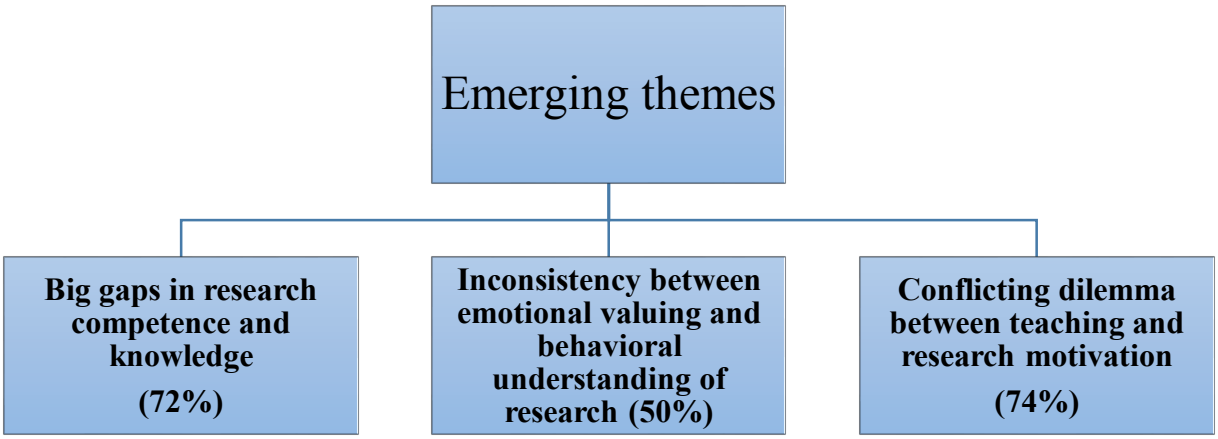


Figure 6.8. Emerging themes on perception towards research orientation of faculty members

Seventy-two percent of participants pointed out some opinions that in some ways reflected theme number one: the gap in terms of research skills and knowledge. Participants, in general, acknowledged

the gaps in such aspects of research background knowledge, research skills, research competence, and research experience between faculty members who engaged in research and those who did not engage in research. Most of them associated research-oriented faculty members with their overseas graduate education experience and training, their actual research involvement, and their low inclination towards the teaching role. There were also cases of belief that people with doctoral degree are more ready for research works.

Fifty percent agreed with theme number two: the behavioral-emotional inconsistency between emotional and behavioral research values. In simple terms, this theme reflected the opinion that, while everyone tends to accept the value of research, not everyone really embraces a disciplined and practical behavior towards truly engaging in research activities. Most participants ideally claimed that they think research are beneficial and always narrowed these concepts of research benefits towards national development or contribution to policy making (i.e. more applied sorts of benefits). Still, a critical number of participants tended to question whether the real understanding of benefits or values of research have been understood vividly by Cambodian faculty members, especially from the academic senses, as they pointed to the fact that most of them have had little experience in real research works and that the function of Cambodian higher education institutions did not necessitate that they be researchers.

Literature has made lots of discussion about the teaching-research nexus and whether they are complementary or separated components of the academia. Seventy-four percent of the study's interviewees acknowledged theme number three, which was related to the conflicting dilemma between teaching and research motivation. In Cambodian higher education, through this study's interview, the internal debates within faculty members themselves were not inactive. The interviewees tended to show a lot of internal discussion within themselves whether to switch to research while they have been active in teaching. Interviewed faculty members who engaged in teaching believed that Cambodian teaching and learning conditions still need further improvement and also need attention and support, though they acknowledged that research support is important. They were likely to view teaching as a better, perhaps easier, and more stable income source for their works. On the other hand, research-engaged faculty members considered research as an opportunity to network and to grow their area of expertise. They even believed that research is an important means to promote teaching, declaring that faculty members should not be "a teaching machine" which instructs the same things for years and does not update any knowledge through research. Research-oriented interviewees also considered research as an opportunity to earn income, while acknowledging that research income is generally not stable. Another general perspective, with regards to teaching-research debates, was on the complexity and difficulty of research works. Teaching-oriented faculty members were inclined to think of research as a difficult and meticulous endeavor.

Table 6.12. Level-3 themes, level-2 themes, and exemplary quote of perception towards research orientation of faculty members

Common emerging themes at level 3	Categories at level 2	Selected transcript-based quotes	Frequency and Percentage of level-3 themes
Big gaps in research competence and knowledge	***Big competence gaps between research-capable and research-incapable faculty members***	I feel there is a big gap. Strong people are strong. Poor people are still very poor. Say people graduating from Japan, UK, US, Hong Kong… they speak research languages. They stand out. Even they are young they work fast… Some local graduate faculty are also good, but they are generally limited. If we try to see more deeply, they have problems... with English... with research understanding... F44U1E (15)	36 (72%)
	Research competence in English and research language as important for research opportunities	… say we know each other… they start exchanging emails all the time and finding opportunities to work together with us… what if we don't reply their emails… it is about English ability… of course, no collaboration… F33U6E (31)	
	Low theoretical research background knowledge and academic research frameworks	... I think the degree obtained from research-advanced country like Japan is trustable... because they are deep in theories... talking about research here or in some other developing countries, it is not… well… just go to the fields and things like that… sending samples to others to analyze for us and could not do experiment on our own even once... that just looks cool but not much. We did not do it ourselves… that is meaningless. We do not know whether the research results are right or wrong... but in Japan... we can always do experiments and test it until we can write and get our paper published... F48U4E (26)	
	Low research methods skills and experiences in general	Competency is still a main challenge… some faculty members registered to be researchers, but when they started presenting their works in our colloquium, we and they themselves started to realize that they didn't reach that level… so they withdraw… say related to quantitative analysis. M31U2E (20)	
Inconsistency between emotional valuing and behavioral understanding of research	***Conception of research as linked to personal development and to teaching***	I think research is very important as it teaches us how to apply what we learn… for example... How to really make students understand…. F49U9U (13)/ Research is good, honestly… we can understand things more practically and use them in our teaching. We are more confident in teaching and explaining students and students find it easier to understand. When we learn from our teachers, equation is equation... no illustration. F1U4RE (261)	25 (50%)

	Interest without understanding of the nature of research	The thinking that funding is the matter is a shallow reason… as long as people are intelligent and they can observe and develop questions and hypotheses… funding and facilities come next… research is about human intelligence… though of course we need funding and facilities E17CDE (7)/ Others seem to like to raise about funding. Funding is when we have capacity; funding just come. M12U1E (28)	
Conflicting dilemma between teaching and research motivation	***Extrinsic motivation debates***	Motivation is about money or salary… I think teachers think of money as the most important thing… their time for family... if they can earn money or something (like certificates) they can do research … F11U3U (31, 32, 33)/ Some people make it tough when it comes to finance…I don't do that... I want to motivate them with money... that is a way to make them work... F7U1E (19)	37 (74%)
	Undifferentiated institutional motivation	Say… their salary scale is determined by degree and experience… you are Master's degree holder you get 9 USD, for example; you are doctorates, you get 10 USD… that really discourages people from studying for higher degree… F45U1E (26)	
	Non-existing social and intellectual motives	If they try hard, but there is no support from the environment… that is not possible. What does supporting environment mean? It means for example in general the results of the research studies always direct towards truth. If the revealed truth is not supported... sometimes the results can affect the politics or anything... so... it is another factor that makes researchers dare not to do research... M19U1U (10)	

Case analyses: Though the inconsistency existed internally, participants generally viewed research motivation as very low as they reflected into the support from the government, from the institution, as well as from the society at large. Phenomenological case analyses of different types of stakeholders on research orientation revealed further reflection on the common-theme tendency: for example, that faculty members were, in general, not motivated to do research and that there were orientation gaps between those who actually understand and could do research and those who may not experientially understand real research works and so could not do research (See Table 6.13. below). Like the analysis in previous chapter, these cases' observations were meant to offer more additional information from a whole case perspective so as to understand the context of individual interviewee which possibly generated their opinions. The opinions of these presented cases were just a snapshot of the interview as participants tended to discuss this particular issue of research orientation of Cambodian faculty members.

Table 6.13. Case analyses of different stakeholders on perception towards research orientation

Case 1	Case 2	Case 3	Case 4
Institution: SR **Category:** Policy Maker **Research status:** Engaged **Code:** P37SRE	**Institution:** U6 **Category:** Faculty **Research status:** Engaged **Code:** F36U6E	**Institution:** CD **Category:** External Stakeholder **Research status:** Engaged **Code:** E35CDE	**Institution:** U4 **Category:** University Management **Research status:** Engaged **Code:** M6U4E
This participant was a policy maker, a researcher, and a former leader of a higher education institution. He was a specialist in the field of agriculture. He thought that research requires skills, knowledge, and understanding about its background and that research is difficult, and so not everyone can do it. As a person who has a strong academic network and has engaged in lots of international research community within his own area, he tended to show practical understanding that Cambodian higher education requires more capable researchers to make research function and more supports from the government. He is also a realistic believer that teachers do not engage in research because they need to teach more hours to earn more income to support their living conditions. He was also critical of the lack of local resources for research to be really actively engaged.	This participant was a research-active faculty member. He also taught and led his department. He thought researchers need to have expertise and networks and understand where to garner research resources. He deemed that research is still a superficial movement at Cambodian universities. Research centers might have only names but may not be functioning properly. To promote research, he suggested faculty members be well equipped with enough research training. He showed dissatisfaction with the current practice of research implementation, thinking that it is not enough and not effective yet. More active and real implementation to motivate faculty members to promote research interest and research culture is needed by higher education institutions.	This participant was a research and management staff at a research institute in the country. He believed that research conditions have improved to some extent and that younger researchers tended to show interest in research. He reflected through one practical forum, a joint collaboration with other research institutions led by his institution to promote research dialogues in the country, saying that this forum has created some practical outputs for policy thinking, promoting research culture, and creating network for them to further join collaboration. He mentioned that motivation to do research is still low and highlighted that the education system does not embrace research enough. He also focused on language issue as an important element to access research resources and for faculty members to engage in research.	This participant was a manager of the research unit at his institution, one of the most active in research in science and engineering in the country. He thought his institution has enough research-capable members, led by doctorates and supported by Master's degree holders and students who can perform research to some extent. He added that as long as one obtained Ph.D., s/he is more or less inclined to research works. That makes his institution takes lead in research in these fields in the country. However, he thought that researchers, though capable, might not be motivated enough with the current conditions of working and with their livelihood as a university teacher. His institution has clear strategies to promote research by giving double salary and facilitating researchers as much as they can. He also highlighted cases where research might be misunderstood and believed that, as long as ones have time, research performance and outputs can always be promoted.

6.3. Synthesis of the results on research orientation of Cambodian faculty members

The trends of research orientation were analyzed based on the four constructs: research experience, research competence, research attitudinal orientation, and research motivation of Cambodian faculty members, measured on a scale ranging from 0 (indicating the lowest score) to 5 (indicating the highest score). Research experience and research competence ratings were basically lower than average (i.e. a mean score of 1.96 for research experience, and a mean score that ranged from 1.72 in research technological competence to 2.66 in research managerial competence). These results highlighted some

concerns on research production skills and real research experience. As for research attitudinal orientation, the means score ranged from 2.87 in behavioral research orientation to 3.98 in emotional research orientation, which was considered moderate and high respectively. Similarly, research motivation's mean scores ranged from 3.15 in extrinsic research motivation to 3.86 in generic and intrinsic research motivation. The implication was that participants were emotionally oriented towards and viewed research reward indicators as important for research promotion activities. This actually attended to the first finding chapter's results that showed Cambodian faculty members to be increasingly aware of their research roles. Further analyses showed that these research orientation variables have certain significant relationships with some demographic variables of individual and institutions. Most of these variations were generally linked to faculty members' terminal degree (i.e. whether a faculty member has Ph.D. or not) and their terminal degree country (i.e. faculty graduating locally vs those graduating from abroad). For certain research orientation variables, other demographic variables – such as institutional orientation (public vs private universities) and institutional location (province-based vs city-based) – were statistically significant. Research motivation, however, did not vary between different attributes of all the tested demographic variables.

From the qualitative side, three emerging themes on perceptions towards individual research orientation could be explained as follows: about 72 percent of interviewees perceived "big gaps in research thinking, background knowledge, competence, and experience;" around 50 percent perceived "inconsistency between emotionally valuing and practically understanding research;" and about 74 percent perceived "conflicting dilemma between teaching and research motivation." The qualitative finding pointed to one big question in the quantitative data: whether faculty who rated high in their attitudes and values towards research truly have enough practical understanding of what academic, scientific, and practical research works are like.

For the overall characteristics of research orientation of Cambodian faculty members, the analyses revealed that, generally, faculty have positive attitudes and give values towards research (though these positive attitudes and values are questioned by some qualitative participants), whereas research orientation (in terms of research competence and research experience of faculty members) are generally not as high as their research attitudes. Faculty with Ph.D. degree and terminal degree from a foreign country showed higher research orientation in terms of all these constructs in general, and the gaps in terms of research knowledge and competence were accentuated in the qualitative analyses.

Research Question 2 Highlights: How oriented are Cambodian faculty members towards research activities and production?
• Quantitative rating reflected limited confidence in research competence and experience – i.e. big gaps between researchers and non-researchers in terms of research competence and knowledge. • Quantitative rating reflected moderate to high research attitudinal orientation and values on research rewards – but the results may imply inconsistency between emotionally valuing and experientially understanding research. • Faculty members with Ph.D. and graduating from a foreign country offered higher rating on most research orientation variables. • Qualitative data revealed debates between teaching and research motivation.

CHAPTER 7: RESEARCH SUPPORT ENVIRONMENT (INSTITUTIONAL AND EXTERNAL SUPPORT) OF CAMBODIAN HIGHER EDUCATION SECTOR: FINDING III

Some previous studies have documented certain issues related to research environment of Cambodian universities. This chapter of the present study offered some rigorous perspectives on this topic. This chapter aimed to answer the study's third research question – i.e. how supportive is Cambodian research environment – by asking respondents to quantitatively rate various constructs and indicators of the research support environment (adopted and adjusted from the literature) at their current institutions as well as interviewing them with some open-ended qualitative questions. The research support environment focused on the institutional dimension and the external dimension. Again, the finding presentation came in three themes: the quantitative trends and patterns of research support environment variables, the qualitative themes on perceptions towards the current research support environment in Cambodian higher education sector (and some case analyses), and the final synthesis of the chapter.

7.1. Quantitative results

7.1.1. Overall and specific trends of research environment variables

Overall trends of research support environment variables: Four specific variables were used to observe research support environment at the institutional and departmental dimensions (i.e. general institutional support, availability of research-capable members, departmental leadership, and research resources and facilities) and two variables to represent research support environment at the external dimension (i.e. support from ministry and support from external sources). The overall response to these questions were moderate. Figure 7.1. indicated that the average scores of all of these variables ranged from the lowest value of 2.50 to the highest value of 3.31. – specifically, mean = 2.73 for general institutional supports, mean = 3.31 for availability of research-capable members, mean = 3.17 for departmental leadership, mean = 2.56 for research resources and facilities, mean = 2.52 for support from ministries, and mean = 2.50 for support from external sources). It is apparent from these values of the moderate mean scores that faculty members in general did not show any extreme negative or positive tendency towards the current research support environment at Cambodian higher education. While the overall responses were neutral, it is vital to closely examine specific items used to measure each of these variables.

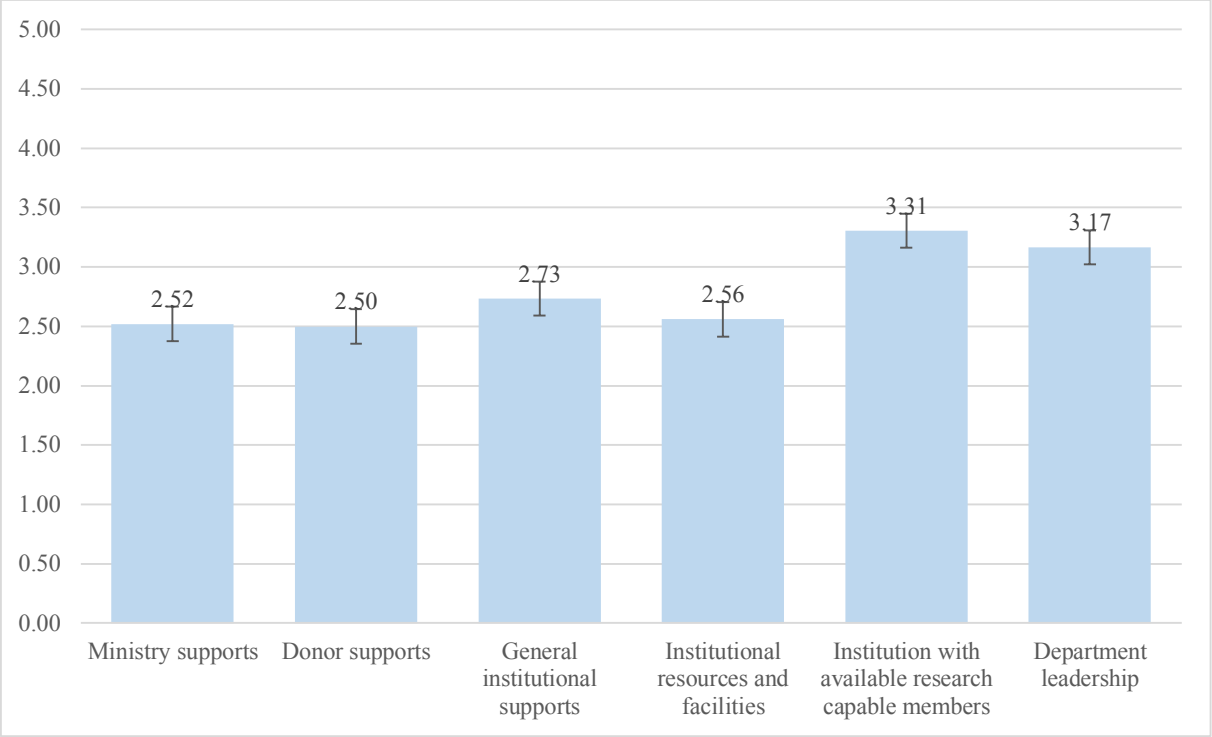


Figure 7.1. Mean scores of each research environment variable

Trends of general institutional research support: Figure 7.2. below further indicated that the percentage of people showing negative rating (i.e. 0 = totally disagree, 1 = strongly disagree, and 2 = disagree) on all the 9 items of the general institutional support variable was generally less than 50 percent.

Only the item "my institution comprises a satisfactory salary scale conforming to the working conditions" comprised 52.17 percent of dissatisfied participants, and the item "my institution offers great motivation in terms of financial rewards if staff conduct research" comprised 53.83 percent of participants giving negative responses. What these two items implied were that Cambodian faculty members were less satisfied with the financial conditions related to research activities at their current institution, compared to other items (see Figure 7.2.). Approximately 40 percent of the participants rated lower on such items as "my institution comprises or plans to create a position for researcher," "my institution offers great motivation in terms of non-financial rewards if staff conduct research," and "my institution does not only have research policy but also implement research activities efficiently."

Together, these statistical trends indicated that approximately more than 50 percent of the samples acknowledged the tolerability of the current research support environment (though there were faculty members who may not be very satisfied with their current research support conditions, especially, in terms of financial motivation).

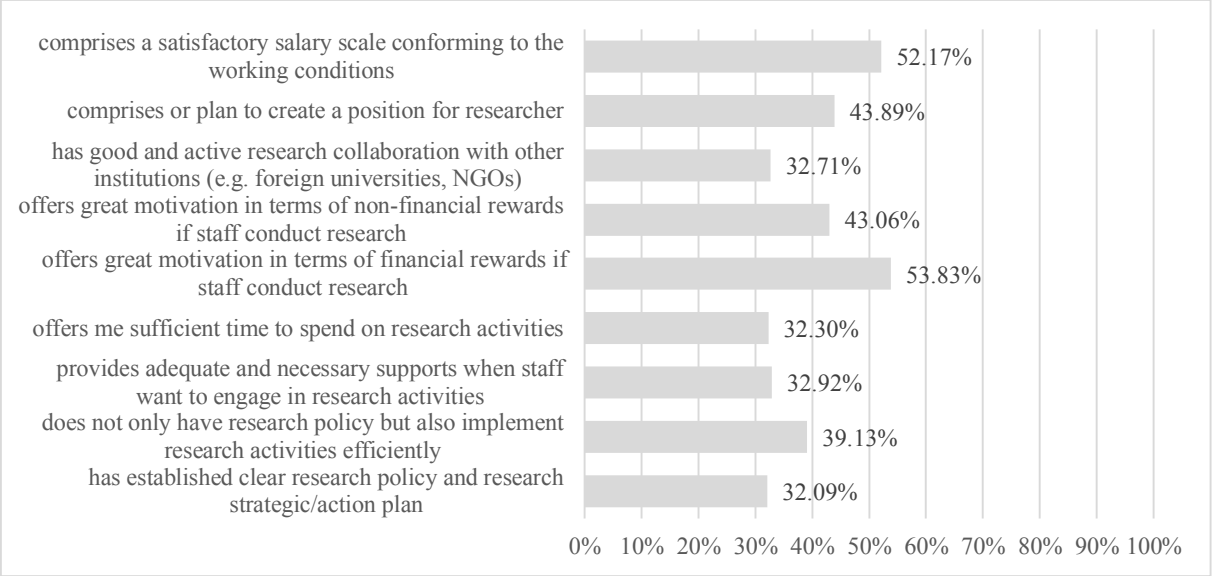


Figure 7.2. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 9 items of general research support environment (My institution...)

Trends of institution with availability of research-capable members: The rating on institution with availability of research-capable members tended to be higher than that of other variables of the institutional and departmental dimensions and external dimensions (as reflected through the overall mean score = 3.31 in Figure 7.1.). Figure 7.3. illustrated that, in approximation, less than 25 percent of the respondents expressed negative belief for all the three items that measured how much participants think their institutions have research-capable human resources. Such results implied that research-capable human resources at these selected institutions were not considered by their faculty members as in a too bad condition in general.

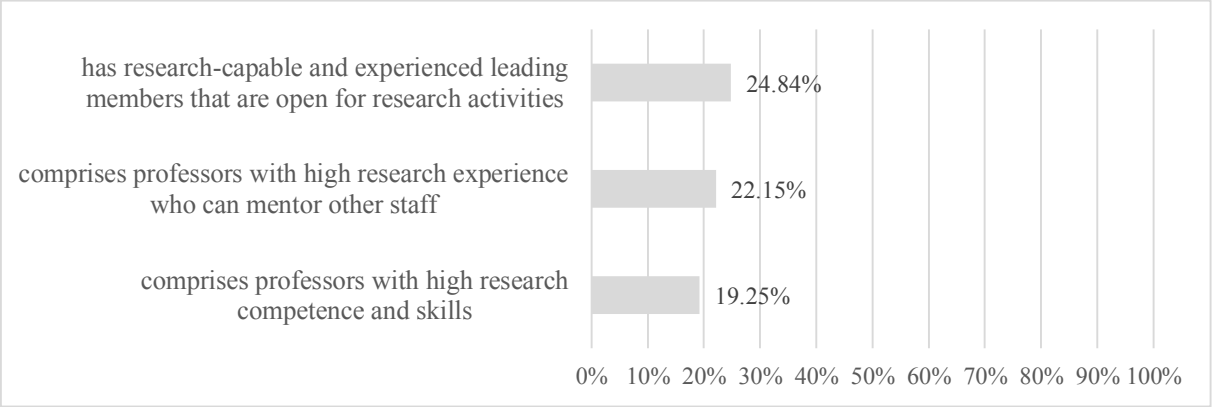


Figure 7.3. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 3 items of availability of research-capable faculty members (My institution...)

Trends of departmental leadership: The rating on research-oriented departmental leadership was also higher than the rating of other variables (mean score = 3.17 as shown in Figure 7.1.). In specific item analyses, approximately less than 30 percent of all the study's 483 respondents rated negative options (i.e. 0 = totally disagree, 1 = strongly disagree, and 2 = disagree) on the 6 items that inquired them on how much their department leaders are oriented towards research (for instance, his/her research competence, his/her research values, his/her research support, his/her feedback approach, his/her decision making approach, and his/her leadership effectiveness) (see Figure7.4.). Low rating on the negative options implied that participants viewed their departmental leaders as somehow supportive and oriented towards research promoting leadership.

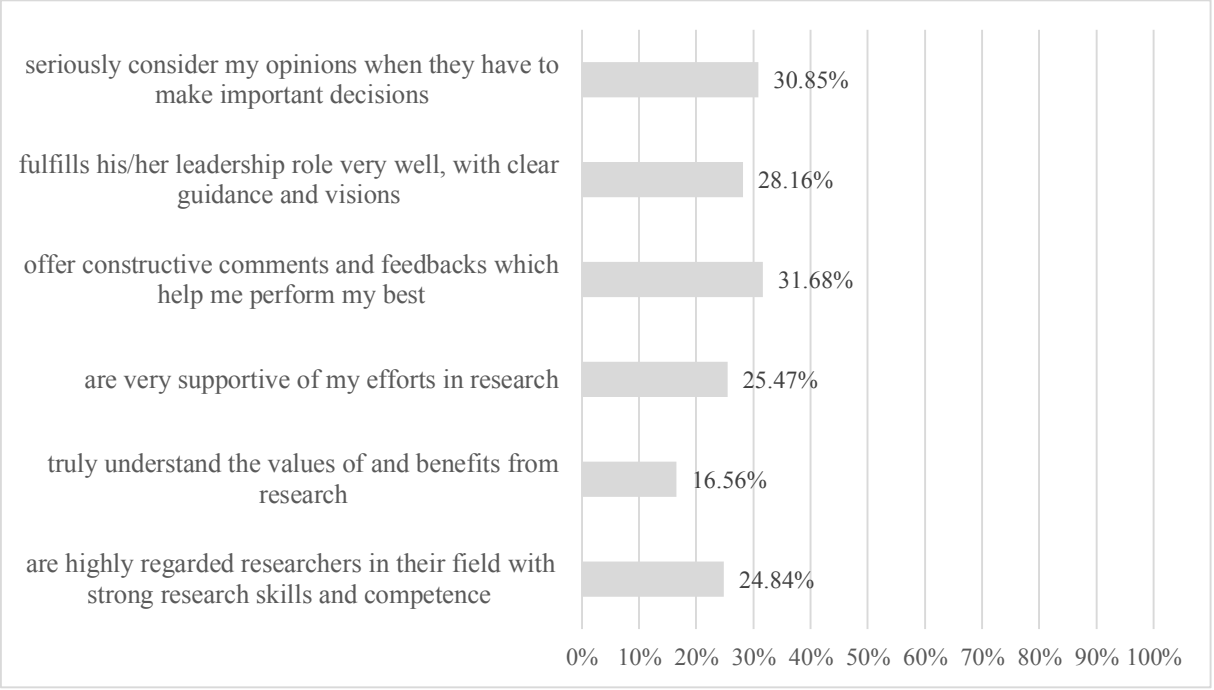


Figure 7.4. Combined percentage of respondents reporting 0=totally disagree, 1= strongly disagree, and 2=disagree on the 6 items of departmental leadership

Trends of institutional research resources and facilities: Institutional research resources and facilities were moderately rated in overall (mean score = 2.56) (see Figure7.1.). But, a closer examination of each specific item (see Figure 7.5.) suggested that more than 50 percent of faculty members in the sample revealed negative perceptions towards two features: research funding from the institution itself (58.18 percent of participants giving negative rating) and research funding from other sources (57.14 percent of them giving negative rating). Around 40 percent of participants showing negative perceptions on items related to research facilities, research units, and research support staff. Less negative opinion about research resources and facilities was given on the condition of institutional technological and academic resources (less than 30 % of negative rating). Overall, these trends implied research financial situation was not in a good shape for Cambodian faculty members.

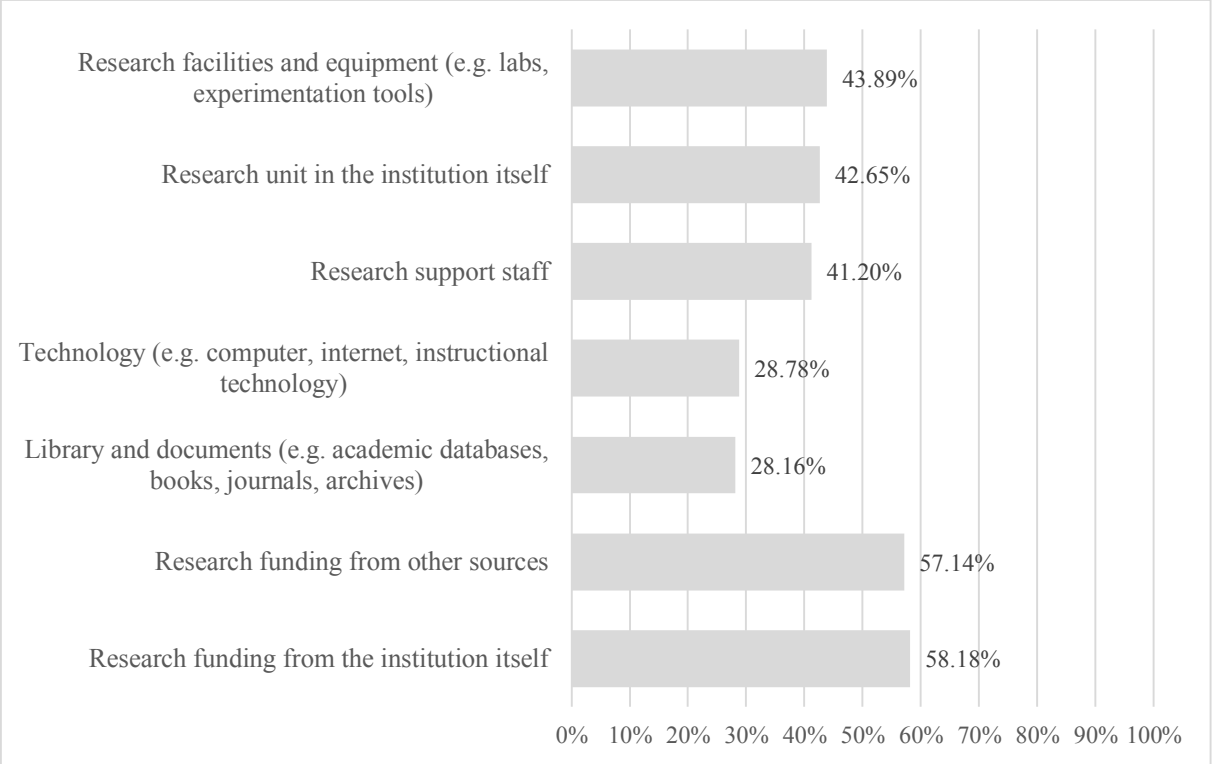


Figure 7.5. Combined percentage of respondents reporting 0=non-existent, 1=very poor, and 2=poor on the 7 items of research resources and facilities

Trends of research support from ministry and external sources: The mean score of rating on research support from ministry (i.e. rating on whether the governing ministry offers adequate training, research opportunities, and/or research funding) had a mean score of 2.52 (see Figure 7.1.). This overall trend implied a neutral level of satisfaction on research support from ministry. There were institutions with faculty members satisfying with the current supports as well as those with less satisfaction. The same applied to the external supports from donors (a mean score of 2.50) (which was exactly the standard mean score of the rating on a scale from 0 to 5).

Figure 7.6. and Figure 7.7. provided statistical trends for specific items of external research support to Cambodian faculty members. Table 7.6. indicated that 59.42 percent dissatisfied with the amount of research funding they received from ministry governing their institutions. Table 7.7. showed that 44.51 percent dissatisfied with the amount of research funding they received from external donors or sources. For all other items of support from ministry and external donors, approximately less than 50 percent of participants showed negative opinions towards such items as capacity building training, scholarship, facilities support, and policy and strategic guidance.

In short, participants, in general, in this current study showed neutral level of satisfaction with the current research support from their governing ministries and external donors.

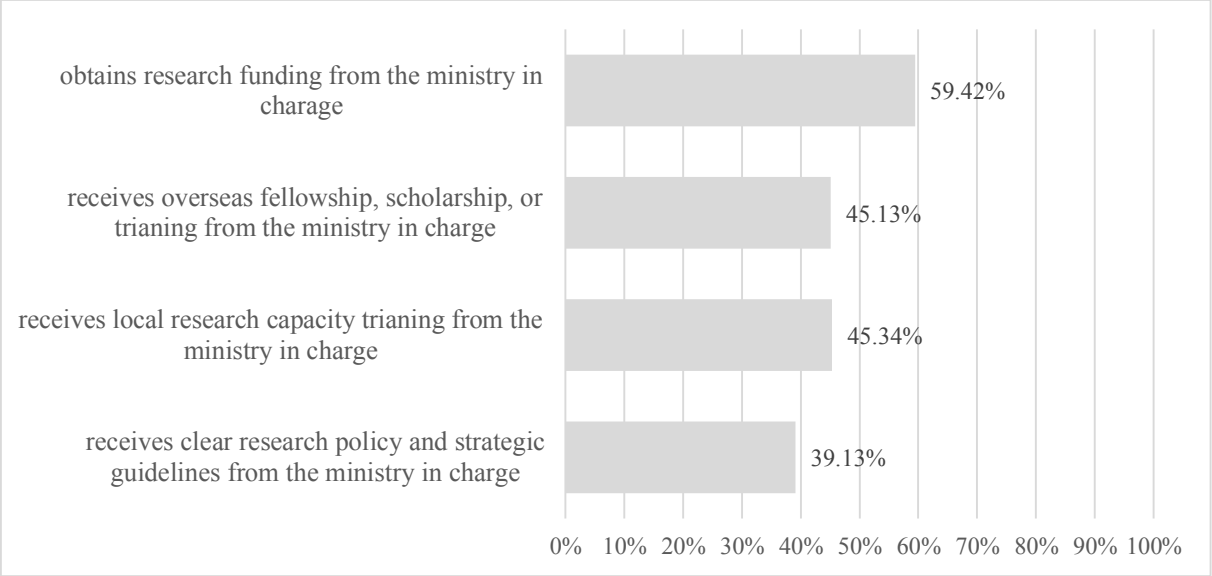


Figure 7.6. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 4 items of research support from ministry

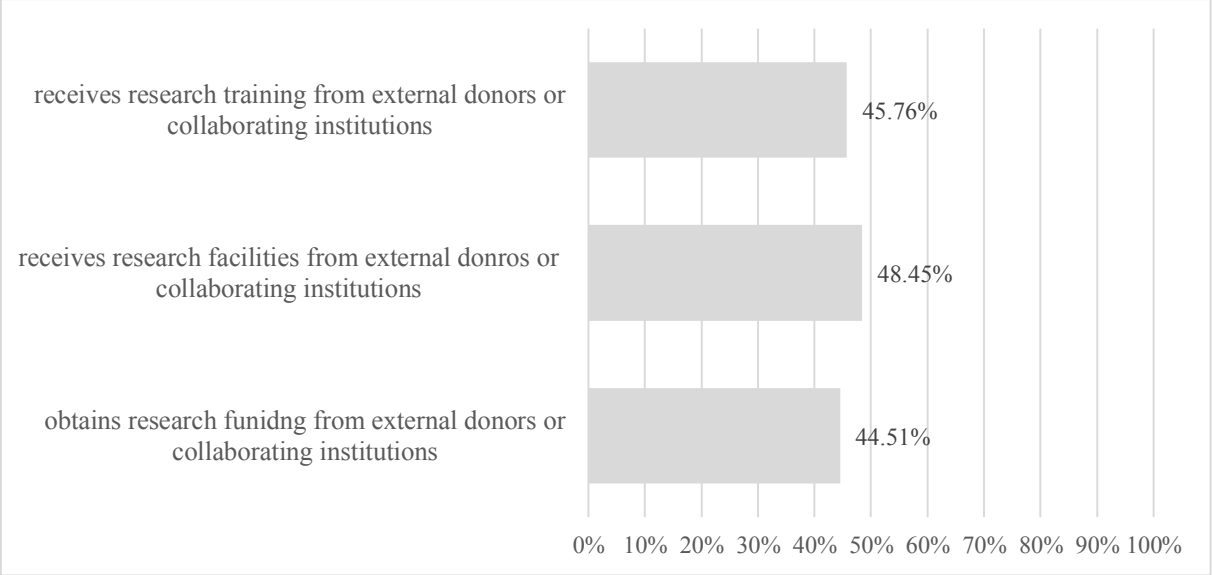


Figure 7.7. Combined percentage of respondents reporting 0=totally disagree, 1=strongly disagree, and 2=disagree on the 3 items of research support from external sources

7.1.2. Patterns of research support environment variables

What this section did was to observe patterns of relationship between the research support environment variables (i.e. general institutional research support, availability of research capable members, institutional research resources and facilities, departmental leadership, supports from ministry, and supports from external sources) and individual demographic variables (i.e. gender, age, terminal degree, terminal degree country, discipline, employment type, and teaching role, institutional

orientation, institution location, and institutional governance). In other words, this section aimed to understand whether or not the research support environment variables varied according to different attributes of individual and institutional demographic variables. These pattern analyses would be useful in further explaining the overall characteristics of research support environment in the current Cambodian higher education setting.

7.1.2.1 Patterns of general institutional research support

Table 7.1. showed that general institutional research support (such as policy, strategy, motivating mechanism, salary, management, time, etc.) significantly varied according to teaching roles of faculty members. That being said, faculty members who had only teaching role tended to offer negative rating than those who had more than teaching roles. The mean score of the former was 2.65; the mean score of the latter was 2.91.

Table 7.1. Patterns of general institutional research support

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.76	0.99	.237	481	.813
	Public	413	2.73	0.99			
Location	Province	151	2.81	1.03	1.229	481	.220
	City	332	2.70	0.96			
Governance	Not under MoEYS	78	2.76	1.11	.244	481	.808
	Under MoEYS	405	2.73	0.96			
Gender	Female	101	2.74	0.96	.071	471	.944
	Male	372	2.73	0.99			
Terminal degree	non-Ph.D.	422	2.73	0.98	-.264	474	.792
	Ph.D.	54	2.77	1.06			
Terminal degree country	Cambodia	278	2.76	1.01	.869	467	.385
	Overseas	191	2.67	0.95			
Teaching role	Teaching and other roles	132	2.91	0.98	2.575	451	.010
	Only teaching	321	2.65	0.97			
Discipline	Science	148	2.78	1.01	.720	481	.472
	Social Science	335	2.71	0.97			
Employment type	Part-time	96	2.80	0.89	.799	461	.425
	Full-time	367	2.71	1.00			
Age	<=30	109	2.70	0.91	1.445	482	.237
	31-45	308	2.70	1.00			
	>=46	66	2.92	1.04			
Teaching hours	<=15 hours	250	2.77	1.03	.954	481	.340
	>15 hours	233	2.69	0.94			

Attributes of other institutional and individual demographic variables did not significantly vary in terms of general institutional research support.

7.1.2.2 Patterns of institution with availability of research capable members

In should be recalled that respondents tended to offer high rating on the availability of research-capable members who they thought are able to lead and mentor research activities at their institutions in the above trend analyses. Table 7.2. presented the result of pattern analyses of this variable, indicating that the rating of availability of faculty members significantly varied by faculty members' gender. In other words, female faculty members tended to have more positive perception on the availability of research-capable members at their current institution, compared to their male counterparts (mean score of female = 3.5; mean score of male =3.3.).

Table 7.2. Patterns of institution with research-capable faculty members

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	3.32	0.96	.164	481	.870
	Public	413	3.30	1.00			
Location	Province	151	3.24	1.11	-.968	481	.334
	City	332	3.34	0.94			
Governance	Not under MoEYS	78	3.34	1.03	.308	481	.758
	Under MoEYS	405	3.30	0.99			
Gender	Female	101	3.50	0.89	2.179	471	.030
	Male	372	3.26	1.01			
Terminal degree	non-Ph.D.	422	3.31	0.99	.237	474	.813
	Ph.D.	54	3.28	1.06			
Terminal degree country	Cambodia	278	3.29	1.05	-.373	467	.709
	Overseas	191	3.32	0.92			
Teaching role	Teaching and other roles	132	3.37	0.94	.905	451	.366
	Only teaching	321	3.27	1.02			
Discipline	Science	148	3.34	0.98	.470	481	.638
	Social Science	335	3.29	1.01			
Employment type	Part-time	96	3.36	0.94	.501	461	.617
	Full-time	367	3.30	1.01			
Age	<=30	109	3.30	0.93	.368	482	.692
	31-45	308	3.33	1.01			
	>=46	66	3.21	1.06			
Teaching hours	<=15 hours	250	3.36	1.04	1.271	481	.204
	>15 hours	233	3.25	0.95			

Attributes of other institutional and individual demographic variables did not significantly vary in terms of faculty members' belief that their institution with availability of research-capable members.

7.1.2.3 Patterns of institutional research facilities and resources

The trend analyses indicated that faculty members' rating on the conditions of institutional research resources and facilities was neutral. Table 7.3. revealed a consistency between the pattern analysis and the trend analyses as the table indicated that no demographic variable was statistically significantly different in terms of the rating on institutional research facilities and resources. The result implied that research facilities and resources of Cambodian universities tended to be in a similar condition. The rating of faculty members in general did not indicate that certain Cambodian universities/institutions may receive more or fewer research facilities and resources.

Table 7.3. Patterns of institutional research facilities and resources

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.60	0.91	.437	481	.662
	Public	413	2.55	0.88			
Location	Province	151	2.62	0.85	1.013	481	.312
	City	332	2.53	0.90			
Governance	Not under MoEYS	78	2.44	0.99	-1.328	481	.185
	Under MoEYS	405	2.58	0.86			
Gender	Female	101	2.66	0.92	1.206	471	.228
	Male	372	2.54	0.88			
Terminal degree	non-Ph.D.	422	2.56	0.88	.189	474	.850
	Ph.D.	54	2.54	0.93			
Terminal degree country	Cambodia	278	2.58	0.88	.780	467	.436
	Overseas	191	2.51	0.89			
Teaching role	Teaching and other roles	132	2.63	0.85	1.143	451	.254
	Only teaching	321	2.53	0.88			
Discipline	Science	148	2.57	0.88	.184	481	.854
	Social Science	335	2.55	0.89			
Employment type	Part-time	96	2.68	0.85	1.343	461	.180
	Full-time	367	2.54	0.89			
Age	<=30	109	2.63	0.86	.517	482	.597
	31-45	308	2.53	0.88			
	>=46	66	2.55	0.95			
Teaching hours	<=15 hours	250	2.58	0.92	.592	481	.554
	>15 hours	233	2.53	0.85			

7.1.2.4 Patterns of research-oriented departmental leadership

Table 7.4. showed that faculty members working at universities under the governance of Ministry of Education, Youth and Sport (MoEYS) generally offered lower rating on departmental leadership than their counterparts working at universities/institutions not under the governance of MoEYS. The mean score of the former was 3.11; the mean score of the latter was 3.42. The results implied that faculty members from non-MoEYS-governed universities/institutions tended to be more satisfied with research orientation of their departmental leaders, compared to the respondents from MoEYS-governed institutions. Attributes of other institutional and individual demographic variables did not significantly vary in terms of perceptions towards research orientation of departmental leaders.

Table 7.4. Patterns of research-oriented departmental leadership

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	3.05	1.00	-.981	481	.327
	Public	413	3.19	1.08			
Location	Province	151	3.11	1.06	-.737	481	.461
	City	332	3.19	1.07			
Governance	Not under MoEYS	78	3.42	1.11	2.320	481	.021
	Under MoEYS	405	3.12	1.05			
Gender	Female	101	3.31	1.08	1.562	471	.119
	Male	372	3.12	1.06			
Terminal degree	non-Ph.D.	422	3.17	1.05	.888	474	.375
	Ph.D.	54	3.04	1.21			
Terminal degree country	Cambodia	278	3.16	1.09	.098	467	.922
	Overseas	191	3.15	1.05			
Teaching role	Teaching and other roles	132	3.25	1.05	1.151	451	.251
	Only teaching	321	3.12	1.09			
Discipline	Science	148	3.24	1.12	1.079	481	.281
	Social Science	335	3.13	1.04			
Employment type	Part-time	96	3.27	0.90	.821	461	.412
	Full-time	367	3.17	1.10			
Age	<=30	109	3.27	1.03	.744	482	.476
	31-45	308	3.12	1.07			
	>=46	66	3.19	1.12			
Teaching hours	<=15 hours	250	3.21	1.12	1.033	481	.302
	>15 hours	233	3.11	1.01			

7.1.2.5 Patterns of research support from ministry

In general, the mean score of research support from ministry was moderate in the trend analysis (see Figure 7.1.). For pattern analyses, Table 7.5. below showed that the mean score of research support from ministry of faculty members working in public universities (mean = 2.56) were statistically significantly higher than the mean score of those working in private universities (mean = 2.26). Surprisingly, the mean score of respondents working in city-based universities (mean = 2.43) was statistically significantly lower than the mean score of those working in province-based universities (mean = 2.71). The results in general implied that participants from public universities and those from province-based universities were more satisfied with the research support they receive from their parent ministry. Attributes of other institutional and individual demographic variables did not significantly vary in terms of perception towards research support from the ministry level.

Table 7.5. Patterns of research support from ministry

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.26	0.97	-2.202	481	.028
	Public	413	2.56	1.08			
Location	Province	151	2.71	1.05	2.614	481	.009
	City	332	2.43	1.07			
Governance	Not under MoEYS	78	2.39	1.20	-1.133	481	.258
	Under MoEYS	405	2.54	1.04			
Gender	Female	101	2.45	1.19	-.852	471	.394
	Male	372	2.55	1.02			
Terminal degree	non-Ph.D.	422	2.53	1.07	.673	474	.501
	Ph.D.	54	2.43	1.01			
Terminal degree country	Cambodia	278	2.58	1.09	1.701	467	.090
	Overseas	191	2.41	1.00			
Teaching role	Teaching and other roles	132	2.53	1.04	.159	451	.874
	Only teaching	321	2.51	1.07			
Discipline	Science	148	2.45	1.05	-.939	481	.348
	Social Science	335	2.55	1.08			
Employment type	Part-time	96	2.56	1.01	.392	461	.696
	Full-time	367	2.51	1.07			
Age	<=30	109	2.46	0.98	1.092	482	.337
	31-45	308	2.50	1.09			
	>=46	66	2.69	1.11			
Teaching hours	<=15 hours	250	2.52	1.05	-.099	481	.921
	>15 hours	233	2.52	1.09			

7.1.2.6 Patterns of research support from external sources

Table 7.6. indicated that there was as statistical significant difference in terms of research support from external sources between public universities and private universities. In this study, public universities' faculty members obtained a mean score of 2.57 on their satisfaction about support from external sources, which was higher than the average rating of faculty members from private universities (with a mean of only 2.05). Also, faculty members majoring in natural science and related fields tended to reveal more positive perception towards receiving research support from external sources, compared to faculty members in the field of social science and related ones – mean score = 2.68 for the natural science group vs mean score = 2.42 for the social science group.

Table 7.6. Patterns of research support from external source

Variables	Groups	N	Mean	SD	t/F test	df	Sig.
Orientation	Private	70	2.05	1.18	-3.426	481	.001
	Public	413	2.57	1.19			
Location	Province	151	2.51	1.23	.198	481	.843
	City	332	2.49	1.19			
Governance	Not under MoEYS	78	2.50	1.39	.012	98.885	.990
	Under MoEYS	405	2.50	1.17			
Gender	Female	101	2.55	1.16	.423	471	.673
	Male	372	2.49	1.20			
Terminal degree	non-Ph.D.	422	2.50	1.21	-.405	474	.685
	Ph.D.	54	2.57	1.10			
Terminal degree country	Cambodia	278	2.45	1.22	-1.087	467	.277
	Overseas	191	2.57	1.16			
Teaching role	Teaching and other roles	132	2.47	1.20	-.355	451	.722
	Only teaching	321	2.52	1.19			
Discipline	Science	148	2.68	1.22	2.217	481	.027
	Social Science	335	2.42	1.19			
Employment type	Part-time	96	2.64	1.17	1.163	461	.246
	Full-time	367	2.48	1.20			
Age	<=30	109	2.61	1.18	.562	482	.570
	31-45	308	2.46	1.20			
	>=46	66	2.48	1.27			
Teaching hours	<=15 hours	250	2.57	1.18	1.396	481	.163
	>15 hours	233	2.42	1.23			

7.2. Qualitative results

The main qualitative interview questions of research question 3 included such questions as "What is it like to talk about research support environment of Cambodian higher education sectors? Are you satisfied with the current levels of supports from different sources (i.e. government, ministries, donors, professional society, private sector, civil society)? Why and why not?" Because the researcher used semi-structured interview techniques in the actual interview, there were more probing and confirming questions asked. All those questions basically aimed to generate generic answers to the current research support environment as well as challenges of Cambodian faculty members have faced. Again, results of the qualitative data were presented in three modes: 1. the emerging themes and sub-themes from the interview (i.e. the trends and challenges of research support environment), 2. the transcript-based quotes from interviewees, and 3. the quantified qualitative data in the form of frequency and percentage of each level-3 themes (See Figure 7.8. and Table 7.7.). Some case descriptions were also provided to offer more information from phenomenological perspectives of particular individual and institutional cases.

Thematic analyses: Three common themes emerged from the thematic analyses of research question three. Approximately seventy-two percent of participants pointed to the "problems with academic profession and academic cultures". About sixty percent pointed to the idea of "uncultivated research institutionalization". And around sixty-two percent raised or inferred the theme related to "uncertain research resources-creating and resources-sustaining mechanisms." Figure 7.8. illustrated these themes.

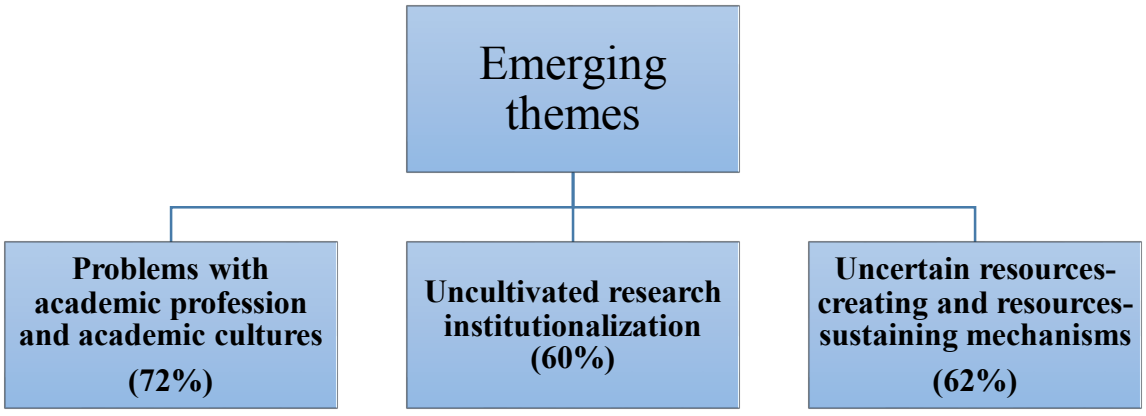


Figure 7.8. Emerging themes on perception towards research support environment

Concerns of participants over academic profession and academic cultures generally came around the issue of professorship or scholarship, academic leadership, intellectual nature of the academia, and academic collegiality, and the problematic system as a whole. Some participants questioned whether the higher education system of the country in the first place was designed for intellectual and research

purposes. In many ways, they believed that this was not the case and that Cambodian universities were designed for teaching and learning only. So, the social and educational systemization of the institutions towards producing research and knowledge were also completely non-existent. The institutions such as "research unit" or "researcher centers" were believed to be not functional. There were many cases about research units being used for the works of students' research, not as centers for advance studies or center for excellence in certain specialized fields. Although graduate programs have offered some sorts of research courses and thesis- or dissertation-production opportunities to Cambodian graduate students, the majority of participants believed that these graduate programs had not been at the standardized level of research training. These graduate programs conditions always evoked more concerns for the discipline of natural and physical science among interviewees because they believed that these fields required stronger physical resources to make research function really work.

The attempts to promote research were seen as a recent endeavor and still happening in piecemeal modes. The majority of participants criticized the fact of not having systemized the academic ranking and academic career path at Cambodian universities, making research far less important or not necessary for the local academics. Also, institution wise, research works were not considered in the form of purely academic works but more of applied research or research-for-teaching sorts of concepts. Professional academic leaders who understand the nature of research and the benefits research were considered still very limited, as exemplified by the more private universities who are more entrepreneurial and profits-oriented. Participants believed that having research-oriented leaders for their institutions – i.e. leaders who do not just verbally express their values of research but also take real facilitation and supporting actions – will contribute a lot to research promotion. Some participants also believed that the hours-based salary system truly discouraged research activities because faculty would be likely to spend more hours teaching for more incomes. As they pointed to the majority of private universities in the country, most of which employed more private teachers than full-time ones for certain reasons, the hours-based salary system may strongly influence the research engagement of those private faculty members.

Among the interviewees of this study, research resources are almost always the case. Despite the claims may vary from one to another interviewee – on whether the resources needed are funding, facilities, systems, human, or time, resources, in general, are needed for research to function. In should be noted that when it came specifically to funding, the participants tended to talk more about what they referred to as "research incentives," namely the financial benefits from engaging in research works. So, in Cambodian context, the financial support may not be only about funding for research but about incentives for researchers.

Table 7.7. Leve-3 themes, level-2 themes, and exemplary quotes on perception towards research support environment

Common emerging themes on research support environment at level 3	Categories at level 2	Selected transcript-based quotes	Frequency and Percentage of level-3 themes
Problems with academic profession and academic cultures	***Laissez-faire academic leadership and culture***	To make the system works, we need a tradition. We need a structure… if the teachers have never engaged in research activities, how can they supervise students… how can students engage in research activities… Even Ph.D. graduates… Having a Ph.D. doesn't mean you are a scholar. You need experience... if you come back and there is no structure, no lab. Professors do not know how to do research. No mentor... E17CDE (4)/ There is only paper but people do not do it. Only on the paper regardless of whether it is strategies, or visions, or missions. But in reality there is no such thing… M3U12E (55)/ University has not much autonomy… academic journals have to be independent. They publish what is true. They present the truth. If the university thinks too much about politics, they can't create journal outlets. If they write well and just because they criticize and we reject them, they will stop trusting us... how can we write that everything is good when the whole system is destructed, for example... P8ERE (16)	36 (72%)
	Problems within institutions	It is common... more interest, more conflicts. That is why people don't want to work F1U4E (122)/ Sometimes my mind was so soft that I closed the door and cried alone. I try my best. There are lots of complaints from staff. there are also political and internal fighting. Despite reform, understanding about ethics of some of our staff is limited M26U12U (10)	
	Problems with the culture of system in general	It is difficult. First the term research relates to the concept of investigation... when we translate it into Khmer terms, people get scared of it because they experience similar words during the Khmer Rouge regime... they don't want to say or give data.... they also don't accept new things... when we give them research results, they don't want to listen... E46CDE (15)/ Data collection is hard. People understanding about research is low, so they do not cooperate. Also, institutions tend to hide data; they do not reveal data for researchers' uses M16U3U (26)/ It takes time. Master's degree holders generally do not see real research values. We need only those who give values to research more than money... but in Cambodia, even a Ph.D. holder like myself, still care about our economy. Sometimes it is more psychological. Society pushes us to. We think about money more than dignity and knowledge though some have enough already... E46CDE (13)	

Uncultivated research institutionalization	**Hours-based teaching systems**	Some actually have research ability, but they teach more because teaching salary at universities in Cambodia is hours-based. If they teach more hours, they earn more money P43SRE (2)	30 (60%)
	Research training problems	Even advisors have limited research ability, say those graduating in Cambodia who have never engaged in theses or research writing. Each university has to urge them to do research. Education sector, like ACC, does not pressure university to pursue research that much... F49U9U (17)/ … and all graduates from abroad who have research capability should have a willingness to improve the capacity of locally graduating faculty and students… F2IUU (164)	
	Less active academy and research centers	We have the academy but whether they play their roles are questions P5DHE (79)/ the research office was chaotic… I did not know where the leader comes from … because he does not know… he can't coordinate… he just knows administration stuff… Research office has only about 3 to 4 members… P8ERE (14)	
Uncertain resources-creating and resources-sustaining mechanisms	***Donors as the only source of funding***	Existing research follows donors' missions. There have not been any deep analyses on the real positive impact of those research to the society. More about getting money for that particular time rather than for a sustainable future P5DHE (17)/ University has no funding. All come from external sources F39U4E (29)	31 (62%)
	Non-existing and unsystematic government support	No funding from government here. All are donors funding. F1U4E (154)/ For funding sources, I think the government does not pay much attention. They lack strategies to find funding sources F4U11U (54)	
	No strong private and industrial movement	I think funding from industry and private sector is good, but we never have such thing. Only industry can do it. When I talk to you, I talk about social science. For science, only industry can work things out. But for us those who understand research in that area is rare, people to communicate with industry do not exist, and industry itself does not value research M12U1E (28)	
	Non-existing local academic resources	We got academic resources through donations, but those are not sustainable. We got it by asking our partners to download for us… of course it is not enough… still very much lacking… but when we need it, we can find it, to some extent… F39U4E (31)	
	Available but unmanageable human resources	We also send our faculty to pursue their higher education abroad… in Spain, Australia, Korea, Malaysia, Philippines, Thailand… some staff quit our universities after they return and work outside for, say, 2000 USD. We had no contract with them before. That is the problem M26U12U (10, 12)	

Case analyses: Interviewees with different positions and working in different places were selected, so that their perception towards research support environment of Cambodian higher education institutions can be presented and compared (see Table 7.8.).

Table 7.8. Case analyses of different stakeholders on their perception towards research support environment

Case 1	Case 2	Case 3	Case 4
Institution: DH **Category:** Policy Maker **Research status:** Engaged **Code:** P21DHE	**Institution:** U8 **Category:** Faculty **Research status:** Engaged **Code:** F38U8E	**Institution:** CD **Category:** External Stakeholder **Research status:** Engaged **Code:** E18CDE	**Institution:** U3 **Category:** University Management **Research status:** Engaged **Code:** M15U3E
The participant came from an institution under MoEYS, working as a consultant for a project. He thought universities in Cambodia generally pay little attention to academic profession and the sense of modern universities as a places for knowledge creation. The government, for him, has no clear vision in science or research policies which are vital in gearing higher education institutions to become specialized in particular areas or become scholarly expertized in particular disciplines. Also, he viewed the current system of working does not show much values on professional academic leadership. The hours-based system of giving salary for teaching can be a critical problem. The engagement of industry or private sectors has even been less active for higher education sectors to make research function. Unlike other interviewees, this participant strongly questioned the reality of political influences on research, saying that there are many topics that researchers can engage without having to touch political issues. So, he did not think political problem as a big matter but more as an excuse for not doing research.	The interviewee was a senior scholar in the field of anthropology. He has researched and published a lot in the past. But currently he has been more active in disseminating the research knowledge. He was a unique case in this study because his research has aimed more for local uses and he engaged in his anthropological and historical research works out of self-interest, not for funding or anything. He thought most current attempts of research at universities and in the country has not been very real and academic. Institutions created are generally not at all functioning. Unlike most other interviewees, this participant thought that Cambodia is not yet in a stage where science research should be given more attention than social science and humanities themes, pointing to the many social problems facing the country today. He also pointed to the fact that science and technology have been more advanced in other countries, so technology transfer is a better choice. He also thought that research support system is not just about the capability of individual researchers but it needs more inputs and willingness from the national and institutional leaders to make it work properly.	This person was a senior, very productive researcher, who has published more than 100 research papers and books throughout his academic life. He has worked for many international organizations. He emphasized that research tradition is needed to make research really work in the long run. Current educational, social, and cultural systems in the country are not friendly for scientific ways and research ways of thinking. He was critical of science fields in which Cambodia has even fewer researchers, compared to their social science counter-parts. The lack of resources and modern facilities in science fields, the lack of motivation mechanisms, and the capacity improvement approaches have still been limited. He even stressed more on the lack of mindset and willingness to be a researcher and the lack of what he called "intelligence" or competence and skills to be a researcher. He thought that human capital and academic resources now are very limited, despite the small number of Ph.D. holders available. His insight towards research for Cambodia now is to build graduate capacity, bringing them to the number of researchers to the critical mass.	This person has worked as teachers and led graduate programs at his institution for some years. He majored in law. He also offered courses on research methods to graduate students. He thought some Cambodian universities have been in a transition period, from teaching towards research university. But he considered it a long way to go, given the realistic teaching-oriented situation. For him, the current teaching-oriented Cambodian system of teaching cannot be abandoned because quality teaching is always the priority for the current Cambodian students. He believed institutions do not have enough interest in research development, coupled with the lack of resources and human capital from the government and related institutions. Such support environment does not offer a promising outlook for research. He thought teachers need to teach to survive. To make them get engaged in research, enough capacity building and motivation are needed in this transition period. He also raised concerns over the current education system that generally lacks research bases from the beginning; serious policies and strategies to tackle this problematic roots are important.

All of these cases tended to agree on the missing picture of research traditions (from social and educational perspectives) as well as the supporting resources for Cambodian higher education institutions to make research work. However, they tended to be difference in terms of perception

towards which gateways to really promote the research environment. Case 4 considered the top-down supporting approach in educational sector to be the only solution, while Case 1 and Case 3 thought of institutional and individual supporting conditions as more critical. Case 2 was unique, as he viewed the government as an important actor for gearing research works of Cambodian academics and higher education institutions, but he himself and his groups have been very active at the individual and team level in promoting local as well as international research works and outputs.

7.3. Synthesis of the results on research support environment of Cambodian higher education sector

Research support environment in this current study consisted of two dimensions: external and institutional dimensions. External dimensions contained two variables: support from ministry and support from external sources. Institutional dimension contained four variables: general institutional research support, availability of research-capable faculty members, institutional resources and facilities, and departmental leadership.

Specific items of these variables were measured on a scale of 0 (indicating the lowest score) to 5 (indicating the highest score). The result, in overall, showed moderate to high rating of availability of research capable faculty members at the institutional level (mean score = 3.31) and of departmental leadership (mean score = 3.17). General institutional research support and institutional resources and facilities were approximately rated moderate as well, with the former having a mean score of 2.73 and the latter 2.56. Participants also reported moderate external environment supports; that is, from ministry level (mean score = 2.52) and from external donors (mean score = 2.50). Overall, the results tended to show a neutral perception towards the current Cambodian research support environment. While the overall trends were neutral, specific ratings on such items as institutional research funding and salary scale were generally unsatisfactory.

Research environment variables were hardly differentiated by different attributes of demographic variables. Only few statistical significant differences were detected. To be specific, the rating on support from ministry varied according to participants' institutional orientation and location; the rating on support from external sources varied according to participants' institutional orientation and discipline; the rating on general institutional support varied according to participants' teaching role; the rating on institutional resources and facilities varied according to participants' institutional governance; and, finally, the raining on availability of research-capable members varied according to participants' gender. Despite some of these variations, these pattern analyses seemed to indicate that

perceptions on the current conditions of research support environment of Cambodian higher education sector did not vary much among participants and their institutions.

On the other hand, from the qualitative analyses on perceptions towards current research support environment, approximately 72 percent of the interviewees reported opinions that viewed the current research support environment as "having problems with academic profession and culture." About 60 percent of the interviewees acknowledged the theme "uncultivated research institutionalization." And 62 percent supported the theme "uncertain resources-creating and resources-sustaining mechanisms."

Research Question 3 Highlights: What is it like to talk about research support environment of Cambodian higher education sector?
• Neutral quantitative rating on general institutional support, availability of research-capable members, research resources and facilities, departmental leadership, support from external sources, and support from ministry • Low quantitative rating specially on items related to financial conditions • Still unorganized academic profession and academic cultures (e.g. raised problems of academic profession, level and system of academic salary, system of recruitment and appointment, academic freedom, professional academic leadership, etc.) • Lack of research institutionalization (e.g. systems of specialized research centers, or institute for excellence in certain field, and professional research support administration and management in those institutions) • Dependent and unsustainable research resources (i.e. funding, facilities, human, time, and academic resources)

CHAPTER 8: WHAT FACTORS EXPLAIN CAMBODIAN FACULTY MEMBERS' RESEARCH OUTPUTS? FINDING IV

Past studies of Cambodian research culture and capacity have discussed various factors influencing research culture and capacity of Cambodian universities, mostly using qualitative data. This present study used both the statistical, correlational analyses and the qualitative thematic analyses to answer a similar research question: "What are factors explanatory of research outputs of Cambodian faculty members?" The main analyses employed zero-inflated negative inflation models to observe statistical effects of selected independent/predictor variables on the composite research output score, the composite international research output score, and the composite local research output score. The use of zero-inflated negative binomial regression models was considered fitted for the current study's data distribution. That being said, such a model is designed for count data, and it generates two further types of specific models: *the count model* (following the negative binomial distribution) that predicts the variation of research outputs (including the zero counts) and *the inflated model* (in this study, the logit model) that predicts the excess zero group. Further moderation analyses to test if the effects of the predictor variables (found significant in the main models) vary across disciplines, institutional orientation, institution location, and age were conducted, employing the same zero-inflated negative binomial regression models. Like the previous chapters of finding, this chapter's presentation started from the quantitative results, was followed by the qualitative results, and then was finalized by a short synthesis of the whole chapter.

8.1. Quantitative results

8.1.1. Descriptive statistical information

Table 8.1. below presented the details of all dependent and independent variables to be analyzed.[33] The table indicated that the research output scores were treated in three ways. First, the composite research output was dichotomized: among the 483 respondents, 57.6 percent of them fell into the zero-research output group, and 42.4 percent of the respondents fell into the group with at least one research output. The dichotomized research output score was used for a bivariate simple logistic regression. The second treatment of the research output scores was the transformation of the composite weighted research output score (divided by duration of their working years) into natural logarithm (mean = -.23; SD =

[33] It should be noted that previous chapters discussed specific trends and patterns of each of these variables. Please refer to Chapter 4 for the detailed explanation of demographic variables, Chapter 5 for the discussions of research output trends and patterns, Chapter 6 for the discussions of trends and patterns of research orientation variables, and Chapter 7 for the discussions of trends and patterns of research support environment variables.

1.22). This dependent variable was used for a bivariate simple linear regression. With the logarithmic transformation, the dependent variable turned normally distributed, and so simple linear regression was an appropriate statistical test. These two bivariate tests between each independent/predicator variables and the dependent variables were conducted to specify models for the main zero-inflated negative binomial regression analyses. The main analyses were conducted with the third treatment of the dependent variable (i.e. the composite weighted research output score, with a mean score of 5.43 and a standard deviation of 12.54.

Table 8.1. Descriptive statistical information of all variables

Variables	Items	Frequency	Percentage	Mean	Standard deviation
Dependent variables					
Dichotomized research output (N = 483)	0 = No research output	278	57.6		
	1 = More than one output	205	42.4		
Logarithmic research output score (N = 205)	Composite weighted research output score divided by the duration of respondent's services at his/her current institution (in years) and transformed into natural logarithm			-.23	1.22
Composite weighted research output (N = 483)	Composite research output score as a result of the summation of the weighted 13 types research output indicators			5.43	12.54
Demographic variables					
Institution orientation	1 = Private	70	14.5%	1.86	.352
	2 = Public	413	85.5%		
Institution location	0 = Province	151	31.3%	.69	.464
	1 = City	332	68.7%		
Institution governance	0 = Not under MoEYS	78	16.1%	.84	.368
	1 = Under MoEYS	405	83.9%		
Gender	0 = Female	101	20.9%	.79	.410
	1 = Male	372	77.0%		
	999 = Missing	10	2.1%		
Terminal degree	0 = No Ph.D.	422	87.4%	.11	.317
	1 = Ph.D.	54	11.2%		
	999 = Missing	7	1.4%		
Terminal degree country	0 = Cambodia	278	57.6%	.41	.492
	1 = Foreign country	191	39.5%		
	999 = Missing	14	2.9%		
Teaching role	0 = Teaching and other roles	132	27.3%	.71	.455
	1 = Only teaching role	321	66.5%		
	999 = Missing	30	6.2%		
Discipline	1 = Science and related fields	148	30.6%	1.69	.461
	2 = Social science and related fields	335	69.4%		
Employment type	1 = Part-timer	96	19.9%	1.79	.406
	2 = Full-timer	367	76.0%		
	Missing	20	4.1%		
Age	1 = Less or 30 years old	109	22.6%	36.67	7.42

	2 = 31 to 45 years old	308	63.8%		
	3 = 46 years old or older	66	13.7%		
Teaching hour	1 = Less or 15 hours/week	250	51.8%	17.58	13.94
	2 = More than 15 hours/week	233	48.2%		
Individual dimension independent variables					
Research experience	Faculty members' rating on previous engagement or involvement in research activities during graduate studies or as working experience (measured originally by 6 items on a 5-point scale)			1.96	0.98
Research production competence	Faculty members' rating on ability in writing, publishing, and presenting research outputs (measured by 3 items on a 5-point scale)			2.07	1.21
Research general competence	Faculty members' rating on general ability in research design, literature, data-handling, and quantitative and qualitative data analysis skills (measured by 5 items on a 5-point scale)			2.65	1.09
Research technological competence	Faculty members' rating on ability in using statistical, qualitative, and referencing software to manage and analyze research data (measured by 3 items on a 5-point scale)			1.72	1.14
Research managerial competence	Faculty members' rating on ability in in various management skills from project management to financial management of research works (measured by 3 items on a 5-point scale)			2.66	1.05
Research emotional orientation	Faculty members' rating on emotion and feeling towards the values of and interest in research works (measured by 6 items on a 5-point scale)			3.98	0.82
Research behavioral orientation	Faculty members' rating on behavior and commitment towards the values of and interest in research works (measured by 3 items on a 5-point scale)			2.87	0.93
Research intrinsic motivation	Faculty members' rating on the importance and expectation of various intrinsic research rewards (as measured by 7 items on a 5-point scale)			3.86	0.77
Research extrinsic motivation	Faculty members' rating on the importance and expectation of various extrinsic research rewards (measured by 3 items on a 5-point scale)			3.15	0.91
Institutional dimension independent variables					
General institutional research support	Perceptions on general institutional policy, strategy, motivation, working systems, and cultures to promote research activities and performance (measured by 9 items on a 5-point scale)			3.17	1.07
Availability of research capable members	Perceptions on conditions of an institution whether it comprises research-capable faculty members and leaders to guide and assist research activities and performance (measured by 3 items on a 5-point scale)			2.73	0.99
Institutional resources and facilities	Perceptions on institutional resources and facilities (such as funding, technology, academic resources, etc.) to support research activities and performance (measured by 7 items on a 5-point scale)			3.31	1.00
Departmental leadership	Perceptions on departmental leaders' attitudes, orientation, and competence in academic management and research profession (measured by 6 items on a 5-point scale)			2.56	0.88
External dimension independent variables					
Support from ministry	Perceptions towards various research supporting inputs or actions from the ministry governing the institution (measured by 4 items on a 5-point scale)			2.52	1.07
Support from external sources	Perceptions on various research supporting inputs or actions from external sources (such as donors, collaborators, etc.) (measured by 3 items on a 5-point scale)			2.50	1.20
Note: Age and teaching hours and other attitudinal variables also contain missing values but were replaced with their respective median score. Logarithmic transformation was conducted to obtain normality.					

8.1.2. Bivariate analyses for criterion validity, assumption tests, and model specification[34]

Generally, in regression analysis, model specification can be hard. If a model contains too few predictors, it can be underspecified and can be biased. If it contains too many predictors, it is over-specified and can also be biased. Researchers need a model that is "just right." This study, in its initial stage, included three dimensions of independent/predictor variables – i.e. 26 predictor variables in total. For general regression analyses, researchers can employ a step-wise approach to analyze such multiple predictors to decide which variables are statistically significant. However, for regression models with over-dispersed count data – such as the current study's data – there has not been much theoretical and methodological discussion about the model specification approach specific for this particular (zero-inflated negative binomial) regression. So, the researcher decided to specify the predictors for this study by doing bivariate regression analyses – specifically, a bivariate simple logistic linear regression analysis with the dichotomized research output and a bivariate simple linear regression analysis the logarithmic composite weighted research output[35] (see Figure 8.1.). Predictor variables (from the three dimensions) which were statistically significantly correlated with these two distinctively-treated dependent variables in the bivariate analyses would be selected for the main zero-inflated negative binomial analyses. This was a criterion-validity approach used in the current study to appropriately reduce and specify predictors for the main zero-inflated negative binomial model analyses. By specifying the model this way, the main model would not be either underspecified or over-specified.

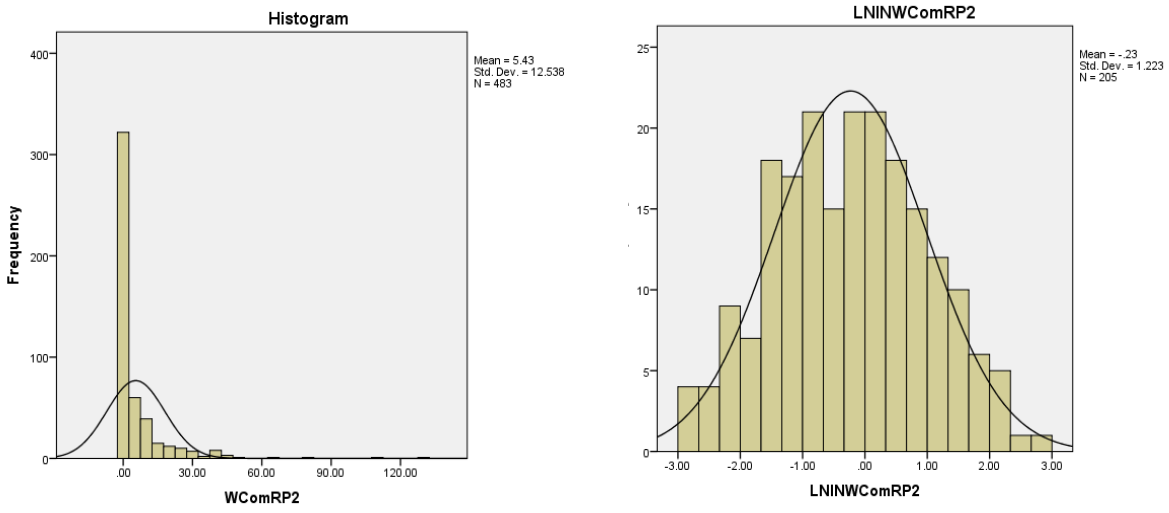


Figure 8.1. Distribution of weighted composite research output score and logarithmic weighted composite research output score divided by service period

[34] This section employed SPSS statistical software for the analysis.
[35] The logarithmic transformation of research output was conducted to obtain normality of the distribution, so as to make the simple linear regression analyses statistically appropriate.

It should also be noted that the bivariate simple logistic regression analyses comprised all the 483 samples. However, the bivariate simple linear regression analysis consisted of only 205 samples because it did not include the zero counts. Table 8.2. below showed the results of these separate bivariate analyses of the predictors and the two dependent variables of research output score.

Table 8.2. Separate bivariate analyses of each independent variable with dichotomized research output score and logarithmic weighted research output score divided by service period

Dimensions	**Variables**	**Simple logistic regression with dichotomized research output** (N = 483)		**Simple linear regression with logarithmic research output** (N = 205)	
		B	**Sig.**	**B**	**Sig.**
Demographic variables (11 variables)	*Institutional orientation*	-.957	.001**	-.542	.080
	Institution location	-1.149	.000***	-.156	.482
	Institutional governance	.118	.636	-.142	.534
	Gender	.169	.455	.110	.596
	Terminal degree	-1.736	.000***	.490	.021*
	Terminal degree country	-.930	.000***	.323	.062
	Teaching role	.320	.125	.432	.023*
	Discipline	.285	.152	-.213	.237
	Employment type	-.089	.704	-.159	.470
	Age	.034	.006**	-.058	.000***
	Teaching hour	.098	.594	-.228	.183
Individual dimension (9 variables)	*Research experience*	1.126	.000***	.567	.000***
	Research production competence	.882	.000***	.477	.000***
	Research general competence	.759	.000***	.344	.000***
	Research technological competence	.588	.000***	.326	.000***
	Research managerial competence	.504	.000***	.360	.000***
	Research emotional orientation	.527	.000***	-.187	.181
	Research behavioral orientation	.606	.000***	.189	.085
	Research intrinsic motivation	.240	.054	-.167	.210
	Research extrinsic motivation	.128	.211	.138	.173
Institutional dimension (4 variables)	*General institutional research support*	-.031	.738	-.103	.252
	Availability of research capable members	.086	.356	-.002	.982
	Institutional resources and facilities	.019	.853	.021	.826
	Departmental leadership	.078	.370	.026	.747
External dimension (2 variables)	*Support from ministry*	-.086	.320	.141	.111
	Support from external sources	.109	.157	.273	.001**
Note: *** p < .001; ** p < .01; * p < .05					

Simple logistic regression results: For the bivariate simple logistic regression analysis, twelve predictor variables had statistical significant relationship with the dichotomized research output. Institutional orientation (B = -.957 ; p <.01), institution location (B = -1.149 ; p <.001), terminal degree (B = -1.74 ; p < .001), terminal degree country (B = -.93 ; p < .001), age (B = .034 ; p < .01), research experience (B = 1.126 ; p < .001), research production competence (B = .882 ; p < .001), research general competence (B = .759 ; p < .001), research technological competence (B =.588 ; p <.001), research managerial competence (B = .504 ; p <.001), research emotional orientation (B = .527 ; p <.001), and research behavioral orientation (B = .606 ; p <.001) were all significantly related to whether faculty members produced research outputs or not, on a bivariate basis. The results suggested that faculty members from public university, faculty members from city-based university, faculty members holding doctoral degrees, faculty members graduating from a foreign university, older faculty members, faculty members with higher research experience, faculty members with higher research production competence, faculty members with higher research general competence, faculty members with higher technological competence, faculty members with higher managerial competence, faculty members with higher emotional research orientation, and faculty members with higher behavioral research orientation were more likely to produce at least one research output – compared to their counterparts. What was noticeable was that no institutional dimension's variables had statistically significant relationship with the dichotomized research outputs in these bivariate analyses.

Simple linear regression results: For the bivariate simple linear regression with the logarithmic composite weighted research output score, only nine variables postulated statistically significant relationship. Terminal degree (B = .490; p <.05), teaching role (B = .432; p <. 05), age (B = -.058; p < .001), research experience (B = .567; p <.001), research production competence (B =.477; p <.001), research general competence (B = .344; p <.001), research technological competence (B = .326; p<.001), research managerial competence (B= .360; p<.001), and support from external sources (B = .273; p <.01) were correlated with the logarithmic composite weighted research output score, on a bivariate basis. What these significances imply was that faculty members with doctoral degree, faculty members who had only teaching roles, younger faculty members, faculty members with higher research experience, faculty members with higher research production competence, faculty members with higher research software competence, faculty members with higher research managerial competence, and faculty members receiving support from external sources were those who were likely to produce more research outputs. Like the analysis of the dichotomized research output, these bivariate simple linear regression results showed no statistical significances between variables of the institutional dimension with research output.

Assumption test discussions: The next stage of analysis was the assumption test, using Pearson correlation r matrix. The Pearson correlation r analyses aimed to see bivariate correlation among

independent variables (see Table 8.3.) in order to detect whether all these independent/predictor variables were highly correlated in a way that alerts the problem of multi-collinearity or suppressor effects. Table 8.3. indicated that there were patterns of high correlation between certain variables originating from the same construct. For example, research production competence was strongly related to research general competence, research technological competence, and research managerial competence. The same applied to the relationship between research emotional attitude and research behavioral attitudes as well as between research extrinsic motivation and research intrinsic motivation. This happened because originally they were aimed to measure the same construct. Previous Principle Component Analyses classified these main variables into different sub-constructs. So, to avoid multi-collinearity and suppression effects, some of these variables originating from the same construct were not inputted into the main analyses using zero-inflated negative binomial regression. However, other variables that were correlated but not originating from the same construct were not excluded from the main analyses. Research experience and research production competence, for example, represented distinctive constructs. Their high correlation score was not necessarily due to internal consistency because their measurement scales and measurement items were completely different in the first place. Research emotional orientation and research behavioral orientation, on the other hand, were not included in the main zero-inflated negative binomial regression models due to the indication of possible suppression effect. Adding them into the model changed the sign of other predictor coefficients.

Final decision for main model specification: Thus, after all these criterion validity tests and considerations – using bivariate simple logistic regression, bivariate simple linear regression on separate independent variable, and the assumption test based on Pearson correlation r matrix – the researcher finally specified the model by deciding to include seven variables into the *inflated model* of the main zero-inflated negative binomial models. These seven variables incorporated institutional orientation, institutional location, terminal degree, terminal degree country, age, research experience, and research production competence (see Table 8.4.). For the *count model* of the main zero-inflated negative binomial regression analyses, six variables were selected – i.e. terminal degree, teaching roles, age, research experience, research production competence, and support from external sources (see Table 8.4.). Again, all these selected variables were significantly related to both the dichotomized research output (N = 485) and the logarithmic research output (N = 205) and were not candidates of multi-collinearity and suppression effects.

Table 8.3. Pearson correlation matrix among independent/predictor variables

	L	G	Ge	TD	TDC	TR	D	ET	TH	A	RE	RPC	RGC	RSC	RMC	REA	RBA	RIM	REM	DL	IGS	IAM	IR	MS	ES
O	.268**	-.181**	-.084	.092*	.144**	.026	-.044	.194**	-.085	.175**	.053	.115*	.070	.074	.024	.144**	.106*	.072	.034	.045	-.011	-.007	-.020	.100*	.154**
L		-.296**	-.229**	.167**	.351**	.025	-.225**	.034	.097*	.078	.198**	.179**	.191**	.131**	.066	.005	-.026	.017	-.008	.034	-.056	.044	-.046	-.118**	-.009
G			.173**	-.063	.097*	.115*	.282**	-.008	.041	-.025	-.054	-.019	.043	-.003	.083	-.013	.003	-.020	.037	-.105*	-.011	-.014	.060	.052	-.001
Ge				.032	-.032	-.026	.087	.004	.026	.164**	.030	.078	.045	.014	.072	.034	.017	-.086	.020	-.072	-.003	-.100*	-.056	.039	-.019
TD					.197**	-.099*	-.134**	.076	-.025	.057	.297**	.283**	.197**	.191**	.141**	.063	.103*	.001	.020	-.041	.012	-.011	-.009	-.031	.019
TDC						.021	-.193**	-.034	-.063	-.003	.345**	.357**	.303**	.271**	.243**	.119*	.131**	.079	.023	-.005	-.040	.017	-.036	-.078	.050
TR							.003	-.102*	.126**	-.112*	-.082	-.041	-.014	-.015	-.018	.003	-.089	-.010	-.034	-.054	-.120*	-.043	-.054	-.007	.017
D								-.024	-.023	.141**	-.104*	-.005	.049	-.150**	.005	.058	.026	.021	.070	-.049	-.033	-.021	-.008	.043	-.101*
ET									.115*	.097*	-.047	-.024	-.040	-.053	-.056	.031	-.010	-.019	.030	-.038	-.037	-.023	-.062	-.018	-.054
TH										.038	-.072	-.004	-.007	.017	-.065	-.045	-.174**	-.019	-.033	-.047	-.043	-.058	-.027	.005	-.064
A											.002	.006	.006	-.065	-.130**	-.007	.004	-.038	-.058	-.051	.048	-.058	-.055	.033	-.067
RE												.712**	.649**	.543**	.504**	.303**	.403**	.199**	.102*	.201**	.154**	.191**	.158**	.165**	.227**
RPC													.749**	.622**	.635**	.323**	.402**	.189**	.150**	.197**	.138**	.194**	.164**	.197**	.217**
RGC														.595**	.620**	.361**	.365**	.254**	.186**	.198**	.143**	.178**	.201**	.208**	.194**
RSC															.517**	.160**	.243**	.107*	.084	.098*	.136**	.100*	.138**	.211**	.204**
RMC																.333**	.372**	.293**	.207**	.209**	.182**	.211**	.199**	.178**	.214**
REA																	.552**	.619**	.375**	.308**	.239**	.345**	.191**	.232**	.158**
RBA																		.411**	.317**	.334**	.360**	.412**	.254**	.318**	.305**
RIM																			.616**	.395**	.339**	.351**	.256**	.255**	.202**
REM																				.287**	.303**	.219**	.300**	.279**	.188**
DL																					.564**	.576**	.496**	.492**	.423**
IGS																						.624**	.562**	.617**	.491**
IAM																							.456**	.456**	.438**
IR																								.519**	.453**
MS																									.683**

Note: *** p< .001; ** p<.01; * p <.05

O = Institutional orientation, L = Institutional location; G = Institutional governance; Ge = Gender; TD = Terminal degree; TDC = Terminal degree country; TR = Teaching role; ET = Employment type; TH = Teaching hour; A = Age; RE = Research experience; RPC = Research production competence; RGC = Research general competence; RSC = Research software competence; RMC = Research managerial competence; REA = Research emotional attitude; RBA = Research behavioral attitude; RIM = Research intrinsic motivation; REM = Research extrinsic motivation; DL = Departmental leadership; IGS = Institutional general support; IAM = Institutional availability of research capable members; IR = Institutional resources and facilities; MS = Support from ministry; ES = Support from external sources

8.1.3. Main zero-inflated negative binomial regression analyses

Zero-inflated negative binomial regression models (ZINB) were used in this study to observe the effects of the selected independent/predictor variables (based on the bivariate separate analyses and assumption tests) on the composite weighted research output score, the composite weighted international research output score, and the composite weighted local research output score. Again the ZINB models were considered appropriate because the distributions of these dependent variables were count data distributions, had the excess zero characteristics, and had the over-dispersed characteristics (as the value of variances were much higher than the mean scores).[36]

So, three main ZINB models were conducted: the composite weighted research output model, the model for composite weighted international research output, the model for composite weighted local research output. Other ZINB models following these three main models were moderation models.

- First, with the composite weighted research output score (with all the 483 samples), the main ZINB model could be represented conceptually by the following two expressions: *the count model* whereby the predicted count of the research outputs (in this case, following the negative binomial distribution) is a function (*f*) of terminal degree, teaching role, age, research experience, research production competence, and support from external sources (1), and *the inflated model* (in this case, the logit model) whereby the predicted probability of the excess zero research outputs is a function (*f*) of institutional orientation, institutional location, terminal degree, terminal degree country, age, research experience, and research production competence (2):

    - **Count model:**

    Research outputs = *f* (terminal degree, teaching role, age, research experience, research production competence, support from external sources) (1)

    - **Inflated model:**

    Research outputs = *f* (institutional orientation, institutional location, terminal degree, terminal degree country, age, research experience, research production competence) (2)

[36] Unlike previous bivariate analyses, these main analyses drew on Stata software (Version 14) because SPSS software (embedded with R software packages) does not offer the Vuong analysis, making Stata more convenient and complete for inexperienced researcher using zero-inflated negative binomial regression. It should be noted again that the ZINB models generate two result models: *the count model* that predicts the variation of research outputs and *the zero-inflated model* that predicts the excess zero of the research outputs. To be more specific, a ZINB model offers answers to two questions: first, why some faculty are research productive and some do not even engage in research production (as illustrated by the zero-inflated model), and, second why some faculty members are more research productive than others do (as illustrated by the count model).

- The second main ZINB model was conducted with the same conceptual models, but with the composite weighted international research output score as the dependent variable (see Table 8.5).
- The third main ZINB model was conducted with the same equation, but with the composite weighted local research output score as the dependent variable (see Table 8.6).
- The moderated ZINB models were further analyzed by separating discipline, institutional orientation, institution location, and age into different groups to test whether the detected significant effects in the first main ZINB model analysis vary according to these different attributes.

The first main ZINB model of composite weighted research output: Table 8.4. indicated that three predictor variables significantly explained the variation of the composite weighted research output score in the count model – namely, age (B = .037**; IRR = 1.038), research experience (B = .383**; IRR = 1.466), and research production competence (B =.440***; IRR = 1.553). The value of coefficient B in the count model represented the expected change in log (count research output) for a unit increase in the value of each predictor variable. To illustrate, the value of B = .037 meant that for a one-unit increase in age, the expected change in the log(count) of research output is .037, holding all other variables constant. For research experience, the expected change was .383. For research production competence, the expected change was .440. These significant coefficients of the count model implied that older faculty members, faculty members with higher research experience, and those with higher research production competence produced more research outputs.

Inferring from the Incidence-Rate Ratio (IRR), which is similar to the concept of Exp(B) in the logistic regression analysis, the statistical output suggested that an increase in a one unit of age resulted an increased in research output by a factor of 1.038 (that is, a 4-percent change)[37], holding other variables constant. A one-unit increase in research experience suggested an increase of research output by a factor of 1.466 (namely, an approximately 47-percent change). Likewise, a one-unit increase in research production competence implied an increment by a factor of 1.553 (or an approximately 55-percent change) in research outputs. This clearly showed that, among these three significant variables, research production competence had the strongest effect on the production of research outputs of Cambodian faculty members (i.e. by a factor of 1.55), followed by research experience (i.e. by a factor of 1.466), and age (just by a factor of 1.038).

Table 8.4. also showed four variables to statistically explain the excessive zero group, as revealed in the inflated model. Basically, the inflated model predicted who were likely to fall into the no-research-

[37] Change Percentage = 100 (IRR – 1)

output group. The statistical results showed that institutional location (B = -.681*), age (B = -.041*), research experience (B = -.680**), and research production competence (B = -.378*) were the statistically significant predictors. What these implied were that a faculty from province[38] was likely to fall into the group producing no research output, that younger faculty members also tended to fall into the same unproductive group. The same applied to faculty members with low research experience and those with low research production competence. These results clearly were consistent with the results of the count model.

Table 8.4. also illustrated the model-fit statistics of this tested ZINB model (as shown in the note section of the table). The significance of log-likelihood statistics (LR chi(6) = 82.93, p < .001) simply suggested that the model (with all these independent variables specified) was fit, and so such analysis was appropriate. The significance of the Vuong statistical tests (Vuong test = 5.36, p < .001) further explained that the zero-inflated negative binomial was a better choice for the current study's data than the use of other Poisson or negative binomial regression models.

Table 8.4. Main ZINB of composite weighted research output score

Variables	B (Coef.)	S.E.	z	p value	IRR
Count model					
Terminal degree	-0.266	0.188	-1.41	0.158	0.767
Teaching role	0.281	0.147	1.82	0.069	1.325
Age	0.037	0.011	3.44	0.001**	1.038
Research experience	0.383	0.110	3.48	0.001**	1.466
Research production competence	0.440	0.098	4.49	0.000***	1.553
Support from external sources	0.111	0.074	1.49	0.135	1.117
Constant	-1.703	0.543	-3.14	0.002**	0.182
Inflated model					
Institutional orientation	-0.640	0.382	-1.68	0.094	
Institutional location	-0.681	0.301	-2.26	0.024*	
Terminal degree	-1.165	0.602	-1.94	0.053	
Terminal degree country	0.054	0.282	0.19	0.848	
Age	-0.041	0.018	-2.34	0.019*	
Research experience	-0.680	0.207	-3.29	0.001**	
Research production competence	-0.378	0.161	-2.35	0.019*	
Constant	5.513	1.034	5.33	0.000***	
Lnalpha	-0.2160	0.164	-1.32	0.188	
Alpha	0.805	0.132			
Note: N = 445; Zero observations = 256; Inflation model = logit; LR chi(6) = 82.93, p < .001; Vuong test = 5.36, p < .001; *** p < .001; ** p < .01; * p < .05; IRR = Incident-rate Ratio = Exp(B)					

[38] Province-based institution was coded 0; City-based institution was coded 1.

In conclusion, the first main ZINB analysis of the relationship among selected independent variables and the composite weighted research output score suggested that institutional location, age, research experience, and research production competence were significant predictor variables of research outputs of Cambodian faculty members.

Such claims were evident from further descriptive pattern analyses of the relationship between research outputs and those significant variables. Figure 8.2. indicated that 50.6% of faculty members from city-based universities in the selected samples of 483 produced more than one research output, compared to only 24.5% of faculty from province-based universities who produced at least one research output. Figure 8.3. indicated that faculty members (older than 46 years old) were the most productive group as 48.5% of them produced at least one research output, followed by faculty members (aged from 31 to 45 years old) with 44.2% of them producing at least one research output, and followed by the youngest group (aged equal to or less than 30 years old) with only 33.9% of them producing more than one research output. Figure 8.4. indicated the pattern relationship between research experience (low and high) and research output (no output and at least one output). The bar chart revealed that 62.93% of faculty with high research experience produced at least one research output, while only 37.07% of faculty with low research experience produced at least one research output during their services at their current higher education institution. Finally, Figure 8.5. presented the pattern between research production competence (low vs high) and research outputs (no output vs at least one output). The chart suggested that 71.22 percent of faculty members with high research production competence produced at least one research output during their services, while only 28.78% of faculty members who claimed low research production competence could produce at least one research output during their services.

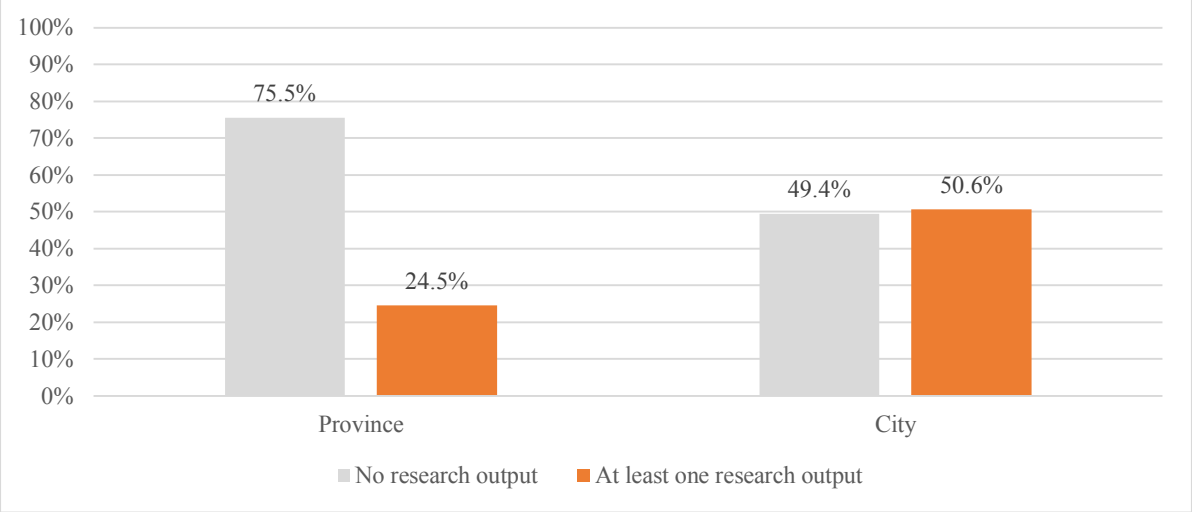


Figure 8.2. Patterns of relationship between institutional location and faculty members' research outputs

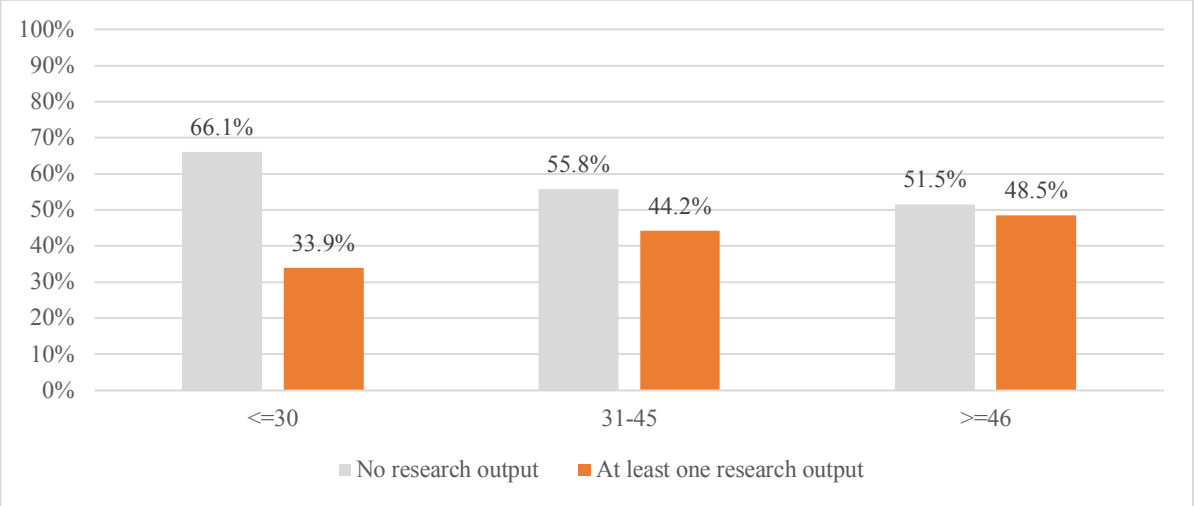


Figure 8.3. Patterns of relationship between age and faculty members' research outputs

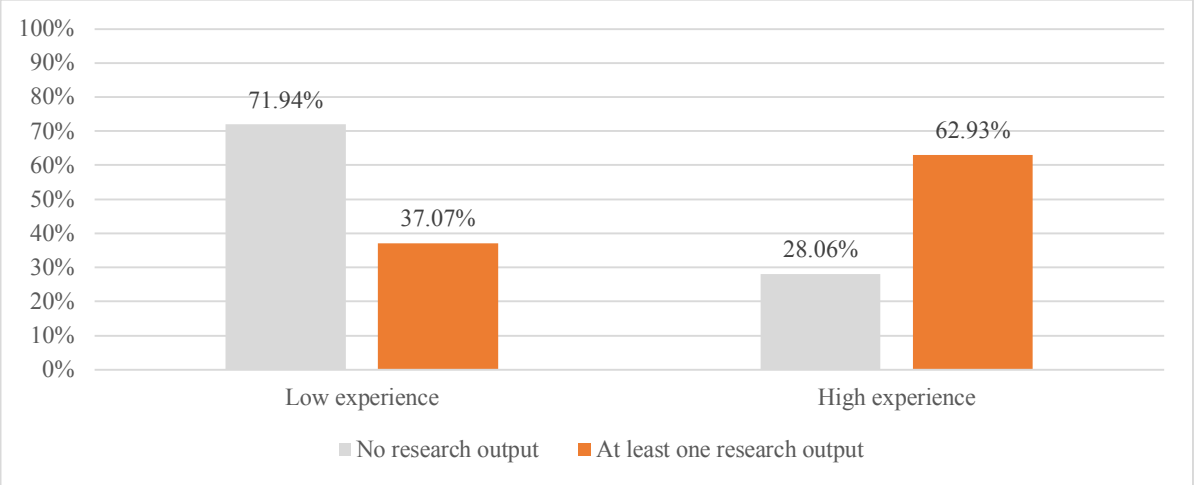


Figure 8.4. Pattern of relationship between research experience and research output

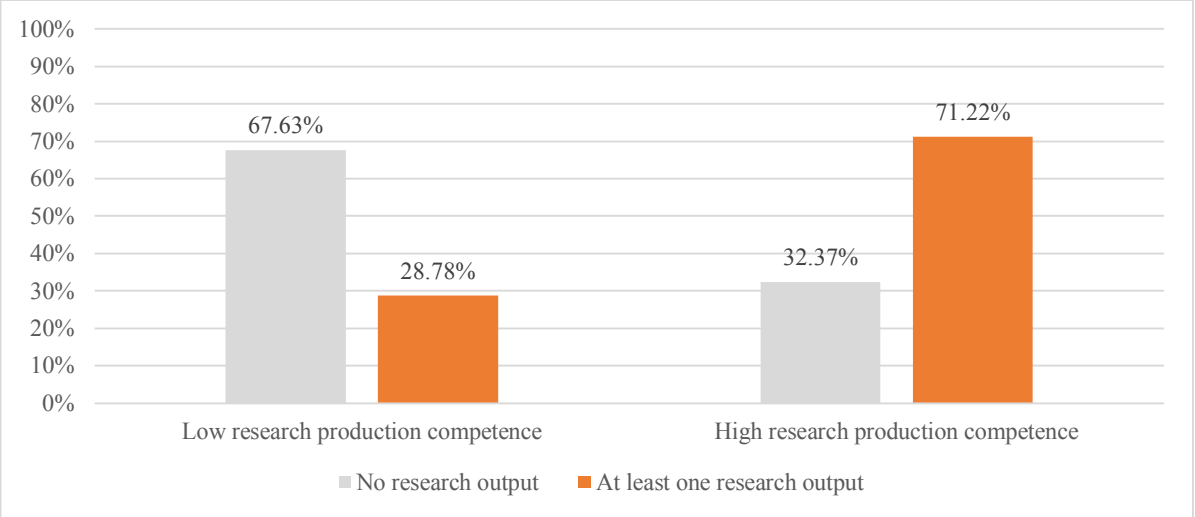


Figure 8.5. Pattern of relationship between research production competence and research output

A further analysis was conducted to see if the above-stated effects vary according to the place of publication of research outputs or not – i.e. international research outputs vs local research outputs.

The second main ZINB model for composite weighted international research output: First, the analysis focused on the international research outputs. Table 8.5. showed that age and research production competence remained statistically significant in the count model, and research experience and research production competence also were still statistically significant in the inflated model. What the count model results suggested were that older faculty members and faculty members with higher research production competence were more productive in international research outputs. For the inflated models, faculty members with higher research experience and faculty with higher research production competence also distinguished themselves from their counterparts with lower research experience and lower research production competence in terms of whether or not they produced international research outputs. However, unlike the main composite research output model, faculty members with high research experience did no longer significantly explain higher research outputs in the count model. In the same manner, faculty members from city-based universities and older faculty members no longer explained the difference between whether or not they produced research outputs.

Table 8.5. Main ZINB model of composite weighted international research output score

Variables	Coef.	S.E.	z	p value	IRR
Count model					
Terminal degree	-0.07	0.242	-0.29	0.771	0.932
Teaching role	0.276	0.211	1.31	0.191	1.318
Age	0.042	0.015	2.81	0.005**	1.043
Research experience	0.181	0.132	1.37	0.17	1.198
Research production competence	0.336	0.146	2.3	0.021*	1.40
Support from external sources	0.195	0.105	1.86	0.063	1.215
Constant	-1.38	0.773	-1.78	0.075	0.252
Inflated model					
Institutional orientation	-0.106	0.458	-0.23	0.817	
Institutional location	-0.738	0.379	-1.95	0.051	
Terminal degree	-0.407	0.396	-1.03	0.303	
Terminal degree country	-0.143	0.301	-0.48	0.634	
Age	-0.007	0.019	-0.4	0.687	
Research experience	-0.554	0.211	-2.62	0.009**	
Research production competence	-0.711	0.195	-3.65	0.000***	
Constant	5.305	1.147	4.62	0.000***	
Lnalpha	-0.2580	0.205	-1.26	0.208	
Alpha	0.773	0.158			

Note: N = 445; Zero observations = 347; Inflation model = logit; LR chi(6) = 27.77, p < .001; Vuong test = 5.97, p < .001; *** p < .001; ** p < .01; * p < .05; IRR = Incident-rate Ratio

The third main ZINB model for local composite weighted research output: As for the local research outputs analyses (see Table 8.6), older faculty members and faculty members with higher research experience were candidates who produced more local research outputs in the count model. Interestingly, one new variable loaded statistical significance in this ZINB model of local research output – that is, terminal degree. The result suggested that faculty members without doctoral degree were more productive in producing local research outputs. Also in the count model of local research outputs, one variable that switched from statistical significant to non-significant status was the research production competence. Such result implied that research production competence might not be an important factor that influenced the variation in local research outputs among Cambodian faculty members. For the inflated model, faculty members from public university, older faculty members, faculty members with higher research experience, and faculty members with higher research production competence remained to be the ones who were more likely to fall into the groups who produced local research outputs.

Table 8.6. Main ZINB model of composite weighted local research output score

Variables	Coef.	S.E.	z	p value	IRR
Count model					
Terminal degree	-0.497	0.195	-2.55	0.011*	0.608
Teaching role	0.223	0.167	1.33	0.183	1.250
Age	0.038	0.011	3.54	0.000***	1.039
Research experience	0.351	0.12	2.94	0.003**	1.421
Research production competence	0.165	0.109	1.51	0.132	1.179
Support from external sources	-0.007	0.072	-0.09	0.926	0.993
Constant	-1.371	0.579	-2.37	0.018*	0.254
Inflated model					
Institutional orientation	-0.291	0.398	-0.73	0.465	
Institutional location	-0.74	0.325	-2.28	0.023*	
Terminal degree	-0.931	0.564	-1.65	0.098	
Terminal degree country	0.347	0.296	1.17	0.24	
Age	-0.055	0.018	-3.01	0.003**	
Research experience	-0.783	0.218	-3.6	0.000***	
Research production competence	-0.433	0.17	-2.54	0.011*	
Constant	6.013	1.089	5.52	0.000***	
Lnalpha	-0.6770	0.233	-2.89	0.004**	
Alpha	0.51	0.119			
Note: N = 445; Zero observations = 290; Inflation model = logit; LR chi(6) = 39.39, p < .001; Vuong test = 5.08, p < .001; *** p < .001; ** p < .01; * p < .05, IRR = Incident-rate Ratio					

All these second and third ZINB models analyzed were statistically fit (as shown in the note of each table above in the note section). The overall conclusion was that key variables whose effect sizes were

strong and did not vary much according to the place of publication were age, research experience, and research production competence. The other two less influential variables were institutional location and terminal degree. It was also clear that research production competence was less important in local research output production but more important in international research output production, whilst research experience was more influential in local research output production but less in in international research output production.

8.1.4. Moderation analyses

After the three main ZINB analyses above, it was presumable that age, research experience, and research production competence were significantly influential independent/predictor variables that explained research outputs of Cambodian faculty members. This section further investigated these three variables' effects on the composite weighted research output, this time by separating the analyses between different disciplines (i.e. science and related fields vs social science and related fields), different institution location (i.e. province-based universities vs city-based universities), and different institutional orientation (i.e. private universities vs public universities), and age (i.e. less than or 30 years old vs from 31 to 45 years old vs 46 years old or older).

Moderation analyses by discipline, institutional orientation, and location: The results (see Table 8.7.) indicated that the only key variable explaining composite weighted research outputs among science-majored faculty members were research experience (B = .672**) in the count model. For social science majored faculty members, research output variation was explained by age (B = .027*) and research production competence (B = .433***) in the count model. In the inflated model, social science majored research output was explained by all the three variables.

For the private-institution faculty members, research production competence strongly explained the variation of their research outputs (B = .814***) in the count model. For the public-institution faculty members, however, all the three variables were explanatory of the research output variation (in the count model) and only research experience and research production competence distinguished between faculty who did not produce output at all and those who did (in the inflated model.).

None of these three variables were explanatory of research outputs of faculty members from province-based institutions in both the count and the inflated models. For the faculty members from city-based institution, age, research experience, and research production competence all explained the variation of research outputs in the count model; in the inflated model, however, only research production competence explained whether faculty members from city-based institutions produced or did not produce research output.

Table 8.7. Moderated ZINB models of composite weighted research output score by discipline, institutional orientation, and institution location

Variables	Science	Social science	Private	Public	Province	City
Count model						
Age	0.028	.027*	-0.031	.035**	0.001	.033**
Research experience	0.672**	0.188	0.002	.392***	0.382	.328**
Research production competence	0.302	.433***	.814***	.359**	0.396	.439***
Constant	-1.323	-0.401	1.68	-1.081*	0.196	-0.983*
Inflated model						
Age	-0.03	-0.052*	-0.068	-0.033	-0.051	-0.0342
Research experience	-0.296	-0.85***	-0.809	-0.72***	-1.08**	-0.509*
Research production competence	-0.499	-0.535**	-0.22	-0.504**	-0.244	-0.543**
Constant	2.522*	4.956***	5.462**	3.668***	5.229**	3.231***
Lnalpha	-0.148	-0.233	-1.29*	-0.157	-0.032	-.192
Alpha	0.862	0.792	0.274	0.855	0.969	0.825
LR chi(3)	43.56***	40.91***	16.77***	77.53***	11.46**	71.31***
N	148	335	70	413	151	332
Note: Only coefficient values were reported; *** p < .001; ** p < .01; * p < .05						

Table 8.8. Moderated ZINB model of composite weighted research output score by age

Variables	<=30	31-45	>=46
Count model			
Terminal degree country	-.926**	-.267	.062
Research experience	0.145	.409**	1.356**
Research production competence	.597**	.488***	-0.639
Constant	0.549	0.052	0.638
Inflated model			
Terminal degree country	-0.555	-0.414	0.201
Research experience	-0.414	-0.742**	0.077
Research production competence	-0.254	-0.393*	-2.007
Constant	2.184**	2.484***	2.768*
Lnalpha	-0.953*	-0.088	-0.089
Alpha	0.386	0.916	0.915
LR chi(3)	20.57***	53.33***	14.01**
N	106	301	62
Note: Only coefficient values were reported; *** p < .001; ** p < .01; * p < .05			

Moderation analyses by age: Finally, the results of the analysis of separated age groups (as shown in Table 8.8.) indicated that for young faculty members (aged 30 or younger), they were likely to produce

more research outputs if they graduated from abroad and if they had high research production competence. For the middle-aged faculty members group (from 31 to 45 years of age), research experience and research production competence both statistically explained the variation of research output (in the count model) and significantly differentiated between those who produced and those who did not produce research outputs (in the inflated model). For the elder group (aged from 46 plus), research experience was the only important indicator explaining research output production – that is to say, older faculty members having higher research experience were also more research-productive.

Figure 8.6. presented the pattern of relationship between research experience, research output, and research competence by different age, discipline, institutional orientation, and institution location groups. In overall, the graph illustrated that having at least one research output was always related to higher research production competence (as indicated by the yellow line) and high research experience (as indicated by the orange line).

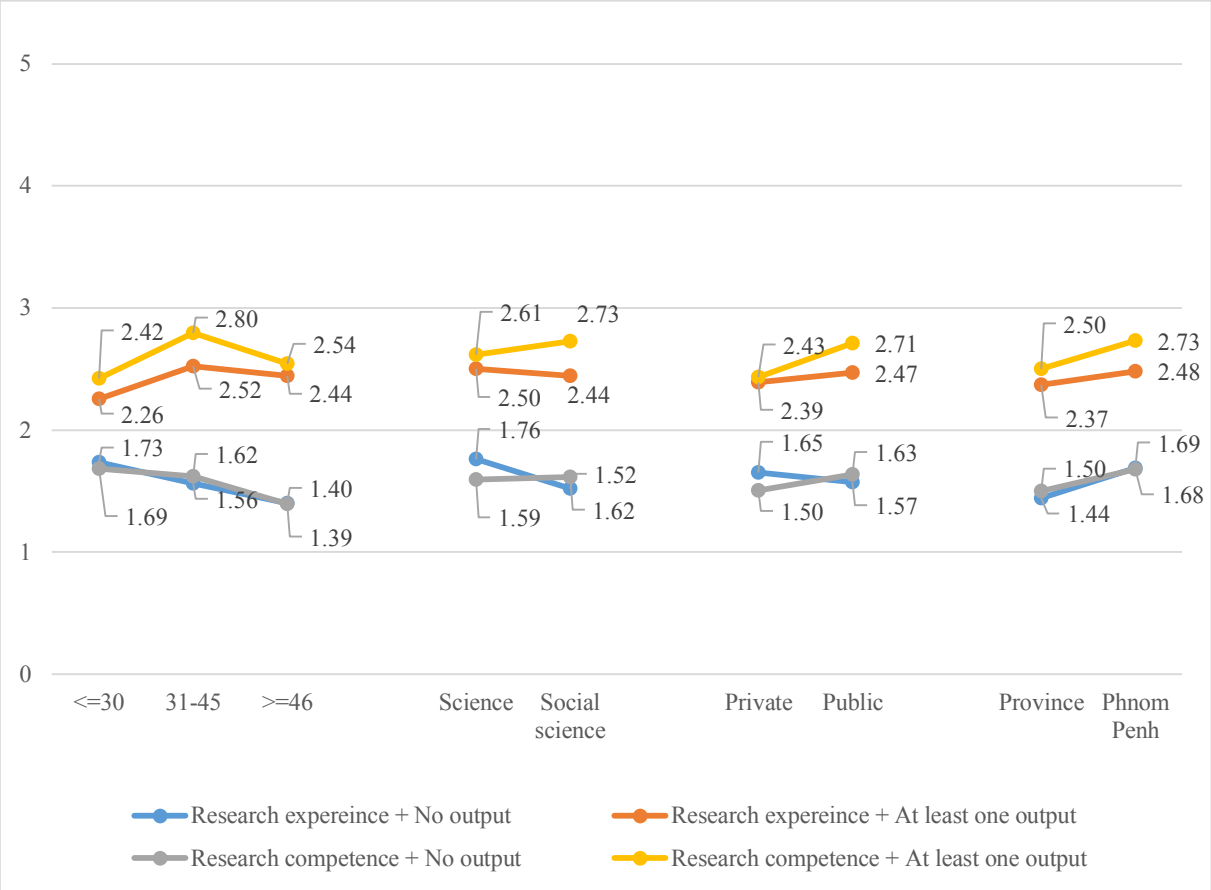


Figure 8.6. Mean of research experience and research production competence by research output (classified by age, discipline, institutional orientation, and institution location)

8.2. Qualitative results

The main qualitative interview questions of research question 4 included such questions as: "What do you think are main factors obstructing research engagement or performance of Cambodian faculty? Why are you engaged and productive in research activities and outputs? What do you think are reasons of other faculty members being research productive?" Because the researcher used semi-structured interview techniques, in the actual interview there were more probing and confirming questions asked. All those questions basically aimed to generate generic perspectives on factors affecting research activities and performance of Cambodian faculty members from the interviewees' perspectives, which would add further and deeper understanding to the quantitative analyses. Answers were presented in three modes: 1. the emerging themes and sub-themes from the interview, 2. the transcript-based quotes from interviewees, and 3. the quantified qualitative trends in the form of frequency and percentage of each level-3 theme (See Figure 8.8.). Unlike previous chapters' analyses, there were two major trends in the analyses of this research question 4; that is to say, common themes of pushing factors that make certain faculty members research productive and common themes of obstructing factors that make most faculty research-unengaged. These two trends were illustrated by different tables: Table 8.9. showed the qualitative themes, codes, and exemplary quotes of the pushing factors; Table 8.10., in the opposite direction, revealed the inhibiting factors of research outputs production.

Thematic analyses for pushing factors: Research ability, strong research mindset, strong research team/network, and enabling institutions were commonly synthesized codes and themes that explained pushing factors of research-productive faculty members. Approximately 94 percent of the participants agreed that it was research ability (counting research experience, research competence, background knowledge, and other research skills and working skills) to be the most important determinant of what made them and other faculty members able to engage and produce research works. About 84 percent believed that faculty members who engaged or produced research were likely to possess a kind of strong positive and practical mindset towards research. These faculty members tended to see research as an opportunity for growth, rather than an obstacle. They were generally oriented to use research opportunity to improve or advance their knowledge and skills in their area of expertise as well as to earn some extrinsic rewards from research. About 64 percent of the interviewees also gave credit to the institutional facilitation that enabled them to do research. Most participants raising this point believed that by just facilitating researchers and not causing problems during research process, their institutions already assisted them in engaging in research activities - even though these kinds of motivation were not much about money or physical rewards. Another 48 percent believed that having a team with or a network of well-organized and capable membership and working regulations could be a positive factor that helped them to be able to accomplish research tasks.

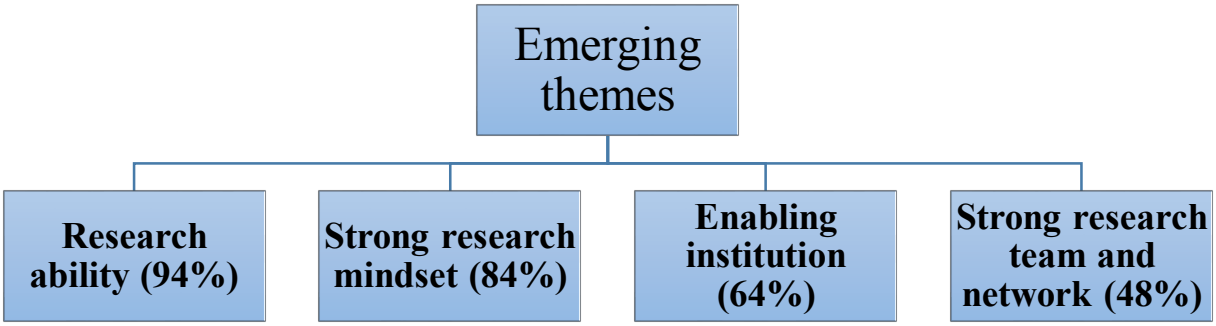


Figure 8.7. Emerging themes on perception towards factor pushing research engagement and production

Table 8.9. Level-3 themes, level-2 themes, and exemplary quotes on perception towards factor pushing research engagement and production

Common emerging themes at level 3	Categories at level 2	Selected transcript-based quotes	Frequency and percentage of level-3 themes
Research ability	***Research competence and skills***	All of them can do research but we can say it takes time… here we have seniors who hold Ph.D. from France or Belgium… they can help and supervise us… they open the way for us… F27U4E (29)/ Research competence for now is probably not okay for most faculty members to do research… actually competence depends the research tasks. If it is about field works with quantitative analyses or things like that, they cannot do it because they don't have experience. But if it is just about article review, they might be able to do it, but still not deep. Their ability is limited. F10U3E (26)	47(94%)
	Research experience and mastery	Now I have three projects in my hands… I used to publish 8 papers within 2.5 years… mostly in Taylor and Francis… I don't like it (research) that much, but it is an opportunity. When I work for UN… I focus on UN reports, national reports, so we need lots of analyses and research. F7U1E (51)	
Strong research mindsets	***Academic and research orientation and passion***	Factors that make me engaging in research? Emm… hard to say… I think first of all I give up teaching… sometimes I spend two or three days just focusing wholly on research… I give up teaching… I also have an inspiration to build knowledge and expertise in my area... F14U1E (37)/ If people give me 4 classes, I will take only two classes... teaching is tired... teaching needs lots of preparation and lots of correction and assignment and reports... teaching one class means a lot of works... teachers have lots of headache... I think if I take that headache for research... I can learn a lot... F24U12E (20)	42(84%)

	Perseverance ability	We have to work non-stop. Research… generally we are free from 5:30 to 8:30 p.m. to do it. We stop caring about administrative stuff and we can sit and focus on research… M6U4E (40)/ In reality I engaged in research even more than that… because we are not typical workers who have regular working time. For us, sometimes we have no Saturday and Sunday… working at night time.... because research works have a lot to do... some people work up late till 1 or 2 a.m. at night... myself, sometimes waking up at 2 or 3 a.m. to work on it... so sometimes before the new working day at 8 a.m. I have worked for 8 hours already... M12U1E (10)	
	Practical cognitive experience of growth and opportunities from research	… if we look at our engaged research projects most have foreigners involving... they prepare things and we are doers... but the salary gaps between them and us are huge... so I think if I know research well, I can earn that much as well... also engaging in research and publication give me opportunity to obtain scholarship for further education abroad... F25U12E (25)/ I think I can do research because… our income and saving become stable… so if the income is not stable for now, we still have enough reserved money to survive from month to month… so I think that makes me able to do research… M12U1E (24)/ I started working as a market researcher, as an interviewer for almost ten years for both NGOs and private companies… I started to realize that research is beneficial and earns me much income… Like my boss in Phnom Penh, one month, he may earn up to 20,000 USD. Coca Cola gave us three projects. If we understand research clearly, it is much easier to earn money from it... My boss knows well how to get funding... he has experience... and that is why he is my boss... M23U12E (18)	
Strong research team and network	***Networking and fame***	… to do research in Cambodia you need network. That is the most important thing. Without network, you cannot do it. No one accepts you, both the external and internal donors. If they know you, they come to you. P8ERE (14)/ … so we are much donors-driven... in engineering department, Dr. Pheakdey has relationship with Germany, so they contact German donors... Dr. Chanrith graduating from Japan... so he has liaison with Japanese... F14U1E (25)	24(48%)
	Learning and managerial teams	Collaboration is important… we think of that clearly… that is why when I start leading this… we meet among all staff and suggest that research proposal have to be linked to one another… I mean this department has to join with that department… M6U4E (36)/ .... after all these, we form up one team, select the team members, 3 or 4. One leader leads the team and allocates responsibility, and we discuss the scope of the project... research like this in general is team work, not individual work... members read and share ideas.... with clear task allocations... that also means no conflict. Otherwise, the team will be divided. Researchers cannot work alone. There has to be a strong team. P8ERE (6)	
	Supports from students and colleagues	Universities in foreign countries have research projects and they take lead and they choose their partners in Cambodia… collaborating projects… we involve students to do these research projects… they can take some parts of the projects to write their theses... F33U6E (4)/ ... we	

		design methods... we write research proposals... we decide the team members… if the projects are big, writers of proposal have to be diverse... and internal network here generally involves students who graduate from the French-side faculty F13U3E (6, 42)	
Enabling institution	***Real facilitation***	Faculty members obtain their degree locally generally while young ones just finish their degrees and never do research. Only Ph.D. people may write dissertation here… so they don't know much about research… we therefore launch workshop to encourage them to engage in research... we organized our own workshops and we invited US professors to come and share their experience... my team also invites many key persons like Eva... to come and share her experience about creating CDRI and other works in Africa... M13U2E (20)/ There are evident of meetings to discuss about research improvement... like creating university-industry linkage... evident of connecting with industry to get fund... evident of trying to connect with foreign universities... F39U4E (18)/ He, the former rector, promoted research a lot by for example selecting outstanding students to engage on his research projects... F25U12E (18)/ We have soft infrastructure by creating system of teaching faculty and teacher-researcher faculty. The teacher-researcher faculty get double salary and teach only 192 hours a year… we also ask faculty to report their research outputs every year… and we use that as indicators to give them bonus from our university income surplus at the end of the year... we have industry linkage unit and work with teacher research... M6U4E (2)	32(64%)
	Not causing problems	The important thing is motivation and the internal environment. Budget. And they should open application for everyone equally. If they pass, allow them to do that research. Do not be so strict with time because the paid salary is too little for lecturers. And those leading members know that F1U4E (277)/ I think it is the same everywhere; to open a shop, we need to depend on branding. We need to allocate some percentage of our obtained funds to the university to use their brand name without problem... F7U1E (21)	

Thematic analyses for obstructing factors: On the other hand, individual fixed mindset on research and on return to research (64%), unsupportive institutional visions and systems (62%), unaccommodating social and educational visions and systems (74%) were synthesized to be key obstructing factors for faculty members to engage in research activities or produce research outputs. When asked what they think make most faculty members unable to do research, various codes reflecting these three themes generally emerged out of the data (see Table 8.10.). Most people believed that it was the individual's way of thinking about research that mad them unable to engage in research. They claimed research-unengaged faculty members tended to value income than knowledge and they tended to desire a quick income not a long-term one, which could be generated through teaching many hours. Research was complicated and income from research was not stable, many research-engaged faculty members claimed. If faculty do not see the core long-term benefits, they will not engage in

research activities. Most participants also pointed to institutional negative research support environment and external, or socio-cultural, environment – for example, lacking of research tradition and lacking of research-based and research-oriented education – as main factors for the current low and limited levels of research activities and production.

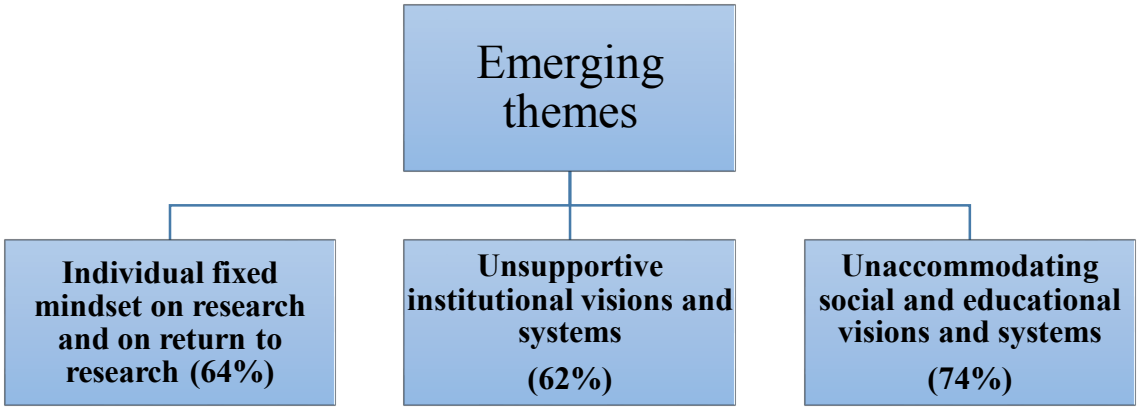


Figure 8.8. Emerging themes on perception towards factors obstructing research engagement and production

Table 8.10. Level-3 themes, level-2 themes, and exemplary quotes of perception towards factors obstructing research engagement and production

Common emerging themes at level 3	Categories at level 2	Selected transcript-based quotes	Frequency and percentage of level-3 themes
Individual fixed mindset on research and on return to research	***Lacking background knowledge and skills***	They don't do research because research needs skills… in writing research proposal, research design, data collection, data analyses, data interpretation... those are not easy skills. It does not mean that all faculty members can do research P36SRE (4)/ They give value to research but they don't know how to do research… They don't know how research should start. If talking about statistics, they don't know what tests they have to use to analyze data. They just don't know how. But they really want to do it. But how to do research, they don't know. M3U12E (57-60)/ Research is hard; to know how to do research, we need to read a lot of other works… People with research competence are not abundant F49U9U (5, 7)	32(64%)
	Financial constraints	The trade-off between income from teaching and income from research is a consideration for teachers whether they engage or don't engage in research F50U2U (27)/ Value of research is a question… what is research for? No money, no value. F50U2U (24, 28)	
Unsupportive Institutional visions and systems	***Teaching loads and time constraints***	That may relate to teaching hours. If there have too much teaching load, they don't have time for research. But if we reduce their teaching hours, the university has to pay a lot because reducing teaching hours means paying more salary	31 (62%)

		to teachers. The university can lose profit F18U3U (56)	
	Lacking effective support systems	There exists only paper but people do not do it. Only on the paper regardless of whether it is strategies, or visions, or missions. But in reality there is no such thing… Only theory! The leader could say that we need to learn to conduct research or that only research can help you to develop, but the person who say that do not know how to do research... M3U12E (55, 66)	
	Institutional ability to attract and retain researchers	We are struggling to motivate them to stay and to avoid losing them… let's talk about human resources. Say, we sent 10 people to study abroad… when they come back and we can keep the 10 in our institution, that is very good. We are afraid that sending 10 and only 3 stay... and perhaps after working here for 10 years... those 3 also leave. It is not easy to retain one doctoral graduate to work. That is a big challenge. That is not just about money. We need a mechanism to keep them. M6U4E (69)/ Cambodia create human resources for others to make use of... this is called brain drain. There is no mechanism to collect capable people from abroad to work P5DHE (22)	
Unaccommodating social and educational visions and systems	***Lacking clear governmental visions and funding support plan***	It is hard… the university cannot guarantee any sources. It has to look to the government. Any county in the world does this. I have had enough understanding about this. First, it has to be the government. The government has to actively support the university first... when the private sectors see that, they also come and invest money in us. M6U4E (32)/ ... that depends on the direction or vision of the nation development... say we need to focus on research in these particular fields... the question is do we have that clear development direction? ... No country in this world can do research without funding. P20DHE (22, 24)	37(74%)
	Lacking social and intellectual tradition and culture of research	First if we want to know the root causes, we can say that we do not have tradition in scientific research due to cultural issues… culturally we cannot question… politically we dare not ask questions to our superiors or leaders… the second point is related to the values given to scholars... In Cambodia scholar do not have true sage in society ... people are scared of or respect the ruling people, capitalists, and the rich more... E17CDE (7)	
	Research- and science-deficient education system	In other countries… their social development has science and research embedded as an integral component or critical roles in building students' competence… but Cambodia faces that challenge because the curriculum does not include it as a major component... so it is quite a very new issue for students at higher education institutions, not only my university but all universities M26U12U (3)/ Curriculum in each university are too much course based, with little research; literature sources are limited and mostly there are only English materials... E34DCE (34)	

Case analyses: Qualitative data were further analyzed from a case comparative perspective to see if perceptions towards factors influencing research activities and performance varied between research-engaged and research-unengaged faculty members and between institutions with active research works and those having less research activities. Table 8.11 and 8.12. illustrated the differences. For individual

comparison, interviewees engaging in research tended to show stronger confidence in research performance and having research experience and tended to have a more positive and practical mindset towards creating research opportunity for themselves. Most of them also worked hard.

Table 8.11. Cases comparison between faculty members engaged and those not engaged in research on their perception towards factors influencing research engagement and production

	Faculty member: 1st comparison	**Faculty member: 2nd comparison**
Research-engaged individual cases	**F25U12E:** This participant was a young academic, graduating in Cambodia but was trained by many foreign faculty members during her services as a research assistant for a research-oriented university leader. She has engaged and assisted her boss in many research projects. During the interview, she was an educator and a mentor of research courses and projects at her institution as well as a researcher herself. She believed that research is an opportunity to grow. She has learnt a lot from thinking in research ways. With research skills, she anticipated to get a better position and career in the future and she may be able to pursue higher education abroad. She thought teaching is tiring and needs to prepare a lot. She defined herself more as a learner and a diligent worker. She has worked on any research assignment designated by her boss. She thought good leaders are important to facilitate research development at one institution. Despite so, she understood that researchers can still help themselves to make their research team work.	**M12U1E:** This participant earned a Ph.D. from a foreign country and has published a lot in international journals in his field of education. He also engaged in many local research projects where he obtained funding and had to conduct, lead, mentor, and prepare reports for donors. He thought that he could engage in research because he has competence and experience and background knowledge, while many other faculty members are not likely to obtain these experience. He also thought he now has stable income and so can spend more time on research. He personally did not like teaching at all. He believed that his interest in research comes by chance as he was invited to engage bit by bit in research activities by his seniors and academic acquaintances. He has had a strong network for research. He gained fame in his area and could always obtain funding for more research works if he wants to. He thought researchers have to work very hard, much harder than other people in other careers.
Research-unengaged individual cases	**F23U12U:** From the same institution as the above case (F25U12E), this participant did not engage in research. He majored in information technology, which a local Master's degree. He believed that factors making most faculty members not engaged in research is the livelihood problem and the opportunity problem. He acknowledged that people need to work for incomes. Because engaging in research may take a lot of time and does not yield much benefits, people are not oriented to do research. People also need to spend time for family, and they have to think of their health, he thought. Research is good but not an easy job. He valued research and wanted to learn more so that he may have a chance to pursue higher degree abroad. He has little experience with research works, but he understood some research concepts from his Master's degree education.	**F50U9U:** This participant was a teacher and a management staff in one private university in the country. Besides his graduate thesis for a master degree in one local university, he has never published articles or engaged in research projects. Most of his academic careers involved teaching. He thought research does not function well in the country because many faculty members do not understand research. He mentioned that, during his graduate program, most students chose to take final exam to graduate, not writing research a thesis. This means that people do not like doing research, he believed. He said research is very complicated. To make research works, he suggested more pressure should be put on universities. He thought that, if faculty members can still earn more for more hours of teaching, only people who cannot teach well may be interested in doing research. He thought research is broad; preparing his teaching materials may be a part of research.

For institutional comparison, those institutions with more research activities seemed to have established more tangible research products and more efficient systems to manage and proceed with research works. Interviewees from those kinds of institution also raised clear examples of changes of institutional attitudes towards promoting research and actual research facilitating works by the leaders and the administrators after they started to understand the benefits of research.

Table 8.12. Cases comparison between research-active and research-inactive institutions on situation of research performance

	Institution: 1st comparison	**Institution: 2nd comparison**
Research-engaged institutional cases	**U4:** This institution is one of the oldest in the country. During the interview, the institution has had 23 research projects on the go. And each of its 7 departments has its own research projects. Most of the projects are related to science and technology, from food science to research projects in information technology. There have been also various projects funded by local private business, say on pure drinking water quality. This institution has taken a number of real strategies to promote research in the institution, counting from creating researcher positions, giving double salaries to the researchers; institutionalizing the research-industry linkage unit; engaging students in research activities; attracting facilities and funding from external agency, etc. It is also one institution in the country with lots of Ph.D. holders from developed countries. This institution has quite a long history in its fields of science and engineering. It has continued to send its faculty members to partner institutions abroad to pursue Masters and doctoral degree.	**U1:** This institution is the top of its fields of agriculture in the country though not very popular among Cambodian students. It is also one of the oldest public university in the country, with up to 10 departments. Due to its focused specialization, the institution has popularly attracted many research and development projects from abroad, from the government, and from local donors. This institution is perhaps one that produces lots of local research products in Khmer languages because those outputs are beneficial for local farmers as well as policy makers. It is not under the Ministry of Education, Youth, and Sport. There is one main research center in the university, but research activities have been engaged by faculty members in other departments. Currently, it has developed about six more specialized research centers after the government has encouraged research and development activities in education sector.
Research-unengaged institutional cases	**U9:** This institution is a private university, one of the largest in the country. Its main missions in the first place was for educational purposes. It offers up to Ph.D. degree in certain fields. It is comprehensive, offering courses in various disciplines and fields. The institution has faculty members with Ph.D. and Master's degree, leading and teaching there. Reportedly, the institution has a research office that works to attract consultancy funding, but there are only few staff working in that office. Students or faculty members are asked to join when there is research funding available. Faculty members are mostly engaged in teaching. There are more part-time faculty members than full-time ones. Those faculty members come and teach and do not have much time to meet or discuss about their academic jobs.	**U14:** This institution is one that is based in a province of the country. It used to be well-known for its partial focus on agriculture in the past. So far, it has offered courses in various disciplines. Because of its location, the institution has hosted a small number of students, compared to major universities in the city. Faculty members have little engagement in research projects so far. There are limited number of Ph.D. holders working and leading in the university. This institution does not have a research unit. Some of its faculty members are invited from city-based universities to teach during weekends. The institution offers basically undergraduate programs and degrees.

8.3. Synthesis of the results on factors influencing research outputs of Cambodian faculty members

After all, certain individual dimension variables were identified to pose influences on the variation of research outputs of Cambodian faculty members and on the differentiation between faculty members who did not produce research output at all and those who produced research outputs. All models analyzed were statistically fit. Research experience, research production competence, and age were significantly influential on research output production of Cambodian faculty members. Research experience had significant positive relationship with local research output production, while research production competence seemed to be more associated with international research output production. Further pattern analyses revealed that individual faculty members with strong research output production competence and experience were mostly those obtaining Ph.D. degree and graduating their degree from a foreign country. The effects of these significant predictor variables on research output did not vary much within the social-science group, the middle-aged group, the group from city-based universities, and the group from public universities, while some of these variables turned insignificant in the science group, the province-based group, and the private university group analyses.

Qualitative themes emerging from the inquiry on interviewee's perceptions on factors affecting research activities and performance revealed two trends. On the one hand, interviewees tended to perceive that research ability (94%), strong research practical mindset (84%), strong research team/network (48%), and enabling institution (64%) are the pushing factors for research-productive Cambodian faculty members. On the other hand, individual fixed mindset on research and return on research (64%), unsupportive institutional visions and systems (62%), and unaccommodating social and educational visions and systems (74%) were deemed to be the obstructing factors inhibiting Cambodian faculty members from engaging in research activities.

To conclude, the results indicated that individual dimension tends to strongly influence research outputs of Cambodian faculty members; to be more specific, individual research ability (i.e. research experience and research production competence) statistically significantly determined both the difference between faculty members who produce and those who do not produce research as well as among research-productive faculty members. Faculty members who have strong research team and enabling institutions were also likely to be research engaged and productive. The external dimension and the institutional and departmental dimension variables had no statistically significant relationship with research outputs and rather generally viewed as negatively affecting research activities from the qualitative perspectives.

Research Question 4 Highlights: What factors explain research outputs of Cambodian faculty members?
• Individual research experience significantly predicting research outputs • Individual research production competence significantly predicting research outputs • Significant effects of research experience and research production competence changed in certain ways by separate analyses of age, disciplines, institutional orientation, and location • Individual practical research mindset (i.e. observed differences between researchers and non-researchers in qualitative analysis and bivariate analyses) • Strong research team/networks and/or enabling institutions (i.e. observed differences between researchers and non-researchers in qualitative analysis)

CHAPTER 9: DISCUSSIONS, IMPLICATIONS, AND LIMITATIONS

This study was procedurally conducted to answer four empirical research questions, using both the quantitative data from 483 faculty members and the qualitative data from 50 interviewees. Consequently, the study conducted eight main pieces of analyses – four qualitative analyses for the four research questions and four quantitative analyses for the same four research questions. The study therefore yielded a considerable number of results, but they all boiled down into achieving one main purpose: to understand what it is like to talk about current Cambodian research output production and what explains it. This chapter offered discussion on this main purpose of the study by presenting six sections. At the outset, it offered a quick summary of all the key conclusions of each specific research question. Second, the chapter explored its claim on the limited scale of researchers and research outputs of Cambodian higher education sector. Third, the study discussed its main finding on why research ability and research mindset (and relevant explanations) do matter in driving research output production in Cambodian faculty members. Fourth, the chapter tried reflecting the argument of individual factors into the mixed-methods analyses and higher-dimension environment. The fifth section was more practical; it envisioned some possible strategic implications towards promoting Cambodian faculty members' research output production in the future. Finally, this chapter presented some undeniable limitations of the study and suggested possible further studies.

9.1. Summary of all key findings

The main purpose of this study was to understand trends and correlates of research outputs of Cambodian faculty members. To deeply understand issues around this main purpose, the study answered four specific research questions. The results could be concluded as follows:

- **in response to research question one** on the trend of research outputs, the study found that the number of research-engaged faculty members as well as their research outputs in Cambodian higher education sector were still limited, niched, and dependent (though the awareness about the research function of higher education institutions has currently increased and generally been acknowledged by stakeholders).
- **in response to research question two** on research orientation of Cambodian faculty members, the analyses revealed that, in general, they showed more positive attitudinal orientation towards research but they offered lower rating on research competence and research experience. Some noticeable research orientation patterns included the significant gaps of most research orientation variables – i.e. research experience, research competence and

research attitudinal orientation – between Ph.D. and non-Ph.D. holders, between local terminal degree holders and foreign terminal degree holders, between faculty members based in city and those based in provinces, and between faculty members of public universities and those of private ones.

- **in response to research question three** on research support environment, some problems with regards to academic cultures, research institutionalization, and research resources have still been considered serious challenges for Cambodian higher education institutions to be research conductive and productive (though certain selected institutions with some active research-engaged faculty members have distinctively displayed certain research-inclined traits).
- finally, **in response to the main research question** on factors influencing research outputs, the results indicated that individual research ability (i.e. research production competence and research experience) statistically significantly differentiated between faculty members who produced and those who did not produce research outputs as well as significantly explained the variation of research outputs. Practical research mindset also qualitatively reflected many positive traits of research-engaged and research-productive faculty members, which distinguished them from research-unengaged and less productive ones. Other relevant explanations – i.e. the possible moderation effects posed by different disciplines and by different institutional types and the qualitative explanations related to having a strong team/network and an enabling institution as pushing factors for research production – were also detected.

Overall, in response to the main purpose that sought to understand what it is like to talk about research output of Cambodian faculty members and what explains it, the study came to the conclusion that researchers and research outputs are still limited in general and that those scarce research outputs produced by a small group of faculty members are mainly explained by individual's research ability and research mindset. These two variables play instrumental roles in making research outputs possible in the currently teaching-oriented academic environment of Cambodian higher education sector.

But how truthful and reliable are these arguments in the current Cambodian higher education context? How fitting are the findings to the literature and theoretical thinking on research performance or productivity, especially in developing countries? How reliable are the methods used to draw such conclusions? And what kinds of implications can be drawn from this study? The following sections closely examined and verified these major questions and discussed the study's limitations – using possible evidence from the analyzed data, some secondary data, and the empirical literature – in order to depict contextual and theoretical meaning that confirms or contradicts the study's results.

9.2. Exploring the claimed limitations of researchers and research outputs in Cambodian higher education sector

The claim of limited researchers and research outputs of Cambodian higher education sector is a common sense, but little has been done to offer objective perspectives into such claim. The study argued as such based on its statistical findings on the limited number of researchers, the low composite research outputs in average, the more reported local research products, the reporting of conference presentation as a dominant research activity, and the orientation more towards social science and related fields. Likewise, this study's claim also hinged on the three qualitative themes from interviewees' opinions that revealed the paradox between increased research awareness and limited research outputs, the theme of niched and dependent research activities, and the theme related to inadequate relevance of existing research works. In certain ways, qualitative data emphasized that existing research works are less purely academic and scientific but more applied and donors-driven. Research outputs were also perceived less impactful and visible.

These quantitative and qualitative findings can be reflected from a deeper discussion on the measurement methods used in this study as well as from insights of most existing local and regional literature on research culture and capacity of higher education institutions in developing countries (see, for example, Meek & Suwanwela, 2006; Sanyal & Varghese, 2007; Kwok et al., 2010; Savage, 2011; Sombatsompop et al., 2011).

Quantitative finding discussion: From the methodological perspective, the way of measuring research outputs in this study can be criticized for its inclusion of less standardized indicators (such as non-peer-reviewed local research outputs) but, taken as a whole, the measurement can still prove the claimed "limitation," "niched," and "dependence," of the researchers and outputs. During their services at their current higher education institutions, in average, fewer than four research outputs were produced by Cambodian faculty members. Dividing this output of individual faculty members by their number of working years, in average, a faculty member tended to produce less than one research output per annum. From a similar perspective, more than 90 percent of the samples reported "never publishing" certain types of products (such as books or journal articles with international publishers). However, some extreme individuals, as presented in the findings, were productive in international as well as local research works. But, as explicated, they were outliers. This current study's survey showed a total of 1,565 research outputs reported from the 483 sampled faculty members of the 15 selected universities/institutions. More local research outputs and research outputs of social science and related

fields were reported. In this sample, only certain universities (such as U1, U2, and U6) had more faculty members producing research outputs than those who did not.[39]

It is also possible to question these quantitative findings on its representativeness and generalizability to the larger population. The inferential attempts may be not methodologically appropriate, reflecting into the inclusion of local and non-peer-reviewed research outputs and the exclusion of citation counts in the measure. Temporally speaking, the study measured the outputs within the whole service periods, rather than within 2 or 3 years as done in previous studies. These practices actually provided chances of reporting higher research outputs and inflated the real trends. The study acknowledged the limitation in its measurement. Also, because the selection of the 15 universities were purposive and were likely to include medium- to high-ranking universities/institutions in the country, the possible inflation of reported higher research outputs has to be acknowledged. Such purposive selection was done because one of the main goals of this study was to explain research outputs of Cambodian faculty members and so the sampling selection required inclusion of research-inclined institutions. So, despite with a more random selection and the inclusion of more standardized measures, the conclusion of this current study "that research outputs are still limited" is not likely to change. In its own scope, the study's findings offered some practical perspectives on how research output production works in the current Cambodian higher education context.

Qualitative finding discussion: In many ways, the qualitative findings on research support environment of Cambodian higher education sector could offer more in-depth explanations on the claimed "limitation of researchers and research outputs." Majority of participants believed that research awareness among faculty members have been increased in some way and also showed some appreciation for various actions taken by MoEYS through the HEQCIP to promote research culture. But the participants still maintained that research activities and production have been very limited and niched as they showed serious concerns over the lack of research in hard science field and the too much dependence on donors' funding, pointing also to the fact that the government and universities, in general, do not provide research funding and incentive packages for research works at universities. Also, the third theme on the question of relevance of existing research works and their impacts on academic and social development was understandable in many practical senses, given the nature of the donors-guided research activities and the general lack of dissemination mechanisms. Methodology wise, these qualitative findings were generated from direct coding of actual wording of respondents and further abstracted to the concluded major themes. Most of these coding ideas resulted from the researcher's ecological framework of thinking based on previous literature of this area, and so the

[39] It should be noted that this does not count research outputs produced by Cambodian scholars and scientists in its entirety. Currently, more Cambodian graduates pursuing degree abroad and scholars from non-academic sectors have contributed to producing more academic research outputs.

qualitative analysis was, in a sense, not a complete exploratory work. Though doing so can be criticized, such approaches are not uncommon for qualitative research analyses. Because the qualitative method is based on interpretivist perspectives, it is hard to avoid subjectivity of the researcher.

Discussion of previous literature of developing countries' research cultures and systems: The lack of academic cultures has been of critical concern for developing countries' research performance. For Cambodia, its higher education sector was influenced at certain times by the French and the Russian systems. Universities of these two systems are theoretically not supposed to play much active research roles (see, for example, Neave, 2002; Sanyal & Varghese, 2007) because these countries have their own national research centers (the case of France) and academy (the case of Russia) to conduct advanced scientific research. Altbach (2016) claimed that countries with such differentiated research systems find it hard to support research universities (p. 176).

The lack of research culture and institutionalization has been experienced by many developing countries in South-East Asia. Previous studies in Cambodian and other developing countries' context raised such similar concerns. Kwok et al. (2010) pointed to the problem with academic profession in Cambodian higher education and called for differentiated higher education institutions. Koswara and Tadjudin (2006) pointed to "the lack of research umbrella" in Indonesian higher education. Nguyen and Meek (2016) discussed "the lack of an effective research behavior formalization system" as a problem of research performance of Vietnamese higher education. Arimoto (2015) cautioned the failed shift from mere academic to academic profession and called for attention on the institutionalization of the research-teaching-study nexus in a more systemic way. Based on this current study's interviewees' vantage points on the macro-level perspective, the four types of academic cultures (Clark, 1980) – i.e. the culture of profession, the culture of discipline, the culture of enterprise, and the culture of system – could be conceived as generally unfulfilled in Cambodian higher education sector.

Previous studies on research culture and capacity of developing countries also generally appealed for attention on resources (e.g. human resources, financial resources, academic resources, physical infrastructure, and even time) (Altbach, 2003). Due to insufficient resources, research activities in those contexts exist more in the form of research collaboration and/or commissions- or consultancy-typed research works driven by donors and perhaps less academically-oriented (Meek & Suwanwela, 2006; Sanyal & Varghese, 2007). The general support on innovation and research and development from the government of developing countries has still been relatively low, compared to that of developed countries. In Cambodia, particularly, the funding from the government on higher education sector in general is 0.1 % of the country's GDP, according to Un and Sok (2014). The exact statistic of funding package for research in Cambodian higher education sector has not been revealed so far

(though the government has apparently considered investing in this research area to continue the course of the research-promoting HEQCIP funded by the World Bank from 2010 to 2015).

Other possible actors that would contribute to producing research outputs – for example, industry sector, professional society, and other actors of national innovation system – have also not been in a good shape in the country. Though Cambodia has the Russian-styled academy – as exemplified by the Royal Academy of Cambodia (RAC) – in its higher education sector, previous studies generally believed that these academies have yet to fulfill their research functions well (see, for example, Kwok et al., 2010). As for industrial and private sectors, in general, the notion and policy for industrial development have also been very recent (as reflected by the currently-issued Industrial Development Policy (2015-2025). It is, from practical senses, an appreciable endeavor, yet it clearly implies that, so far, the role of industry and private sectors in connecting with the higher education sector to promote knowledge creation and innovation has been sluggish and seemingly is a long way to go. What is more, in aids-dependent countries, civil society and non-governmental organizations tend to obtain certain portions of external funding for research works. This situation is true in Cambodian non-governmental sectors, yet most of those research works are policy-oriented and not academic, and there has still been little evidence that these non-academic civil society sectors have made much research collaboration with the academic sector of the country. In general, limited researchers and research outputs are practically shaped by the whole academic environment that lacks most required systems, cultures, and traditions as well as resources.

Discussion of practical context of Cambodian academics' conditions: While the higher education in the first place has not been oriented towards research, its particular characteristics further shape the limitation of research output production. The number of highly-educated scholars and intellectuals in Cambodia have actually been increased in the past decades. Though still low, the number of doctorates in higher education sector reach almost 1,000 in crude number (in 2015), and it is higher than that if considering this group in other sectors. But this increased number of scholars and intellectuals has generated little impacts on research and knowledge production of the country. In actuality, though there has been higher concentration of highly-educated people in the country in the past 2 decades, not all of them (who obatin at least Master's degree) choose to walk into the academic track. Some find state position more satisfactory and give more opportunity to high ranking social statuses. Some are more entrepreneurial and start to work in business sectors. Others work for the generally more-highly-incentivized non-governmental organizations or private sectors. Statistics on these flow of Cambodian highly-educated people – produced locally or in a foreign country – tend to be not well tracked so far. Proper policies to motivate or brain-gain this scholar group have also not yet developed systematically. This academic leak of human resources is not untypical in the contemporary world of free market, yet this is a sad fact for countries with already low performing academic culture and systems. It is also

enlightened to understand that the distribution of faculty members (who have bachelor degree as their terminal degree and have currently been working as lecturers in Cambodian universities) is quite high – MoEYS statistics reported about 24 percent of them in year 2014 – 2015.

To put the academic problems into more critical perspective, even some choose to be in the academic track, not all of those highly-educated individuals in the Cambodian academia are bound for research works. All fall into the teaching stream as the main role or have to take huge responsibility of administrative and leadership roles; only some faculty members realize research opportunities because funding sources are scarce and barely known. It should be underscored that funding of research of the Cambodian higher education sector can generally be done in two modes: the inflow mode (as shown in Figure 9.1.) and the outwards fund-searching mode (as shown in Figure 9.2.), as reflected through the following figures. Such funding mechanisms clearly imply the niche opportunity for faculty members both to access information about the funding and to obtain ones.

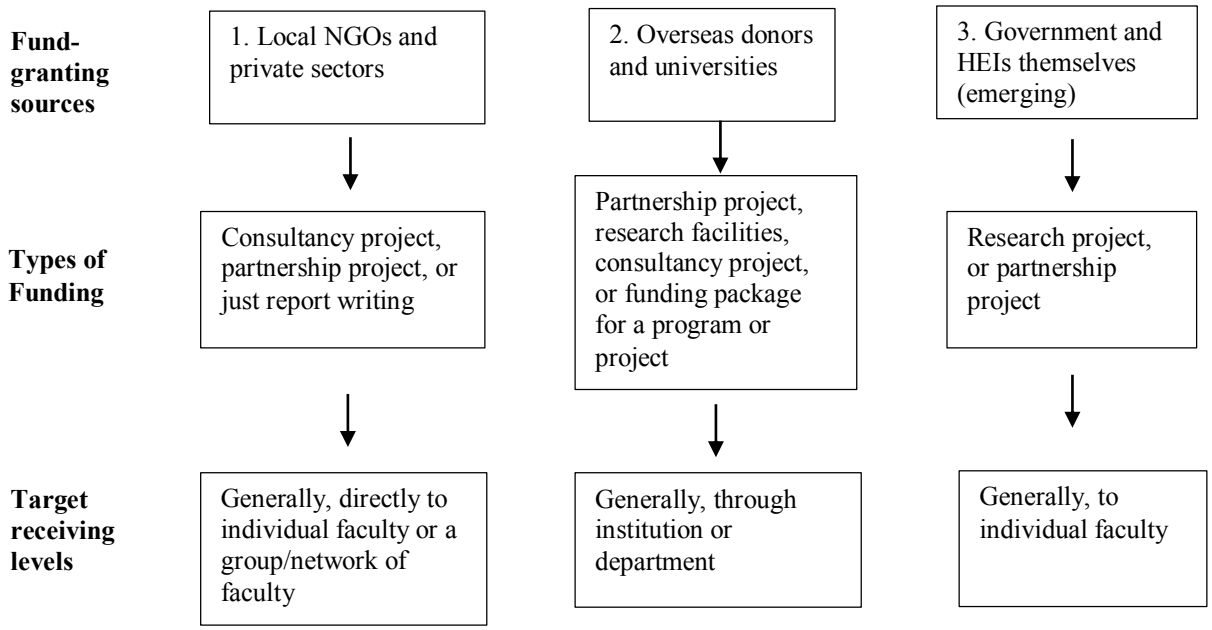


Figure 9.1. General trend of inward flow of research funding from external sources to Cambodian universities

By discussing the methodological approaches used in this study, the previous literature on overall academic and research cultures of developing countries, and the Cambodian academics' conditions, it is clear that researchers and research outputs production of Cambodian faculty members are not in positive shape. Yet, the study implies that research awareness and support have been increased in the country's higher education sector in the last decade. Promotion of research awareness among faculty members can be noticed in certain ways – perhaps what CICP (2016) referred to as the "research in transition." This is especially true when one takes a temporal perspective to look at it – that being said,

if one compares the current research implementation with itself some decades ago. And, no doubt, this is true everywhere, given the many changes in global movements – viz. mass higher education, changing academic profession, R&D roles, technological roles, and internationalization and regionalization movements. Yet, such maxim is less considerate without an assessment from a comparative perspective with other countries or regions. If compared to developing countries in the region, Cambodian current research transition has still been of little significance in many aspects – for instance, in terms of, its visions of public science and innovation, its real strategic actions to promote research outputs, and its real investment from the government for advanced research institutionalization. With a deeper analytical look into the current trends, one possible argument emerges: that is, this transition or promoted trend is more a pebble effect coming from the global (or regional) movements rather than an awakened endeavor from a national strategic standpoint. In other words, it is more of a "going-with-the-flow" than of a "well-planned, systematic" move. Again, this is not to say that the government and higher education institutions have not done their jobs. It just infers that more has to be done in a more systemic and visionary way.

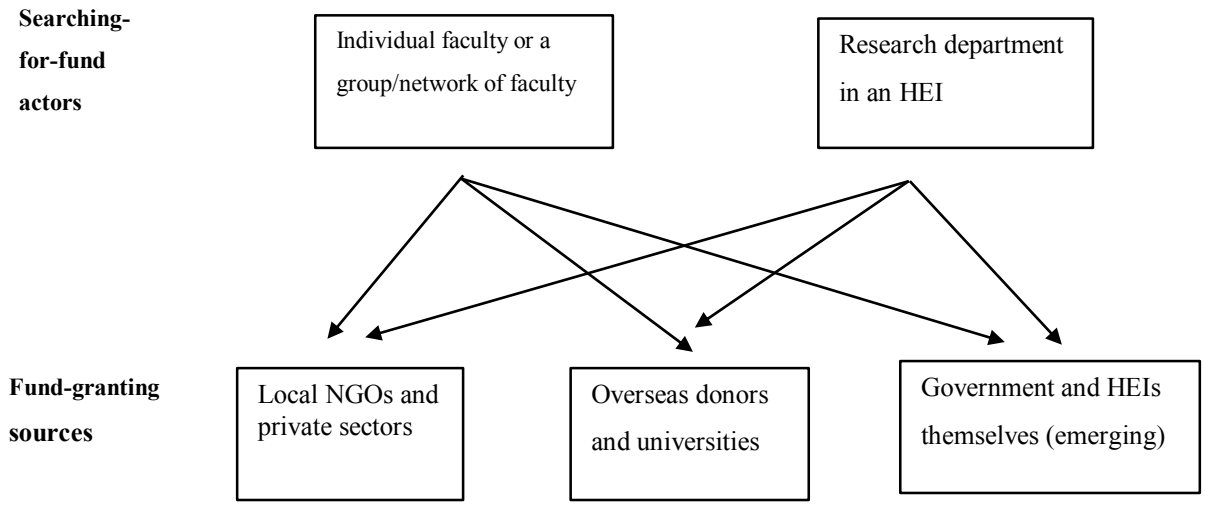


Figure 9.2. General trend of outward fund attracting mechanisms at Cambodian universities

Kyvik and Lepori (2010) argued that the institutions of university of applied science in Europe tend to try to meet the expectations of all the four actors (viz. state authorities, supranational organizations, societal stakeholders, and academia) while also trying to shape their own trajectory of development, leading to what the authors called the *research drift* phenomena. CAP-survey-based studies have also noted some orientation towards research stream among higher education institutions from different nations. From this perspective, all the earlier discussions about limitation of researchers and research outputs of Cambodian faculty members should lead to one big question: whether the *research drift* can really happen in Cambodian academia? All of these discussions have so far focused on the larger

portion of the research-unfriendly side of the higher education sector. The next section turned to look at it's the smaller research-active side.

9.3. Why research ability and mindset matter? Rethinking individual dimension

The current study has identified reported research outputs of Cambodian faculty members. The next important question this study tried to explore was what key factors make these people able to produce their research outputs. The main arguments from this study evolved around the two ideas: research ability and research mindset. These two concepts were found to be main factors that not only differentiated research-engaged from research-unengaged faculty members but also key factors explaining variation of research outputs production of Cambodian academics. Some theoretical and empirical notions tend to give light to explain such significant functions and roles of ability and mindset. Theoretically speaking, these notions incorporate such concepts as self-efficacy, background knowledge, research training environment, cumulative advantage and reinforcement factors, the ideas of "survival of the fittest," academic self and academic mindset, research orientation, and even human capital. They are, in certain ways, theoretically supposed to function as influencing factors of productivity in general and of research productivity in particular. Some practical discussions on graduate education and research production system of Cambodian higher education should also offer more practical insights to explain why research ability and mindset are imperative. These theoretical concepts and practical conditions were key discussion points of the following sections.

9.3.1. Having strong research ability and skill sets

Research ability in this study covers research production competence and research experience (as measured by various psychometric items through the 6-point Likert scale) both of which were statistically related to composite weighted research outputs of Cambodian faculty members in the ZINB analysis. From this current study's finding, clear statistical and qualitative evidence can prove why research ability predict research outputs.

- **Quantitative finding discussion:** As the results showed, a one-unit increase in research production competence generates a change of research output production by a factor of 1.55 (55 percent change); a one-unit increase in research experience generates a change by a factor of 1.47 (or 47 percent change) in research output production. There was a clear huge gap in terms of research production competence and research experience between faculty who reported high research outputs and those who produced fewer or did not produce research outputs at all – that is to say, 71.22% of the high-research-production-competence faculty

members reporting at least one research output, compared to only 28.78% of those with low research production competence, and 62.93% of highly-experienced faculty members reporting at least one research output, compared to only 37.07% of the low-experience ones. Figure 9.3. showed further evidence of patterns among the three variables, illustrating that the most productive group in the samples were faculty with both high experience and high production competence (56.01%) and least productive group were faculty with low experience and also low production competence (58.83%).

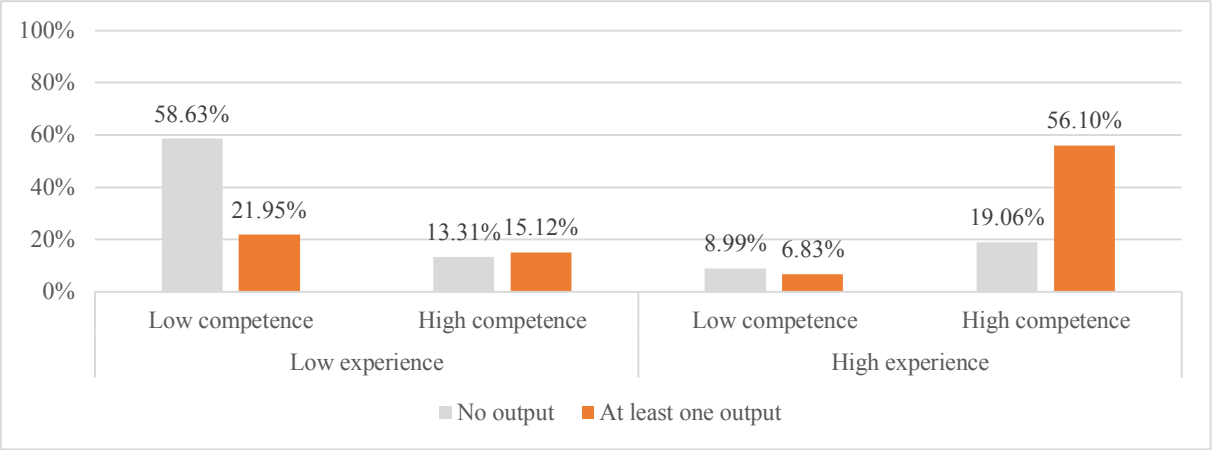


Figure 9.3. Patterns of participants by research outputs, research production competence, and research experience (in percentage)

In this study, after all, four research competence components were observed: research production competence (i.e. ability in writing, publishing, and presenting research works), research general competence (i.e. ability in research design, literature, data-handling, and data analysis skills), research technological competence (i.e. ability in using statistical or qualitative software to manage and analyze research data), and research managerial competence (i.e. ability in project and financial management skills of research works). Though only research production competence shows statistical significance in the composite model analyses, in separate analyses, other components are all statistically related to research outputs. These imply that there are huge gaps in terms of research competence and research experience between Cambodian faculty members who can produce research outputs and those who cannot. Research experience (i.e. engagement in various research activities during the graduate program and/or services at their current working places or other working places) and research production competence are also highly correlated. Figure 9.4. also showed that there is a likely possible interaction between research experience and research production competence since faculty with high production competence and high experience tended to produce 7 research output in average, compared to only .78 output for faculty with low production competence

and low experience. These two constructs conceptually reflect the idea of research ability as key determinants of research outputs.

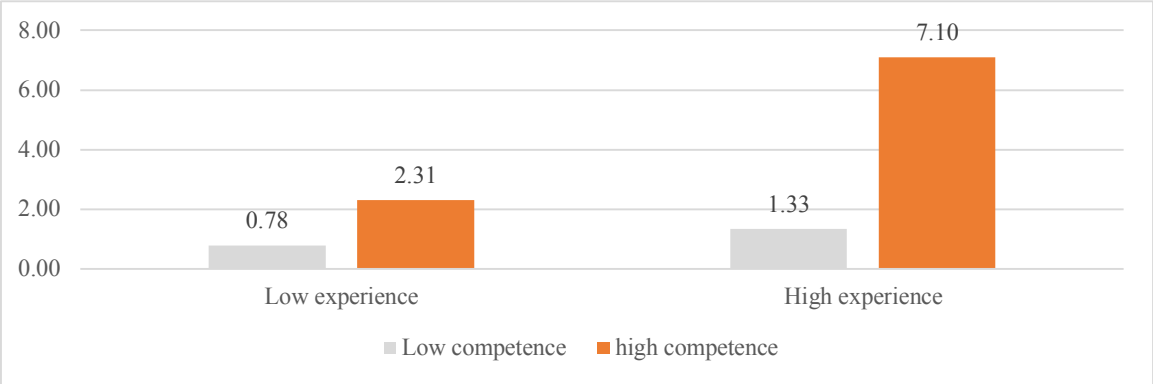


Figure 9.4. Mean scores of research outputs by level of research experience and research production competence

- **Qualitative finding discussion:** In the qualitative analysis, more than 90 percent of the interviewees emphasized that having research ability was the primary criteria to engage effectively in research in Cambodia. In research question 3 that seeks to understand research orientation of Cambodian faculty members, the qualitative themes also suggested that the interviewees generally perceived a clear huge gaps between those who do not do research and those who can do research. They generally associated these gaps to the degree they hold (Ph.D. vs non-Ph.D.) and the place they graduate their terminal degree (faculty graduating from a well-developed country and faculty graduating locally). One research prolific respondent in the interview claimed: *"Cambodian faculty lacks research framework and they don't understand the trick of the trade in publication arena. So their works cannot be published."* Most of the so-called research projects conducted in Cambodian higher education, as participants synthesized, are led by the known principle investigators and these people generally are the ones who develop proposal to obtain grants, manage the funding, conduct analyses, and write the research results. Through the qualitative investigations, interviewees reveal different levels of research ability (i.e. those who are research-literate, those who are research-fluent, and those who are master and thinkers in research skills). Hazelkorn (2008) suggested six faculty typology towards research orientation: research negative, research defunct, research inclined, research minded, research oriented, and research active. Generally, those Cambodian faculty members who reach the level of mastery show strong confidence in even peer-reviewed research publications in international outlets.

From theoretical and empirical perspectives, three concepts are also relevant in explaining why research ability influences research outputs: first, it is the concept of research self-efficacy and

research training environment which were detected to have strong correlation with research productivity in certain studies (e.g. Phillips & Russel, 1994; Kanh & Scott, 1997; Brocato & Mavis, 2005; Band et al., 2005; Bland et al., 2006); second, it is the concept of cumulative advantage and reinforcement (Creswell, 1985) referring to the more benefits one can gain from engaging or producing more research outputs; and, third, the idea of background knowledge that is important for academic achievement as well as research achievement (Bland et al., 2005; Marzano, 2004).

- **The evidence of research self-efficacy and research training environment:** Empirical literature in the area of research production from psychometric perspectives usually showed strong evidence in terms of the significant relationship between the concept of research self-efficacy and research training environment (which are the proxy of research competence and experience) and research production. One useful explanation of why faculty with strong research competence and research language can engage actively and productively in research in the current not well supported Cambodian higher education is to discuss the theoretical ideas of research self-efficacy and the theoretical idea of background knowledge as well as the practical ideas of networking and funding sources. Practical research competence also involved the fact that faculty members showed cognitive experience of research literacy and mastery as they could speak research languages in their areas in conceptual and thematic modes. In many previous studies, self-efficacy is correlated with research production. Phillips and Russell (1994), for example, detected that self-efficacy and research production are related ($r = .45$). Eke et al. (2012) found research self-efficacy to pose influence on research intention, which, from the Planned Behavior Theory perspective, could further influence research production.

- **The concept of background knowledge:** To be literate and competent in research, research theoretical background in one's particular area is very important. Brocato and Mavis (2005) also looking at the issue form the psychological and cognitive paradigm asserted that research skills and deep knowledge in the research areas have positive significant influences on individual research production. Theoretical and methodological background provide framework for thinking and rationalizing and in-depth analyses from historical, temporal, spatial, and thematic points of view, and so are vital for researchers. They provide a disciplined and systematic big picture of a particular research area. Practically speaking, it is very hard for researchers (though practice- or policy- or action-oriented ones) to have critical and well-rounded understanding of technical and conceptual elements of the research topics without understanding the leading theories in those areas.

While the current study also found supportive statistics that show positive attitudes towards research, it has to be critical with certain attitudes and values that can be, in reality, superficial and with less practical understanding about research: for example, in the research tradition in their own fields, the languages spoken by research community in their areas, the philosophical and methodological aspects of knowledge and science, and other areas related to the practical works of research projects or research implementation. All are not acquired by just having positive images of research. There is one serious phenomenon called "sorta kinda know" phenomena that should be avoided from now on (Lanchester, 2014), and equally important is the cognitive gap related to understanding fallacy which happens as one thinks s/he understands but actually cannot work things out properly – (Oakley, 2014) should not be allowed to rule the academic system in the country. These fallacies can also be seen in cases of people who believe they want to do research but do not actually have a growth research mindset. That is to say, faculty have to go deep into deeply and practically understanding the research and scholarship trends and skills and backgrounds in their areas. Because like the idea of promoting academic achievement of students through improving their background knowledge (Marzano, 2004), the idea of enhancing research production of Cambodian faculty members also has to follow the system of building their "research background knowledge" in the first place.

No doubt, without the theoretical understanding of research one cannot get things published in international, high quality journal outlets. Scholars and prolific researchers know this situation clearly. Theoretical framework of the areas and theoretical frameworks of the methods used are very important to prove that the ones who submit manuscript for publications do speak the research language and understand the main arguments in their particular research areas. These kinds of understanding generally cannot be built overnight and it takes a lot of time and experience of engagement in these scholarly activities from publications to conference presentation. In other words, to be productive, researchers have to master the materials and knowledge in their areas of expertise. That is one main reason why experience is very important. In the Bland et al. model (2005), research background knowledge was one of the item in individual characteristics that promote research performance.

- **The idea of cumulative advantage and reinforcement:** Cumulative advantage and reinforcement, as synthesized by Creswell (1985) on factors influencing research performance, referred to the sociological and psychological gains from more experience of research works and productions. These concepts supported the argument of why research ability matters. People who obtain competence and experience generally produce more, and as they produce more research they are likely to build strong network, attract more resources, find more

collaborative opportunity, etc. Also as experience in production increase they also can work faster to finish their products with quality. Research requires multiple skills and crafts, from technological skills, publishing skills, project managerial skills, methodological data-handling skills, and to the theoretical knowledge in certain areas, just to count a few.

From practical perspectives, the relationship between ability and mindset and research outputs in Cambodian higher education sectors can be explained by looking at how its graduate education and the research funding conditions of the country. The reflections indicate that in a situation where graduate schools – that are supposed to create researchers – do not play its role properly and where research funding is donors-dependent, only the fittest (those with distinctive quality) can actually survive in those conditions.

- **Discussion of the practical context of Cambodian graduate programs:** Another explanation is the question of how Cambodian academia so far produce researchers? In many cases, it is the graduate education program that plays this role. Unfortunately, as earlier mentioned, graduate education in the country is still in its low performance state. Most top-ranking public universities in the countries provide only Master's Degree. Private universities may offer up till Doctorate degree, but the question of quality is a concern. Curriculum are basically courses-based, with small projects at the end – which people refer to as research. Academic resources – say, subscription to journal articles or databases – do not exist in most universities. And who supervise those graduate students? This is another question. Basically, from the program perspective, Cambodian graduate education is not meant to create researchers. From the graduate student perspectives, most are students having full-time jobs and pursue their postgraduate degree in the weekend program or the evening program. They are not likely to immerse into the real scholarly world – say, in terms of publication of articles or academic conference presentation – due to many reasons, from funding to guidance. Most local graduate programs offer courses of research methods and basic statistics or software uses – but, due to the lack of real practices through publication and exposes to academic areas, their applications of what they learnt in those courses can be another concern. Overall, graduate education in the country, so far, has yet to fulfill the role of research creating for the country academia. That explains why locally graduating faculty members were less confident in their research skills and knowledge, compared to the foreign country graduates, especially those in top-ranking international universities, who generally experienced the opposite conditions. In analogical terms, think of a graduate from a four-year courses-based bachelor degree program being promoted to lecturer position in one academic institution. It is unlikely to imagine this person is research-oriented or research-competence to the level that they can independently conduct or lead research projects – academic or applied kind – or effectively transfer research-

based academic knowledge through teaching. In 2014-2015 statistics, Cambodia hosts around 20 percent of this group in their current higher education sector.

- **Discussion of the practical context of Cambodian the donors-driven research works:** Only competent researchers can actually survive in many contexts. In developed contexts, funding on research and development have been dropped for certain reasons, only those research projects that are promising and contributing in terms of application are likely to be funded. To create such proposal ones may need strong ability and experience from proposal development to understanding the international trends and further to understanding the "trick-of-the-trade" techniques in winning the grants. In Cambodia, this argument is even truer because, in overall, the research funding resources are scarce – as the study indicated, mostly from external donors. So, only the best capable individuals are likely to survive in the research world – the fittest. Previous local literature like (Kwok et al., 2010) reported many research products of the commission-typed or donors-driven types of research, which, from the perspective of this study, required faculty with skills and experience to get grants or build network for collaboration to be able to do it. It is also useful to understand the relationship from demographic patterns that exist. Research outputs are mostly products of active foreign graduates and higher degree faculty. To understand why it is necessary to understand of funding again. The funding is generally dropped to only those who are capable of understanding the scientific forms of research and can produce quality works. And so foreign graduates who have experience and network in research are good candidates to do the works. In general, research works were conducted in team, and there are one or two principle investigators. The interview with these people all consistently prove that they have all these skills sets and long experience in research. Most of them even can handle more than one research area.

Clearly, multi-potential skills sets are very important to a successful researcher, and cannot be obtained without proper training. This is perhaps true with many careers in the contemporary knowledge society, but it rings strong in the research domain. For Cambodia, the individuality aspect should be even more strongly emphasized not only on the idea of "freedom to think" but on the idea of "competence to think" and "competence to learn". In other words, to be research productive, Cambodian faculty first have to speak the research languages and experience real academic research works that academics in the developed worlds have so far done and those in the emerging economies have tried to do.

9.3.2. Having right research mindsets

One useful explanation of why faculty with strong practical research growth mindset is to discuss the idea of various abstract concepts related research attitude variables (such as research interest, research preference, research orientation, research motivation, research intention, research outcome expectation, research attitudes, etc.). They generally imply what this study call research mindset, which reflects the truthful inner quality of orientation towards research. Faculty with these kinds of mindset see real opportunity from engaging in research activities. This research mindset concept has to be explained clearly since it is the result that is based strongly from the exploratory qualitative finding as around eighty percent of the fifty participants raised certain opinions that reflect this notion. In specific terms, research mindset triagonally encompasses academic and research orientation and passion, research perseverance ability, and practical cognitive experience of growth through research. The relationship between mindsets and research outputs production can be explained from mainly the qualitative data and in some ways by the quantitative data, as well as by such concepts as: the ideas of academic self and academic mindset (e.g. Williams, 2008; Brooks & Monirith, 2010; Rattan, Savani, Chugh, & Dweck, 2015), the notion of research orientation and perseverance (e.g. Bland et al., 2005; Bland et al., 2006; Babu & Singh, 1998), and the evidence of cumulative advantages and reinforcement (e.g. Creswell, 1985). Again, it is worthwhile to reflect this concept into the obvious trends of donors-driven research works and the well-acknowledged problem of research motivation.

- **Qualitative finding discussion:** Faculty members who were productive in research outputs generally viewed research as opportunity to grow and as something generative, whilst those who did not engage in research viewed research more as complicated works and less generative – especially, when they compared its benefit to that from teaching. Around 50 percent of the interviewee highlighted the notion of inconsistency between emotional valuing research and experiential understanding research. In many cases of the interview, research-active faculty members believed or showed that they are research-preferring, goal-oriented, disciplined, and hard workers as they thrive to reach the advanced or expert level in their fields. In another operational term, research growth mindset can imply the belief that sees the challenges in research engagement yield great extrinsic and intrinsic outcome in the long run. To be able to engage in research activities in Cambodia in its current conditions, faculty have to have a practical and growth mindset.

- **Quantitative finding discussion:** Furthermore, in quantitative analysis, research behavioral orientation was statistically differentiated by terminal degree and terminal degree countries in separate pattern analyses in this study, though the composite analysis showed no statistical significance. Faculty with PH.D. and those graduating from foreign countries showed more

behavioral orientation towards research: having less teaching hours, having strong research networks, and more sense of commitment for research. In the bivariate quantitative analysis, faculty members who produced at least one research output rated higher than their zero-output counterparts did in terms of emotional research orientation (mean score of 4.16 vs 3.84) and behavioral research orientation (mean score of 3.15 vs 2.67) (See Figure 9.5. below). These indicators actually reflect practical mindsets, though in composite analyses they are not statistically significantly related to research outputs. It is hard to specify these relations objectively in the case of this current study's samples. But, this has to be a very important discussion for the current study because previous studies tended to show that Cambodian faculty members do value research. This variable is also highly correlated with research competence variables.

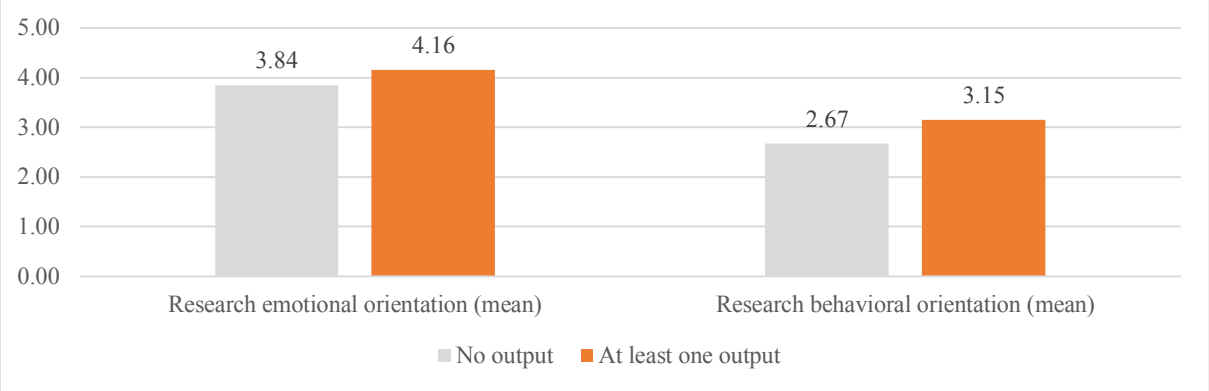


Figure 9.5. Mean difference on research emotional orientation and research behavioral orientation between faculty members without research output and those with at least one output

- **The discussion of the "academic self-understanding":** Practical mindset is perhaps related strongly to the personal bigger concept of "academic self", as Williams (2008) proposed in response to the confusion around this career: "*significant shift in self-understanding and practice are needed for academe to claim a social role as a 'profession'."* They feel they belong to the academia, not necessary their institutions. Felt (2009) through her book titled "Knowing and Living in Academic Research" argued that research culture varies according to context and so encourage the importance of true understanding of what an academic nature is like. The academic self-understanding is critically important to define one's academic identity, which can serve his or her academic journey in the long run. Previous local literature also discussed this concept, referred to as "virtue" of the academics who see their research engagement may contribute to their national development and defining it as their key roles to play as an academic (Brooks & Monirith, 2010). This belonging academic mindset reflects what Ernest Boyer called "the scholarship of discovery", the one that is necessary for an academic to be a real academic.

Academic mindsets: Research practical mindset conceptually encompasses the visual cognitive experience of what research entails and provides. Rattan, Savani, Chugh, & Dweck (2015) classifies the students' academic mindsets into major two: the growth mindset and the belonging mindset, which are critically important for students' achievement. This concept is not necessarily in the area of research production, but it does reflect how attachment and positive thinking can influence performance of a human being. A high percentage of the fifty interviewees (i.e. 84%), in this study, raised a theme that supported the idea of practical research mindset as a main factor that pushed their research engagement and production. Similar to the students' academic mindset, the research mindset in this study involve three components: the sense of belonging to the academia, the experiential understanding that research endeavors will be generative in the long run (growth opportunity), and the cognitive commitment and preference for research.

- **Research orientation and perseverance:** Bland et al. (2005) and Bland et al. (2006) pointed to the idea of "research orientation" in the dimension of individual characteristics as important factor to influence research-conductive institution and so research production. Previous studies also raised the idea that selecting faculty members with the right personality types for research will increase research productivity (e.g. Mallinckrodt, Gelso, & Royalty, 1990). In real senses, growth and pragmatic mindsets of active researchers in Cambodia can be reflected through their languages as they describe their research experience, showing hard work, their disciplined attitudes, their network, and their criticality with funding or research management. They generally can persevere hard research works. One active researcher claims: *"... we have to work non-stop…" and "sometimes, before people start their working days in the morning, we already spend 8 hours working at night."* This involves a strong self-discipline to achieve such hard works. They are committed to research and less on teaching. An interviewee claimed about reasons that make them engage actively in research: *"I think, first of all, I give up teaching… sometimes, I spend two or three days just focusing wholly on research… I also have an inspiration to build knowledge and expertise in my area…"* Babu and Singh (1998) conducted a principle component analysis and detected a number of determinants of research productivity, among which "persistence," "concern for advancement," and "professional commitment" are vital for the production of research outputs.

- **Cumulative and reinforcement factors:** Creswell (1985) explained that faculty who perform well in terms of research outputs will acquire even higher opportunities (and rewards or resources) to advance their productivity even further. Cumulative advantage is based more on sociological, rather than psychological, explanations. Empirical studies based on this explanation may look at graduate training experiences, employment at prestigious institutions,

and resources available for research. A similar idea of reinforcements can also be related to making researchers desiring to do more research or produce more. Similar to cumulative advantage, the concept of reinforcements refers to the receiving of feedbacks or recognitions from successful published works or other academic achievements. Faculty tend to be more productive when their previous successful works are well recognized (Creswell, 1985). Researchers based on this explanation generally look at citations, early publications, or informal recognition as key variables.

- **Discussion on the practical context of donors-driven research works in Cambodia:** Part of the knowledge production and research-related academic works of Cambodian faculty members are consultancy jobs (Kwok et al., 2010). This trends are obvious in many developing countries. Mouton & Waast (2009), in Meek, Teichler, & Kearny (2009), reported reasons for engaging in consultancy works, which included improve knowledge and skills, enjoying variety of topics, increase networking, inadequate salary, research not addressed by own institution, and high demand (p.161). These reasons are parts that explain what is called strong and pragmatic research mindset in the current study. Studies in developing countries' contexts (Sanyal & Varghese, 2007; Koswara & Tadjudin, 2006) indicated that faculty in those settings are less academically-oriented researchers, but more of the commissions-oriented researchers. Kwok et al. (2010) and CICP (2016) also acknowledged these phenomena in Cambodian cases.

- **Discussion on the extrinsic motivation:** About 74 percent of the interviewee pointed to the idea of "conflicting dilemma between teaching and research motivation". There is hence another big conceptual question to handle in this argument: are they curiosity-driven researchers, people who understand the nature of research and love knowledge? As Mouton & Waast (2009) reported in their study: reasons for engaging in consultancy works include *improve knowledge and skills, enjoy variety of topics, increase networking, inadequate salary, research not addressed by own institution, and high demand* (p.161). This study has limitation to prove that research-minded faculty members are those ones who thrive more for financial benefits only. Most of them, while working hard and seeing research as opportunity to grow in their areas, also claim that they can earn income from research projects or that they have stable income to think of doing research. Most of them actually could manage to earn certain types of both the extrinsic and the intrinsic benefits from their engagement in research activities. Data from the qualitative interview clearly indicate that most of these researchers are also bound for extrinsic outputs from doing research, specifically, in terms of receiving certain amount of bonuses or commissions from research and consultancy jobs to obtaining facilities for their institutions after research projects completed.

So, it is not convincing to strongly claim that they will do research regardless of whether they can earn those extra incomes or not – though some of them show such likeliness. There was an interviewee in this study who did his research in the field of anthropology and Khmer culture, without caring much about funding. Another possible question with these rare individuals are whether they detach their academic curiosity drives completely from expected implications to the society. That is another hard question. Still, findings from the qualitative data suggested that research and teaching debates do exist in the Cambodian context as faculty members tend to rationally choose the one they prefer. Faculty who teach generally think that teaching can give them better and more stable income.

9.3.3. Other possible explanations

Other possible factors should be discussed to explain research output production in the context of Cambodian higher education sector. Some moderation and interaction patterns and some further qualitative themes are decent for such further discussions in this study.

Moderating characteristics: Research ability and mindset are abstract constructs. In more realistic senses, the scores of research outputs – as well as the score of research production competence and research experience – were generally differentiated between older and younger faculty members, between doctoral and non-doctoral degree holders, between overseas and local graduates, between faculty members from city-based universities and those from province-based universities, and between faculty members from public institutions and those from private institutions. In further moderation analyses, the effects of research production competence and/or research experience on research outputs might turn insignificant in the separate analysis of only the science-majored faculty members, of only the faculty members from province-based universities, of only the faculty members from private universities, of only the faculty members of the young-age group, and of only those within the old-age group. Also, it should be noted that the effect of research production competence on the count variation of research outputs turned insignificant in the separate analysis of only local research outputs, while the effect of research experience turned insignificant in the separate analysis of only international research outputs.

While such patterns could be due to the smaller sample size of these groups in the study's samples, these fluctuated significance patterns somehow reflected the particularity or distinctiveness in terms of effects on research performance shaped by different disciplines and institutional types of Cambodian higher education settings. These moderation patterns also reflected the particularity or distinctiveness of effects on research outputs by different individual professional characteristics in Cambodian higher education settings. Kwok et al. (2010), for instance, pointed out that certain disciplines and specialized

institutions of those disciplines – such as agriculture, certain fields of Institute of Technology of Cambodia, and certain fields of the Royal University of Fine Arts – have potentials to attract more funding in terms of commission-typed research works or research collaboration. Institution wise, certain public and top-ranking universities have better fame, both locally and internally, and so are likely to attract more collaborators in research projects. Royal University of Phnom Penh, for instance, have conducted 114 research programs through collaboration from 1999 to 2015, as reported through the university's promotion video. With such strength, faculty members working within those disciplines and institutions may gain further opportunities for research works, adding to the opportunities incurred by their research competence and research mindsets.

The following figures offered some further descriptive evidence of these distinctive patterns from the study's samples. Figure 9.6. showed that 56 percent of Cambodian graduates from overseas produced at least one research output, while only 33.5 percent of local graduates did. Figure 9.7. indicated that faculty graduating from a foreign country and having high research experience were generally more productive than other groups, but, interestingly, those graduating in Cambodia and having higher experience and high research competence were even more productive. Figure 9.8. also showed that faculty members at the age of 46 or older, with high research experience and high research production competence, were the most productive group in the sample. They produced an average of 11.79 research output during their services.

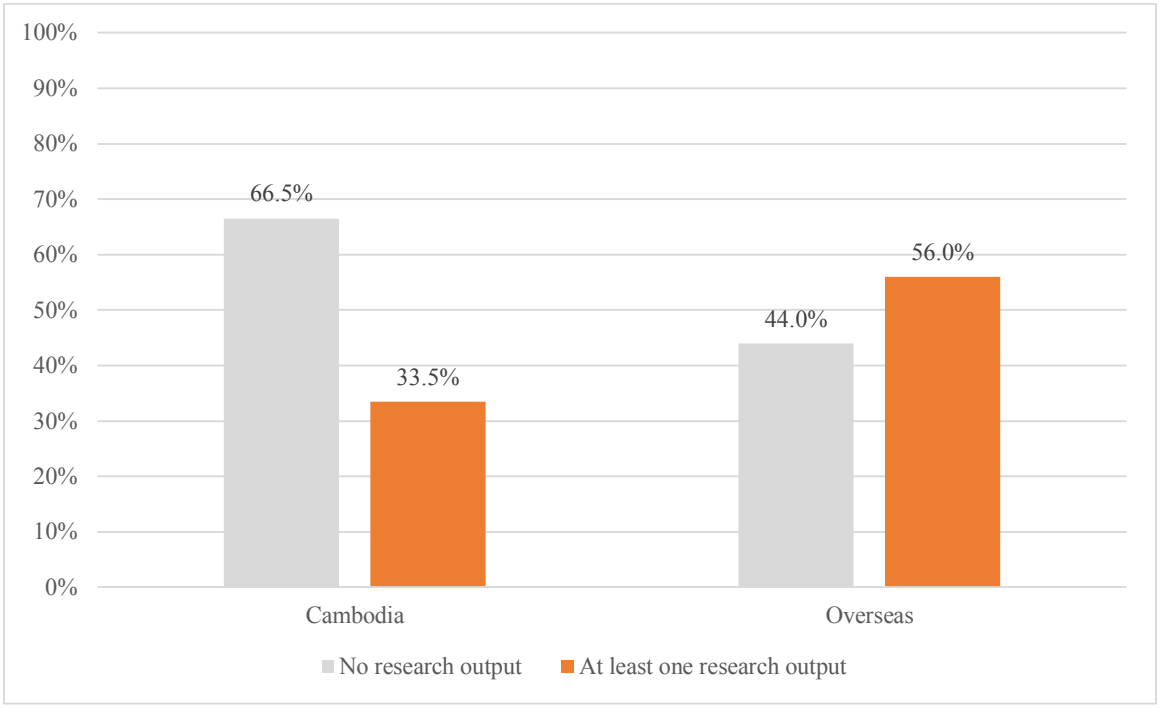


Figure 9.6. Patterns of relationship between faculty members' terminal degree country and their research outputs

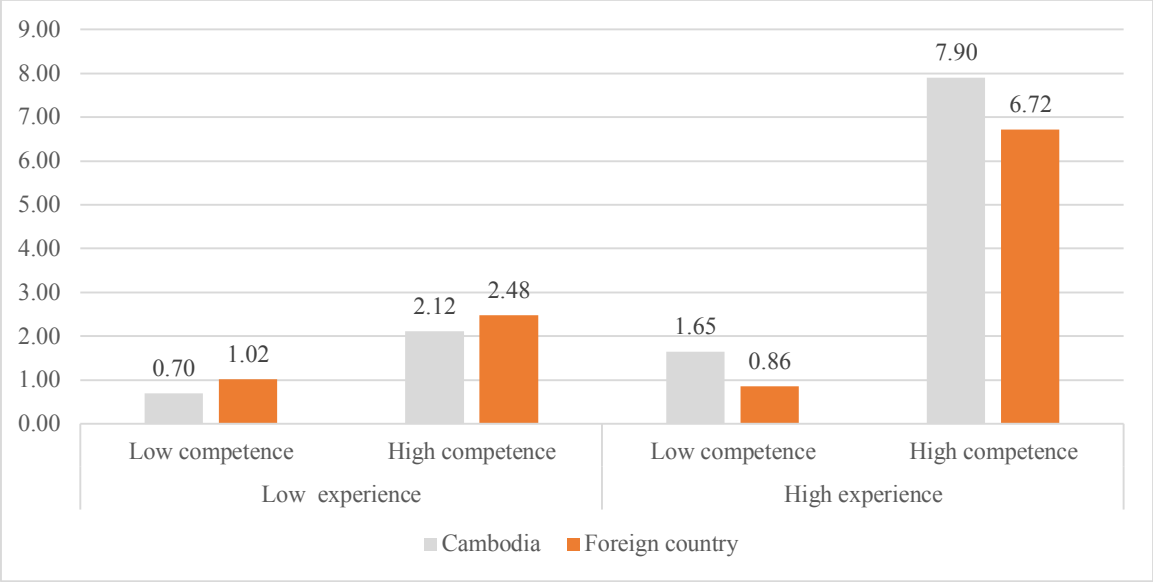


Figure 9.7. Mean score of research outputs of interaction among terminal degree country, research experience, and research production competence

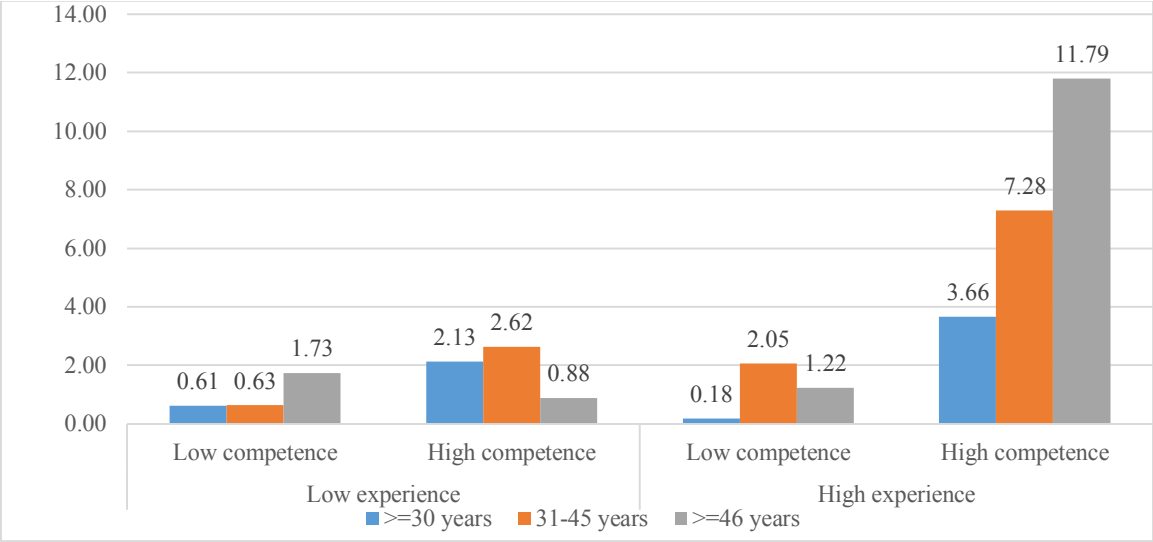


Figure 9.8. Mean score of research outputs of interaction among age, research experience, and research production competence

Strong research team/network and enabling institutions: Besides possible moderating characteristics shaping the effects on research performance by different disciplines, different institutional types, and some individual traits, having a strong research team and an enabling institution is a plus for opportunity to engage and produce research in Cambodian higher education sector. A smaller percentage of interviewees tended to give support to this idea of strong research team/network and enabling institutions, and yet this factor can be pragmatically acceptable through many possible explanations.

From theoretical explanations, Bland et al. model (2005; 2006) and many other studies focusing on institutional effects support the roles of institutions in promoting research activities. Enabling activities include facilitation, networking, managerial and financial tasks, internal interdisciplinary connection, etc. Institutional characteristics can be seen as a contribution to cultural ways of thinking. Other studies, from institutional perspectives, generally support these ideas of collegiality and mentorship among faculty members as well as external network among scholars in the same professional society as a great and productivity-generated practice of academics (e.g. Shim, O'Neal, & Rabolt, 1998; Kim, Pedersen, & Cloud, 2007).

In this study, U1, U4, U6, and U12 showed strong unique institutional characteristics that reflect their contribution to engaging their staff in research: for instance, having right-functioning research administration unit, orienting towards specialization in the popular discipline, and having professional academic leaders. In this study, University 1 reportedly produced 114 research programs from 1999 to 2015 through collaborations with international universities, and University 4 reported 23 research projects during the data collection period. University 2 has started its journal outlet since the call for promotion of research at higher education institutions. Though the quality of the outlet is probably still limited; some volumes have already made their ways. Like other institutions, University 6 and 12 have also created somehow functioning research centers and have enjoyed certain external projects, especially in agricultural fields.

In Cambodian context, it is also necessary to understand the flow of funding for current research to see why network and team work and facilitating roles of institutions should not be disregarded in explaining current research outputs – though statistical data did not prove it. There are generally observed two trends of flow of funding into Cambodian higher education institutions for research activities, as explained in earlier sections: the outward fund-searching mechanism and the inward flow of funding. Those research-active faculty members are the key players in attracting funding for research-engaged institutions as those institutions may perform their facilitating roles properly.

9.4. Reflection through higher-dimension challenges and mixed-methods perspectives

What the above discussions have offered so far were the conclusions that individual dimension (i.e. individual research ability and research mindsets are most explanatory of research outputs production of Cambodian faculty members in their currently research-unfriendly environment. Further explanations on moderation effects of individual traits, disciplines, and institutional types were discussed. Still, literature in this particular area, as reviewed, tended to point to the effects from higher dimensions, such as institutional environment or external supports, which were not statistically

significant in the quantitative composite model analyses of this study. Thus, it is worth discussing the current study's conclusions through the lenses of higher dimensions and the perspectives from mixed-methods analyses.

Higher dimension discussions: The above findings that signified the effects of research ability and research mindset tended to draw attention on perhaps an overlooked perspective towards why some faculty members in Cambodia can produce research outputs while they are based in the research environment that is not very supportive. There are a number of reasons why this study cannot detect statistical effects of the higher dimensions on research output production. First, the study focused more on the research-productive faculty members. The ZINB model used for the analysis focused on the counted outputs as well as the zero-outputs. That being said, the current study inclined to look at the issues more from the slight research-active portion, while most previous studies looked at the issues from the large research-inactive pie of the overall population of Cambodian faculty members. Second, the study's findings emphasized individual factor influences since it focused on output production, while most previous local literature tended to put focuses on discussing the structural, cultural, and/or political dimensions as they focused on overall research culture and capacity. Research performance concept and research culture and capacity concept are related but not the same. So, the findings of this study and most of the previous ones are not necessarily contradictory; it is just about using different lenses to look at the issue.

In actuality, extending the perspective from the small group of Cambodian researchers to the big pie of research-unengaged faculty members, the current study also reached the conclusion of multi-dimensional challenges revolving around the structural, institutional, and cultural frames:

- **the muted academic cultures:** this can be reflected into the important literature of Burton R. Clark (1980) on the four academic cultures: the culture of profession, the culture of discipline, the culture of enterprise, and the culture of system.
- **the inefficacy of research institutionalization** (the lack of established and systemic research centers, centers of excellence, or academic journal outlets at universities). This can be reflected into the systems of research and research training as guided by Guy Neave (2002): the French national research center system, the Russian academy system, and the UK- and US-models research university.
- **the well-acknowledged inadequacy of research resources** (from financial to academic resources). This can be reflected into most literature on research and research performance of developing countries (counting Meek & Suwanwela, 2006; Salazar-Clemeña, & Almonte-Acosta (2007); Sanyal & Varghese, 2007; Savage, 2011, etc.)

These major themes and its specific elements were widely discussed by previous local and regional studies in certain ways. Most previous perspectives such as that of Altbach's core and peripheries on the academia, UNESCO's discussions on developing countries' knowledge and science productivity, and previous academic works in African and South-East Asian contexts are obviously consistent with previous local literature and this current study's finding on the less supportive macro-context of research environment in developing countries. In general, developing countries still have very limited and dependent research production mechanisms, and the multi-facetted challenges facing research are prevalent: counting, for instance, the limited research-active faculty members, dependence on donors' funds, poorly-structured academic professions, lacking resources and incentives, and unsupportive existing institutional systems (see, for example, Meek & Suwanwela, 2006; Sanyal & Varghese, 2007; Kwok et al., 2010; Savage, 2011; Sombatsompop, et al., 2011; Nguyen & Meek, 2016).

It is critical to understand that, underlying all these problems, Cambodian higher education still faces problems related to culture of modern academic and scientific system in general and perhaps problems related to deep understanding of their pass intellectual knowledge system due to wars and economic reasons. Arimoto (2015)[40] cautioned the failed shift from academics to academic profession and, from an international comparative perspective, called for attention on the institutionalization of the Research-Teaching-Study nexus as the real academic profession in the future universities (p. 19). If this is the case for international and Japanese universities, Cambodian universities have to even much more awakened about these issues of institutionalization of its universities in a way that ensures systematic, well-organized, relevant, and catching-up, and, after all, professionally academic tendencies. Kwok et al. (2010) pointed out that Cambodian research capacity is negatively influenced by the lack or low state of academic profession in the system of higher education. Any contexts that lack right academic system and traditions as well as groups of skillful and mastery human capital are unlikely to create a productive and sustainable research culture and infrastructure. Institutional theories make it clear that one major reason of failed state is failed institution. In developing countries, without question, this may apply to even to existing research institutions therein – i.e. some research institutions that are nominal but not truly functional, if not artificial.

Still, given the focus of the study and the support from both data sets, the idea of individual factor influences in Cambodian context can be understandable, especially for a study whose research questions seek more to look at the small group of research-active faculty members and focus on research outputs counting, not on general culture and capacity. As guided by its major findings that so underscore the individual influences on research output production, the current study reflects the vitality of individual human capital and the middle-out approaches to respond to the current problems of research output production in Cambodian higher education sector.

[40] In Research Institute for Higher Education Seminar Report 2015

Mixed-methods perspectives: While there are some contrasting points between qualitative and quantitative data, the joint-display mixed-methods analysis tended to show more consistency and convergence of quantitative and qualitative data in the conclusions about influences of research ability and mindset (see Table 9.1. below). For research mindset, the results are plausible when taking bivariate quantitative analyses into perspective. The table indicated that the individual research competence and research mindset as important indicators explaining or correlating with research outputs, while notifying that the three (social, institutional and departmental, and individual dimensions) are more of factors that shape the research culture at higher dimensions and somehow influence ability and mindset and research production at the lower dimension of the studied context.

Inconsistency in various points, such as motivation between research and teaching and influence of institutional supports on research outputs are generally related to conceptual difference in measuring the construct of quantitative and qualitative data. This is actually typical phenomena in the convergent mixed-methods analyses. While there were contradictory patterns between quantitative and qualitative data findings, this matrix offered a complete picture of key findings and gaps that may invite further study to re-investigate. It should be noted that due to time limitation, the analyses of this joint display matrix (as presented in Table 9.1.) was not conducted with depth and criticality. In this study, it just tried to offer a comparison of results between the quantitative and the qualitative data in order to offer more additional information to the above discussion. In a sense, Table 9.1. below was meant to show a summary of key findings for each research question.

In should be noted as well that the conclusion of this study explains the current setting but not necessarily a fixed state of truth that stays static and unchanged across time. In the future, if Cambodian higher education enlarges its scope and increases its strategic activities, the other dimensions of social, institutional, and departmental aspects will play more important or direct roles in positively shaping the quantity and quality of Cambodian faculty's research production. However, in the current practical situation, as a reflection from the individual factors, the researcher strongly calls for attentions to the improvement of individual researchers' competence and mindsets.

Table 9.1. Joint display matrix of qualitative and quantitative analyses[41]

Research question	Qualitative main themes	Qualitative statistics	Quantitative key variables	Quantitative statistics	Quantitative-Qualitative consistency
Research question 1: How productive are Cambodian faculty members?	Limited research engagement and performance but increased research awareness	40 (80%)	Research production trend vs research emotional orientation trend	Research output production ranged from as low as 2.69% of international book chapters published to 22.85% of local conference presentation. In average, producing 3.24 outputs during their services and less than 1output per year. Majority of participants had zero publications; but they rated high on their emotional research orientation (an average of 3.98 on a scale from 0 to 5).	Consistent
	Dependent and niched research activities	28 (56%)	Research outputs by universities and disciplines	59.55 % of outputs produced by only three universities. 65.18% social science related research outputs.	Consistent
	Less relevant research quality and impacts	38 (76%)	Research outputs by places of publication	56.36% of reported local research outputs. Most reported research outputs were local conference presentation (22.85%).	Consistent
Research question 2: How oriented are Cambodian faculty members towards research?	Big gaps in research competence and knowledge	36 (72%)	Research competence and Research experience trends	Low mean score of 1.9 for research experience and 2.3 for research production competence; research software competence was lower (1.72). 85.51 % answered never, rarely, and sometimes on "having experience writing research paper for publication"	Consistent
	Inconsistency between emotional valuing and behavioral understanding	25 (50%)	Research emotional orientation trend vs research behavioral orientation	Mean score of research emotional orientation (i.e. value, interest, love of research) was 3.98, but mean score of research behavioral orientation (i.e. network, teaching hours, commitment) was only 2.87)	Consistent
	Conflicting dilemma between teaching and research motivation	37 (74%)	Research motivation	Research motivation was rated high in both importance and expectation, and moderate to high in terms of intrinsic (3.86) and extrinsic motivation	Inconsistent

[41] Joint-display-matrix is an emerging approach for mixed-methods data analyses. This study's joint-display-matrix was not an in-depth analysis. It was more of a side-by-side display of the qualitative and quantitative data for comparison.

				(3.15)	
Research question 3: How supportive is Cambodian research environment	Undisciplined academic profession	36 (72%)	Availability of research capable member trends and departmental leadership	Rating on belief that one institution has research-capable members and leaders was moderate to high – 3.31 of mean score; and rating on research departmental leadership was also high (Mean = 3.17)	Inconsistent
	Uncultivated research-oriented organizational culture and system	30 (60%)	General institutional supports	Neutral rating of general institutional support (Mean = 2.73); however, more than 50 percent of participants rated low on salary and financial incentives	Inconsistent
	Uncertain resources-creating and resources-sustaining environment	31 (62%)	Research resources and facilities trends	Neutral rating on institutional research resources and facilities (Mean = 2.56); yet more than 50% of participants rated low on satisfaction of research funding (both from external and internal sources) and funding from ministry	Inconsistent
Research question 4: What factors positively influence research production?	Research ability	47 (94%)	Research competence and research experience	Statistically significantly explaining expected change in research outputs (by a factor of 1.47 for research experience and a factor of 1.55 for research production competence) in composite models and remained statistically significant in most interacted and moderated models.	Consistent
	Strong practical research mindset	42 (84%)	Research emotional orientation and research behavioral orientation (proxy)	Mean score difference on research emotional orientation between faculty without research outputs (3.84) vs faculty with at least one output (4.16); Mean score difference on research behavioral orientation between faculty without research outputs (2.67) and faculty with at least one research output (3.15).	Consistent
	Research team	24 (48%)	Availability of research capable member trends and departmental leadership	Mean scores on rating on availability between research capable members between faculty without output (3.26) and faculty with at least one output (3.35) are not much different. The same apply to departmental leadership (3.12 vs 3.21)	Inconsistent
	Enabling institution	32 (64%)	General institutional	Mean scores on rating on general institutional research support between faculty without output	Inconsistent

			supports	(2.74) and faculty with at least one output (2.71) are not much different.	
Research question 4: What factors negatively influence research production?	Individual fixed mindset on research and return on research	32 (64%)	Research emotional orientation and research behavioral orientation (proxy)	Mean score difference on research emotional orientation between faculty without research outputs (3.84) vs faculty with at least one output (4.16); Mean score difference on research behavioral orientation between faculty without research outputs (2.67) and faculty with at least one research output (3.15).	Consistent
	Unsupportive institutional visions and systems	31 (62%)	General institutional supports, availability of research capable faculty members, resources and facilities, and departmental leadership	Mean scores on rating on general institutional research support between faculty without output (2.74) and faculty with at least one output (2.71) are not much different. Mean scores on rating on availability between research capable members between faculty without output (3.26) and faculty with at least one output (3.35) are also not much different. The same apply to the rating of departmental leadership (3.12 vs 3.21) and rating on institutional research resources and facilities (2.55 vs 2.56).	Inconsistent
	Unaccommodating social and educational visions and systems	37 (74%)	Support from ministry and support from external sources	Mean score on rating on support from ministry is 2.56 for faculty without any research outputs vs mean score of 2.46 of faculty with at least one research output. Mean score on rating of support from external sources is 2.48 for faculty without any research output vs 2.53 for faculty with at least one research output.	Inconsistent

9.5. Implications and suggestions

This current study expounded how individual factors matter significantly in cultivating academic and research movements in the developing countries' context, like that of Cambodia. There are two conceptual implications from the study's findings: first, individual research ability and mindset have to be cultivated to increase Cambodian academia's research output production; and, second, capable human resources have to be retained and motivated to lead and transform the research function of Cambodian higher education institutions. The study also noted some actions-oriented implications.

In order to provide some guiding perspectives into the implication of this study, it is perhaps worthwhile to delve a little bit into previous scholars' conception of research promotion frameworks (see Table 9.2.). To do that, the study looked from the practical framework of UNESCO's scholars and the framework by Bland and Ruffin, as shown in the table below. These elements come from both academic and practical perspectives. The questions are how these elements can be practically translated into Cambodian context.

Table 9.2. Some previous studies' conceptual and practical perspectives on how to promote research at higher education institutions

Bienenstock (2008) in the educated volume of Vessuri and Teichler (2008) suggested that a high quality research university should embrace the following characteristics:	**Zakari (2008) in the same edited volume of Vessuri and Teichler (2008)** considered the following factors to have effects on research and development:	**Bland and Ruffin (1992)** believed that 12 indicators (and further developed into 15 factors) are influential factors that shape the research productive environment of higher education institutions:	**Sanyal and Varghese (2007)** shared perspectives on research development in developing countries:
Faculty: High quality faculty committed to research and teaching; Graduate students: High quality graduate students (and desirably undergraduate students) who want to learn to perform research or function with advanced expertise; Environment: An intellectual climate that encourages scholarship; Facilities: Facilities in which research and teaching can be performed effectively; Findings: Funding for operations and instruction; Funding: Research funding; Environment: Research infrastructure; and Leadership: High quality leadership	Government policy and funding to support capacity building; Stable, autonomous, and flexible institutional environment; Merit-based evaluation; Effective international networking; Local leadership – especially passionate championing by resident or expatriate individuals; and International supports	Recruitment and selection; Clear coordinating goals; Research emphasis; Culture, Positive group climate; Mentoring; Communication with professional network; Resources; Scientific work time; Size/experience/expertise; Communication; Rewards; Brokered opportunities; Decentralized organization; and Assertive participative governance	Amount of money invested in research; Staff training and availability; The capacity of the system to retain capable people in R&D activities; and Expanded higher education system

Actually, certain things have already been implemented or proposed by Cambodian governments, policy makers, higher education management, and faculty members to promote research culture in Cambodia, as shown in Table 9.3. above. This is not necessarily a complete list of support activities, but it should provide a snapshot of existing endeavors. What has been done has to be appreciated therefore. Still, further have to be done.

Table 9.3. What have been done to promote research culture and capacity in Cambodia in brief perspective[42]

At the state level	At the institutional level	Non-academic sectors
• Policy and strategies on research development • Policy and strategies on graduate education • Capacity building training (through HEQCIP) • Capacity building through overseas higher education (through HEQCIP) • Research grants (through HEQCIP)	• Established research institutions • Donors-driven collaboration and consultancy research works • Engaging in HEQCIP-funded projects • Internal funding packages and policies and strategies • Publishing outlets (journal or magazines) • More research-enhanced graduate programs • Organized conferences and meetings • Engaging students in research activities • Sending and receiving Cambodian graduates to/from overseas • *Existing academies*	• *Existing research works in some state institutions* • More active research activities in civil society and non-governmental sectors • Buddhist institute • Research on Cambodia conducted by international agencies • Research on Cambodia conducted by foreign graduates • Multi-stakeholder-coordinated research forums • Private research institutions

The current study's implications: There are two conceptual implications from these findings: first, individual research ability and mindset have to be cultivated to increase Cambodian academia's research output production; and, second, research-capable human resources have to be retained and motivated to lead and transform the research function of Cambodian higher education institutions. Two action-oriented strategies can be considered from this study's conceptual implications.

- First, it is the need to develop *differentiated research-based and researchers-led graduate education*. These graduate programs will produce the next generation of research-competent and research-minded academics to fulfill the big hierarchical gaps between the majority of

[42] Sources: MoEYS reports, institutional websites, national congress documents, and institutional documents collected during the interview

teaching-oriented faculty members and the very limited number of research-productive academics.

Aebisher (2015) puts it: *What makes a university world class? A world-class university has a critical mass of talent (both faculty and students), self-governance and administrative autonomy; academic freedom for faculty and research, which includes the right to critical thought; the empowering of young researchers to head their own laboratories; and sufficient resources to provide a comprehensive environment for learning and cutting-edge research*. The "empowering of young researchers" part is clearly a move that is worth considered by Cambodian policy makers. Altbach (2016) and Kwok et al. (2010) raised a similar idea of "creating the next generation" of researchers. Sending faculty members to pursue education abroad is something appreciable in the current transition period of Cambodian research development, but this is not going to promote the national academic power in the long run. The number of Ph.D. holders are still less than 1,000 people and the ones specializing in science are still very rare. Not all of those Ph.D. holders perform research. Also, people holding advanced degree in theoretical physics or neuro-science are scarce. So, without creating more numbers of doctorates and specialists and diversifying the more practical science and engineering areas, contribution from research and innovation to development will not be very effective. The local institutions providing quality graduate programs should be the best gateway to meet the needed quantity and quality in the long run.

- Second, it is the need to reform or establish *systemic research institutions* (such as research centers or centers of excellence or publication outlets) at least at certain Cambodian already research-inclined universities. These institutions have to be truly research-functional, managerially professional, disciplinarily specialized, with strong academic collegiality, and with independent and sustainable resources-creating and resources-managing mechanisms. The graduate education programs and the systemic research centers should be run by diversifying sources of research support from both academic and non-academic sectors and led by professionally research-capable academics.

  Institutionalization does not encompass only physical elements; it requires the cultural elements to be cultivated as well. Research leadership and management are critical parts that influence the whole institutional culture. Research management involves "optimizing of human resources" or "optimizing of investment in human capital" (Neave, 2002). Academic profession, professional academic leadership, professional academic administration, and academic mindsets (which are related to the "unbundling mindset phenomenon" as raised by Gehrke and Kezar (2015)) are necessary aspects of the current Cambodian higher education

system. More academic leaders need to be properly trained to specialize in their academic leadership fields. Erasmus scholarship programs called MARIHE (Master's of Research and Innovation in Higher Education) provide such courses as new public management, management in LLL, and human resources management as well as courses on the theories and practices of research and innovation management to its participants. Academic leaders in Cambodia should experience such kinds of programs. Proper training on leadership to professional academic leaders can contribute in many ways to the current Cambodian context. In practical senses, University 12 used to have highly-regarded research leaders; that institution, therefore, has engaged in research quite actively. University 4 has its strong research support unit that links external sources and their internal staff – the unit that is facilitated by a research-competent doctorate.

Table 9.4. Syntheses of other suggested and possible strategies for research promotion of Cambodian higher education institutions

Possible strategic directions		Possible contributors	Possible contribution
Key suggestions	• Enhancing research ability and research mindsets through building differentiated research-based, researchers-led graduate programs by encouraging leading and active researchers at flagship universities • Increasing research outputs through building systemic research centers or centers of excellences and publication outlets at universities	University management, department leaders, research-active faculty members, and research-inclined graduate students	Building research skills, knowledge, attitudes, mindsets, and traditions
Other possible relevant suggestions	• Engaging leading and active researchers in mentoring and collegiality: advanced research skills and knowledge (i.e. general research skills and specific research skills and research technology by areas of expertise) through training and practical experience at HEIs • Exploiting research skills from existing research institutions for academic resources, human capital (say, as supervisor) and research practicum • Creating more research-based educational programs and curriculum: Embedding research subjects into all levels of education, especially undergraduate education • Encourage and rewarding research-based teaching and learning • Exposing students and faculty to research resources: exploiting research outputs and technology transfer from open access modes for international resources (i.e. products, systems, publications, etc.)	Department leaders, research-active faculty members, and research-inclined graduate students	Building research skills, knowledge, attitudes, mindsets, and traditions

Handling these capable individuals properly may contribute to solving current higher-dimension problems of Cambodian research culture and capacity. After all, unlike suggested perspectives on mentorship and professional learning, graduate education and research-professionalized and systematized institutions are more of a collaborative effort than an individual endeavor alone. These support systems have to be run with the clear vision of academic cultures and based on scientific and systemic approaches. Table 9.4. below tried to explicate what have been discussed in more concrete terms and some other possibilities.

9.6. Limitations and further studies

Academic honesty is the most valuable part of academic knowledge creation. From critical perspectives, this study is limited in a number of ways, from methodologies to the time limitation, and from its analyses to generalizability. Unintentional errors may also exist in this whole piece of writing. Further investigations on this topic as well as other related topics are needed to further and more deeply understand research output production in a developing country like Cambodia.

9.6.1. The debatable issues of research outputs measurement and conceptions

In previous studies, research production has been increasingly measured by using bibliometric indicators (such as citation counts and impact factors) in scientific databases – the measures that illustrate both quantity and quality of the research outputs. This is a limitation of this study since it is not feasible for this current study to measure citation or quality of some reported local research products that are published in international academic journals not indexed in those scientific databases like Scopus or ISI Web of Knowledge. In actual practices, even international measurements of research work in the academic profession survey – i.e. the CAP surveys – did not measure citations as well. Other academic researchers still prefer to employ local research production indicators in order to validly and reliably understand the studied context (see, Bazeley, 2010; Shin & Cummings, 2010). Many previous authors raised concerns about the too much dependency on using measurement benchmark of research outputs conceptualized by the developed context, as it may not reflect the local conditions. Altbach (2013), for example, claimed: *besides the negative image of academic work in developing countries and those overall conclusions (from knowing that their professors are poorly supported and their academic programs are constrained), little is known about academics working in higher education institutions in developing countries* (p.1). Actually, there are currently noticeable academic attempts to promote the so-called "indigenous knowledge" in the academy of developing countries and to decolonize the knowledge imposed by the Western world in certain countries as India and Africa (as reflected throughout the whole edited volume of Kapoor and Shiza, 2010; Thaman,

2006). UNESCO has also put lots of efforts to rethink indigenous knowledge and developing countries' research and development and innovation, not just in higher education sector, but in all key sectors.

Also, previous studies generally measured research production within a specific period of time (generally 2 years or 3 years); the current study measures the research outputs during the whole working period of the respondents. Measuring this way can ensure that the researcher can have enough data (i.e. reported research outputs) to analyze the main research question of factors influencing research outputs. Measuring the outputs only 2 or 3 years will yield too little outputs to be analyzed. Still, the study obtained the data of their working periods and so could further analyze the research trends per annum (as presented in the discussion). The study also used this statistical trend (research outputs during their whole service divided by the number of working years) of research outputs to observe its patterns of relationship with the predictor variables.

Unlike large-scale and higher-level research production studies – as the ones focusing on the international scope, this study does not use econometric kinds of measurement – such as actual amount of funding, actual amount of research facilities, or actual number of academic resources. The study adopted the psychometric scales from previous literature, which is more applicable in the study context. Generally, measurement using clear econometric scales is not feasible for two reasons, either there no such data available or those data are hard to obtain or not allowed for researchers to obtain. In practice, previous researchers used a lot of psychometric measures, because for certain variables, the econometric proxy does not really yield proper measures.

After all, these problems of measurements of research outputs by including local outputs and by measuring the whole period of working, and the measurement of other research-related indicators by psychometric scale alone can be criticized. These aspects imply that further studies should reach the conceptual levels of research productivity, not just merely the quantitative research outputs. Using more standardized measures from bibliometric perspectives and more exact measurable scales are strongly recommended to offer an even more objective perspective on the study of this sort.

9.6.2. The possible biases in data collection and data analyses

For data collection, while the data is rich from both the textual and numerical aspects, the researcher has to acknowledge that there are possible biases in the data collection. The data distribution in 3 universities had to be done through the facilitator from the universities, which could be those sources of biases. The researcher instructed the respondents to seal the envelope before returning the questionnaire and actual returned questions were mostly sealed, however. Also, certain response that are un-engaged have been removed from the analyses.

For data analyses, the model specifications included only variables that are significantly related to the research outputs on the separate bivariate analysis. This uses of criterion validity tests to specify models are likely to be the only methods to exclude irrelevant and suppressors variables from the analyses of prediction effects. However, such analyses have somewhat been less practiced by researchers. But given the context of the current study's data, the researcher needed a proper method to select model that is free of undesirable effects – such as the multi-collinearity or the suppression effects. Also, the analysis of the joint-display matrix was still not deeply critical due to the time constraint, making the focused triangulations and comparisons not sharp. There were also possible subjective responses to the questionnaire since some respondents worked as both faculty and leading members and so were unlikely to rate low of the institutions they led.

Finally, in qualitative analyses, the quantifying parts are done at the third level. The most rigorous approach is to do it at the second level. But time constraint makes the researchers unable to offer specific code to level 2, and rather used level-3 themes to code each participants whose answers are related to the themes. This practice can be criticized by critical qualitative researchers such as those using grounded theories. Also, the researcher cannot use "member check" to compare the coding because this is a dissertation for individual researcher.

9.6.3. The generalizability of the study

The study cannot be generalized to the larger population because it included only medium and top ranking universities in the country. Still, it is likely to be generalizable to the sampling frame of the 15 universities. At the outset, the study did not use purely random sampling methods due to the feasibility of the context of study and the intention to include research-productive faculty members for the analysis of factors affecting research outputs, which is the main focus of this study. Though qualitative and quantitative data supported many of the study's arguments, it is still hard to draw on these data sets to generalize to the larger population. Also, the discussion of this study has done little to give insights from previous works whose findings may contradict the current study's arguments on ability and mindsets. Further studies that clarify or extend this current one are strongly needed.

9.6.4. Further studies

The limitations of this study include its measurement, data collection, and sampling and generalizability, responses to these specific methodological aspects are encouraged. Still, aside from these suggestions in response to the limitation, the study does not handle some critical themes and topics of Cambodian academic and research environment, which haven't received much attentions so far. Hence, further studies should critically look into these vital topics critically. Four topics emerged

as intriguing themes during the data collection and data analyses, which should be further investigated. First, it was the debates between emotionally valuing research and experientially understanding the values of research. Interesting points for research attitudinal orientation finding from qualitative data was whether faculty who rated high in their values on research truly contain practical understanding of the real benefits from research. Second, the teaching-research nexuses experienced by Cambodian research-engaged faculty members were raised by a considerable number of interviewees. This topic has been one of the most studied in these areas of research; it is therefore worthwhile for its in-depth investigation in Cambodia since the results may lead to new insights on why research should be promoted. Third, the roles of graduate education in Cambodia to train researchers have to be well observed and reported; not much have been done so far. Finally, it is valuable to study the overall innovation and knowledge systems of Cambodia, especially the country indigenous knowledge system and its intellectual culture, in critical perspectives. Lacking such understanding of a country that once used to be a great civilization means losing an important piece of valuable history that may benefit the contemporary human society.

CHAPTER 10: CONCLUSIONS

The current study, in a broad sense, is conducted in response to the limitation of comprehensive and objective investigations on research output production of Cambodian faculty members. It is conducted at the time when academic and policy attention on knowledge, science, innovation, and research performance (from both the developed and the developing worlds) have gained strong momentum and have been considered indispensable for sustainable national and universal development. While procedurally answering four specific research questions, the current study's main purpose is to objectively comprehend what the trends of research output production of Cambodian faculty members are and what factors explain those research outputs. The study comes up with two simple conclusions: that the number of researchers and the produced research outputs of the current Cambodian higher education sector are still very limited and dependent and that research ability and research mindset of individual faculty members are significantly correlated with their research outputs. Though these main findings emphasize influences of individual factors on research outputs, the study also acknowledges the detected macro-level challenges which are still experienced by faculty members and the Cambodian higher education sector in general. However, these macro-level factors can be understood more as something that shapes the overall research culture and capacity, not necessarily as direct determinants of individual's research outputs. As an implication, this study highlights the criticality and necessity of research skill sets and research mindset of individual faculty members in promoting research performance of Cambodian academic sector and strongly accentuates the roles of Cambodian existing research-competent and research-minded faculty members in their contributions to creating future research-capable and research-oriented individuals for the nation's academic and other non-academic innovation sectors.

Comparing the current Cambodian research environment of higher education sector to that of its past, one positive tendency becomes obvious: that is, the increased awareness of research function of Cambodian university and the more explicit support and attention towards rethinking research function at universities, aside from the full focuses on teaching and learning. Though such momentum in this country has still been slow, more faculty members and university management have started to discuss and think about how their institutions can promote research activities. Some have taken various piecemeal actions – for example, creating journal outlets, sketching research motivation plans, sending more faculty members abroad for higher degree, or even attempting to develop specialized research centers. Still, these kinds of fragmented actions have not yet been well translated into noteworthy increments of research outputs or originally created knowledge. The observed research output trends remain low in this study, as reflected by the fact that 77.85 to 97.13 percent of the samples reported 'not producing' any of the 13 types of the measured research outputs and that only about 8 percent of the samples having published journal articles with international publishers. Likewise, Cambodian

academics tend to produce more local outputs or engage in local research activities than they do with international research outputs and activities. Conference presentation activities are reported more than published research works. Research outputs are niched and dependent on certain groups of faculty members – such as those from city-based universities, those from public universities, and those of social science and related fields. These niched and dependent trends of research outputs, if seriously considered, should evoke some big questions about how research and knowledge should function in and for Cambodian academic and national development at large.

As researchers and thinkers have tried to investigate why Cambodian research outputs are still limited, the majority of them take a perspective from the large portion of the research-unengaged group and so generally point to such problems of overall research environment as structural, cultural, or political factors. The current study detected a similar conclusion on these macro-level research environment challenges as its qualitative data depicted the three problems of 1) academic cultures (i.e. the culture of profession, the culture of disciplines, the culture of systems, and the culture of enterprise)[43], 2) research institutionalization (i.e. the lack of well-established and functional research centers or centers of excellence at universities), and 3) problems of research resources (such as with financial, academic, time, and infrastructural resources) to be major concerns. However, the study perceived the macro-level problems more as shaping or molding mechanisms of the research culture and capacity, rather than the direct determinants of individual research outputs. In other words, these macro-level challenges are more likely to impact the overall research culture and capacity than to directly influence research output production of individual faculty members. Such claim is possible because the reported research outputs in this study were not result of the government's or university's planned system but more of the "going-with-the-flow" movements of external donors funding – the movements that lack strong academic and research traditions underlying them.

If the macro-level factors do not directly explain research outputs produced by the small group of Cambodian faculty members, the right question to ask is "what lead to the production of those research outputs of Cambodian faculty members while they are working in an environment not very research-supportive?"

This study argued that these scarce research-engaged Cambodian faculty members can produce their research outputs due mainly to their strong individual research experience and research production competence – what the study refers together to as "research ability" – and their strong research mindset. In simple terms, the stronger their research ability and more practically oriented their mindset is towards research, the more research-engaged and research-productive Cambodian faculty members

[43] As a reflection into Burton R. Clark's four academic cultures (1980).

are. Again, these observed relationships exist in the higher education context where multiple challenges come from all layers and experienced by most faculty members in overall.

Taken as a whole, faculty members who produce research outputs tend to have strong confidence in research production skills (such as skills for writing and publishing articles) and research background knowledge in their areas of expertise. These researchers, in common, speak research languages in their academic areas, virtually know where to obtain funding, understand how to start and proceed with their research works, and know how they can manage and solve problems they face during the research process. Looking more deeply into the competence aspects, research works require multiple skills and crafts – for instance, publishing skills, technological skills, project managerial skills, methodological data-handling skills, and theoretical knowledge in certain areas, just to count a few. Cambodian research-productive faculty members generally gain such research competence through their active engagement in research publications or conferences during their doctoral study abroad or through actual research experience during their working period at universities or other research-oriented institutions. Such competence and experience are deterministic in their self-confidence and their disciplined mindset towards research, and so they generally tend to be more committed in research activities than they are in teaching. They also tend to show high commitment towards reaching the advanced level of knowledge in their specialized skills, understanding practically that such goal is possible only through research engagement and productions. In this study, most of these faculty members who reported higher research outputs, higher research competence scores, higher research experience scores, and higher research attitudinal orientation scores are older faculty members, doctoral degree holders, and graduates from a foreign university. The research ability and mindset gaps between Cambodian research-productive faculty members and their research-unproductive counterparts are not trivial. Qualitative and quantitative data alike support such patterns.

These findings imply "survival of the fittest" philosophy. Practically speaking, when it comes to obtaining donors-driven research projects, research competence and research experience as well as networking are essential criteria. Because research resources in Cambodia are very limited (as proven by the fact that most funding are from external donors through research collaborations and/or consultancy projects), only those faculty members who are distinctively capable may survive in the Cambodian research world. Theoretically speaking, a considerable number of previous empirical studies also highlight the importance of "research self-efficacy" and "background knowledge" as they argue that higher research self-efficacy is significantly correlated with higher research productivity of faculty members and graduate students. Right research training environment, in the literature, is also found to be practical conditions for promoting researchers' skills, knowledge, experience, and so outputs. Likewise, the more engagement and more production, researchers generally gain more "cumulative advantages" and "reinforcement" to engage and produce more.

Because Cambodian research-active and research-productive faculty members in general tend to possess these competence- and mindset-related quality and other relevant traits that distinguish them from research inactive ones, these small group of faculty members have been the ones who actually make research output production work to a certain degree in this country's higher education arena. It is, therefore, clear that fostering individual research ability and research mindset is the most necessary tasks to accomplish in the current Cambodian higher education sector, as it is likely to pose effects not only on research output production of individuals but perhaps also on the macro-level environment whereby academic cultures, research institution building, and research capitals are still not in good shape. This current study's findings, in a sense, heighten the concerns over the roles of these research-competent and research-minded faculty members in contributing to the promotion of mechanisms that create future researchers and research systems in Cambodian academic sector.

For more actions-oriented implications, establishing (differentiated research-based and researchers-led) graduate programs and developing (professionally-managed, academically-functioned, and resources-sustained) research centers or centers of excellence at Cambodian universities are compulsory. Graduate programs, in many contexts, are supposed to produce researchers, so they are important gateways to promote research culture and increase research outputs in Cambodia. Strong research-based graduate programs will fulfill the current immense gaps between the small group of research-active faculty members and the large group of teaching faculty members. It is necessary that these graduate programs to be developed are differentiated from the current programs: that being said, their curriculum have to be based on research, their institutions have to be led by researchers, their facilities have to be well equipped with research-supportive resources, and their visions and missions have to gear towards producing high-quality scientists, scholars, and researchers. Besides graduate programs, it is important that Cambodian universities have to institutionalize research centers or centers of excellence under their umbrella. These attempts have previously been tried out in Cambodia but, in many cases, ended up with just superficial institutions. Current so-called "research units" of some local universities are clear example. To make them more effective, these research centers have to naturally adopt the academic cultures, have strong senses of collegiality, be professionally led, and have mechanisms to create and sustain resources.

Along with well-established graduate schools that train researchers and research centers that produce research outputs, a right and systemic mechanism that ensures selection of only research-eager graduate students to be trained and faculty members who aim high in research to be recruited in these institutions have to be put in places. These suggested developments are key for strong researchers and research institutions, which are promising approaches to create enough research-competent and research-minded human resources for the future of research, innovation, and knowledge creation through Cambodian higher education and academic sector.

This study is not flawless; certain limitations include possibly the data collection biases, the measurements of some psychological constructs, and the issues of sampling and generalizability. The researcher has to also acknowledge that study does not offer enough critical reversed discussions on why certain elements were not detected statistically significant or explanatory of research output production in the studied context. To capture a more truthful and complete picture, it is necessary for further studies to seek better approaches to obtain more reliable and more diversified data sets – for example, a clear and consistent statistical dataset from the government (in terms of actual research funding or in terms of numbers of all research-related institutions in the country) or a more quality dataset from academic databases (in terms of bibliometric measures of research products and citations of Cambodian academics). Four topics emerged as intriguing themes during the data collection and data analyses. They should also be further investigated: first, the debate between emotionally valuing research and experientially understanding the values of research; second, the issues of teaching-research nexuses experienced by Cambodian research-engaged faculty members; third, the roles of graduate education in Cambodia in training researchers; and, fourth, the overall innovation and knowledge systems of Cambodia, especially, the nation's indigenous intellectual culture.

Of final note, research and knowledge are more of intellectual and brain activities. Whilst it is true that, in many cases, research cannot be conducted without funding, infrastructure, proper administrative support (as claimed and concerned by many previous studies), this current study, as it reflected into the Cambodian context, argued that research ability and research mindset are more critically important assets and should be built and hardened within individual academics in the first place to actually promote research production and culture in the country in the long run. In a similar way, these two latent elements at the individual level are perhaps most imperative in the capability to generate physical and external support and resources. Physical support is needed; yet the works of the mind cannot be disregarded. Creswell (1985) asserted that financial conditions are not the only factor when it comes to building a strong research environment. One Cambodian proliferate researcher similarly proclaimed in the interview: *"The thinking that funding is the matter is a shallow reason… as long as people are intelligent and they can observe and develop questions and hypotheses… funding and facilities come next… research is about human intelligence… though of course we need funding and facilities."* The term "intelligence" perhaps implies not just the true competence but also the right mindset.

Researchers from different disciplines – for instance, those from engineering fields that require expensive infrastructure – may reflect on such thinking differently. They are not wrong. Yet, the need for "intelligence" and "higher thinking" ability for high-quality science and research production is a truism and cannot be overlooked. As long as one acquires strong research skill sets and develop practical research-oriented and academic mindset, an educator, a lawyer, or even a physicist may be

able to figure out pragmatic approaches to produce research outputs from their daily working conditions (though working in a limited research support environment).

It is an argument that many may not satisfy because there have been much top-down-approach thinking that points to the faults of the society and the government for not giving enough support and because current research and academic environment are influenced strongly by capitalism. Yet, those top-down expectations generally do not help much in real practice, especially in developing countries where the functions of the state and institutions are always not in good shape. More pragmatic and middle-out approaches to the problem are needed. In other words, Cambodian academia and researchers turning competitive and outstanding or not depend largely on the academics themselves and how they handle their competence and mindset as well as their institutional systems and resources. Academics have to intelligently choose whether they have to invest in these fundamental pillars for a progressive and long-term development or to always continue surviving with the academic tree that has only barks and not cores. And if the academia does not function or produce quality knowledge and outputs, the word "civilization" or "moral culture," as raised by Wilhelm von. Humbolt[44] and many thinkers on the roles of higher education, may not exist in its right form. Cambodian academia has to contribute strongly and effectively to "cultivating deep thought in itself and others"[45] to ensure its right inputs for the next generation, which simply means that faculty members have to engage systemically and actively in truth-based scientific and scholarly research production as well as knowledge development and innovation.

[44] See Merniva 1970 publication on University Reform in Germany (by Wilhem von. Humbolt)
[45] See Berg & Seeber's "The Slow Professor" (2016)

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Appendix 1: Interview guide with faculty members (in English)

Interview Guide on Research Activities and Perceptions towards Research Environment at Cambodian Higher Education Institutions (For Faculty Members)

Interview instruction: Setting the scene (3 minutes)

1. **Interviewer's self-introduction:**
   My name is Eam Phyrom. I am currently a graduate student at Hiroshima University, doing my doctoral degree in Educational Development.

2. **Interview objectives:**
   Today's interview comprises three objectives: 1). to explore research experience, activities, and orientation of Cambodian faculty members, 2). to investigate research support environment of higher education institutions, 3). to explore overall perceptions on research activities and research environment

3. **Confirming time availability of respondent and the use of voice recorder:**
   Before starting, let me confirm that the interview generally lasts for about one hour. Does that work fine for you? [The researcher adjusts the time according to the convenient time availability of respondents.] Is it okay to use voice recorder?

Starting the Interview:

I. Core content

1.1. Personal and institutional data (2 minutes)

First of all, could you please state and/or describe the following points:

- Name, age, position, and department or faculty
- Highest degree obtained and the institution offering the degree
- Year starting working in the current institution

1.2. Perception on current institutional research environment (20 minutes)

[adapted from Bland & Ruffin (1992)]

Now I would like to turn into the research environment at your current institution:

1. What are the current policy on research activities and research development at your current institution? Please state your institutional missions, vision or philosophy.
2. Do you think your current institution has a strong research culture? Why and why not?
3. What is your opinion on the research ability of your colleagues or subordinates?
4. How varied are there among your faculty members in terms of ages, specialization, and terminal degree of faculty working in your current institution?
5. How do you describe the governance, leadership, and management of your institution with respect to supports given to research implementation?
6. How do you describe the internal communication with respect to research collaboration?
7. Please illustrate on your institutional conditions with respects to:
   - Research funding
   - Technology
   - Research facilities
   - Library and documents
   - Electronic journal subscription
   - Research center or unit
   - Research results dissemination
8. How does your institution build staff's research capacity? How does your institution motivate staff to engage in research?
9. Does recruiting staff consider their research capacity? Please illustrate.
10. Please give your opinion on research collaboration with other institutions.

1.3. Perception on general research environment in Cambodian higher education sector (10 minutes)

Let me now move to your perceptions/opinions about research in general:

1. How would you describe the research in Cambodia today? How about the situation of research supports for higher education sector?
2. What are the main factors that lead to your thinking of research situation that way?
3. (What do you think are the justification for the increased interest and attention on academic research development at Cambodian higher education in the past several years?)
4. What do you think of the future of research culture and capacity of Cambodian higher education institutions?

II. Specific contents for faculty (25 minutes)

Finally, I have a number of other key questions:

1. Have you ever engaged in research activities before? Where?
2. Speaking of your current institution, do you engage in research activities? If yes, please describe your research experience in terms of:
   - Research proposal development
   - Funding sources and amount of funding
   - Number of achieved research projects and on-going research projects
   - Administration and funding management: allocation, evaluation, task assignments, etc.
   - Characteristics of research: topic, types of research, methods used, etc.
   - Data collection and analysis
   - Research results treatment: Publication? Presentation?
3. Please describe your research outputs so far: at your current institution and at other places.
4. What factors lead to your engagement or unengagement in research activities at your current institution?
5. How do you spend and manage your working time?
6. How confident are you in your research capacity? Which components or stages of research you think are difficult and challenging for you?
7. How do you describe your research networks?
8. How do you define RESEARCH?
9. Do you think research is important? How?
10. Do you have intention and orientation to engage in research activities at your current institution in the future? On which area? Why? And how will you start?

Further comments: _____.

Thanks for your cooperation!

Appendix 2: Interview guide with faculty members (in Khmer)

បទសម្ភាស (សាស្ត្រាចារ្យ) ស្តីអំពី ការចូលរួមធ្វើ និងការយល់ឃើញអំពីការស្រាវជ្រាវក្នុងកម្រិតឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា

ការណែនាំពីការសម្ភាស ៖

១. ការណែនាំខ្លួនរបស់អ្នកស្រាវជ្រាវ៖ *ខ្ញុំបាទឈ្មោះ អេវ៉ម ភិរម្យ មុខងារជា និស្សិតផ្នែក អប់រំ នៅសាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា ប្រទេស ជប៉ុន*
២. ការជម្រាបអំពីគោលបំណងនៃការសម្ភាស៖ *ស្វែងយល់អំពី ១). បទពិសោធន៍ សកម្មភាពជាក់ស្តែង និងទំនោរទៅរកការងារស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ ២). ពត៌មានអំពីស្ថានភាពស្រាវជ្រាវ និងការគាំទ្រការស្រាវជ្រាវក្នុងស្ថាប័នការងារ និង ៣). ការយល់ឃើញទាក់ទងនឹងការងារស្រាវជ្រាវជារួម*
៣. ការបញ្ជាក់ពីការប្រើម៉ាស៊ីនថតសំឡេង និងពេលវេលារបស់វាគ្មិន៖

_____ (3 minutes) _____

ការចាប់ផ្តើមការសម្ភាស៖

I. <u>ផ្នែកទូទៅ</u>

<u>ផ្នែកទី ១.១ ៖ *អំពីពត៌មានផ្ទាល់ខ្លួន*</u> (2 minutes)

- *ឈ្មោះ អាយុ និងមុខងារ និងនាយកដ្ឋាន ឬមហាវិទ្យាល័យ*
- *កំរិតវប្បធ៌មខ្ពស់បំផុត និងស្ថាប័នសិក្សាដែលអ្នកទទួលបានកំរិតវប្បធ៌មខ្ពស់បំផុត*
- *ឆ្នាំចាប់ផ្តើមបម្រើការងារក្នុងស្ថាប័នសព្វថ្ងៃ*

<u>ផ្នែកទី ១.២៖ *ការយល់ឃើញអំពីស្ថានភាពស្ថាប័ន ទាក់ទង និងការស្រាវជ្រាវ*</u> (20 minutes)

[adapted from Bland & Ruffin (1992)]

*១. តើស្ថាប័នមាន**គោលជៅ**យ៉ាងណាខ្លះក្នុងការងារស្រាវជ្រាវ? បើដូច្នោះសូមរៀបរាប់ពីបេសកកម្ម ទស្សន:វិស័យ គោលនយោបាយ និងយុទ្ធសាស្ត្រស្រាវជ្រាវរបស់ស្ថាប័ន?*
*២. តើលោក/លោកស្រី គិតថាស្ថាប័នរបស់អ្នកមាន**វប្បធ៌ម**ស្រាវជ្រាវរឹងមាំដែរឬទេ? ហេតុអ្វី?*
*៣. តើលោក/លោកស្រី គិតថាស្ថាប័នរបស់លោក/លោកស្រីមានសាស្ត្រាចារ្យដែលមាន**សមត្ថភាព**ស្រាវជ្រាវកំរិតណា?*
*៤. តើស្ថាប័នរបស់លោក/លោកស្រី មានបុគ្គលិកដែលមាន**លក្ខណៈខុសគ្នា**ខ្លាំងពីសាស្ត្រាចារ្យម្នាក់ទៅម្នាក់ទៀត ដូចជាលើកត្តា អាយុ កំរិតវប្បធ៌ម ជំនាញដែរឬទេ? ចំនួនបុគ្គលិកប៉ុន្មាន?*
*៥. តើស្ថាប័នរបស់លោក/លោកស្រី មាន**អភិបាលកិច្ច និងការគ្រប់គ្រង**បែបណាដែរទាក់ទិននឹងសមត្ថភាព និងការគាំទ្រតម្រែតម្រង់ទិសក្នុងការស្រាវជ្រាវ?*
*៦. តើ**ទំនាក់ទំនងផ្ទៃក្នុង**មានលក្ខណៈបែបណាដែរទាក់ទិននឹងការស្រាវជ្រាវ?*
៧. សូមរៀបរាប់ទាក់ទងនឹងភាពគ្រប់គ្រាន់ និងដំណើរការរបស់៖

- *មូលនីធិថវិកាស្រាវជ្រាវ*
- *សម្ភារៈបរិក្ខាស្រាវជ្រាវ*
- *បច្ចេកវិទ្យា*
- *បណ្ណាល័យ និងឯកសារ*
- *Subscribing ទស្សនាវត្តីអេឡិចត្រូនិច*
- *មណ្ឌលស្រាវជ្រាវ និងគណកម្មការស្រាវជ្រាវ*
- *ការចែកចាយលទ្ធផលពីការស្រាវជ្រាវរបស់បុគ្គលិក*

*៨. តើមាន**ការលើកទឹកចិត្ត** ឬ**ការបំប៉នសមត្ថភាព**លើការស្រាវជ្រាវដែរឬទេ? ដូចម្តេច?*
*៩. តើ**ការជ្រើសរើសបុគ្គលិក**មានគិតពីសមត្ថភាពនៃការស្រាវជ្រាវដែរឬទេ? ដូចម្តេច?*
*១០. សូមរៀបរាប់ពី**ការសហប្រតិបត្តិការ**លើការស្រាវជ្រាវ ក្នុងស្ថាប័នរបស់លោក/លោកស្រី ជាមួយស្ថាប័នដទៃ?*

<u>ផ្នែកទី ១.៣៖ ស្ថានភាពទូទៅទាក់ទិននិងការស្រាវជ្រាវនៅកម្រិតឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា</u> (10 minutes)

១. តើសំរាប់លោក លោកស្រី ការស្រាវជ្រាវ (Academic research or Scientific research) ក្នុងប្រទេសកម្ពុជាសព្វថ្ងៃមានលក្ខណៈបែបផែន និងស្ថានភាពយ៉ាងណាដែរ? ចុះចំពោះការគាំទ្រការងារស្រាវជ្រាវវិញ?

២. តើ លោក លោកស្រី គិតថាអ្វីខ្លះជាកត្តាចំបងដែលអាចបង្អាក់លទ្ធភាពនៃការធ្វើការស្រាវជ្រាវក្នុងប្រទេសកម្ពុជាជាទូទៅ? ក្នុងកំរិតឧត្តមសិក្សា?
៣. (តើ លោក លោកស្រី យល់ថាមានកត្តាអ្វីខ្លះដែលនាំអោយមានការផ្តោតការយកចិត្តទុកដាក់ដល់ ការងារស្រាវជ្រាវក្នុងកម្រិតឧត្តមសិក្សា ក្នុងរយៈពេលប៉ុនស្មានឆ្នាំចុងក្រោយនេះ?)
៤. តើ លោក លោកស្រីយល់ថាទៅថ្ងៃអនាគតស្ថានភាពស្រាវជ្រាវនៅកម្រិតឧត្តមសិក្សា នឹងមានលក្ខណៈបែបណាដែរ? ឬថាតើស្ថាប័នឧត្តមសិកស្សាគួរធ្វើយ៉ាងណា?

II. <u>ផ្នែកដាក់លាក់សម្រាប់សាស្ត្រាចារ្យដែលមានបទពិសោធន៍ស្រាវជ្រាវ (25 minutes)</u>

១. តើលោក/លោកស្រី មានបទពិសោធន៍ធ្វើការងារស្រាវជ្រាវពីមុនដែរ ឬទេ? នៅកន្លែងណាខ្លះ?
២. បើនិយាយពីស្ថាប័នដែលលោក/លោកស្រី កំពុងបម្រើការងារសព្វថ្ងៃ តើអ្នកមានធ្វើសកម្មភាពស្រាវជ្រាវដែរឬទេ? បើមានសូមធ្វើការរៀបរាប់អំពីបទពិសោធន៍នៃការធ្វើការស្រាវជ្រាវដែលអ្នកបានឆ្លងកាត់តាមដំណាក់កាលនីមួយ ៗ៖

- *ដំណើរការសរសេរគំរោង*
- *ប្រភពជំនួយ/មូលន្ធិធិ និងចំនួនមូលន្ធិធិជាមធ្យម*
- *ចំនួនគំរោងស្រាវជ្រាវដែលអ្នកបានសំរេច និងកំពុងដំណើរការ និងរយៈពេលនៃគំរោង*
- *ការគ្រប់គ្រងរដ្ឋបាល និងមូលន្ធិធិនៃការស្រាវជ្រាវ៖ ការបែងចែកថវិការ ការត្រួតពិនិត្យវាយតម្លៃ ការបែងចែកការងារ ។ល។*
- *លក្ខណៈនៃការស្រាវជ្រាវ៖ ប្រធានបទ ប្រភេទនៃការស្រាវជ្រាវ វិធីសាស្ត្រ ។ល។*
- *ការប្រមូលទិន្នន័យ ការវិភាគទិន្នន័យ (អ្នកទទួលខុសត្រូវ ។ល។)*
- *ការប្រើប្រាស់លទ្ធផលនៃការស្រាវជ្រាវ៖ ដូចជា ការបោះផ្សាយលទ្ធផល ឬការធ្វើបទបង្ហាញផ្សេង ៗ ។*

៣. សូមរៀបរាប់អំពី ផលិតផលស្រាវជ្រាវ (Research outputs) នៃការស្រាវជ្រាវរបស់អ្នកជាទូទៅ ។ និងផលិតផលក្នុងរំឡុងពេលបំរើការក្នុងស្ថាប័នសព្វថ្ងៃ ។
៤. តើកត្តាអ្វីដែលជំរុញអោយលោក/លោកស្រី អាចធ្វើការស្រាវជ្រាវបានក្នុងស្ថាប័នសព្វថ្ងៃ?
៥. តើលោក/លោកស្រី គ្រប់គ្រងពេលវេលាធ្វើការងារបែបណាទើបអាចមានពេលសំរាប់ការស្រាវជ្រាវ?
៦. តើលោក/លោកស្រី ជឿជាក់លើខ្លួនឯងប៉ុណ្ណាលើសមត្ថភាពស្រាវជ្រាវក្នុងជំនាញរបស់លោក/លោកស្រី? ចំណុចណានៃការស្រាវជ្រាវដែលអ្នកគិតថាពិបាក? តើលោក/លោកស្រី គិតថាជំនាញនៃការស្រាវជ្រាវនេះអ្នកទទួលបានមកពីប្រភពណា?
៧. តើលោក/លោកស្រី មានបណ្តាញសំរាប់ការងារស្រាវជ្រាវយ៉ាងណាដែរ ទាំងខាងក្នុង និងក្រៅស្ថាប័ន?
៨. តើក្នុងភាសារខ្មែរ ពាក្យថា ការស្រាវជ្រាវ គួរតែមានអត្ថន័យដូចម្តេចចំពោះលោក/លោកស្រី?
៩. តើលោក/លោកស្រី គិតថាការស្រាវជ្រាវសំខាន់ដែរឬទេ?សំខាន់យ៉ាងម៉េចខ្លះ?
១០. តើលោក/លោកស្រី មានចេតនា និងទំនោរចង់បន្តធ្វើការស្រាវជ្រាវក្នុងស្ថាប័នលោក/លោកស្រីទៅអនាគតដែរឬទេ? លើផ្នែកអ្វី? ហេតុអ្វី? ហើយចាប់ផ្តើមដូចម្តេច?

មតិយោបល់បន្ថែម៖ _____ ។/

សូមអរគុណជាអនេកប្បការសំរាប់ការសហការរបស់លោកអ្នក!

Appendix 3: Survey questionnaire (in English)

Questionnaire on Research Support Environment and Research production of Cambodian Faculty Members and Higher Education Institutions

*** Overall Instructions:

- *The term "research" herein refers to the type of research conducted based on scientific and rigorous research methods, with appropriate techniques for proposal development, data collection, data analysis, result verification, and result interpretation. It does not refer to any activities of searching for documents or materials on the internet to prepare for teaching sessions.*
- *Please carefully read the detailed instruction in each of the 4 sections before completing the questionnaire.*
- *Please put the completed questionnaire back into the envelope and seal it well before returning it to the distributor or the researcher in order to ensure the confidentiality of your responses. Thank you!*

I. Individual research attributes

1.1. How often have you experienced the following research-related activities?

☛ ***Response options range from 0 to 5 [0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Usually, 5 = Always]. Please write your preferred option code in the provided space ____ in front of each statement.***

____ i. I have experience working with various research or consultancy projects.
____ ii. I have experience writing project reports or research reports.
____ iii. I have experience writing research papers for publication.
____ iv. I have attended and/or presented my research papers at academic conferences.
____ v. I have thoroughly reviewed published research articles related to my field of expertise.
____ vi. I engaged actively in research during my graduate education (e.g. in research design, data collection, data analysis).

1.2. Please rate your own competence in the following research and research-related skills:

☛ ***Response options range from 0 to 5 [0 = Totally incompetent, 1 = Very poor, 2 = Poor, 3 = Good, 4 = Very good, 5 = Excellent]. Please write your preferred option code in the provided space ____ in front of each statement.***

____ i. Writing research grant proposal to apply for funding
____ ii. Finding and synthesizing relevant literature effectively
____ iii. Designing research study (e.g. designing questionnaire, developing conceptual framework, designing experiment)
____ iv. Collecting research data using proper instruments (e.g. interview, observation, focus group discussion)
____ v. Analyzing quantitative data using statistics (e.g. test of difference, regression, factor analysis)
____ vi. Analyzing qualitative data using qualitative approaches (e.g. thematic analysis, content analysis, grounded theory)
____ vii. Writing scientific research paper for publication
____ viii. Presenting a research paper at academic conference
____ ix. Using quantitative data analysis software (e.g. SPSS, STATA, SAS, Matlab, R)
____ x. Using qualitative data analysis software (e.g. Nvivo, Atlas.ti, MAXQDA)

____ xi. Using referencing software (e.g. Endnote, Mendeley, Zotero)

____ xii. Using advanced computing office skills (e.g. advanced tools in Word, in Excel, in PowerPoint)

____ xiii. Managing project and financial activities (e.g. project planning, financial planning, project evaluation)

____ xiv. Communicating fluently in academic English (both in verbal and written forms)

1.3. Please indicate your views on your attitudes towards the following points:

☛ ***Response options range from 0 to 5 [0 = Totally disagree, 1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree, 5 = Totally agree]. Please write your preferred option code in the provided space ____ in front of each statement.***

____ i. I clearly understand the values and benefits of research.

____ ii. I teach fewer courses and/or fewer hours.

____ iii. I can persevere hard and meticulous research works and challenges.

____ iv. I am highly committed to becoming a successful researcher.

____ v. I have a strong research network, both within and outside of the institution and both locally and internationally.

____ vi. I am very much interested in doing research.

____ vii. I love sharing knowledge and experience.

____ viii. I love writing and always try to understand how to become a good writer.

____ ix. I love thinking about new ideas and ideas that bring improvement.

1.4. Please indicate your opinions on your motivation to do research regarding the following:

☛ ***Please answer two questions (1.4.1. and 1.4.2.) in column B and C in the table below by indicating how much you agree or disagree with the types of motivation (in column A). Response options range from 0 to 5 [0 = Totally disagree, 1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree, 5 = Totally agree]. Please write your preferred option code in the provided space ____ in each column under each question.***

A		B	C
Types of motivation		**1.4.1. How important are the following types of motivation to you if you are to engage in research activities?**	**1.4.2. How much do you expect you can get the following types of motivation if you are to engage in research activities at your current institution?**
i.	Getting better and appropriate salary raises	_____	_____
ii.	Getting an administrative assignment or promotion	_____	_____
iii.	Getting commissions or other financial rewards	_____	_____
iv.	Getting new research knowledge, skills and experience	_____	_____
v.	Enhancing networks and future collaboration	_____	_____
vi.	Getting a good job related to research in the future	_____	_____
vii.	Advancing professional expertise in the field	_____	_____
viii.	Having newer, clearer, and deeper knowledge and know-hows for teaching students	_____	_____
ix.	Achieving recognition and appreciation from students, peers, and university's leading members	_____	_____
x.	Contributing new knowledge to the field as well as helping the society	_____	_____
xi.	Others	_____	_____

II. Individual research production

2.1. Research production

☛ ***Please place the tick mark (✓) in the answer box ☐ in each column for any research product you have produced. And please also state the exact number of each product in the space "How many: _____".***

*** ***<u>If you have never engaged in research or produced any of the following research products, please skip this section and move to the next section (2.2).</u>***

	Research Product	During your services at your current institution	During your services at other places besides your current institution
i.	Published books with international publishers	☐ How many: __	☐ How many: ___
ii.	Published research articles with international publishers	☐ How many: __	☐ How many: ___
iii.	Published book chapters with international publishers	☐ How many: __	☐ How many: ___
iv.	Published international conference proceedings	☐ How many: __	☐ How many: ___
v.	Presented paper at international conference	☐ How many: __	☐ How many: ___
vi.	Obtained international research grants	☐ How many: __	☐ How many: ___
vii.	Published books with local publishers	☐ How many: __	☐ How many: ___
viii.	Published research articles in local journals	☐ How many: __	☐ How many: ___
ix.	Published book chapters with local publishers	☐ How many: __	☐ How many: ___
x.	Published local conference proceedings	☐ How many: __	☐ How many: ___
xi.	Presented paper at local conference	☐ How many: __	☐ How many: ___
xii.	Obtained local research grants	☐ How many: __	☐ How many: ___
xiii.	Wrote research grant proposals or answered call for proposals	☐ How many: __	☐ How many: ___
xiv.	Wrote research reports for donors/funders/consultancy projects	☐ How many: __	☐ How many: ___
xv.	Supervised Master's or Ph.D. students	☐ How many students: ___	☐ How many students: ___
xvi.	Others: _____	☐ How many: __	☐ How many: ___

2.2. What is your intention to conduct research at your current institution in the future?

☛ ***Please indicate how much you have intended to produce research outputs at your current institution in the next 3 years. Response options range from 0 to 5 [0 = Totally disagree, 1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree, 5 = Totally agree]. Please write your preferred option code in the provided space ____ in each column under each question.***

____ i. I really want to conduct research at my current faculty in the next 3 years.

____ ii. I have a clear plan to conduct research at my current faculty in the next 3 years.

____ iii. I expect that I can conduct research at my current faculty in the next 3 years.

III. Institutional research environment

☛ ***Please indicate how much you agree or disagree with the following statements with regards to your institutional conditions. Response options range from 0 to 5 [0 = Totally disagree, 1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree, 5 = Totally agree]. Please write your preferred option code in the provided space ____ in front of each statement.***

3.1. My current university…

____ i. … has established clear research policy and research strategic/action plan.
____ ii. … does not only have research policy but also implement research activities efficiently.
____ iii. … comprises professors and academics with high research competence and skills.
____ iv. … comprises professors and academics with high research experience who can mentor other staff.
____ v. … has research-capable and experienced leading members that are open for research activities.
____ vi. … provides adequate and necessary supports when staff want to engage in research activities.
____ vii. … offers me sufficient time to spend on research activities.
____ viii. … offers great motivation in terms of financial rewards if staff conduct research.
____ ix. … offers great motivation in terms of non-financial rewards if staff conduct research.
____ x.… has good and active research collaboration with other institutions (e.g. foreign universities, NGOs)
____ xi. … comprises or plan to create a position for researcher.
____ xii. … comprises a satisfactory salary scale conforming to the working conditions.

3.2. With regards to external supports, my university…

____ i. … receives clear research policy and strategic guidelines from the ministry in charge.
____ ii. … receives local research capacity training from the ministry in charge.
____ iii. … receives overseas fellowship, scholarship, or training from the ministry in charge.
____ iv. … receives research funding from the ministry in charge.
____ v. … obtains research funding from external donors or collaborating institutions.
____ vi. … receives supported research facilities from external donors or collaborating institutions.
____ vii. … receives research training from external donors or collaborating institutions.

3.3. Concerning the leadership at my current department…

____ i. my department leaders are highly regarded researchers in their field with strong research skills and competence.
____ ii. my department leaders truly understand the values of and benefits from research.
____ iii. my department leaders are very supportive of my efforts in research.
____ iv. my department leaders offer constructive comments and feedbacks which help me perform my best.
____ v. my department head fulfills his/her leadership role very well, with clear guidance and visions.
____ vi. my department leaders seriously consider my opinions when they have to make important decisions.

3.4. Please rate your university in terms of the quality of the following items

☛ ***Response options range from 0 to 5 [0 = Non-existent, 1 = Very poor, 2 = Poor, 3 = Good, 4 = Very good, 5 = Excellent]. Please write your preferred option code in the provided space ____ in front of each statement.***

____ i. Research funding from the institution itself
____ ii. Research funding from other sources
____ iii. Library and documents (e.g. academic databases, books, journals, archives)
____ iv. Technology (e.g. computer, internet, instructional technology)
____ v. Research support staff
____ vi. Research unit in the institution itself
____ vii. Research facilities and equipment (e.g. labs, experimentation tools)

IV. Questions about yourself

☛ ***Please place the mark (✓) in the answer box ☐ which you think most appropriate for you. If you choose to answer "Other," please help fill in further details in the space _____ provided.***

i. Gender: ☐ Male ☐ Female
ii. Age: _____ years old (e.g. 29 years old)
iii. Highest degree: ☐ Ph.D. ☐ Master's ☐ Bachelor ☐ Other: _____
iv. Year you obtained your highest degree: _____ (e.g. 2010)
v. Country where you obtained your highest degree: ☐ Cambodia ☐ Foreign country: _____ (e.g. Japan)
vi. Academic discipline: _____ (e.g. Economics)
vii. Year you started working at your current university: _____ (e.g. 2012)
viii. What is your current department? _____ (e.g. Department of Environment)
ix. What is your current position? _____ (e.g. Teaching faculty)
x. Employment type: ☐ Full-time ☐ Part-time ☐ Other: _____
xi. How many hours do you teach a day? _____ (e.g. 12 hours/day)
How many days do you teach a week? _____ (e.g. 6 days/week)

<u>This is the end of the questionnaire!</u>

<u>Thanks profusely for your time and inputs!</u>

If you have any further comments or other additional items to each question (which I do not raise in this questionnaire), please write it down here:

_____

_____

**** Please place the completed questionnaire back into the envelope and seal it well before returning it to the distributor or the researcher in order to ensure the confidentiality of your responses!*

Appendix 4: Survey questionnaire (in Khmer)

កម្រងសំណួរស្ទង់មតិ លើប្រធានបទ ការគាំទ្រ និងផលិតផលស្នាដៃនៃការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ និងស្ថាប័ន ឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា

*** <u>សេចក្តីណែនាំទូទៅក្នុងការបំពេញកម្រងសំណួរនេះ៖</u>

ពាក្យថា "ការស្រាវជ្រាវ" ក្នុងកម្រងសំណួរនេះសំដៅដល់ការស្រាវជ្រាវ ដែលផ្អែកលើវិធីសាស្ត្រច្បាស់លាស់ និងមានការរៀបចំគម្រោង ប្រមូលទិន្នន័យ វិភាគ ផ្សៃរងផ្ទាត់ និងបកស្រាយបង្ហាញត្រឹមត្រូវតាមគោលការណ៍ស្រាវជ្រាវ ។ មិនសំដៅដល់ការស្វែងរកឯកសារដើម្បីរៀបចំមេរៀន បង្រៀនឡើយ។

- *កម្រងសំណួរនេះចែកចេញជា ៤ ផ្នែកធំៗ ។ សូមមេត្តាពិនិត្យមើលការណែនាំលម្អិតក្នុងផ្នែកនីមួយៗ មុនពេលបំពេញ។*
- *នៅពេលបញ្ចប់ការបំពេញ សូមមេត្តាដាក់កម្រងសំណួរដែលបំពេញហើយទៅក្នុងស្រោមសំបុត្រដែលលោកអ្នកទទួលបានជាមួយនឹងកម្រងសំណួរនេះ និងបិទមុខសំបុត្រឱ្យជាប់ មុននឹងប្រគល់ត្រឡប់មកអ្នកប្រមូលវិញក្នុងន័យរក្សាការសំងាត់។ សូមអរគុណ។*

១. លក្ខណៈទូទៅទាក់ទាងនឹងការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ

១.១. តើលោកអ្នកមានបទពិសោធន៍កម្រិតណាទាក់ទងនឹងចំណុចដូចខាងក្រោម?

ៈ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [០ = មិនដែលសោះ ១ = កម្រ ២ = ម្តងម្កាល ៣ = ជារឿយរឿយ ៤ = ញឹកញាប់ ៥ = ជាប្រចាំ]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

____ i. *ធ្លាប់បានធ្វើការជាមួយគម្រោងស្រាវជ្រាវ ឬគម្រោងប្រឹក្សាផ្សេងៗ។*
____ ii. *សរសេរបាយការណ៍គម្រោង ឬរបាយការណ៍ស្រាវជ្រាវ។*
____ iii. *សរសេរអត្ថបទស្រាវជ្រាវ (Research paper) សម្រាប់បោះពុម្ព។*
____ iv. *ចូលរួម ឬធ្វើបទបង្ហាញអំពីការស្រាវជ្រាវរបស់អ្នកនៅក្នុងសន្និសីទស្រាវជ្រាវ (Conference)។*
____ v. *អានអត្ថបទស្រាវជ្រាវ (Research paper) ដែលត្រូវបានបោះពុម្ពទាក់ទងនឹងជំនាញរបស់អ្នក។*
____ vi. *ចូលរួមស្រាវជ្រាវយ៉ាងសកម្មនៅពេលអ្នកសិក្សាថ្នាក់ក្រោយឧត្តមសិក្សា (ឧ. ចូលរួមក្នុងការរចនាការស្រាវជ្រាវ ក្នុងការប្រមូលទិន្នន័យ ក្នុងការវិភាគទិន្នន័យ ។ល។)*

១.២. សូមដាក់ពិន្ទុទៅលើសមត្ថភាពទាក់ទងនឹងជំនាញនៃការស្រាវជ្រាវរបស់លោកអ្នកដូចខាងក្រោម៖

ៈ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [០ = មិនចេះទាល់តែសោះ ១ = ខ្សោយមែនទែន ២ = ខ្សោយ ៣ = ចេះល្មមគួរសម ៤ = ចេះច្រើន ៥ = ចេះយ៉ាងច្បាស់លាស់]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

____ i. *សរសេរគម្រោងស្រាវជ្រាវ (Research grant proposal) ស្នើរសុំមូលនិធិស្រាវជ្រាវ។*
____ ii. *ស្វែងរកឯកសារពាក់ព័ន្ធនឹងការស្រាវជ្រាវ និងចេះសំយោគខ្លឹមសារនៃឯកសារទាំងនោះ (Literature review) ។*
____ iii. *រចនាការសិក្សាស្រាវជ្រាវ (ឧ. រៀបរៀងកម្រងសំណួរ, កំណត់ក្របខ័ណ្ឌគោលគំនិត, រៀបចំការពិសោធន៍)។*
____ iv. *ប្រមូលទិន្នន័យស្រាវជ្រាវដោយប្រើឧបករណ៍ត្រឹមត្រូវ (ឧ. ការសង្កេត, ការសង្កេត (Observation), ពិភាក្សាក្រុម គោល (Focused group discussion))។*
____ v. *វិភាគទិន្នន័យបែបបរិមាណដោយប្រើស្ថិតិ (ឧ. Test of difference, regression, factor analysis)។*
____ vi. *វិភាគទិន្នន័យបែបគុណភាពដោយប្រើវិធីសាស្ត្រត្រឹមត្រូវ (ឧ. Thematic analysis, content analysis, grounded theory)។*
____ vii. *សរសេរអត្ថបទស្រាវជ្រាវ (Research paper) សម្រាប់បោះពុម្ព។*
____ viii. *ធ្វើបទបង្ហាញពីការស្រាវជ្រាវរបស់ខ្លួននៅក្នុងសន្និសីទស្រាវជ្រាវ (Academic conference)។*
____ ix. *ប្រើប្រាស់ software ណាមួយសម្រាប់វិភាគទិន្នន័យបែបបរិមាណ (ឧ. SPSS, STATA, SAS, Matlab, R)។*
____ x. *ប្រើប្រាស់ software ណាមួយសម្រាប់វិភាគទិន្នន័យបែបគុណភាព (ឧ. Nvivo, Atlas.ti, MAXQDA)។*
____ xi. *ប្រើប្រាស់ software ណាមួយសម្រាប់កំណត់ឯកសារយោង (ឧ. Endnote, Mendeley, Zotero)។*
____ xii. *ប្រើប្រាស់ជំនាញកុំព្យូទ័រសម្រាប់ការិយាល័យកម្រិតខ្ពស់ (Advanced computing office skills in Word or Excel)។*
____ xiii. *ចេះគ្រប់គ្រងគម្រោង និងគ្រប់គ្រងផ្នែកហិរញ្ញវត្ថុ (ឧ. បង្កើតផែនការគម្រោង, ធ្វើគម្រោងថវិការ, វាយតម្លៃគម្រោង) ។*
____ xiv. *និយាយ និងសរសេរភាសារអង់គ្លេសបែបអាកាដឹមិច (academic)។*

១.៣. តើលោកអ្នកយល់ឃើញយ៉ាងណាចំពោះឥរិយាបថរបស់លោកអ្នកទៅលើចំណុចដូចខាងក្រោម?

☛ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [0 = មិនយល់ស្របទាល់តែសោះ ១ = មិនយល់ស្របភាគច្រើន ២ = យល់ស្របតិចតួច ៣ = យល់ស្របគួរសម ៤ = យល់ស្របភាគច្រើន ៥ = យល់ស្របពេញទំហឹង]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

_____ i. *ខ្ញុំយល់យ៉ាងច្បាស់លាស់ថា ការស្រាវជ្រាវមានតម្លៃយ៉ាងណា និងផ្តល់ផលប្រយោជន៍យ៉ាងណាខ្លះ។*
_____ ii. *ខ្ញុំបង្ឿនតិចមុខវិជ្ជា និងតិចម៉ោងដើម្បីមានពេលគ្រប់គ្រាន់សម្រាប់ការស្រាវជ្រាវ។*
_____ iii. *ខ្ញុំអាចទ្រាំទ្របាននឹងការងារដ៏ស្មុគ្រស្មាញ និងការងារតូចៗ ល្អិតល្អន់ យ៉ាងច្រើន ក្នុងការងារស្រាវជ្រាវ។*
_____ iv. *ខ្ញុំមានការប្តេជ្ញាខ្ពស់ថានឹងក្លាយទៅជាអ្នកស្រាវជ្រាវដ៏ជោគជ័យមួយរូប។*
_____ v. *ខ្ញុំមានបណ្តាញធ្វើការងារស្រាវជ្រាវច្រើន (ទាំងក្នុង និងក្រៅស្ថាប័ន និងទាំងក្នុង និងក្រៅប្រទេស) ។*
_____ vi. *ខ្ញុំចាប់អារម្មណ៍យ៉ាងខ្លាំងលើការស្រាវជ្រាវ។*
_____ vii. *ខ្ញុំចូលចិត្តចែករំលែកចំណេះដឹង និងបទពិសោធន៍។*
_____ viii. *ខ្ញុំស្រលាញ់ការសរសេរ និងព្យាយាមស្វែងយល់ពីរបៀបនៃការសរសេរឱ្យបានល្អ។*
_____ ix. *ខ្ញុំចូលចិត្តគិតពីអ្វីដែលថ្មី ដែលប្លែក ដែលអាចនាំទៅរកភាពប្រសើរជាងមុន។*

១.៤. តើលោកអ្នកយល់ឃើញយ៉ាងណាចំពោះការលើកទឹកចិត្តដែលអ្នកត្រូវការដើម្បីអាចធ្វើការស្រាវជ្រាវបាន?

☛ សូមឆ្លើយសំណួរ ១.៤.១. និង ១.៤.២. ក្នុងតារាង B និង C ខាងក្រោមដោយបញ្ជាក់ពីការយល់ឃើញរបស់អ្នកទៅលើចំណុចនីមួយៗ ក្នុងតារាង A (បែបផែននៃការលើកទឹកចិត្ត) ។ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [0 = មិនយល់ស្របទាល់តែសោះ ១ = មិនយល់ស្របភាគច្រើន ២ = យល់ស្របតិចតួច ៣ = យល់ស្របគួរសម ៤ = យល់ស្របភាគច្រើន ៥ = យល់ស្របពេញទំហឹង]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាក្នុងចន្លោះ____ដែលបានទុកជូនសម្រាប់ចំណុចនីមួយៗ នៃសំណួរនីមួយៗ។

A	B	C
បែបផែននៃការលើកទឹកចិត្ត	**<u>១.៤.១.</u> តើអ្នកយល់ស្របប៉ុណ្ណាថាការលើកទឹកចិត្តខាងក្រោមពិតជាសំខាន់សម្រាប់អ្នក ដើម្បីឱ្យអ្នកអាចធ្វើការស្រាវជ្រាវបាន?**	**<u>១.៤.២.</u> តើអ្នករំពឹងទុកប៉ុណ្ណាថាលោកអ្នកអាចនឹងទទួលបានការលើកទឹកចិត្តដូចខាងក្រោមប្រសិនបើអ្នកចូលរួមធ្វើការស្រាវជ្រាវក្នុងស្ថាប័នរបស់អ្នកសព្វថ្ងៃ?**
i. *អាចទទួលបានការតម្លើងប្រាក់ប្រៃវត្សសមរម្យ*	_____	_____
ii. *អាចទទួលការចាត់តាំងឱ្យបំពេញមុខតំណែង ឬការងារសំខាន់ៗ*	_____	_____
iii. *អាចទទួលបានថវិការ ឬប្រាក់កម្រៃខាងក្រៅបន្ថែម*	_____	_____
iv. *អាចទទួលបានចំណេះដឹងនិងបទពិសោធន៍បន្ថែមលើការស្រាវជ្រាវ*	_____	_____
v. *អាចពង្រឹងបណ្តាញការងារសម្រាប់ការសហការនាពេលក្រោយ*	_____	_____
vi. *អាចទទួលបានការងារល្អទាក់ទងនឹងការងារស្រាវជ្រាវទៅថ្ងៃក្រោយ*	_____	_____
vii. *អាចពង្រឹងនៅចំណេះដឹងជំនាញរបស់ខ្លួន*	_____	_____
viii. *អាចទទួលបានចំណេះដឹងថ្មី និងច្បាស់លាស់ដើម្បីបង្ឿនសិស្ស*	_____	_____
ix. *អាចទទួលបានការលើកសរសើរ (ពីសិស្ស ពីគ្រូដូចគ្នា ឬពីថ្នាក់ដឹកនាំ)*	_____	_____
x. *អាចបន្ថែមចំណេះដឹងថ្មីទៅលើផ្នែកស្រាវជ្រាវរបស់ខ្លួន និងដើម្បីជួយសង្គម*	_____	_____

២. ផលិតផល ឬស្នាដៃនៃការស្រាវជ្រាវ *(Research production)*

២.១. ផលិតផល ឬស្នាដៃនៃការស្រាវជ្រាវរបស់លោកអ្នក

☛ សូមគូសសញ្ញា ✓ ក្នុងប្រអប់ចម្លើយ □ ចំពោះស្នាដៃស្រាវជ្រាវណាដែលលោកអ្នកបានបង្កើត។ បន្ទាប់មកសូមមេត្តាជួយបញ្ចាក់បន្ថែមក្នុងចន្លោះ "ចំនួន៖ _____" អំពីបរិមាណនៃស្នាដៃនីមួយៗដែលលោកអ្នកបានបង្កើតនោះ។ ***ប្រសិនបើលោកអ្នកមិនធ្លាប់ធ្វើការស្រាវជ្រាវ ឬបង្កើតស្នាដៃស្រាវជ្រាវដូចខាងក្រោមទេ សូមរំលងទៅចំណុចបន្ទាប់ (២.២.)។

ផលិតផល ឬស្នាដៃពីការស្រាវជ្រាវផ្សេង ៗដែលអ្នកបានបង្កើត៖	***ក្នុងអំឡុងពេលបម្រើការងារក្នុងសាកលវិទ្យាល័យដែលអ្នកបង្រៀនសព្វថ្ងៃ***	***ក្នុងអំឡុងពេលបម្រើការងារ ឬសិក្សាក្នុងស្ថាប័នផ្សេង ក្រៅពីសាកលវិទ្យាល័យបង្រៀនសព្វថ្ងៃ***
i. ជោះផ្សាយសៀវភៅក្នុងរោងពុម្ពអន្តរជាតិ (published books with international publishers)	□ ចំនួន៖_____	□ ចំនួន៖_____
ii. ជោះផ្សាយអត្ថបទស្រាវជ្រាវក្នុងទស្សនាវដ្តីអន្តរជាតិ (published research articles in international journals)	□ ចំនួន៖_____	□ ចំនួន៖_____
iii. ជោះផ្សាយជំពូកសៀវភៅក្នុងរោងពុម្ពអន្តរជាតិ (published book chapters with international publishers)	□ ចំនួន៖_____	□ ចំនួន៖_____
iv. ជោះផ្សាយអត្ថបទសន្និសីទលក្ខណៈអន្តរជាតិ (published international conference proceedings)	□ ចំនួន៖_____	□ ចំនួន៖_____
v. ធ្វើបទបង្ហាញក្នុងសន្និសីទស្រាវជ្រាវលក្ខណៈអន្តរជាតិ	□ ចំនួន៖_____	□ ចំនួន៖_____
vi. ទទួលបានមូលនិធិស្រាវជ្រាវពីស្ថាប័នអន្តរជាតិ (obtained international research grants)	□ ចំនួន៖_____	□ ចំនួន៖_____
vii. ជោះផ្សាយសៀវភៅក្នុងស្រុក (published books with local publishers)	□ ចំនួន៖_____	□ ចំនួន៖_____
viii. ជោះផ្សាយអត្ថបទស្រាវជ្រាវក្នុងស្រុក (published research articles in local journals)	□ ចំនួន៖_____	□ ចំនួន៖_____
ix. ជោះផ្សាយជំពូកសៀវភៅក្នុងស្រុក (published book chapters with local publishers)	□ ចំនួន៖_____	□ ចំនួន៖_____
x. ជោះផ្សាយអត្ថបទសន្និសីទក្នុងស្រុក (published local conference proceedings)	□ ចំនួន៖_____	□ ចំនួន៖_____
xi. ធ្វើបទបង្ហាញក្នុងសន្និសីទស្រាវជ្រាវក្នុងស្រុក	□ ចំនួន៖_____	□ ចំនួន៖_____
xii. ទទួលបានមូលនិធិស្រាវជ្រាវពីស្ថាប័នក្នុងស្រុក (received local research grants)	□ ចំនួន៖_____	□ ចំនួន៖_____
xiii. សរសេរសំណើរស្រាវជ្រាវទៅស្ថាប័នណាមួយ ឬឆ្លើយតបទៅនឹងការផ្សព្វផ្សាយពីមូលនិធិ (wrote proposals or answered call for proposals)	□ ចំនួន៖_____	□ ចំនួន៖_____
xiv. សរសេររបាយការណ៍សម្រាប់ម្ចាស់ជំនួយ ឬគម្រោងប្រឹក្សា (wrote research reports for donors/funders/consultancy projects)	□ ចំនួន៖_____	□ ចំនួន៖_____
xv. ធ្វើជាសាស្ត្រាចារ្យណែនាំនិស្សិតថ្នាក់បណ្ឌិត ឬ អនុបណ្ឌិត	□ ចំនួនសិស្ស៖____	□ ចំនួនសិស្ស៖____
xvi. ផ្សេង៖ _____	□ ចំនួន៖_____	□ ចំនួន៖_____

២.២. តើលោកអ្នកមានចេតនាយ៉ាងណាក្នុងការធ្វើការស្រាវជ្រាវទៅថ្ងៃអនាគត?

☛ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [0 = មិនយល់ស្របទាល់តែសោះ ១ = មិនយល់ស្របភាគច្រើន ២ = យល់ស្របតិចតួច ៣ = យល់ស្របគួរសម ៤ = យល់ស្របភាគច្រើន ៥ = យល់ស្របពេញទំហឹង]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

____ i. អ្នកពិតជាចង់ធ្វើការស្រាវជ្រាវនៅក្នុងសាកលវិទ្យាល័យរបស់អ្នក ក្នុងរយៈពេល ៣ឆ្នាំខាងមុខនេះ។

____ ii. អ្នកមានគម្រោងច្បាស់លាស់ថានឹងធ្វើការស្រាវជ្រាវ ក្នុងសាកលវិទ្យាល័យរបស់អ្នក ក្នុងរយៈពេល ៣ឆ្នាំខាងមុខនេះ។

____ iii. អ្នករំពឹងទុកថានឹងអាចដំណើរការស្រាវជ្រាវនោះបាន ក្នុងសាកលវិទ្យាល័យរបស់អ្នក ក្នុងរយៈពេល ៣ឆ្នាំខាងមុខនេះ។

៣. ស្ថានភាពរបស់សាកលវិទ្យាល័យ និងនាយកដ្ឋានទាក់ទងនឹងការងារស្រាវជ្រាវ

☞ សូមធ្វើការដាក់ពិន្ទុទៅលើស្ថានភាពរបស់សាកលវិទ្យាល័យ និងនាយកដ្ឋានលោកអ្នកទាក់ទងនឹងការងារស្រាវជ្រាវ។ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [0 = មិនយល់ស្របទាល់តែសោះ ១ = មិនយល់ស្របភាគច្រើន ២ = យល់ស្របតិចតួច ៣ = យល់ស្របគួរសម ៤ = យល់ស្របភាគច្រើន ៥ = យល់ស្របពេញទំហឹង]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

******បញ្ជាក់៖ សាកលវិទ្យាល័យ = University នាយកដ្ឋាន = Department (ជាផ្នែកនៃសាកលវិទ្យាល័យ)***

***៣.១. សាកលវិទ្យាល័យ**របស់ខ្ញុំសព្វថ្ងៃ...*

____ i. ... *បានបង្កើតនូវគោលនយោបាយស្រាវជ្រាវ និងគម្រោងយុទ្ធសាស្ត្រសម្រាប់ការស្រាវជ្រាវយ៉ាងច្បាស់លាស់។*
____ ii. ... *មិនត្រឹមតែមានគោលនយោបាយស្រាវជ្រាវប៉ុណ្ណោះទេ ថែមទាំងបានអនុវត្តការស្រាវជ្រាវយ៉ាងមានប្រសិទ្ធិភាព។*
____ iii. ... *មានសាស្ត្រាចារ្យ និងបុគ្គលិកដែលមានចំណេះដឹង សមត្ថភាព និងជំនាញខ្ពស់លើការស្រាវជ្រាវ។*
____ iv. ... *មានសាស្ត្រាចារ្យ និងបុគ្គលិកដែលមានបទពិសោធន៍ខ្ពស់លើការស្រាវជ្រាវដែលអាចជួយណែនាំបុគ្គលិកដទៃ។*
____ v. ... *មានថ្នាក់ដឹកនាំ ដែលមានសមត្ថភាព និងបទពិសោធន៍ខ្ពស់ និងបើកទូលាយលើការស្រាវជ្រាវ។*
____ vi. ... *ផ្តល់ជូននូវការគាំទ្រចាំបាច់ និងគ្រប់គ្រាន់នៅពែលសាស្ត្រាចារ្យចង់ចូលរួមធ្វើការស្រាវជ្រាវ។*
____ vii. ... *ផ្តល់ជូនសាស្ត្រាចារ្យនៅពេលវេលាគ្រប់គ្រាន់សម្រាប់ធ្វើការស្រាវជ្រាវ។*
____ viii. ... *ផ្តល់ជូននូវការលើកទឹកចិត្តខ្ពស់ជាលក្ខណៈហិរញ្ញវត្ថុ ប្រសិនបើសាស្ត្រាចារ្យធ្វើការស្រាវជ្រាវ។*
____ ix. ... *ផ្តល់ជូននូវការលើកទឹកចិត្តខ្ពស់ជាលក្ខណៈមិនមែនហិរញ្ញវត្ថុ ប្រសិនបើសាស្ត្រាចារ្យធ្វើការស្រាវជ្រាវ។*
____ x. ... *មានការសហការល្អ និងយ៉ាងសកម្មក្នុងការស្រាវជ្រាវជាមួយស្ថាប័នដទៃ (ដូចជាសាកលវិទ្យាល័យក្រៅស្រុក អង្គការ...)*
____ xi. ... *បានបង្កើតឱ្យមាន ឬគ្រោងនឹងបង្កើតឱ្យមានមុខតំណែង ជាអ្នកស្រាវជ្រាវ។*
____ xii. ... *មានកម្រិតប្រាក់ប្រៃវត្សសមស្របទៅនឹងលក្ខខ័ណ្ឌការងារ។*

***៣.២.** ទាក់ទងទៅនឹងការគាំទ្រពីខាងក្រៅលើការស្រាវជ្រាវ **សាកលវិទ្យាល័យ**របស់ខ្ញុំសព្វថ្ងៃ...*

____ i. ... *ទទួលបានការណែនាំផ្នែកគោលនយោបាយស្រាវជ្រាវច្បាស់លាស់ពីក្រសួង ឬស្ថាប័នដែលទទួលបន្ទុក។*
____ ii. ... *ទទួលបានការផ្តល់ការបណ្តុះបណ្តាលផ្នែកស្រាវជ្រាវពីក្រសួង ឬស្ថាប័នដែលទទួលបន្ទុក។*
____ iii. ... *ទទួលបានការផ្តល់ជាអាហារូបករណ៍ទៅបរទេស ឬការបណ្តុះបណ្តាលនៅបរទេសពីក្រសួងទទួលបន្ទុក។*
____ iv. ... *ទទួលបានការផ្តល់កញ្ចប់មូលនិធិស្រាវជ្រាវពីក្រសួងដែលទទួលបន្ទុក។*
____ v. ... *ទទួលបានកញ្ចប់មូលនិធិស្រាវជ្រាវ ឬគម្រោងប្រឹក្សាដែលផ្តល់ដោយម្ចាស់ជំនួយផ្សេងៗ។*
____ vi. ... *ទទួលបានការគាំទ្រជាសម្ភារៈបរិក្ខាស្រាវជ្រាវពីម្ចាស់ជំនួយផ្សេងៗ។*
____ vii. ... *ទទួលបានការបណ្តុះបណ្តាលផ្នែកស្រាវជ្រាវពីស្ថាប័នម្ចាស់ជំនួយ ឬពីស្ថាប័នសហការការស្រាវជ្រាវ។*

***៣.៣.** ទាក់ទងនឹងការដឹកនាំរបស់**នាយកដ្ឋាន (Department)** ដែលខ្ញុំកំពុងបម្រើនសព្វថ្ងៃ...*

____ i. *ថ្នាក់ដឹកនាំនាយកដ្ឋានរបស់ខ្ញុំមានជំនាញ និងសមត្ថភាពស្រាវជ្រាវខ្ពស់ ដែលត្រូវបានគេទទួលស្គាល់។*
____ ii. *ថ្នាក់ដឹកនាំនាយកដ្ឋានរបស់ខ្ញុំយល់ច្បាស់ពីតម្លៃ និងផលប្រយោជន៍ជាក់ស្តែងពីការស្រាវជ្រាវ។*
____ iii. *ថ្នាក់ដឹកនាំនាយកដ្ឋានរបស់ខ្ញុំផ្តល់ការគាំទ្រខ្ពស់ដល់កិច្ចខិតខំប្រឹងប្រែងក្នុងការស្រាវជ្រាវរបស់ខ្ញុំ។*
____ iv. *ខ្ញុំទទួលបានការណែនាំ និងអនុសាសន៍ពីថ្នាក់ដឹកនាំនាយកដ្ឋានរបស់ខ្ញុំដែលនាំឱ្យខ្ញុំធ្វើការរស់ពីសមត្ថភាព។*
____ v. *ថ្នាក់ដឹកនាំនាយកដ្ឋានរបស់ខ្ញុំមានការដឹកនាំតម្រែតម្រង់ទិសបានយ៉ាងល្អ និងទស្សនវិស័យច្បាស់លាស់។*
____ vi. *មតិយោបល់របស់ខ្ញុំ និងសាស្ត្រាចារ្យដទៃត្រូវបានយកទៅពិចារណាយ៉ាងម៉ត់ចត់ដោយថ្នាក់ដឹកនាំនាយកដ្ឋានពេលធ្វើការសម្រេចចិត្តសំខាន់អ្វីមួយ។*

*៣.៤. សូមធ្វើការដាក់ពិន្ទុទៅលើកម្រិតគុណភាពនៃចំណុចនីមួយៗខាងក្រោមរបស់**នាយកដ្ឋាន**ដែលអ្នកកំពុងបង្រៀន៖*

☛ ជម្រើសនៃចម្លើយមានលេខកូដ ពី ០ ទៅ ៥ [០ = មិនមានតែម្តង ១ = មិនល្អទាល់តែសោះ ២ = មិនល្អ ៣ = ល្អគួរសម ៤ = ល្អច្រើន ៥ = ល្អប្រសើរបំផុត]។ សូមជ្រើសរើសលេខកូដនៃជម្រើសចម្លើយណាមួយ ហើយបំពេញវាទៅក្នុងចន្លោះ ____ដែលបានទុកជូននៅខាងមុខចំណុចនីមួយៗ។

____ i. *មូលនិធិសំរាប់ស្រាវជ្រាវ ពីសាកលវិទ្យាល័យផ្ទាល់*
____ ii. *មូលនិធិសំរាប់ស្រាវជ្រាវ ឬានពីស្ថាប័នផ្សេង*
____ iii. *បណ្ណាល័យ និងឯកសារ (ឧ. សៀវភៅ, អត្ថបទស្រាវជ្រាវ)*
____ iv. *បច្ចេកវិទ្យា (ឧ. កុំព្យូទ័រ, អ៊ីនធឺណែត)*
____ v. *បុគ្គលិកជួយគាំទ្រក្នុងការងារស្រាវជ្រាវ*
____ vi. *អង្គភាពស្រាវជ្រាវ របស់សាកលវិទ្យាល័យ*
____ vii. *សម្ភារៈបរិក្ខា និងឧបករណ៍ស្រាវជ្រាវ (ឧ. ឡាបូ, ឧបករណ៍ពិសោធន៍)*

៤. ព័ត៌មានទូទៅអំពីខ្លួនអ្នក

☛ *សូមគូសសញ្ញា ✓ ក្នុងប្រអប់ចម្លើយ □ ដែលលោកអ្នកគិតថាត្រឹមត្រូវបំផុតសំរាប់លោកអ្នក។ ប្រសិនបើលោកអ្នកជ្រើសរើសយកចម្លើយ “ផ្សេង” សូមមេត្តាជួយបញ្ជាក់បន្ថែមក្នុងចន្លោះ____ដែលបានទុកជូន៖*

i. *ភេទ៖* □*ប្រុស* □*ស្រី* ii. *អាយុ៖* _____ (*ឧ. ២៩ ឆ្នាំ*)
iii. *កម្រិតវប្បធម៌ខ្ពស់បំផុត៖* □*ថ្នាក់បណ្ឌិត* □*ថ្នាក់អនុបណ្ឌិត* □*ថ្នាក់បរិញ្ញាបត្រ* □*ផ្សេង:*_____
iv. *ឆ្នាំទទួលបានសញ្ញាបត្រកម្រិតខ្ពស់បំផុត៖*_____ (*ឧ. ឆ្នាំ២០១០*)
v. *សញ្ញាបត្រខ្ពស់បំផុតរបស់អ្នកទទួលបានពី៖* □*ប្រទេសកម្ពុជា* □*ប្រទេសផ្សេង៖* _____ (*ឧ. ជប៉ុន*)
vi. *ជំនាញនៃសញ្ញាបត្រកំរិតខ្ពស់បំផុតរបស់អ្នក៖* _____ (*ឧ. ផ្នែកសេដ្ឋកិច្ច*)
vii. *ឆ្នាំដែលអ្នកចាប់ផ្តើមបម្រើការងារនៅក្នុងស្ថាប័នសព្វថ្ងៃ៖*_____ (*ឧ. ឆ្នាំ២០១២*)
viii. *តើអ្នកបង្រៀននៅក្នុងនាយកដ្ឋាន (Department) អ្វី?* _____ (*ឧ. នាយកដ្ឋានជីវវិទ្យា*)
ix. *តើមុខងាររបស់អ្នកជាអ្វី?* _____ (*ឧ. សាស្ត្រាចារ្យបង្រៀន*)
x. *លក្ខខណ្ឌការងារ៖* □*ជាបុគ្គលិកពេញម៉ោង* □*ជាបុគ្គលិកក្រៅម៉ោង* □*ផ្សេង៖* _____
xi. *តើអ្នកបង្រៀនប៉ុន្មានម៉ោងក្នុងមួយថ្ងៃ?* _____ (*ឧ. ១២ ម៉ោងក្នុងមួយថ្ងៃ*)
តើអ្នកបង្រៀនប៉ុន្មានថ្ងៃក្នុងមួយសប្តាហ៍? _____ (*ឧ. ៦ ថ្ងៃក្នុងមួយសប្តាហ៍*)

ចប់កម្រងសំណួរសួរដេមតិ!

សូមអរគុណជាអនេកប្បការសំរាប់ការសហការរបស់លោកអ្នក!

មតិយោបល់បន្ថែម៖

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*** *<u>សូមមេត្តាដាក់កម្រងសំណួរដែលបំពេញហើយទៅក្នុងស្រោមសំបុត្រដែលលោកអ្នកទទួលបានជាមួយនឹងកម្រងសំណួរនេះ និងបិទមុខសំបុត្រឱ្យជាប់ មុននឹងប្រគល់ត្រឡប់មកអ្នកប្រមូលវិញក្នុងន័យរក្សាការសំងាត់!</u>*

Appendix 5: Data collection administrative documents

- ***Permission to MoEYS from researcher (first stage)***

ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា ព្រះមហាក្សត្រ

ភ្នំពេញ ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០១៥

ខ្ញុំបាទឈ្មោះ **អៀម ភិរម្យ** ជានិស្សិតស្រាវជ្រាវថ្នាក់បណ្ឌិត ដែលទទួលបានអាហារូបករណ៍ផ្តែក **ការអភិវឌ្ឍន៍និស្សិតរយៈទី** មកសិក្សានៅ សាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុន ។

សូមគោរពជូន

ឯកឧត្តមរដ្ឋមន្ត្រី

កម្មវត្ថុ ៖ សំណើរសុំការអនុញ្ញាតចុះធ្វើការស្រាវជ្រាវប្រមូលទិន្នន័យ

យោង ៖ លិខិតរបស់លោក **ហាត់តៈ តៃជិ** (Hotta Taiji) ចុះថ្ងៃទី១៣ ខែមករា ឆ្នាំ ២០១៥

យោងតាមកម្មវត្ថុខាងលើ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមរដ្ឋមន្ត្រីជ្រាបថា ខ្ញុំបាទមានតម្រូវការចាំបាច់ក្នុងការធ្វើការស្រាវជ្រាវប្រមូលទិន្នន័យទាក់ទងនឹងការអនុវត្តការងារស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ គ្រូបង្រៀន និងថ្នាក់ដឹកនាំក្នុងសាកលវិទ្យាល័យចំនួន ១២ រួមមាន **សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ សាកលវិទ្យាល័យភូមិន្ទនីតិសាស្ត្រ និងវិទ្យាសាស្ត្រសេដ្ឋកិច្ច សាកលវិទ្យាល័យភូមិន្ទកសិកម្ម វិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា សាកលវិទ្យាល័យជាតិគ្រប់គ្រង សាកលវិទ្យាល័យមានជ័យ សាកលវិទ្យាល័យបាត់ដំបង សាកលវិទ្យាល័យកម្ពុជា សាកលវិទ្យាល័យបច្ចាសាស្ត្រ សាកលវិទ្យាល័យហៀលហ្វាយ សាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល និង សាកលវិទ្យាល័យភូមិន្ទវិចិត្រសិល្បៈ** ដើម្បីបានទិន្នន័យសម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាថ្នាក់បណ្ឌិត ។ ប្រធានបទដែលខ្ញុំបាទនឹងត្រូវចុះធ្វើការស្រាវជ្រាវខាងមុខនេះគឺ **"មុខងារនៃការស្រាវជ្រាវរបស់សាកលវិទ្យាល័យក្នុងប្រទេសកម្ពុជា"** ដែលជាការសិក្សាបន្តពីការស្រាវជ្រាវថ្នាក់អនុបណ្ឌិតរបស់ខ្ញុំបាទក្នុងឆ្នាំ ២០១៣ ។ ការចុះស្រាវជ្រាវនេះនឹងមានរយៈពេល ០៦ សប្តាហ៍ គិតចាប់ពីថ្ងៃទី ០៩ ខែកុម្ភៈ ដល់ថ្ងៃទី២៣ ខែមីនា ឆ្នាំ២០១៥ ។

អាស្រ័យដូចបានជម្រាបជូនខាងលើនេះ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមមេត្តាអនុញ្ញាតដល់ខ្ញុំបាទ ក្នុងការចុះស្រាវជ្រាវប្រមូលទិន្នន័យដោយសេចក្តីអនុគ្រោះ ។

សូមឯកឧត្តមរដ្ឋមន្ត្រីទទួលនូវការគោរពពីខ្ពង់ខ្ពស់អំពីខ្ញុំបាទ ។

ហត្ថលេខា

អៀម ភិរម្យ

- ***Permission to MoEYS from researcher (second stage)***

ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា ព្រះមហាក្សត្រ

រាជធានីភ្នំពេញ ថ្ងៃទី ០៨ ខែតុលា ឆ្នាំ២០១៥

ខ្ញុំបាទឈ្មោះ **អៀម ភិរម្យ** ជានិស្សិតស្រាវជ្រាវថ្នាក់បណ្ឌិត ដែលទទួលបានអាហារូបករណ៍លើផ្នែក **ការអភិវឌ្ឍន៍វិស័យអប់រំ** មកសិក្សានៅសាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុន ។

សូមគោរពជូន

ឯកឧត្តមរដ្ឋមន្ត្រី

កម្មវត្ថុ ៖ សំណើរសុំការអនុញ្ញាតចុះធ្វើការស្រាវជ្រាវប្រមូលទិន្នន័យបន្ថែម

យោង ៖ លិខិតរបស់លោក **ហត់តះ តៃជិ** (Hotta Taiji) ចុះថ្ងៃទី១០ ខែតុលា ឆ្នាំ ២០១៥

យោងតាមកម្មវត្ថុខាងលើ និងដោយមិនទាន់ទទួលបានទិន្នន័យគ្រប់គ្រាន់ពីការប្រមូលលើកមុន ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមរដ្ឋមន្ត្រីជ្រាបថា ខ្ញុំបាទមានតម្រូវការចាំបាច់ក្នុងការប្រមូលទិន្នន័យម្តងទៀតទាក់ទងនឹងការអនុវត្តការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យក្នុងសាកលវិទ្យាល័យ និងវិទ្យាស្ថានចំនួន ១៥ រួមមាន៖ ១.*សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ* ២.*សាកលវិទ្យាល័យជាតិគ្រប់គ្រង* ៣.*សាកលវិទ្យាល័យភូមិន្ទនីតិសាស្ត្រ និងវិទ្យាសាស្ត្រសេដ្ឋកិច្ច* ៤.*វិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា* ៥.*វិទ្យាស្ថានជាតិអប់រំ* ៦.*សាកលវិទ្យាល័យមានជ័យ* ៧.*សាកលវិទ្យាល័យបាត់ដំបង* ៨.*សាកលវិទ្យាល័យស្វាយរៀង* ៩. *សាកលវិទ្យាល័យជាស៊ីមកំចាយមារ* ១០.*សាកលវិទ្យាល័យភូមិន្ទកសិកម្ម* ១១.*សាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល* ១២.*សាកលវិទ្យាល័យភូមិន្ទវិចិត្រសិល្បៈ* ១៣.*សាកលវិទ្យាល័យបញ្ញាសាស្ត្រ* ១៤.*សាកលវិទ្យាល័យបៀលប្រាយ* និង ១៥.*សាកលវិទ្យាល័យន័រតុន* ដើម្បីទទួលបានទិន្នន័យគ្រប់គ្រាន់សម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សា។ ប្រធានបទដែលខ្ញុំបាទនឹងចុះធ្វើការស្រាវជ្រាវគឺ "**កត្តាជំរុញផលិតផលការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យក្នុងសាកលវិទ្យាល័យប្រទេសកម្ពុជា**" ដែលជាការសិក្សាបន្តពីការស្រាវជ្រាវថ្នាក់អនុបណ្ឌិតរបស់ខ្ញុំបាទក្នុងឆ្នាំ ២០១៣ ។ ការចុះស្រាវជ្រាវប្រមូលទិន្នន័យបន្ថែមនេះនឹងមានរយៈពេលប្រមាណ **០៧** សប្តាហ៍ គិតចាប់ពីថ្ងៃទី ០៥ ខែវិច្ឆិកា ដល់ថ្ងៃទី២៥ ខែធ្នូ ឆ្នាំ២០១៥ ។

អាស្រ័យដូចបានជម្រាបជូនខាងលើនេះ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមមេត្តាអនុញ្ញាតដល់ខ្ញុំបាទ ក្នុងការចុះស្រាវជ្រាវប្រមូលទិន្នន័យដោយសេចក្តីអនុគ្រោះ ។

សូមឯកឧត្តមរដ្ឋមន្ត្រីទទួលនូវការគោរពដ៏ខ្ពង់ខ្ពស់អំពីខ្ញុំបាទ ។

ហត្ថលេខា

Sath

អៀម ភិរម្យ

- ***Permission to MoEYS from academic supervisor (first stage)***

HIROSHIMA UNIVERSITY
Graduate School for International Development and Cooperation
1-5-1 Kagamiyama Higashi-Hiroshima-Shi, Hiroshima 739-8529

January 13th, 2015

Dear Sir or Madam,

I am writing to seek your permission to allow Mr. EAM PHYROM to conduct his research at your university.

EAM PHYROM has been a doctoral student specializing in Higher Education Development since April 2014 at the Graduate School for International Development and Cooperation, Hiroshima University, Japan. For his doctoral dissertation, he plans to conduct a study on the research function of universities in Cambodia, deeply investigating the research policies, roles, performance and future directions of relevant key stakeholders. The overall goal of this study is to observe how the government's bodies, the academic sector, and the private or non-governmental sectors can contribute to building a strong research system at Cambodian higher education. This research study can possibly contribute a great deal to the university-based research development plan of the Ministry of Education, Youth and Sports (MoEYS).

The researcher plans to collect a wide range of data through a set of questionnaire distributed to (and a series of interview conducted with) university professors, research unit staff, and the university or faculty management from 12 Cambodian universities. Through the collected data and a further rigorous analysis, I strongly hope that his study will provide very useful inputs into the endeavor of Cambodian government to build the culture of research in its higher education sector. Also, it will provide useful reference points for further research study on the nature of research and research experience in the developing context like Cambodian.

Therefore, as his academic advisor, I would like to ask you to grant permission to EAM PHYROM to conduct his study at Cambodian universities he proposes. Should you have any further questions, please do not hesitate to contact me.

Yours sincerely,

Taiji Hotta, PhD
Associate Professor
E-mail: hotta@hiroshima-u.ac.jp
Tel/Fax: +81-82-424-6284

- ***Permission to MoEYS from academic supervisor (second stage)***

HIROSHIMA UNIVERSITY
Graduate School for International Development and Cooperation
1-5-1 Kagamiyama Higashi-Hiroshima-Shi, Hiroshima 739-8529

October 10th, 2015

Dear Sir or Madam,

I am writing to seek your permission to again allow Mr. EAM PHYROM to conduct his research at 15 selected Cambodian universities.

EAM PHYROM has been a doctoral student specializing in Higher Education Development since April 2014 at the Graduate School for International Development and Cooperation, Hiroshima University, Japan. For his doctoral dissertation, he plans to conduct a study on the research function of universities in Cambodia, trying to examine research policies, roles, performance, and future directions of relevant key stakeholders in developing research culture in the country. The main goal of his study is to investigate how variables at policy level, external level, institutional level and faculty level explain research productivity of Cambodian academics. This research study can possibly contribute a great deal to the research development plan of the Ministry of Education, Youth, and Sport (MoEYS).

With the kind permission from MoEYS last time (issued on 02 February 2015), the researcher collected a range of qualitative data through interview with more than 40 key university staff and academics (in February and March 2015). This time, based on the collected qualitative data, the researcher has developed an instrument (survey questionnaire) aiming to further collect quantitative data from university professors, research unit staff and university management from 15 Cambodian universities. Through the collected data and further analyses, I strongly hope that his study will provide very useful inputs into the endeavor of Cambodian government to build the culture of research in its higher education sector. Also, it will provide useful reference points for further research study on the nature of research and research culture in the developing context like that of Cambodia.

Therefore, as his academic advisor, I would like to ask you to grant permission to EAM PHYROM to conduct his study again at Cambodian universities he proposes. Should you have any further questions, please do not hesitate to contact me.

Yours sincerely,

Taiji Hotta, PhD
Professor and Vice Executive of International Center, Hiroshima University
E-mail: hotta@hiroshima-u.ac.jp
Tel/Fax: +81-82-424-6284

- ***Letter to university management (first stage)***

ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា ព្រះមហាក្សត្រ

រាជធានីភ្នំពេញ ថ្ងៃទី០៧ ខែកុម្ភៈ ឆ្នាំ២០១៥

ខ្ញុំបាទឈ្មោះ **អៀម ភិរម្យ** ជានិសិត្សស្រាវជ្រាវ ថ្នាក់បណ្ឌិតដែលទទួលបានអាហារូបករណ៍ផ្នែក **ការអភិវឌ្ឍន៍ ទិសយអប់រំ** មកសិក្សានៅ សាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុន ។

សូមគោរពជូន

ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ

កម្មវត្ថុ ៖ សំណើរសុំការអនុញ្ញាតចុះធ្វើការសម្ភាសប្រមូលទិន្នន័យ

យោង៖ <u>លិខិតរបស់ពីក្រសួងអប់រំ ចុះថ្ងៃទី០២ ខែកុម្ភៈ ឆ្នាំ២០១៥ និងលិខិតរបស់លោក **ហត់តៈ តៃជិ** (Hotta Taiji)ចុះថ្ងៃទី១៣ ខែមករា ឆ្នាំ ២០១៥</u>

យោងតាមកម្មវត្ថុខាងលើ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមសាកលវិទ្យាធិការជ្រាបថា ខ្ញុំបាទមានតម្រូវការចាំបាច់ក្នុងការធ្វើការស្រាវជ្រាវប្រមូលទិន្នន័យដោយធ្វើការសម្ភាសសាស្ត្រាចារ្យ និងថ្នាក់ដឹកនាំផ្នែក (ឬអង្គភាព) ស្រាវជ្រាវ ទាក់ទងនឹងការអនុវត្តការងារស្រាវជ្រាវ ក្នុងសាកលវិទ្យាល័យចំនួន ១២ ក្នុងប្រទេសកម្ពុជា ដែលរួមមានសាកលវិទ្យាល័យរដ្ឋចំនួន ៩ និងសាកលវិទ្យាល័យឯកជនចំនួន ៣ ។ ក្នុងនោះខ្ញុំបាទបានជ្រើសរើសយក**សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ**ផងដែរ ដើម្បីបានទិន្នន័យគ្រប់គ្រាន់សម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាថ្នាក់បណ្ឌិត ។ ប្រធានបទដែលខ្ញុំបាទនឹងត្រូវចុះធ្វើការស្រាវជ្រាវគឺ **"មុខងារនៃការស្រាវជ្រាវរបស់មហាវិទ្យាល័យក្នុងប្រទេសកម្ពុជា"** ដែលជាការសិក្សាបន្តពីការស្រាវជ្រាវថ្នាក់អនុបណ្ឌិតរបស់ខ្ញុំក្នុងឆ្នាំ ២០១៣ ។ ការចុះស្រាវជ្រាវនេះមានរយៈពេល ០៦ សប្តាហ៍ គិតចាប់ពី ថ្ងៃទី០៩ ខែកុម្ភៈ ដល់ថ្ងៃទី២៣ ខែមិនា ឆ្នាំ២០១៥ ។

អាស្រ័យដូចបានជម្រាបជូនខាងលើនេះ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមសាកលវិទ្យាធិការមេត្តាអនុញ្ញាតដល់ខ្ញុំបាទ ក្នុងការចុះស្រាវជ្រាវប្រមូលទិន្នន័យដោយសេចក្តីអនុគ្រោះ ។

សូមឯកឧត្តមសាកលវិទ្យាធិការទទួលនូវការគោរពដ៏ខ្ពង់ខ្ពស់អំពីខ្ញុំបាទ ។

ហត្ថលេខា

អៀម ភិរម្យ

- ***Letter to university management (second stage)***

ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា ព្រះមហាក្សត្រ

រាជធានីភ្នំពេញ ថ្ងៃទី០៤ ខែវិច្ឆិកា ឆ្នាំ២០១៥

ខ្ញុំបាទឈ្មោះ **អៀម ភិរម្យ** ជានិសិត្សស្រាវជ្រាវថ្នាក់បណ្ឌិត ដែលទទួលបានអាហារូបករណ៍លើផ្នែក **ការអភិវឌ្ឍន៍ទីស័យអប់រំ** មកសិក្សានៅ សាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុន ។

សូមគោរពជូន

ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ

កម្មវត្ថុ ៖ សំណើរសុំការអនុញ្ញាតចុះធ្វើការប្រមូលទិន្នន័យតាមរយៈការចែកកម្រងសំណួរ

យោង៖ លិខិតរបស់**ក្រសួងអប់រំ**ចុះថ្ងៃទី២៧ ខែតុលា ឆ្នាំ២០១៥ និងលិខិតរបស់លោក **ហាត់តៈ តៃជិ** (Hotta Taiji)ចុះថ្ងៃទី ១០ ខែតុលា ឆ្នាំ ២០១៥

យោងតាមកម្មវត្ថុខាងលើ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមសាកលវិទ្យាធិការមេត្តាជ្រាបថា ខ្ញុំបាទមានតម្រូវការចាំបាច់ក្នុងការធ្វើការស្រាវជ្រាវប្រមូលទិន្នន័យតាមរយៈការចែកកម្រងសំណួរ (ដូចដែលបានភ្ជាប់ជូន) ដល់សាស្ត្រាចារ្យដែលកំពុងបំរើការងារក្នុងសាកលវិទ្យាល័យ និងវិទ្យាស្ថានចំនួន **១៥** ក្នុងប្រទេសកម្ពុជា ដែលរួមមានស្ថាប័នអប់រំរដ្ឋ ១២ និងស្ថាប័នអប់រំឯកជនចំនួន ៣។ ក្នុងនោះខ្ញុំបាទបានជ្រើសរើសយក ***សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ*** ផងដែរ ដើម្បីទទួលបានទិន្នន័យគ្រប់គ្រាន់សម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាថ្នាក់បណ្ឌិតរបស់ខ្ញុំបាទ។ ប្រធានបទដែលខ្ញុំបាទនឹងត្រូវចុះធ្វើការស្រាវជ្រាវគឺ “**កត្តាដំរុញផលិតផលនៃការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យក្នុងសាកលវិទ្យាល័យប្រទេសកម្ពុជា**” ដែលជាការសិក្សាបន្តពីការស្រាវជ្រាវថ្នាក់អនុបណ្ឌិតរបស់ខ្ញុំបាទក្នុងឆ្នាំ ២០១៣។ ការចុះស្រាវជ្រាវនេះមានរយៈពេលប្រមាណ **០៧** សប្តាហ៍ គិតចាប់ពី ថ្ងៃទី០៥ ខែវិច្ឆិកា ដល់ថ្ងៃទី២៥ ខែធ្នូ ឆ្នាំ២០១៥។

អាស្រ័យដូចបានជម្រាបជូនខាងលើនេះ ខ្ញុំបាទសូមគោរពជូនឯកឧត្តមសាកលវិទ្យាធិការ មេត្តាអនុញ្ញាតដល់ខ្ញុំបាទ ក្នុងការចុះស្រាវជ្រាវប្រមូលទិន្នន័យក្នុងសាកលវិទ្យាល័យរបស់ឯកឧត្តមដោយសេចក្តីអនុគ្រោះ។

សូមឯកឧត្តមសាកលវិទ្យាធិការទទួលនូវការគោរពដ៏ខ្ពង់ខ្ពស់អំពីខ្ញុំបាទ។

ទំនាក់ទំនង៖

លេខទូរស័ព្ទ៖ (+855) 77983943

អីមែល៖ eamphyrom@yahoo.com

ហត្ថលេខា

អៀម ភិរម្យ

- ***Letter to faculty (first stage)***

Dear Professor/Lecturer,

I am Eam Phyrom, currently pursuing my doctoral degree in higher education development at Hiroshima University, Japan. I am writing to seek your cooperation in completing my distributed questionnaire, as attached.

The tentative title of my doctoral dissertation is "The Research Function of Cambodian Universities: Policies, Roles, Performance, and Future Direction." The study basically aims to investigate how the endeavors put on university research implementation and development of relevant stakeholders at different levels have been progressing.

The attached questionnaire contains a number of key variables significantly important to answer my research hypotheses. It is therefore highly appreciated if you could help complete the questionnaire by 23rd February 2015 and hand it back to personnel at the administration office of your university. Your responses will be kept confidential and used only within the scope of this research purposes.

While scientific and academic research at higher education institutions have received great attention in almost every nation in the world, Cambodia has also been on the same track. Thus, your kind participation is very much valued as it will contribute in its own way to the development of a good research system for Cambodian higher education sector in the near future.

I would love to profoundly thank you for spending your valuable time working on this questionnaire. Should you have any questions or suggestions, please do not hesitate to reach me at the contact below.

Yours sincerely,

Eam Phyrom
Graduate student at Hiroshima University
E-mail: eamphyrom@yahoo.com
Tel: (+81) 80 4559 9770

- ***Letter to faculty (second stage)***

សាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា

សាលាជាន់ខ្ពស់សម្រាប់កិច្ចសហប្រត្តិបត្តិការ និងការរអភិវឌ្ឍអន្តរជាតិ

<u>វប្បធម៌ សមត្ថភាព យុទ្ធសាស្ត្រ និងផលិតផលនៃការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ និងស្ថាប័នឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា</u>

ជូនចំពោះ លោក និងលោកស្រីសាស្ត្រាចារ្យជាទីគោរព

ខ្ញុំបាទឈ្មោះ ***អៀម ភិរម្យ*** *ជាបេក្ខជនបណ្ឌិត កំពុងសិក្សាលើផ្នែក "ការរៀបរំកម្រិតឧត្តមសិក្សា" នៅក្នុងសាកលវិទ្យាល័យហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុន។ ខ្ញុំបាទបានរៀបរៀងកម្រងសំណួរនេះឡើង ដោយមានគោលបំណងសិក្សាទៅលើបច្ចុប្បន្នភាពនៃវប្បធម៌ សមត្ថភាព យុទ្ធសាស្ត្រ និងស្នាដៃនៃការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ និងស្ថាប័នឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា ដោយធ្វើការវិភាគលម្អិតទៅលើទំនាក់ទំនងនៃកត្តាដែលអាចមានឥទ្ធិពលទៅលើការបង្កើតស្នាដៃស្រាវជ្រាវរបស់សាស្ត្រាចារ្យ។ ខ្លឹមសារនៃកម្រងសំណួរនេះមួយផ្នែក ត្រូវបានចម្រាញ់ចេញមកពីការសម្ភាសន៍របស់ខ្ញុំបាទជាមួយនឹង អ្នកបង្កើតគោលនយោបាយ សាស្ត្រាចារ្យ និងថ្នាក់ដឹកនាំផ្នែកស្រាវជ្រាវតាមសាកលវិទ្យាល័យចំនួន ៥០ រូប ក្នុងខែ កុម្ភៈ និងមិនា ឆ្នាំ ២០១៥នេះ។ ជារួម ការសិក្សានេះធ្វើឡើង ក្នុងន័យស្វែងរកគន្លឹះក្នុងការបន្តការលើកកម្ពស់ វិស័យស្រាវជ្រាវក្នុងកម្រិតឧត្តមសិក្សាក្នុងប្រទេសកម្ពុជា។*

ដូចដែលលោកគ្រូ អ្នកគ្រូ បានជ្រាបស្រាប់មកហើយថា ការស្រាវជ្រាវបានក្លាយជាកម្មវត្ថុមួយយ៉ាងសំខាន់ដែលក្រសួងអប់រំ យុវជន និងកីឡា និងស្ថាប័នឧត្តមសិក្សានៃប្រទេសកម្ពុជាបាន និងកំពុងយកចិត្តទុកដាក់ក្នុងការកែទម្រង់ និងលើកកម្ពស់។ ដូចនេះ រាល់ចម្លើយដ៏ស្មោះត្រង់របស់លោកគ្រូ អ្នកគ្រូ នឹងចូលរួមចំណែកយ៉ាងច្រើនក្នុងការផ្តល់បន្ថែមនូវពត៌មាន ភស្តុតាង និងគំនិតល្អ ។ ដែលអាចកែលម្អ និងពង្រឹងវិស័យនេះឱ្យកាន់តែប្រសើរឡើងទៅថ្ងៃមុខសម្រាប់ប្រទេសជាតិយើង។

នេះជាការសិក្សាបន្តពីការសិក្សាថ្នាក់អនុបណ្ឌិតមួយក្នុងឆ្នាំ ២០១៣ ទាក់ទងទៅនឹងបទពិសោធន៍ក្នុងការងារស្រាវជ្រាវរបស់សាស្ត្រាចារ្យនៃប្រទេសកម្ពុជា។ សូមបញ្ជាក់ថារាល់ចម្លើយរបស់លោកគ្រូ អ្នកគ្រូ ក៍ដូចជាឈ្មោះស្ថាប័ននឹងត្រូវបានរក្សាការសម្ងាត់ និងមិនត្រូវបានយកទៅប្រើឱ្យខុសពីកម្មវត្ថុនៃការស្រាវជ្រាវនេះឡើយ។ យោងតាមការធ្វើតេស្តសាកល្បង លោកគ្រូ អ្នកគ្រូ នឹងចំណាយពេលប្រមាណជា ៣០ ទៅ ៤០ នាទីក្នុងការបំពេញកម្រងសំណួរនេះ។

ខ្ញុំបាទសូមអរគុណជាអនេកចំពោះការចូលរួមរបស់លោកគ្រូ អ្នកគ្រូ។ ប្រសិនបើមានចម្ងល់ ឬសំណួរបញ្ជាក់ សូមមេត្តាទាក់ទងមកខ្ញុំបាទផ្ទាល់ដោយសេចក្តីរីករាយ តាមរយៈលេខទូរស័ព្ទ ឬអ៊ីម៉ែលដូចខាងក្រោម។ សូមអរគុណ!

អៀម ភិរម្យ, *បេក្ខជនបណ្ឌិត*

សាលាជាន់ខ្ពស់សម្រាប់កិច្ចសហប្រត្តិបត្តិការ និងការរអភិវឌ្ឍអន្តរជាតិ (IDEC), សាកលវិទ្យាល័យហ៊ីរ៉ូស៊ីម៉ា (HU)

លេខទូរស័ព្ទ៖ ០៧៧ ៩៨ ៣៩ ៤៣ ឬ (+៨១) ៨០ ៤៥៥៩ ៩៧៧០ ; អ៊ីមែល៖ eamphyrom@yahoo.com

- ***Permission from MoEYS (first stage)***

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងអប់រំ យុវជន និងកីឡា
លេខ: ៤៨៤២ អយក.ឧវអ

រាជធានីភ្នំពេញ,ថ្ងៃទី ០២ ខែ កុម្ភៈ ឆ្នាំ ២០១៥

សោរពជូន

-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទនីតិសាស្ត្រ និងវិទ្យាសាស្ត្រសេដ្ឋកិច្ច
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យជាតិគ្រប់គ្រង
-លោកជំទាវសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យបាត់ដំបង
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យមានជ័យ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទវិចិត្រសិល្បៈ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទកសិកម្ម
-ឯកឧត្តមនាយកវិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យបញ្ញាសាស្ត្រកម្ពុជា
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យកម្ពុជា
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យបៀលប្រាយ

កម្មវត្ថុ : សំណើសុំអនុញ្ញាតឱ្យនិស្សិតឈ្មោះ **អៀម ភិរម្យ** ចុះធ្វើកម្មសិក្សាស្រាវជ្រាវ ។
យោង :-ពាក្យស្នើសុំរបស់សាមីជនចុះថ្ងៃទី ១០ ខែ មករា ឆ្នាំ ២០១៥ ។
-លិខិតរបស់សាកលវិទ្យាល័យហ៊ីរ៉ូស៊ីម៉ា នៃប្រទេសជប៉ុនចុះថ្ងៃទី ១៣ ខែ មករា ឆ្នាំ ២០១៥ ។

តបតាមកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំសូមជម្រាបជូន **ឯកឧត្តម លោកជំទាវ លោកសាកលវិទ្យាធិការ** មេត្តាជ្រាបថា លោក **អៀម ភិរម្យ** ជានិស្សិតអាហារូបករណ៍ថ្នាក់បណ្ឌិត ផ្នែកការអភិវឌ្ឍវិស័យអប់រំ នៃសាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា (**Hiroshima University**) ប្រទេសជប៉ុន បានស្នើសុំចុះធ្វើកម្មសិក្សាស្រាវ ជ្រាវ និងប្រមូលទិន្នន័យពាក់ព័ន្ធ និងប្រធានបទ " **មុខងារនៃការស្រាវជ្រាវរបស់សាកលវិទ្យាល័យក្នុងប្រទេសកម្ពុជា** " រយៈពេល ០៦ សប្តាហ៍ ចាប់ពីថ្ងៃទី ០៩ ខែ កុម្ភៈ ឆ្នាំ ២០១៥ ដល់ថ្ងៃទី ២៣ ខែ មីនា ឆ្នាំ ២០១៥ ដើម្បីជាជំនួយស្មារតីក្នុងការសរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាថ្នាក់បណ្ឌិត ផ្នែកការអភិវឌ្ឍវិស័យអប់រំ នៃសាកលវិទ្យាល័យ ហ៊ីរ៉ូស៊ីម៉ា (**Hiroshima University**) ប្រទេសជប៉ុន ។

អគារលេខ៨០ មហាវិថី ព្រះនរោត្តម ភ្នំពេញ កម្ពុជា ទូរស័ព្ទ: (៨៥៥-២៣) ២១០ ១៤៣ /២១៧ ២៥៣ /៤២៦ ៨៤១ ទូរសារ: (៨៥៥-២៣) ២១៧ ២៥០/ ២១២ ៥១២
អ៊ីមែល: info@moeys.gov.kh / crsmeys@camnet.com.kh គេហទំព័រ : www.moeys.gov.kh

អាស្រ័យហេតុនេះ សូម **ឯកឧត្តម លោកជំទាវ លោកសាកលវិទ្យាធិការ** មេត្តាជួយសម្រួលដល់ការចុះធ្វើកម្មសិក្សាស្រាវជ្រាវរបស់និស្សិតរូបនេះតាមការគួរ ។

សូម **ឯកឧត្តម លោកជំទាវ លោកសាកលវិទ្យាធិការ** ទទួលនូវការរាប់អានជ័ំស្មោះពីខ្ញុំ

ជ.រដ្ឋមន្ត្រីក្រសួងអប់រំ យុវជន និងកីឡា

រដ្ឋលេខាធិការ

យក់ ឡុយ

ចម្លងជូន

- ក្រសួងការបរទេស និងសហប្រតិបត្តិការអន្តរជាតិ
-ស្ថានទូតជប៉ុន ប្រចាំព្រះរាជាណាចក្រកម្ពុជា
-ក្រសួងកសិកម្មរុក្ខាប្រមាំញ និងនេសាទ
-ក្រសួងសុខាភិបាល
-ក្រសួងវប្បធម៌ និងវិចិត្រសិល្បៈ
-សាលាខេត្តបាត់ដំបង
-សាលាខេត្តបន្ទាយមានជ័យ
" ដើម្បីជូនជ្រាបជាព័ត៌មាន "
-ឯកសារ ទវអ. -កាលប្បវត្តិ

- ***Permission from MoEYS (second stage)***

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងអប់រំ យុវជន និងកីឡា
លេខ: ៤៤៣៥ **អយក.**នវក

រាជធានីភ្នំពេញថ្ងៃទី២៣ ខែ តុលា ឆ្នាំ ២០១៥

ជម្រាបជូន
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទនីតិសាស្ត្រ និងវិទ្យាសាស្ត្រសេដ្ឋកិច្ច
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យជាតិគ្រប់គ្រង
-ឯកឧត្តមនាយកវិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា
-ឯកឧត្តមនាយកវិទ្យាស្ថានជាតិអប់រំ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទកសិកម្ម
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យភូមិន្ទវិចិត្រសិល្បៈ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យមានជ័យ
-ឯកឧត្តមសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យស្វាយរៀង
-លោកជំទាវសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យបាត់ដំបង
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យន័រតុន
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យបញ្ញាសាស្ត្រ
-លោកសាកលវិទ្យាធិការ នៃសាកលវិទ្យាល័យវេស្ទើនប្រាយ
-លោកសាកលវិទ្យាធិការរង នៃសាកលវិទ្យាល័យជាស៊ីមអង្គរ

កម្មវត្ថុ :សំណើសុំចុះធ្វើកម្មសិក្សាស្រាវជ្រាវប្រមូលទិន្នន័យ សម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាពីថ្ងៃទី ០៥ ខែ វិច្ឆិកា ឆ្នាំ ២០១៥ ដល់ ថ្ងៃទី ២៥ ខែ ធ្នូ ឆ្នាំ ២០១៥ ។
យោង :-លិខិតរបស់សាកលវិទ្យាល័យហ៊ីរ៉ូស៊ីម៉ា នៃប្រទេសជប៉ុន ចុះថ្ងៃទី១០ខែ តុលា ឆ្នាំ២០១៥ ។
-ពាក្យស្នើសុំរបស់សាមីជនចុះថ្ងៃទី ០៨ ខែ តុលា ឆ្នាំ ២០១៥ ។

តបតាមកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំសូមជម្រាបជូន **លោកជំទាវ ឯកឧត្តម សាកលវិទ្យាធិការ ឯកឧត្តមនាយក លោកសាកលវិទ្យាធិការ** មេត្តាជ្រាបថា លោក **អៀម ភិរម្យ** ជានិស្សិតអាហារូបករណ៍ថ្នាក់បណ្ឌិត ផ្នែកការអភិវឌ្ឍវិស័យអប់រំ នៃសាកលវិទ្យាល័យហ៊ីរ៉ូស៊ីម៉ា ប្រទេសជប៉ុនស្នើសុំចុះធ្វើកម្មសិក្សាស្រាវជ្រាវ និងប្រមូលទិន្នន័យលើប្រធានបទ " **កត្តាជំរុញផលិតផលការស្រាវជ្រាវរបស់សាស្ត្រាចារ្យក្នុងសាកលវិទ្យាល័យប្រទេសកម្ពុជា** "សម្រាប់សរសេរនិក្ខេបបទបញ្ចប់ការសិក្សាក្នុងឆ្នាំ ២០១៦ ។

អាសយដ្ឋាន ... មហាវិថី ព្រះនរោត្តម ភ្នំពេញ កម្ពុជា ទូរស័ព្ទ: (៨៥៥-២៣) ... ទូរសារ: (៨៥៥-២៣) ...
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អាស្រ័យដូចបានជម្រាបជូនខាងលើ ខ្ញុំសូម **លោកជំទាវ ឯកឧត្តម សាកលវិទ្យាធិការ ឯកឧត្តមនាយក លោកសាកលវិទ្យាធិការ** មេត្តាអនុញ្ញាតឲ្យ លោក **អៀម កិរម្យ** បានចុះធ្វើកម្មសិក្សាស្រាវជ្រាវប្រមូលទិន្នន័យតាម គ្រឹះស្ថានឧត្តមសិក្សានៅក្រោមការគ្រប់គ្រងរបស់ លោកជំទាវ ឯកឧត្តម សាកលវិទ្យាធិការ ឯកឧត្តមនាយក លោក សាកលវិទ្យាធិការ តាមការគួរ ។

សូម **លោកជំទាវ ឯកឧត្តម សាកលវិទ្យាធិការ ឯកឧត្តមនាយក លោសាកលវិទ្យាធិការ** ទទួលនូវការរាប់អានដ៏ស្មោះពីខ្ញុំ

ជ. រដ្ឋមន្ត្រីក្រសួងអប់រំ យុវជន កីឡា
រដ្ឋលេខាធិការ

យក់ ឌុយ

ចម្លងជូន
-ក្រសួងការបរទេស និងសហប្រតិបត្តិការអន្តរជាតិ
-ស្ថានទូតជប៉ុនប្រចាំព្រះរាជាណាចក្រកម្ពុជា
-អគ្គនាយកដ្ឋានឧត្តមសិក្សា
"ដើម្បីជូនជ្រាបជាព័ត៌មាន"
- កាលប្បវត្តិ-ឯកសារ នា.ទ/អ

Appendix 6: Additional statistical findings

- **Frequency and percentage of faculty producing or not producing research outputs**

Indicators		0 research output	> = 1 research outputs	Total
Published books with international publishers	Frequency	448	35	483
	Percentage	92.75%	7.25%	100%
Published research articles with international publishers	Frequency	445	38	483
	Percentage	92.13%	7.87%	100%
Published book chapters with international publishers	Frequency	470	13	483
	Percentage	97.31%	2.69%	100%
Published international conference proceeding	Frequency	442	41	483
	Percentage	91.51%	8.49%	100%
Presented paper at international conference	Frequency	414	69	483
	Percentage	85.71%	14.29%	100%
Obtained international research grants	Frequency	433	50	483
	Percentage	89.65%	10.35%	100%
Published books with local publishers	Frequency	396	87	483
	Percentage	81.99%	18.01%	100%
Published research articles with local publishers	Frequency	411	72	483
	Percentage	85.09%	14.91%	100%
Published book chapters with local publishers	Frequency	440	43	483
	Percentage	91.10%	8.90%	100%
Published local conference proceeding	Frequency	442	41	483
	Percentage	91.51%	8.49%	100%
Presented paper at local conference	Frequency	376	107	483
	Percentage	77.85%	22.15%	100%
Obtained local research grants	Frequency	438	45	483
	Percentage	90.68%	9.32%	100%
Wrote research reports or consultancy reports for donors	Frequency	410	73	483
	Percentage	84.89%	15.11%	100%

- **Frequency and percentage of exact research outputs by university**

Values	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15	Grand Total
IB	26	17	0	3	1	11	2	1	0	2	3	4	2	0	0	72
IA	23	7	4	2	0	22	1	1	0	3	0	2	3	0	0	68
IBC	12	2	1	1	0	3	0	1	0	2	1	2	0	0	0	25
ICP	26	6	4	7	0	12	3	1	0	3	6	4	0	0	0	72
ICPre	66	13	9	17	2	40	4	3	5	6	6	7	1	0	0	179
IRG	51	3	3	6	4	28	1	1	10	4	0	8	0	0	0	119
LB	41	34	19	1	17	39	5	4	5	6	12	9	11	6	0	209
LA	24	53	4	5	11	29	5	1	10	5	5	13	6	2	0	173
LBC	12	16	10	1	15	13	1	1	2	7	11	17	2	7	0	115
LCP	14	7	1	6	1	14	2	1	1	2	3	7	1	1	1	62
LCPre	62	41	9	15	17	35	10	4	13	8	11	14	2	8	1	250
LBG	25	8	4	6	3	14	1	1	0	4	4	3	0	0	0	73
CR	44	12	0	12	8	27	3	2	11	10	7	6	5	1	0	148
Total	426	219	68	82	79	287	38	22	57	62	69	96	33	25	2	1565
Percentage	27.22%	13.99%	4.35%	5.24%	5.05%	18.34%	2.43%	1.41%	3.64%	3.96%	4.41%	6.13%	2.11%	1.60%	0.13%	100.00%
N	95	43	20	38	31	29	28	21	28	27	15	23	27	46	12	483
Total/N	4.48	5.09	3.40	2.16	2.55	9.90	1.36	1.05	2.04	2.30	4.60	4.17	1.22	0.54	0.17	3.24

Note: IB = International Book; IA = International Journal Article; IBC = International Book Chapter; ICP = International Conference Proceeding; ICPre = International Conference Presentation; IRG = International Research Grants; LB = Local Book; LA = Local Journal Article; LBC = Local Book Chapters; LCP = Local Conference Proceeding; LCPre = Local Conference Presentation; LRG = Local Research Grants; and CR = Consultancy or research reports; >= 5 means faculty with five or more than five research outputs; Total/n = Total exact output divided by number of respondent in each institution

- **Detailed statistics of all items of research orientation and research support environment items**

Research experience

Items	N		R		S		O		U		A		Total	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Q111	96	19.88%	84	17.39%	173	35.82%	75	15.53%	40	8.28%	15	3.11%	483	100%
Q112	83	17.18%	104	21.53%	180	37.27%	58	12.01%	43	8.90%	15	3.11%	483	100%
Q113	154	31.88%	114	23.60%	145	30.02%	39	8.07%	19	3.93%	12	2.48%	483	100%
Q114	156	32.30%	104	21.53%	130	26.92%	63	13.04%	21	4.35%	9	1.86%	483	100%
Q115	28	5.80%	30	6.21%	103	21.33%	147	30.43%	137	28.36%	38	7.87%	483	100%
Q116	70	14.49%	73	15.11%	120	24.84%	86	17.81%	95	19.67%	39	8.07%	483	100%

Note: *0 = Never (N), 1 = Rarely (R), 2 = Sometimes (S), 3 = Often (O), 4 = Usually (U), 5 = Always (A)*

Q111: I have experience working with various research or consultancy projects; Q112: I have experience writing project reports or research reports; Q113: I have experience writing research papers for publication; Q114: I have attended and/or presented my research papers at academic conferences; Q115: I have thoroughly read published research articles related to my field of expertise; Q116: I engaged actively in research during my graduate education (e.g. in research design, data collection, data analysis).

Research production competence

Items	TI		VP		P		G		VG		E		Total	Total %
Q121	135	27.95 %	44	9.11%	117	24.22 %	145	30.02 %	38	7.87%	4	0.83%	483	100.00 %
Q127	92	19.05 %	46	9.52%	107	22.15 %	149	30.85 %	79	16.36 %	10	2.07%	483	100.00 %
Q128	106	21.95 %	57	11.80 %	90	18.63 %	136	28.16 %	77	15.94 %	17	3.52%	483	100.00 %

Note: *0 = Totally incompetent (TI), 1 = Very poor (VP), 2 = Poor (P), 3 = Good (G), 4 = Very good (VG), 5 = Excellent (E)*

Q121: Writing research grant proposal to apply for funding; Q127: Writing scientific research paper for publication; Q128: Presenting research paper at academic conference.

Research general competence

Items	TI		VP		P		G		VG		E		Total	Total %
Q122	32	6.63 %	33	6.83 %	68	14.08 %	213	44.10 %	112	23.19 %	25	5.18 %	483	100.00%
Q123	43	8.90 %	38	7.87 %	82	16.98 %	194	40.17 %	104	21.53 %	22	4.55 %	483	100.00%
Q124	35	7.25 %	37	7.66 %	58	12.01 %	203	42.03 %	114	23.60 %	36	7.45 %	483	100.00%
Q125	58	12.01 %	51	10.56 %	108	22.36 %	183	37.89 %	66	13.66 %	17	3.52 %	483	100.00%
Q126	57	11.80 %	54	11.18 %	120	24.84 %	172	35.61 %	62	12.84 %	18	3.73 %	483	100.00%

Note: *0 = Totally incompetent (TI), 1 = Very poor (VP), 2 = Poor (P), 3 = Good (G), 4 = Very good (VG), 5 = Excellent (E)*

Q122: Finding and synthesizing relevant literature effectively; Q123: Designing research study (e.g. designing questionnaire, developing conceptual framework, designing experiment); Q124: Collecting research data using proper instruments (e.g. interview, observation, focus group discussion); Q125: Analyzing quantitative data using statistics (e.g. test of difference, regression, factor analysis); Q126: Analyzing qualitative data using qualitative approaches (e.g. thematic analysis, content analysis, grounded theory)

Research technological competence

Items	TI		VP		P		G		VG		E		Total	Total %
Q129	101	20.91 %	53	10.97 %	125	25.88 %	141	29.19 %	57	11.80 %	6	1.24 %	483	100.00%
Q1210	175	36.23 %	84	17.39 %	130	26.92 %	72	14.91 %	19	3.93%	3	0.62 %	483	100.00%
Q1211	137	28.36 %	67	13.87 %	118	24.43 %	107	22.15 %	39	8.07%	15	3.11 %	483	100.00%

Note: *0 = Totally incompetent (TI), 1 = Very poor (VP), 2 = Poor (P), 3 = Good (G), 4 = Very good (VG), 5 = Excellent (E)*

Q129: Using quantitative data analysis software (e.g. SPSS, STATA, SAS, Matlab, R); Q1210: Using qualitative data analysis software (e.g. Nvivo, Atlas.ti, MAXQDA); Q1211: Using referencing software (e.g. Endnote, Mendeley, Zotero).

Research managerial competence

Items	TI		VP		P		G		VG		E		Total	Total %
Q1212	51	10.56 %	43	8.90 %	83	17.18 %	166	34.37 %	96	19.88 %	44	9.11 %	483	100.00%
Q1213	70	14.49 %	57	11.80 %	110	22.77 %	170	35.20 %	63	13.04 %	13	2.69 %	483	100.00%
Q1214	16	3.31 %	36	7.45 %	77	15.94 %	196	40.58 %	128	26.50 %	30	6.21 %	483	100.00%

Note: *0 = Totally incompetent (TI), 1 = Very poor (VP), 2 = Poor (P), 3 = Good (G), 4 = Very good (VG), 5 = Excellent (E)*

Q1212: Using advanced computing office skills (e.g. advanced tools in Word, in Excel, in Access, in PowerPoint); Q1213: Managing project and financial activities (e.g. project planning, financial planning, project evaluation); Q1214: Communicating fluently in academic English (i.e. both in verbal and written forms).

Emotional research orientation

Items	TD		SD		D		A		SA		TA		Total	Total %
Q131	7	1.45 %	7	1.45 %	18	3.73 %	70	14.49 %	168	34.78 %	213	44.10 %	483	100.00%
Q134	13	2.69 %	22	4.55 %	59	12.22 %	126	26.09 %	161	33.33 %	102	21.12 %	483	100.00%
Q136	7	1.45 %	11	2.28 %	26	5.38 %	78	16.15 %	171	35.40 %	190	39.34 %	483	100.00%
Q137	2	0.41 %	4	0.83 %	8	1.66 %	54	11.18 %	191	39.54 %	224	46.38 %	483	100.00%
Q138	2	0.41 %	8	1.66 %	29	6.00 %	109	22.57 %	193	39.96 %	142	29.40 %	483	100.00%
Q139	4	0.83 %	6	1.24 %	13	2.69 %	72	14.91 %	195	40.37 %	193	39.96 %	483	100.00%

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q131: I clearly understand the values and benefits of research; Q134: I am highly committed to becoming a successful researcher; Q136: I am very much interested in doing research; Q137: I love sharing knowledge and experience; Q138: I love writing and always try to understand how to become a good writer; Q139: I love thinking about new ideas and ideas that bring improvement.

Behavioral research orientation

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q132	43	8.90%	54	11.18 %	81	16.77 %	158	32.71 %	89	18.43 %	58	12.01 %	483	100.00 %
Q133	10	2.07%	21	4.35%	49	10.14 %	140	28.99 %	190	39.34 %	73	15.11 %	483	100.00 %
Q135	50	10.35 %	64	13.25 %	125	25.88 %	150	31.06 %	70	14.49 %	24	4.97%	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q132: I teach fewer courses and/or fewer hours; Q133: I can persevere hard and meticulous research works and challenges; Q135: I have a strong research network, both within and outside of the institution and both locally and internationally.

Research motivation (importance)

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q1411	10	2.07 %	19	3.93 %	55	11.39 %	106	21.95 %	120	24.84 %	173	35.82 %	483	100.00 %
Q1412	17	3.52 %	27	5.59 %	79	16.36 %	164	33.95 %	116	24.02 %	80	16.56 %	483	100.00 %
Q1413	10	2.07 %	22	4.55 %	56	11.59 %	121	25.05 %	163	33.75 %	111	22.98 %	483	100.00 %
Q1414	2	0.41 %	8	1.66 %	25	5.18%	58	12.01 %	171	35.40 %	219	45.34 %	483	100.00 %
Q1415	2	0.41 %	12	2.48 %	25	5.18%	121	25.05 %	191	39.54 %	132	27.33 %	483	100.00 %
Q1416	3	0.62 %	10	2.07 %	28	5.80%	93	19.25 %	197	40.79 %	152	31.47 %	483	100.00 %
Q1417	0	0.00 %	9	1.86 %	17	3.52%	76	15.73 %	152	31.47 %	229	47.41 %	483	100.00 %
Q1418	0	0.00 %	9	1.86 %	15	3.11%	58	12.01 %	172	35.61 %	229	47.41 %	483	100.00 %
Q1419	8	1.66 %	19	3.93 %	43	8.90%	140	28.99 %	152	31.47 %	121	25.05 %	483	100.00 %
Q14110	2	0.41 %	12	2.48 %	14	2.90%	67	13.87 %	180	37.27 %	208	43.06 %	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q1411: Getting better and appropriate salary raises; Q1412: Getting an administrative assignment or promotion; Q1413: Getting commissions or other financial rewards; Q1419: Achieving recognition and appreciation from students, peers, and university's leading members; Q14110: Contributing new knowledge to the field as well as helping the society; Q1414: Getting new research knowledge, skills, and experience; Q1415: Enhancing networks and future collaboration; Q1416: Getting a good job related to research in the future; Q1417: Advancing professional expertise in the field; Q1418: Having newer, clearer, and deeper knowledge and know-hows useful for teaching students.

Research motivation (expectation)

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q1421	23	4.76 %	38	7.87 %	142	29.40 %	156	32.30 %	69	14.29 %	55	11.39 %	483	100.00 %
Q1422	20	4.14 %	38	7.87 %	134	27.74 %	177	36.65 %	77	15.94 %	37	7.66%	483	100.00 %
Q1423	8	1.66 %	46	9.52 %	104	21.53 %	177	36.65 %	95	19.67 %	53	10.97 %	483	100.00 %
Q1424	1	0.21 %	12	2.48 %	45	9.32%	90	18.63 %	185	38.30 %	150	31.06 %	483	100.00 %
Q1425	1	0.21 %	14	2.90 %	48	9.94%	147	30.43 %	187	38.72 %	86	17.81 %	483	100.00 %
Q1426	4	0.83 %	13	2.69 %	55	11.39 %	135	27.95 %	185	38.30 %	91	18.84 %	483	100.00 %
Q1427	1	0.21 %	12	2.48 %	33	6.83%	90	18.63 %	200	41.41 %	147	30.43 %	483	100.00 %
Q1428	1	0.21 %	17	3.52 %	26	5.38%	94	19.46 %	177	36.65 %	168	34.78 %	483	100.00 %
Q1429	7	1.45 %	18	3.73 %	77	15.94 %	172	35.61 %	129	26.71 %	80	16.56 %	483	100.00 %
Q14210	1	0.21 %	16	3.31 %	44	9.11%	103	21.33 %	190	39.34 %	129	26.71 %	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q1421: Getting better and appropriate salary raises; Q1422: Getting an administrative assignment or promotion; Q1423: Getting commissions or other financial rewards; Q1429: Achieving recognition and appreciation from students, peers, and university's leading members; Q14210: Contributing new knowledge to the field as well as helping the society; Q1424: Getting new research knowledge, skills, and experience; Q1425: Enhancing networks and future collaboration; Q1426: Getting a good job related to research in the future; Q1427: Advancing professional expertise in the field; Q1428: Having newer, clearer, and deeper knowledge and know-hows useful for teaching students.

General institutional research support environment

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q311	25	5.18 %	35	7.25%	95	19.67 %	155	32.09 %	115	23.81 %	58	12.01 %	483	100.00 %
Q312	29	6.00 %	45	9.32%	115	23.81 %	164	33.95 %	97	20.08 %	33	6.83%	483	100.00 %
Q316	17	3.52 %	34	7.04%	108	22.36 %	160	33.13 %	116	24.02 %	48	9.94%	483	100.00 %
Q317	21	4.35 %	32	6.63%	103	21.33 %	171	35.40 %	111	22.98 %	45	9.32%	483	100.00 %
Q318	41	8.49 %	67	13.87 %	152	31.47 %	121	25.05 %	73	15.11 %	29	6.00%	483	100.00 %
Q319	28	5.80 %	55	11.39 %	125	25.88 %	163	33.75 %	76	15.73 %	36	7.45%	483	100.00 %
Q3110	18	3.73 %	42	8.70%	98	20.29 %	176	36.44 %	114	23.60 %	35	7.25%	483	100.00 %
Q3111	37	7.66 %	63	13.04 %	112	23.19 %	147	30.43 %	87	18.01 %	37	7.66%	483	100.00 %
Q3112	40	8.28 %	72	14.91 %	140	28.99 %	144	29.81 %	60	12.42 %	27	5.59%	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q311: My current institution has established clear research policy and research strategic/action plan; Q312: My current institution does not only have research policy but also implement research activities efficiently; Q318: My current institution offers great motivation in terms of financial rewards if staff conduct research; Q3112: My current institution comprises a satisfactory salary scale conforming to the working conditions; Q3111: My current institution is ready to build plan to create a position for researcher; Q3110: My current institution has good and active research collaboration with other institutions (e.g. foreign universities, NGOs); Q316: My current institution provides adequate and necessary supports when staff want to engage in research activities; Q317: My current institution offers sufficient time to spend on research activities; Q319: My current institution offers great motivation in terms of non-financial rewards if staff conduct research.

Institution with availability of research capable members

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q313	5	1.04%	19	3.93%	69	14.29 %	156	32.30 %	162	33.54 %	72	14.91 %	483	100.00 %
Q314	6	1.24%	22	4.55%	79	16.36 %	167	34.58 %	140	28.99 %	69	14.29 %	483	100.00 %
Q315	13	2.69%	24	4.97%	83	17.18 %	139	28.78 %	156	32.30 %	68	14.08 %	483	100.00 %

Note: 0 = Totally disapproving (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Approving (TA)

Q313: My current institution comprises professors and academics with high research competence and skills; Q314: My current institution comprises professors and academics with high research experience who can mentor other staff to do research; Q315: My current institution has research-capable and experienced leading members that are open for research activities.

Institutional research facilities and resources

Items	NE		VP		P		G		VG		E		Total	Total %
Q341	92	19.05 %	68	14.08 %	121	25.05 %	139	28.78 %	52	10.77 %	11	2.28 %	483	100.00%
Q342	63	13.04 %	63	13.04 %	150	31.06 %	146	30.23 %	53	10.97 %	8	1.66 %	483	100.00%
Q343	9	1.86 %	41	8.49 %	86	17.81 %	206	42.65 %	112	23.19 %	29	6.00 %	483	100.00%
Q344	10	2.07 %	28	5.80 %	101	20.91 %	193	39.96 %	119	24.64 %	32	6.63 %	483	100.00%
Q345	20	4.14 %	49	10.14 %	130	26.92 %	197	40.79 %	66	13.66 %	21	4.35 %	483	100.00%
Q346	27	5.59 %	50	10.35 %	129	26.71 %	186	38.51 %	73	15.11 %	18	3.73 %	483	100.00%
Q347	32	6.63 %	56	11.59 %	124	25.67 %	183	37.89 %	69	14.29 %	19	3.93 %	483	100.00%

Note: *0 = Non-existent (NE), 1 = Very poor (VP), 2 = Poor (P), 3 = Good (G), 4 = Very good (VG), 5 = Excellent (E)*

Q341: Research funding from my institution itself; Q342: Research funding from other sources; Q343: Library and documents (e.g. academic databases, books, journals, archives); Q344: Technology (e.g. computer, internet, instructional technology); Q345: Research support staff; Q346: Research unit in the institution itself; Q347: Research facilities and equipment (e.g. labs, experimentation tools)

Research-oriented departmental leadership

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q331	17	3.52%	26	5.38%	77	15.94 %	142	29.40 %	159	32.92 %	62	12.84 %	483	100.00 %
Q332	8	1.66%	19	3.93%	53	10.97 %	125	25.88 %	184	38.10 %	94	19.46 %	483	100.00 %
Q333	19	3.93%	26	5.38%	78	16.15 %	143	29.61 %	143	29.61 %	74	15.32 %	483	100.00 %
Q334	22	4.55%	40	8.28%	91	18.84 %	141	29.19 %	136	28.16 %	53	10.97 %	483	100.00 %
Q335	15	3.11%	36	7.45%	85	17.60 %	154	31.88 %	143	29.61 %	50	10.35 %	483	100.00 %
Q336	23	4.76%	42	8.70%	84	17.39 %	173	35.82 %	115	23.81 %	46	9.52%	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q331: My department leaders are highly regarded researchers in their field with strong research skills and competence; Q332: My department leaders truly understand the values of and benefits from research; Q333: My department leaders are very supportive of my efforts in research; Q334: My department leaders offer constructive comments and feedbacks which help me perform my best; Q335: My department leaders fulfill their leadership roles very well, with clear guidance and visions; Q336: My department leaders seriously consider my opinions when they have to make important decisions

Research support from ministry

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q321	26	5.38%	44	9.11%	119	24.64 %	159	32.92 %	100	20.70 %	35	7.25%	483	100.00 %
Q322	29	6.00%	61	12.63 %	129	26.71 %	164	33.95 %	79	16.36 %	21	4.35%	483	100.00 %
Q323	49	10.14 %	50	10.35 %	119	24.64 %	138	28.57 %	91	18.84 %	36	7.45%	483	100.00 %
Q324	66	13.66 %	72	14.91 %	149	30.85 %	120	24.84 %	54	11.18 %	22	4.55%	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q321: My current institution receives clear research policy and strategic guidelines from the ministry in charge; Q322: My current institution receives enough local research capacity training from the ministry in charge; Q323: My current institution receives enough overseas fellowship, scholarship, or training from the ministry in charge; Q324: My current institution receives enough research funding from the ministry in charge.

Research support from external sources

Items	TD	TD%	SD	SD%	D	D%	A	A%	SA	SA%	TA	TA%	Total	Total %
Q325	43	8.90%	64	13.25 %	108	22.36 %	164	33.95 %	78	16.15 %	26	5.38%	483	100.00 %
Q326	46	9.52%	66	13.66 %	122	25.26 %	146	30.23 %	81	16.77 %	22	4.55%	483	100.00 %
Q327	40	8.28%	57	11.80 %	124	25.67 %	159	32.92 %	73	15.11 %	30	6.21%	483	100.00 %

Note: 0 = Totally disagree (TD), 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA), 5 = Totally Agree (TA)

Q325: My current institution obtains enough research funding or consultancy works from external donors or collaborating institutions; Q326: My current institution receives enough supported research facilities from external donors or collaborating institutions; Q327: My current institution receives enough research training from external donors or collaborating institutions.

Appendix 7: Components of Principle Component Analyses of independent variables

Components	Items	1	2	3	4	Cronbach alpha
Research experience						
Research experience	I have experience writing project reports or research reports	.814				0.836
	I have experience writing research papers for publication	.782				
	I have attended and/or presented my research papers at academic conferences	.776				
	I have experience working with various research or consultancy projects	.751				
	I engaged actively in research during my graduate education (e.g. in research design, data collection, data analysis).	.704				
	I have thoroughly read published research articles related to my field of expertise	.630				
Research competence						
General research competence	Collecting research data using proper instruments (e.g. interview, observation, focus group discussion)	.810				0.913
	Analyzing quantitative data using statistics (e.g. test of difference, regression, factor analysis)	.796				
	Analyzing qualitative data using qualitative approaches (e.g. thematic analysis, content analysis, grounded theory)	.740				
	Designing research study (e.g. designing questionnaire, developing conceptual framework, designing experiment)	.733				
	Finding and synthesizing relevant literature effectively	.599				
Research technological competence	Using qualitative data analysis software (e.g. Nvivo, Atlas.ti, MAXQDA)		.849			0.804
	Using referencing software (e.g. Endnote, Mendeley, Zotero)		.735			
	Using quantitative data analysis software (e.g. SPSS, STATA, SAS, Matlab, R)		.676			
Research production competence	Presenting research paper at academic conference			.736		0.815
	Writing scientific research paper for publication			.705		
	Writing research grant proposal to apply for funding			.579		
Research managerial competence	Using advanced computing office skills (e.g. advanced tools in Word, in Excel, in Access, in PowerPoint)				.846	0.747
	Communicating fluently in academic English (i.e. both in verbal and written forms)				.653	
	Managing project and financial activities (e.g. project planning, financial planning, project evaluation)				.584	
Research attitudinal orientation						
Emotional research orientation	I love sharing knowledge and experience	.855				0.881
	I love writing and always try to understand how to become a good writer	.845				
	I love thinking about new ideas and ideas that bring improvement	.825				
	I am very much interested in doing research	.806				
	I clearly understand the values and benefits of research	.650				
	I am highly committed to becoming a successful researcher	.594				
Behavioral research orientation	I have a strong research network, both within and outside of the institution and both locally and internationally		.756			0.541
	I teach fewer courses and/or fewer hours		.653			
	I can persevere hard and meticulous research works and challenges		.605			

Research motivation

Intrinsic research motivation	Achieving recognition and appreciation from students, peers, and university's leading members	.884				0.926
	Contributing new knowledge to the field as well as helping the society	.864				
	Getting new research knowledge, skills, and experience	.844				
	Enhancing networks and future collaboration	.792				
	Getting a good job related to research in the future	.769				
	Advancing professional expertise in the field	.711				
	Having newer, clearer, and deeper knowledge and know-hows useful for teaching students	.598				
Extrinsic research motivation	Getting better and appropriate salary raises		.853			0.837
	Getting an administrative assignment or promotion		.813			
	Getting commissions or other financial rewards		.803			

Institutional research support environment

General institutional research support	My current institution comprises a satisfactory salary scale conforming to the working conditions	.816				0.921
	My current institution offers great motivation in terms of financial rewards if staff conduct research	.814				
	My current institution is ready to or have plan to create a position for researcher	.779				
	My current institution offers sufficient time to spend on research activities	.725				
	My current institution provides adequate and necessary supports when staff want to engage in research activities	.723				
	My current institution offers great motivation in terms of non-financial rewards if staff conduct research	.715				
	My current institution does not only have research policy but also implement research activities efficiently	.714				
	My current institution has good and active research collaboration with other institutions (e.g. foreign universities, NGOs)	.677				
	My current institution has established clear research policy and research strategic/action plan	.667				
Availability of research capable members	My current institution comprises professors and academics with high research experience who can mentor other staff to do research		.912			0.852
	My current institution comprises professors and academics with high research competence and skills		.904			
	My current institution has research-capable and experienced leading members that are open for research activities		.642			

Departmental leadership

Departmental leadership	My department leaders fulfill their leadership roles very well, with clear guidance and visions	.917				0.934
	My department leaders offer constructive comments and feedbacks which help me perform my best	.903				
	My department leaders are very supportive of my efforts in research	.879				
	My department leaders seriously consider my opinions when they have to make important decisions	.867				
	My department leaders truly understand the values of and benefits from research	.833				
	My department leaders are highly regarded researchers in their field with strong research skills and competence	.805				

Research resources and facilities

Research resources and facilities	Research support staff	.832				0.875
	Research unit in the institution itself	.822				
	Research facilities and equipment (e.g. labs, experimentation tools)	.820				
	Library and documents (e.g. academic databases, books, journals, archives)	.732				
	Technology to support research (e.g. computer, internet, instructional technology)	.706				
	Research funding from my institution itself	.702				
	Research funding from other sources	.697				

Research support from ministry

Research support from ministry	My current institution receives enough local research capacity training from the ministry in charge	.856				0.848
	My current institution receives enough research funding from the ministry in charge	.837				
	My current institution receives clear research policy and strategic guidelines from the ministry in charge	.827				
	My current institution receives enough overseas fellowship, scholarship, or training from the ministry in charge	.801				

Research support from external sources

Research support from external sources	My current institution receives enough supported research facilities from external donors or collaborating institutions	.945				0.917
	My current institution obtains enough research funding from external donors or collaborating institutions	.928				
	My current institution receives enough research training from external donors or collaborating institutions	.906				

Note: Analyses were conducted based on major construct designed at early stages of questionnaire development. Principle component analysis with Varimax rotation and Eigen Value > 1 as determinant of factors were used.

Appendix 8: Qualitative transcript and level-1 coding sample

RI	Open/Level 1 Codes (and Memo)	Original Transcript
1.		Ir: In general, because you have experienced doing research at [your institution] and you lead research activities here, I want to know the situation of research at your institution and your research experience.
2.	Perceiving good research trend but not comparable to developed countries; Perceiving doctoral graduates doing research activities; Perceiving network as important for research activities; Social attention; Increased university research infrastructure; Increasing salary scale as research promoting strategy; Creating research position as research promoting strategy; Making research position related to teaching loads and to salary scales; Sharing university bonuses to active researchers as strategy; Experiencing research in water-related areas	Ie: I think research at our institution is quite good if we talk inside of our nation, but it is not at that level of Japan or anything… There are about 40 doctoral graduates from abroad… they know a lot… when they can get doctoral degree it implies that they know how to do research at least to a certain degree. They come back with their own research projects. They have connection with their professor. So they have continued doing research. Our country now also pays close attention on research. We can see research becoming increasingly active. That goes along with the university mechanism; the university has more infrastructure to support research. Say, there are … things that allow them to do research, first of all. Second we have soft infrastructure; say we create system. For example, if he is a researcher, he gets higher salary than those who just teach. Double salary… That is the position as a researcher. We call it teacher-researcher and full-time researcher. There are two of them. In French, we say [in French] … and [in French] meaning they both teach and do research. This group gets double salary compared to ordinary teacher group… one of the salary package… right that is not much… I don't want to talk about exact amount… but double… but they do not teach over 192 hours per year. But for each hour of teaching, they get paid the same amount as ordinary teacher. And they get a separate salary as a researcher. How much they get after the end of the year is another supporting package. These two systems work in the condition of [my institution]. And as for my own research, I focus on the quality of water. When we talk about water it is something broad. There is waste water, underground water, etc. I focus on surface water. Water on the ground or lake, river, etc. We check its quality to manage it… we want to see why it is polluted and how can we avoid pollution… That is called surface water management. That is my own research.
3.		Ir: What is the sources of funding of these research works?
4.	Having mostly external funding sources; Evidence of call-for-proposal funding; Funding from proposal applications	Ie: We get it from external sources, almost all of them. We get funds from JICA, funds from France, from Belgium. When they call for proposal, we find funding from them… in Europe, we joint research with them. Some of them we wrote the proposal just by ourselves… Like so…
5.		Ir: Most of the time, we were the initiators? The writers of the proposal and submit it?
6.		Ie: Right right…
7.		Ir: How about others coming to us and ask us to join research?

8.	Having fewer in-flow funding; Mostly writing proposals for funds; Research collaborations having little fund; Self-management of funding and projects	Ie: There are … There are… but to my understanding… there are not many of them… Most of the time we write by ourselves… maybe about 30 percent of such things… sometimes they just send our names along… And they get that proposal and work on it… but that does not give us much… not many activities… But for the proposal we write on our own, we can manage it by ourselves… including finance, research activities, and everything… But the ones that others do and we just cooperate… not much… they just drop 4000… 5000 USD or similar amount for us to do various little things such as collecting data and things like that… that is not much…
9.		Ir: How is the funding allocation like in [your institution]?
10.	Finance allocation based on grant allocation; Having university-researchers joint research management; Researchers dealing with technical things themselves	Ie: Here, if we write proposals, the finance… for grants we get, they have their regulations. The university seemingly doesn't take anything. Just like taking the fund and lets us do… when we need money we can withdraw the money through the university account... according to for example the guideline from JICA. And we deal directly with JICA on financial issues… and research and technical issues… directly… Researchers do it themselves.
11.		Ir: In overall, can you know how many research projects here at [your institution]?
12.	Having 28 research projects; Having projects in all departments	Ie: Now we have 28 research projects. Right now…. Right in all departments.
13.		Ir: Can you talk a little bit about the focused topics of those projects?
14.	Increased research projects since 2010	Ie: I don't remember… A lot of them… there are… lots of them I can't remember… There maybe are information in the book… you can get the information on [our] website… The research increases… year by year… since we have focused on research in 2010…
15.		Ir: Why did the institution start to focus on research since 2010, bang?
16.	Having available human resources as factor for research initiation; Having equipment and facilities as factor of research initiation; Returning of Ph.D. graduate as factor for research initiation; University restructuring as factor of research initiation	Ie: Human resources and equipment come in a lot in that year 2010… before we have 3 or 4 doctoral graduates… maybe at most 5 people … but since 2010… lots of doctoral graduates reached the time to come back… five per year or 10 per year… And we also started to focus on research by creating the status of [in French] full time… because we have that criteria, there are people starting to submit for fund.
17.		Ir: Are there publications to journal outlets or something, bang?
18.	Having publications at local, regional, and international level; Publishing conference papers/proceedings	Ie: There are… there are publications at the international level, some at local level, some at the regional level… some in the forms of conference papers… some in the form of proceedings… like so… different levels…
19.		Ir: Do all research project require us to publish?

20.	Not all research projects being published; Research report writing; Existing institutional desire to see publication; Having busyness as factor for not producing research	Ie: No, not all. Depends on the project. In some projects, they require us to publish one as their requirement. Say at least a peer-reviewed journal… like so… For others they just require us to write reports to them… But us as a research-oriented institution, we do not want that… we always push them to publish… but not all of them can do it… because they have lots of tasks not just research…
Note: This is not a full transcript.		

Appendix 9: Curriculum vitae

I. Academic Qualifications

Period:	Degree/Certificate and Institution:
2014 – Present	Pursuing Ph.D. degree in **Educational Development** at Graduate School for International Development and Cooperation (IDEC), Hiroshima University (HU)
2012 – 2014	Master of Arts (M.A.) in **Educational Development** from Graduate School for International Development and Cooperation (IDEC), Hiroshima University (HU)
2005 – 2010	Bachelor of Business Administration (BBA) in **Project Management** from Cambodian Mekong University (CMU)
2003 – 2007	Bachelor of Education (B.Ed) in **Teaching English as a Foreign Language** (TEFL) from Institute of Foreign Languages (IFL), Royal University of Phnom Penh (RUPP)

II. Scholarly Outputs

Published Peer-Reviewed Journal Articles:

- Eam, P. (2015). Faculty involvement in research activity at Cambodian public higher education institutions: Trends, patterns and key characteristics. *International Journal of Comparative Education and Development*, *17*(2), 97-114.
- Eam, P. (2015). Investigating relationship among research self-efficacy, research outcome expectation, and research interest of Cambodian faculty: Testing social-cognitive theory. *International Journal of Sociology of Education*, *4*(3), 199-224.
- Eam, P. (2015). Factors differentiating research involvement among faculty members: A perspective from Cambodia. *Excellence in Higher Education, 6,* 1-11.
- Eam, P., & Seng, C. (2016). A path analysis of Cambodian faculty's research intention: Focusing on direct and mediating effects at individual level. *International Journal of Educational Psychology*. (Under review)

Academic Conference Presentations:

- Eam, P. (2015). Characteristics and patterns of involvement in research activities at Cambodian higher education institutions: The case of five public universities. Presented at the Japanese Comparative Education Society (JCES) 51st annual conference (from 12th to 14th June 2015) at Utsunomiya University, Japan.

- Eam, P. (2015). Do research self-efficacy and research outcome expectation of Cambodian faculty explain their research interest? Another evidence supporting Social-Cognitive Theory. Presented at the International Conference for Educational Research (ICER) (from 14th to 16th October 2015) at Seoul National University, Korea.

- Eam, P. (2016). Factors affecting research intention of Cambodian faculty. Presented at the Japanese Comparative Education Society (JCES) 52nd annual conference (from 24th to 26th June 2016) at Osaka University, Japan.

III. Major Internship, Scholarship, and Other Academic Experience

Internship:

- Internship program on Research Development and Teaching Assistantship at Florida State University, Florida, United States of America (2014/08/16 – 2014/09/26), supported by G.ecbo Program and funded by Satake Foundation.

- The APCEIU 16th Training Workshop on Global Citizenship Education in Seoul and Inje, South Korea (2016/08/16 – 2016/08/24), funded by Asia-Pacific Centre of Education for International Understanding (APCEIU) and permitted by Cambodia Development Resource Institute (CDRI).

Scholarships and Supporting Grants:

- Cambodian Government Scholarship (through Ministry of Education, Youth, and Sport) for a four-year study at Institute of Foreign Language (IFL), Royal University of Phnom Penh (RUPP) (2003/10/01 – 2007/07/31) for a Bachelor of Education.

- Cambodian Mekong University (CMU) scholarship for a four-year study (2005/10/01 – 2009/10/31) for a Bachelor of Business Administration.

- Japanese Government scholarship (i.e. Monbukagakusho Scholarship) for a 6-year study at Hiroshima University (HU) (2011/04/01 – 2017/03/31) for a Master's degree and a Doctoral degree in Educational Development.