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**Master's Thesis of Public Administration**

**A Comparative Study for the R&D  
supporting systems between Seoul  
National University and Arizona State  
University**

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# **A Comparative Study for the R&D supporting systems between Seoul National University and Arizona State University**

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## **Abstract**

# **A Comparative Study for the R&D supporting systems between Seoul National University and Arizona State University**

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Since its establishment in 1946, Seoul National University has played an important role in education and research in Korea for more than 70 years as a leading national university. Especially, it is required to play a more important role in research and development (R&D) with the advent of the knowledge-based economy.

This study tries to explore R&D supporting systems of Seoul National University (SNU) which incorporated on December 28, 2011. In Seoul National University, there are concerns about future changes such as decrease of government grant which are derived from the incorporation might lead decline in R&D performance. Since current R&D supporting systems of Seoul National University is the extension of past systems which had existed before the incorporation, it is important to suggest future directions of R&D supporting systems preparing for the future changes of the university's R&D environment.

With regard to this issue, SNU might adopt several lessons from prominent state universities in the U.S. about their structure of organization, policies & programs, research fund, technology licensing & commercialization, and regulations of R&D management. Arizona State University (ASU), which is

located in Arizona State, is one of the best state universities in the U.S. Arizona State University has achieved remarkable growth in the research after it became R1 University in 1994.

The purpose of this study is to provide helpful suggestions to improve R&D supporting systems of Seoul National University by investigating various aspects of those in Seoul National University and Arizona State University.

This thesis found several lessons from the comparison of the R&D supporting systems of Seoul National University and those of Arizona State University.

First, the role redistribution of ORA (Office of Research Affairs) and R&DB Foundation may be considered to develop more efficient R&D management process. For example, ORA can be specialized to manage overall funded research process and R&DB Foundation can be specialized IP (Intellectual Property) management. In addition, it might be better for ORA to expand its roles for improving the quality of researches by referring OKED at ASU cases.

Second, the current R&D supporting programs and policies at SNU looks like too much focusing on direct financial supports to the researchers. These programs have a positive role to attract prominent scholars into the university. However, it might be just consumption rather than a long term investment. Instead, it might be better to develop various R&D management programs and strategies such as fostering entrepreneurship or relationship management as ASU has done.

Third, SNU is required to be largely engaged in the research fund management process including proposal process not just being limited in connecting research fund organizations and researchers. In that sense, various activities to enhance quality of a researcher's proposals is required at SNU just as ASU is doing, which can bring more chances for funding competitions.

Forth, technology licensing and commercialization management requires professional supports and strategic approaches, which includes specialization of R&DB Foundation on IP management and deciding selective fields of R&D investment which can bring substantial profit. In addition, technology licensing and commercialization management requires university-industry collaboration, therefore, for better performance, university should provide supporting services and useful information for industry as well as faculty. This means universities should try to attract industry to make further cooperation and investment.

Fifth, SNU is required to change its systems for perspective of users not for managers. For example, R&D regulations at SNU are required to be briefly and concisely refined for the perspective of the user. It includes endeavors for integration of regulations and guidelines and elimination of duplicated or unnecessary regulations.

Last but not least, current indirect expenses collecting rates and royalty distribution rates at SNU can be good incentives to the researchers. However, those rates might be reconsidered for more investments of the facilities and infrastructure to improve R&D supporting environment of the university. I insist that investments to R&D infrastructure are more important than monetary incentives for fostering fundamental R&D capacity of the university.

**Keywords:** Research and development, R&D supporting systems, R&D promotion, Seoul National University, Arizona State University

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# Chapter I Introduction

The 21st century is characterized as the knowledge-based economy. Universities are considered among the main engines of the post-industrial era and of the knowledge-based economy.<sup>1</sup> Therefore, the role of universities as a source of knowledge production becomes more important in the knowledge-based economy.

Education and research are the basic missions of universities. Universities in South Korea traditionally have had their weight on the educational role rather than research.<sup>2</sup> Nowadays, universities in the country have faced various challenges, which forces them strengthen their research capacity to survive in rapidly changing environments of the knowledge-based economy.

The emphasis on research and development (R&D) capacity of universities has appeared as a global trend as well as South Korea.<sup>3</sup> Universities are considered as regional innovation hubs or supporters at the research and development for companies. Universities often work together with other parties such as industry and public research institutes via various forms for better performances. Similarly, for the industry, the needs for research cooperation with universities have been increased due to the complexity, convergence, and high cost of R&D.<sup>4</sup>

One of the most significant challenges of the science and technology policies under the knowledge-based economy is how to efficiently align research activities of universities with those of industry. Expenditures by industry for cooperative research with universities in developed countries has more than doubled for recent 10 years and participations of universities in national researches has been rapidly growing.<sup>5</sup> Linking mechanisms between universities and companies are also getting more diverse such as laboratory entrepreneurship, incubating system, and attracting venture investment.<sup>6</sup> A university-industry collaboration mechanism needs to be taken when it comes to a discussion about R&D capacity of universities.

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<sup>1</sup> Altbach, P.G. (2002). Research and training in higher education: The state of the art. *Higher education in Europe*, 27, 1-2, p153

<sup>2</sup> Kim, S. S. (1999). Promotion policies of the university research in Korea. *Science & Technology Policy Institute*, p3

<sup>3</sup> Ibid., p3

<sup>4</sup> Ibid., p3

<sup>5</sup> Yoon, M. S., Kwon, Y. S. (2001). University-industry links and research-based spin-offs. *Policy Research*, 1-142, p2

<sup>6</sup> Ibid., p2

This study tries to explore R&D supporting systems of Seoul National University (SNU) which incorporated on December 28, 2011. Incorporation policy in South Korea has been promoted as a part of the New Public Management (NPM) which emphasizes on downsizing roles of government while expanding roles of market to ensure accountability and performances of a public sector.<sup>7</sup> According to the NPM doctrine, the creation of agencies with greater management autonomy, combined with performance-based pressures to perform, will induce public sector organizations to modernize their management and optimize their functioning, which will ultimately improve their performance.<sup>8</sup>

In this sense, incorporation is an attempt to create a new paradigm as a university with more accountability and efficiency through autonomous changes of overall university operation systems intending better performance. Seoul National University has an obligation to make a constant effort on focusing its resources to develop better operation systems by taking advantage of granted autonomy at any fields.

U.S. universities accepted German's but have created their own systems.<sup>9</sup> In case of U.S., due to the expansion and diversification of higher education, the need for specialized administration and professionals had been emerging since 1950s. As a result, current environment for teaching and research have been established.<sup>10</sup> Moreover, it also seems the development paths of higher education in the U.S. and Korea are similar while there is time lag.<sup>11</sup>

Considering these perspectives, I compare the R&D supporting systems of a U.S. university with Seoul National University. There is no national university in U.S., a state university in U.S would be a good comparative case than private universities alternatively in that they have common points such as having more relations with the government than private universities.

Arizona State University (ASU) which is located in Arizona State, U.S. is one of the prominent state university in U.S. Arizona State University has achieved remarkable growth in the research after it became R1 University in 1994.<sup>12</sup>

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<sup>7</sup> Han, S. J. (2011). A Study on the Performance of the Corporatization of Governmental Bodies: The Corporate Institution of Sejong Center, *Administration Non Chong*, 49(4), p305-306

<sup>8</sup> Verhoest, K. et al. (2010). Autonomy and Control of State Agencies, *New York: Palgrave Macmillan*, p4

<sup>9</sup> Kim, S. S. (1999). p6

<sup>10</sup> Byun, K. Y. & Lee, S. Y. (2015). Establishing Higher Education as a New Field of Study based on Inter-/Multi-disciplinary Approach, *The Korea Educational Review*, 21(1), p202

<sup>11</sup> Ibid., p202

<sup>12</sup> "The Carnegie Foundation for the Advancement of Teaching" classified Arizona State University as Research Universities 1, that engage in extensive research activity.

Moreover, it has been selected nation's most innovative school for second straight years by the U.S. News and World Report (ASU news: <https://asunow.asu.edu>). Table 1 shows basic information about Seoul National University and Arizona State University.

According to the table, both universities share similarities such as similar global ranking by U.S. News and World report in 2017 - SNU ranked at 119th and ASU at 121st. However, there are also differences in that ASU has more professors and students than SNU. ASU has a strong leadership which has continued more than 15 years while SNU leadership only continues 4 years. There might be various factors to affect these differences such as amount of tuition, government policies to manage student quota, and degree of globalization of the universities.

In Seoul National University, there are concerns that future changes such as decrease of government grant which are derived from the incorporation might lead decline in R&D performance so that funding pressure will continue to increase. Since current R&D supporting systems of Seoul National University is the extension of past systems which had existed before the incorporation, it is important to suggest future directions of R&D supporting systems preparing for the future changes of the university's R&D environment. As we can see figure 2 and 5, dependency on the government in R&D funding at ASU (48.54% in 2015) is much less than that of SNU (71.43% in 2015). In this sense, ASU can be a good model for SNU to prepare for decrease of government grant.

The purpose of this study is to provide helpful suggestions to improve R&D supporting systems of Seoul National University by investigating various aspects of those in Seoul National University and Arizona State University. Because R&D supporting systems should reflect needs of researchers and contribute better performances in R&D, analyzing R&D supporting systems should be the first step to suggest a direction for the improvement of the systems.

This study tries to describe current situations and characteristics of the R&D supporting systems of Seoul National University and Arizona State University focusing on the organizations, policies & programs, funded research processes, technology transfer, and university-industry partnerships. Then, I will try to assess their differences and make several suggestions to improve R&D supporting systems of Seoul National University to correspond to its current and future changes.

# Chapter II Research and Development (R&D)

## 1. Concept of R&D

Research and development (R&D) activities are core economic functions of all industrial societies.<sup>13</sup>

The term of R&D is applied to two concepts: research and development. The National Science Foundation in United States defined it as a concept including a basic research, applied research and development.<sup>14</sup>

First, basic research is a research to obtain a more complete scientific knowledge and understanding about the subject, which is divided into pure basic research which aims to seek new scientific knowledge itself and fundamental research which performs research with very basic characteristics.

Second, applied research includes research projects with specific commercial objectives with respect to products or processes or discovers new scientific knowledge. If the purpose of the study is determined then it is called as the development, which appears in the form of patents.

Third, development is using scientific knowledge systematically to make useful materials, devices, systems and contents of the development called as know-how.

A research can be divided the research by companies and a research by universities or research organizations based on the type of institutions that carry out research. Former is called as an industrial research and the latter as an academic research. It also can be distinguished as a natural science, humanities, social science, and other research by its subjects. An industrial research is mainly focused on natural science and often called as R&D since it is product or service development centered.<sup>15</sup>

## 2. R&D promotion strategies

According to Rahm and colleagues (2013), there are three ways for governments to influence their nation's R&D effort. First is direct funding through grants, loans, appropriations, or government contracts. Second is providing tax and

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<sup>13</sup> Rahm, D., Kirkland, J., & Bozeman, B. (2013). University-industry R&D collaboration in the United States, the United Kingdom, and Japan (Vol. 1). *Springer Science & Business Media*, p1

<sup>14</sup> Yim, S.B., 1986, p5; AICPA, "Accounting for R&D Expenditure." ARS, No.14, New York : AICPA, 1973, p 27-29

<sup>15</sup> Yim, S. B., 1986, p6; 申應均, 研究開發管理, 電波科學社, 1976, p50

financing incentives. Third is creating inter-organizational collaborations that vastly extend and expand the nation's collective R&D effort. University-industry collaborations are a principle type of these inter-organizational R&D efforts.<sup>16</sup>

Universities also use similar strategies to extend their R&D capacity just like their governments: direct funding, providing incentives, and creating infrastructure for the university-industry collaboration. However, there could be various implementation strategies since a university is a research implementation institute itself.

### **3. University-industry R&D collaboration**

The concept of university-industry R&D collaboration is getting important nowadays because increasingly interdisciplinary, complex, costly characteristics of modern science encourage scientists to get involved in collaborative research.<sup>17</sup>

Universities and industry have a long history of collaboration and there are many benefits in forming partnerships for universities and industry alike. For universities, these partnerships can provide financial support for their educational, research and service missions; extend the experience of their students and faculty; identify significant, interesting and relevant problems; enhance regional economic development; and increase employment opportunities for students. Such partnerships, however, are impossible without risks. Conflicts of interest between university and industry researchers, suppression of information from fellow researchers and an 'undermining of academic standards' are real issues and must be managed appropriately. Partnerships can be successful if proactive steps are taken to recognize and mitigate the known risks.<sup>18</sup>

In case of U.S., university R&D collaborations are a growing type of inter-organizational alliance being developed and implemented (Rahm et al., 2013, p.153). Universities try to promote R&D collaborations in a various way. For example, they are serious about promoting technology transfer activities are reassessing their tenure and promotion guidelines to include recognition of patents, collaborative research, and applied areas of inquiry. Sometimes administrations encourage collaborative industrial R&D through policies such as allowing professors time off as well as financial rewards for inventive activity.<sup>19</sup>

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<sup>16</sup> Rahm et al., 2013. p9

<sup>17</sup> Lee, S. H., & Bozeman, B. (2005). The impact of research collaboration on scientific productivity. *Social studies of science*, 35(5), p673

<sup>18</sup> Prigge, G. W. (2005). University—Industry Partnerships: What Do They Mean to Universities? A Review of the Literature. *Industry and Higher Education*, 19(3), p2

<sup>19</sup> Rahm, 2013. p70

In case of South Korea, the recent trend of university-industry collaboration is that it is focusing on the science and technology area while subject universities are excessively concentrated on the high-ranked universities, which is different pattern from the past. The collaboration mechanism is also very diverse including laboratory start-ups, attracting incubators, and investment of universities to venture capital.<sup>20</sup>

According to Rahm and his colleagues,<sup>21</sup> the linkage mechanisms that may encourage university-industry R&D collaboration can be summarized as follows:

- Faculty Members Consulting for Firms
- Student Job Placement in Firms
- Student Internships, Co-ops, or Industrial Fellowships
- Alumni Requests for Faculty Assistance for Firms
- The University Offering Professional Short Course or Research Seminars of Likely Interest to Company Personnel
- Evening, Weekend, or Company-Site Delivery of University Classes
- University Efforts to Show-Case New Technologies Developed or Faculty Research Interest and Skills
- Social Interaction Between Faculty and Industry Personnel
- Research Groups Organized as Multi-Disciplinary Teams
- University Sponsored Technology Transfer Conferences, Technology Expositions, or Shows
- Industry Grants to Departments or Colleges (money or equipment)
- Corporate Gifts or On-Going Support to the University
- Personnel and Equipment Sharing
- Follow-up Expertise Delivery by Inventors to Firms Purchasing Licensed Technology
- Technology Champions
- Membership in Technology Transfer Organizations (such as the Licensing Executives Society, the Society of University Patent Administrators, and the Technology Transfer Society, etc.)
- Participation in State or Local Government Economic Development Programs
- Redefinition of University/College/Department Mission to Encourage Applied Research and Development

#### **4. R&D support & performance of universities**

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<sup>20</sup> Yoon, M. S., Kwon, Y. S. (2001). p2

<sup>21</sup> Rahm et al., 2013. p47

There are several studies about various R&D support conditions of universities and their impacts on R&D capacity.

Minguillo & Thelwall (2014) explored which innovation support infrastructure help Higher Education Institutions with research and technology production and knowledge commercialization. They concluded that typology of the infrastructures - research parks, science parks, and campuses - affect the university–industry collaboration. Besides, they demonstrated that the age of a park also significantly associates with the faster establishment of university–industry partnerships.

Siegel and his colleagues (2003) tried to present quantitative and qualitative evidence on the relative productivity of university technology transfer offices (TTO). Their results suggest that TTO activity is characterized by constant returns to scale and those environmental and institutional factors explain some of the variation in performance. According to their result, productivity may also depend on organizational practices. They concluded that the most critical organizational factors are faculty reward systems, TTO staffing/compensation practices, and cultural barriers between universities and firms.

Mansfield & Lee's research (1996) tried to figure out the factors determining which universities will support to do R&D of various types. Specifically, they examined whether the geographical proximity, faculty quality, and the extent of a firm's support of a university affects the number of citations received by a university, and then they reached complicated conclusions, which cannot be easily summarized.

## **5. Research questions**

This research focused on the comparison of R&D supporting systems of Seoul National University and Arizona State University. Specific research questions are:

<Question 1> What are the characteristics of R&D supporting systems in Seoul National University and Arizona State University?

<Question 2> What lessons can be drawn for SNU from the comparison with ASU to improve its R&D supporting systems?

## **6. Selection of comparison criteria**

One of the important points for this comparative study is how to select the

comparison criteria between two universities' R&D supporting systems. Since we are interested in improving R&D effectiveness of the organization through this research, we may start this argument by reviewing those studies which are dealing with the factors or variables related with the R&D effectiveness of organizations.

Mendigorri and colleagues (2016) summarized that many previous authors have coined definition of R&D effectiveness using all or some of following defining factors.<sup>22</sup>

- union of R&D activity and company strategy;
- effort devoted to R&D;
- proper planning of R&D activities;
- identification of market and R&D requirements;
- effective management of R&D personnel;
- effective transfer of technology to industry;
- the use of suitable financial criteria for R&D assessment; and
- good cross-functional teamwork to exploit R&D results.

Medigorri and colleagues (2016) also categorized dimensions and elements of the preliminary scale of "R&D effectiveness" obtained during the content validation phase as strategy, inputs, processes, outputs, and results.<sup>23</sup> They also noted that a vital factor in R&D investment is the existence of an internal organization truly capable of mobilizing and coordinating the above resources, and of promoting the generation of new resources and knowledge.<sup>24</sup>

To sum up these arguments, strategy, processes, organizations are related with the R&D effectiveness and they should be well organized in successful organizations. Additionally, regulations encompass and represent all the factors mentioned above also can be counted as comparison criteria of this study.

In this sense, this study investigates organizations, programs & policies which represent universities' R&D promotion strategies, processes for two main activities of university R&D organizations – Management for research fund and Management for technology licensing & commercialization - and R&D regulations of two universities.

## **7. Method for the research**

This study aims to analyze the current R&D support systems of Seoul National University and Arizona State University and derive the implications for

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<sup>22</sup> Medigorri, E. M. (2016), Measuring the effectiveness of R & D activities: Empirical validation of a scale in the Spanish pharmaceutical sector, *Management Decision*, Vol. 54 No. 2, p324

<sup>23</sup> Ibid., p325

<sup>24</sup> Ibid., p327; Gassmann and Vonzedtwitz(1999); Christensen(2002)



the direction of change of the current R&D supporting systems of Seoul National University by comparison with those of Arizona State University.

To achieve this purpose, qualitative case study is used to compare the characteristics of R&D supporting systems of both universities. Specifically, this study focuses on providing refined information for easy understanding of the characteristics of R&D supporting systems of both universities based on the data and objective information. This study largely depends on checking official announcements and regulations of both universities.

This research also focuses on summarizing current features of R&D support systems such as organizations, policies & programs, processes, technology transfer, university-industry partnership and resource analysis. I would like to collect information about R&D supporting systems via books, papers and web site of each university.

After exploring current features of each university, this study try to figure out similarities and differences from the comparison of both universities.

Finally, this study tries to draw several lessons with discussions of how Seoul National University might learn from Arizona State University to improve its R&D supporting systems based on the above comparisons.

# **Chapter III R&D Capacity of Seoul National University and Arizona State University**

## **1. Seoul National University**

### **1.1 Research funding**

Figure 1 shows the research funding at Seoul National University from 2011 to 2015. According to the figure, the research funding at SNU shows sudden decrease from 612,235 million KRW to 535,135 million KRW between 2012 and 2013, and after then it keeps similar amount of funding. In 2015, the amount of R&D funding at SNU was 544,269 million KRW, which was about 470 million USD. It looks like gradual increase of R&D funding since 2013 after sudden plunge between 2012 and 2013, however, when we convert into USD it shows gradual decrease since 2012 as seen in table 2.

### **1.2 Resources for R&D funding**

Figure 2 indicates resources of R&D funding at Seoul National University from 2013 to 2015, which shows a composition of R&D funding resources. In 2015, while government funding occupies the largest portion (71.43%), the proportion of resources decreases in order of private (14.63%), government-funded institution (11.22%), and university itself (2.35%). For the period, amount of government funding had gradually decreased from 410,820 million KRW to 390,232 million KRW as well as proportion which decreased from 76.48% to 71.43%.

### **1.3 Intellectual property & technology transfer**

Figure 3 indicates intellectual property & technology transfer at Seoul National University from 2013 to 2015. While numbers of patent registrations both of domestic and international has been declined, numbers of technology transfer cases has been increased.

The adoption rate, application cases divided by registration cases, of domestic patents decreased from 73.52% (588 out of 759) in 2013 to 45.69% (456 out of 998). The adoption rate of international patents also decreased from 44.13% (139 out of 315) to 36.33% (93 out of 256).

## **2. Arizona State University**

### **2.1 Research expenditure**

Figure 4 indicates the research expenditure at Arizona State University in 2010, 2014, and 2016. It is impressive that it shows constant increasing trend in the amount of R&D expenditure. ASU ranked top 10 university in 2016 for total research expenditures among institutions without a medical school in U.S. (ASU news: <https://asunow.asu.edu>), which represents that ASU have made a success in R&D capacity expanding.

### **2.2 Resources for R&D funding**

Figure 5 indicates the resources of R&D funding at Arizona State University from 2013 to 2015, which shows a composition of R&D funding resources. While federal government and institution funding occupies most of the amount, order of the proportions of other resources has been changed. In 2015, federal, state, and local government funding occupied almost half (48.53%) of overall funding. 2015. Similar with Seoul National University, federal government funding had gradually decreased for this period.

### **2.3 Intellectual property & technology transfer**

Figure 6 indicates intellectual property & technology transfer at Arizona State University in 2016. This statistics includes the number of start-up companies and major licensing and option agreement. There were 13 start-ups, 60 U.S. patents, 84 major licensing and option agreement in 2016.

## **3. Comparisons of R&D capacity between the universities**

Table 2 shows the comparisons of R&D expenditure converted into USD. The amount of research expenditure of SNU is converted into USD by using the currency exchange rate (USD into KRW) on the last day of the year.

As we can see in the table, when converting the unit into million USD, R&D expenditure at SNU is declining since 2012, while that of ASU is constantly increasing since 2010. SNU used to be ahead of ASU, but recently, it looks that SNU is behind ASU in R&D expenditure.

Figure 7 represents the comparison of proportion of R&D funding resources

between the universities in 2015, which shows high dependency on the government funding in each university. However, dependency on the government in SNU is much more than that of ASU. For example, dependency on government of SNU in 2015 was 71.43%, while that of ASU was 42.87%. In other words, resources of R&D funding are more diverse at ASU than SNU.

Besides, the number of new patents registrations at SNU in 2015 is 465 (domestic) and 93 (international). That of ASU in 2016 is 60 (U.S.). On the other hand, number of technology transfer at SNU in 2015 is 138, while number of major licensing and option agreements at ASU in 2016 is 84. It looks SNU is ahead of ASU in the number of those cases, however, when we take into account the economic size of the countries and economic value of the domestic patents, it is hard to jump into the conclusion that SNU shows better performance.

To sum up, it seems that ASU has similar R&D capacity with SNU, but ASU shows rapid and steady growth in the size of R&D expenditure recently, while there has been fluctuation in SNU. Besides, ASU has various R&D resources and relatively low dependency on the government funding compared with SNU. One may assume that R&D capacity of ASU can be expanded while struggling to improve its management systems to meet various needs of investors.

# Chapter IV R&D supporting systems

## 1. Seoul National University

### 1.1 Organizations for R&D administration

R&D supports functions of Seoul National University are implemented by dual organizations: Office of Research Affairs as an internal organization of the university and R&DB Foundation of Seoul National University as an independent identity which is legally separated from the university.

Figure 8 and 9 are the organization charts of the Office of Research Affairs and R&DB Foundation at SNU, which shows the composition of each organization.

The composition of the Office of Research Affairs - Division of Research Policies, Division of Research Support, and Research Ethics Team - is very simple and its roles are rather comprehensive, instead, the composition of the R&DB Foundation shows detailed functions of the organization based on the team system as figure 9. The composition of the Office of Research Affairs also seems to reflect the characteristics of a government organization, which is focusing on handling budget lawfully and making proper reports and statistics. On the other hand, the composition of the R&DB Foundation reflects complicated and specialized functions to manage R&D process.

To some extent, it looks like the Office of Research Affairs works as a planning/reporting party and R&DB Foundation work as an implementation party. Actually, these two organizations work very closely. Heads of both organizations are same and several staffs are dispatched to other party.

Specific roles of the Office of Research Affairs and R&DB Foundation at Seoul National University are as follows:

#### 1.1.1 R&D supporting roles of the Office of Research Affairs

Office of Research Affairs consists of “Division of Research Policies”, “Division of Research Support”, and “Research Ethics Team.”

First of all, the Division of Research Policies is responsible for the following functions:

- Analyze the R&D investment trend and policies of government and industry and propose future research direction, aim to establish policies to facilitate creative and strategic research
- Establish the R&D direction of the school, and strengthen support in order

to improve the research environment

Secondly, the Research Ethics team operates four ethical review committee and objectives of each committee are as follows:

- Deliberate on the ethical and scientific validity of human subject research plans
- Deliberate on whether consent regarding human subject, or private information such as human specimen or DNA information, has been obtained according to due process of law
- Deliberate on safety measures regarding the human subject or provider of private information such as human specimen or DNA information, and on protection measures for information such as name or resident registration number by which an individual may be identified
- Deliberate on issues regarding the establishment, organization and approval of an information bank for human specimens such as DNA, cells, tissue and DNA information

Lastly, the Division of Research Support operates various programs to support R&D activities, which are summarized in table 3.

Besides, there are 6 committees or boards to plan and review various R&D issues: Future research committee, Committee on Research Integrity, Institutional Animal Care and Use Committee, Institutional Review Board (SNUIRB), Institutional Biosafety Committee (SNUIBC).

It looks that most of budget-involvement programs are operated by the Division of Research Support. The division seems to focus on the various activities to support grant or expenses to the professors.

### **1.1.2 R&D supporting systems of the SNU R&DB Foundation**

Followings are the functions of R&DB Foundation at Seoul National University. R&DB Foundation is the separated legal entity from Seoul National University and its functions are classified into research management, intellectual property management, technology transfer & commercialization, and supports for R&D education.

- Research management functions are related to the information supporting functions including research fund central management (systems that oversee the performing of expenditure, contracts, purchasing, execution, and settlement, etc.) and information providing function such as announcement of on-campus/off-campus R&D projects.
- Function of Intellectual Property Rights is creating barriers to entry against competitors, protects marketing advantages and value as an asset

that creates royalties.

- Technology Licensing refers to the act of providing full execution rights to or acceding all rights due to the request of the inventor of the technology (intangible products such as patent rights, program, know-how etc.), request of a corporation with demand for the technology, or TLO marketing.
- R&D Education Center is established based on the vision and medium-and-long-term development strategy of Seoul National University and SNU R&DB Foundation. It aims to provide systematic and comprehensive education for research administration personnel and researchers of ongoing research in SNU R&DB Foundation, various colleges(graduate schools), research institute and centers, in hope of nurturing professionals in academic-industrial cooperation.

To sum up, the SNU R&DB Foundation is mainly with the ability to provide research information and administrative support as well as it is also responsible for functions related to intellectual property and technological commercialization.

## **1.2 Policies & programs for R&D support**

Most R&D supporting programs currently implemented are described in table 3, which is operated by Division of Research Support at SNU. Besides, there are several policies to foster R&D activities at SNU.

### **1.2.1 Research policies**

The Division of Research Policies makes plans and implements research policies at Seoul National University. Figure 10 shows how the research policy making process works at SNU with its partners.

Main agendas and support systems of research policies at SNU are summarized as follows:

#### **1.2.1.1 Roles of Research planning & policy committee**

Objectives of this committee are to propose future research direction/initiatives, provide research support and establish research policies, establish initiatives for improvement of research environment, strengthen the deliberation function and act as a control tower for research at Seoul National University.

Related committees are as follows:

- Future Research Committee: Proposes future research direction/initiatives, policies and planning
- Research Operations Committee: Provides research support and establishes policies to improve research environment
- Research Administration Coordination Committee: Acts as a communication channel for research administration and works to improve research administration
- Research Administration Working-level meeting: Working-level conference for research administration managers aiming for system improvement

### **1.2.1.2 Delayed Research Funds Support System**

The objectives of this systems is to solve expenses related problems such as borrowing research funds due to delayed deposit, delayed labor payment, use of individual credit card, credit transactions etc., to ensure a positive environment in which the researcher may fully focus on research activities. Application procedure of this system is as follows:

- In case research expense deposit is delayed and advanced payment is needed, research person in charge (PIC) will draw up an indemnity report and submit it to the head of the relevant management institution (or the affiliated institution).
- The head of the relevant management institution shall review the indemnity report submitted by the research PIC and approve the requested expenses within a limit of 50% of the total research funds and after approval, shall make a request to the head of the R&DB Foundation through the OSOS system.
- Use of delayed research expenses is allowed after the review and approval of the indemnity report and application by the head of the R&DB Foundation.

### **1.2.1.3 Support for administration support personnel for major governmental R&D project**

- The objectives of this program is to motive researchers by providing administrative staff during major research projects and ensuring the research environment in which researchers could fully focus on their research. Also, this program aims to create an atmosphere of active



research by supporting additional administration staff in order to maximize research output and create a basis for becoming a world-class research-oriented university.

- Eligibility of this program is that of any major national R&D project with a research fund allocation for the current year to Seoul National University above 1 billion KRW, any project with an indirect fund collection ratio exceeding 15%, and/or, any Scientific Research Center or Government Supported Research Center with a research fund allocation for the current year to Seoul National University above 1 billion KRW.

### **1.2.2 Overhead (indirect expenses) collecting policy**

Overhead (Indirect expenses of the research funding) collecting rate for the research service also can be an important issue for both researchers and universities. The overhead collecting is necessary because it is used for all facilities, labor cost, and other operating expenses to support all research activities in universities. However, those expenses can discourage researchers since they are recognized as extra costs.

Overhead for the research service is levied by the rate announced by the government announcement, and the details of the rate are determined by the head of SNU R&DB Foundation after deliberation of the Research Council. In accordance overhead collecting rate of Seoul National University, the national R&D projects are 28.9%, private projects are 15% and 5% government service projects. And overhead costs are collected when the R&D fund is transferred, and the collection of overhead costs are allocated to 55% to the SNU R&DB Foundation(45% of the common expenses such as utility bills and 10% of book purchasing expenses) and 45% to the college which researcher belong to. Overhead collection contributes to the proper working of R&D support systems and the development of university as a whole. In other hand, it can be a limiting factor to the researchers since the range of utilizing R&D funds. Therefore, in-depth discussion is needed to determine proper size of the overhead collection for both researchers and university.

### **1.2.3 Unburden of educational responsibility for professors**

The factor that could affect the R&D performance of the faculty members is the burden of educational responsibility for professors. It may generate synergies between the two roles of professors: education and research. However, if there is too much emphasis on education, the burden is likely to have a negative impact on

R&D performance of the professors. Seoul National University has implemented unburdens responsible lecture time policies for the professors whose performance are excellent or those who operate research institution which gets high grade in evaluation.

#### **1.2.4 Building infrastructure**

R&D related infrastructure is a factor that can affect the performance of the professors in universities. In particular, due to the recent trend of convergence and complexity of researches, it is getting important to provide interdisciplinary research environment among various area of studies as well as establish industry-university cooperation systems. Seoul National University established Graduate School of Convergence Science and Technology and has operated Advanced Institute of Convergence Technology and National Center for Inter-University Research Facilities. Moreover, there are industry-university cooperative complex at Gwanak campus, Green-bio Research Complex at Pyeong-Chang campus, and venture incubating center at Suwon campus, which shows that the University is continually impelling industry-university cooperation policy.

### **1.3 Research fund management**

Figure 11 is the process of research fund management at Seoul National University. It shows work flow of the funded research project separated by roles of each party involved in the funded research process. Research funds support organizations generally make an announcement and evaluate & select proposals. SNU R&DB Foundation engaged in internal announcement, proposal submission to a funding organization, management of budgeting & expenditure process reflecting a researcher's plan.

The role of R&DB Foundation which has key function of research fund management process is to connect the funding organization and the researchers and to manage appropriate execution of the funds. Figure 12 shows this administrative procedure of research fund execution, which represents the most important concern of the foundation, would be overseeing the appropriate execution of the funds.

### **1.4 Technology licensing and commercialization management**

There are five steps for technology licensing and commercialization at SNU: Signing Memorandum of Agreement, Signing of confidentiality Agreement, Technology testing, Negotiation of Agreement terms, and Agreement signing.

Specific process and explanations for each step of technology licensing and commercialization at SNU are summarized in table 4.

Any intellectual property that has been created by the faculty of the school in relation to their respective duties should be owned by the SNU R&DB Foundation. Figure 13 shows the process for intellectual property management at SNU.

Royalty derived from any given intellectual property will be distributed to the inventors according to “Regulation for intellectual property management at SNU” and “Guidelines for royalty distribution at SNU” as table 5. Net income excludes the intellectual property right costs and technology transfer costs from total income. In case of the net income is more than 20,000,000 KRW, the rates will be determined by the rate of each respective phase and the amount money will be cumulatively added. Remnant net income belongs to the SNU R&DB Foundation.

## **1.5 R&D regulations**

There are 38 internal regulations (including policies and manuals) which regulate research activities at SNU. It is divided into 6 categories except national laws: research fund, special research project, research supports & ethics, intellectual property & entrepreneurship, committee, and other research & university-industry collaboration.

Among those regulations, the most basic regulation is the “Regulations governing SNU research expenses.” It aims to regulate necessary matters for the management of research expenditure including indirect cost expenditures for the professors and researchers at SNU. Table 6 shows summary of those R&D regulations at SNU.

Quantity of the regulations is relatively big in terms of total numbers of regulations which consists of 65,754 words. Besides, there is order of regulations such as regulation, criteria and guidelines, which implies if researchers want to know some topic of their concerns they should try to look up several regulations. This difficulty leads inefficiency in terms of high dependency on research administration.

Besides, SNU provides the forms and templates of documents for research administration process through appendix of regulations or each official document, which requires endeavor of researchers who need to submit documents for administration process.

## **2. Arizona State University**

## **2.1 Organizations for R&D administration**

Similar with SNU, R&D support functions of Arizona State University are implemented by dual organization: Office of Knowledge Enterprise Development (OKED) as an internal organization of the university and ASU Technology Transfer (AzTE) as an independent identity.

### **2.1.1 OKED**

Different from ORA at SNU, OKED at ASU has a various teams and departments according to their specific roles. There are 15 parts of teams and department at OKED as follows:

- Research Academy
- Research Development
- Research Advancement Teams: Unit-Based RA Teams, Centralized RA Team
- Research Advancement Services (RAS)
- The Office for Research and Sponsored Projects Administration (ORSPA): The Proposal and Negotiation Team (PNT), The Office of Industry Research Collaborations, The Award Management Team
- The Fiscal Oversight Team
- The Office of Research Integrity and Assurance
- Department of Animal Care and Technologies
- Research Infrastructure and Facilities Group
- Project Management Office
- Global Operations
- ASU Research Computing

Table 7 shows specific roles of teams & departments in OKED.

### **2.1.2 AzTE**

AzTE is ASU's Exclusive intellectual property management and technology transfer organization for Arizona State University.<sup>25</sup> It was established as an Arizona Limited Liability company with the ASU Foundation as its sole member. Its aim is dissemination of ASU discoveries and inventions to the marketplace.

There are 6 parts at AzTE, which are "Venture Development", "Life

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<sup>25</sup> <http://www.azte.com/>

Sciences Team”, “Physical Sciences Team”, “Business Development Consultants”, “Legal”, and “Finance/Operation Team.” They provide information about intellectual property via Legal part. To sum up, AzTE assists venture development, business development, and intellectual property as follows:

- Venture Development: investor relationships and engagement, startup license negotiation, and post-agreement management
- Business development: product and service potential; market analysis, materials generation and campaign; license structure and negotiation; sponsored research engagement
- Intellectual property: invention disclosure solicitation, management and consulting, and intellectual property management (patents and copyrights)

## **2.2 Policies & programs for R&D support**

When we look through roles of OKED and AzTE, we can see there are various functions and programs to support R&D activities. Different from the cases of SNU, it was hard to find out the cases to support direct expenses for prominent faculty members. However, there are various successful cases of R&D supporting systems at ASU, which activities are focusing on fostering the entrepreneurship and industry partnerships.

Before looking through those activities, I would like to check indirect costs (overhead) rate of ASU to compare with that of SNU.

### **2.2.1 Indirect costs rates collected for research services**

ASU uses a term of “Facility and Administrative (F & A) costs” as a meaning of indirect costs. There are more complications to determine the rates at ASU than those of SNU. The rates also varied depending on whether the proposal is submitted through ASU or ASU Foundation.

#### **2.2.1.1 ASU proposals**

Threshold of F&A costs rate of a project proposed through ASU is usually “Modified Total Direct Cost (MTDC)”, which is applied to all the direct costs minus following: equipment with a unit cost greater than or equal to \$5,000, tuition/fees, participant support, in/out patient care costs, rental of outside facilities, amounts over the first \$25,000 of each subcontract, and alterations/renovations. Alterations/Renovations are defined as having a cost of \$15,000 or more per alteration or renovation. Costs of less than \$15,000 are considered a miscellaneous

expense.

Table 8 shows F&A costs rates of a project which is proposed through ASU.

### **2.2.1.2 ASU Foundation proposals**

The F&A costs rate of a project which is proposed through ASU Foundation is 11% of all direct costs (Total Direct Costs/TDC).

## **2.2.2 Entrepreneurship and economic development**

ASU tries to foster entrepreneurship and economic development. Following is several examples of successful campaigns.

- Empowering women entrepreneurs: ASU secured a \$5 million grant from the U.S. Department of State for Women & Entrepreneurship in the Americas. Through the WE Americas Accelerator, experts from ASU's Thunderbird School of Global Management will provide mentorship, leadership training and business skills development to more than 75 female Latin American entrepreneurs.
- Award-winning innovation: ASU's entrepreneurial spirit was recognized through two prestigious awards in 2016: the Outstanding Achievement as an Entrepreneurial University at the Deshpande Symposium on Innovation and Entrepreneurship in Higher Education, and the Outstanding Contribution to Venture Creation award from the Global Consortium of Entrepreneurship Centers.
- Alumni win Rise of the Rest: NeoLight, a company founded by former ASU students, won the Rise of the Rest – Phoenix startup pitch competition, receiving \$100,000 from AOL co-founder Steve Case. NeoLight is a medical device company that designs phototherapy technologies to treat jaundice in newborns.
- ASU, Samsung tackle cybersecurity: ASU's Center for Cybersecurity and Digital Forensics is helping Samsung Electronics address digital security challenges and advance research, education and entrepreneurship in the field of cybersecurity.

## **2.2.3 Relationship management**

There are several examples to show endeavors of ASU to enhance its research capacity by making constructive relationships with partners, colleagues, and sponsors. It is so called relationship management. Especially, it tries to make

medical partnerships with related parties to overcome its disadvantage of not having a medical school.

- ASU joins network to combat cancer: ASU was selected to lead a Specialized Center in the National Cancer Institute's Chemical Biology Consortium, which brings together leading chemical biologists and molecular oncologists to address unmet needs in therapeutic oncology. ASU's Center for Membrane Protein Drug Discovery, led by Dr. Petra Fromme, aims to determine the structure and dynamics of major cancer drug target membrane proteins.
- ASU teams up with Facebook for research: ASU has signed a Sponsored Academic Research Agreement (SARA) with social media giant Facebook in a mission to improve communication worldwide. The agreement, which is still in its early stages, is likely to operate on an RFP-based approach. We will ensure that for each RFP we are invited to join, all of our expertise is engaged. We will also invite their team to visit ASU in the future to profile all of our assets and expertise.
- Alliance with Mayo Clinic to advance health care: Mayo Clinic, the world leader in patient care, education and research, and ASU, the nation's most innovative university, are bringing together the brightest minds to improve patient care, transform medical education and accelerate cutting-edge research through the Mayo Clinic and Arizona State University Alliance for Health Care. The Mayo Clinic School of Medicine and ASU have developed a novel curriculum in the science of health care delivery. This will be available to students at the new Arizona Campus opening in 2017.

## **2.3 Research fund management**

OKED provides research supporting services according to the steps of a research as table 9. They provide wide range of support services and management throughout the research process from start to conduct researches.

The first step is supporting to identify opportunities and get started. Most interest thing is that there is RA (Research Advancement staff) who is assigned to researchers' unit to support research endeavors and assist researchers when they have questions. RAs provide supports for not just identification and review of funding opportunities, but also provide proposal development and serving as the liaison between researchers and OKED. RAs also link researchers to the resources, tools and teams researchers need at the moment researchers need them. Besides, "experts.asu" is also interesting, which is a searchable database of ASU expertise based on scholarly works and funded awards. The system uses the scholarly works

of our tenured and tenure-track faculty as well as those of selected research faculty and staff to identify, catalog and make searchable the competencies and capabilities that exists across the university. University experts can be identified by searching research units, scientific terms and concepts, as well as full text taken from requests for proposals (RFP), funding opportunity announcements (FOAs), news and journal articles, patents descriptions, business plans, etc.

The second step is supporting to write and submit proposals. In this step, ASU provides project management services to research teams during proposal development and throughout the execution of a sponsored project, specifically, project scoping, budgeting and forecasting, identifying resources and partnering, monitoring and tracking milestone progress, and sponsor reporting and communications. The Office of Industry Research Collaboration at OKED serves as the liaison between ASU and industry and provides guidance to faculty and staff to ensure a successful interaction. When researchers are ready to submit a proposal, RA will coordinate researchers with the Proposals and Negotiations Team or Office of Industry Research Collaboration to review and submit the proposal to the sponsor and notify researchers of any post-proposal submission activities.

The last step is supporting to conduct a research. In this step, ASU provides supporting services for equipment or facilities sharing, cost sharing, supercomputing capabilities, web/technology assistance, central coordinating resource for global project solutions, and fiscal advice.

## **2.4 Technology licensing and commercialization management**

As mentioned, Arizona Technology Enterprises (AzTE) is ASU's exclusive Intellectual Property (IP) management and technology transfer organization. AzTE helps researchers to protect IP, file an invention disclosure, and apply for a patent. For IP management, AzTE provides consulting and IP management (patents and copyrights). For venture development, AzTE provides investor relationships and engagement, startup license negotiation, and post-agreement management services. For business development, AzTE provides product & service potential (market analysis, materials generation and campaign) and license structure & negotiation (sponsored research engagement) services.

In addition, for whom may be interested in launching a startup company, "ASU Entrepreneurship + Innovation (E+I)" program supports entrepreneurs at all stages across ASU and in the community. E+I connects researchers to the information, resources and people that can help turn their ideas into reality. The team can help researchers incubate & accelerate the venture, network with other entrepreneurs, find & become a mentor, identify training & events to help grow the



ideas, and access maker spaces to test ideas and build prototypes.

All the revenue resulted from any given intellectual property will be distributed to the creator, lab, and university according to the RSP (Research and Sponsored Projects Manual) article 604, which summarized in table 10 and 11. The distribution rate varies according to the amount of net income received. 50% of the first \$10,000 of net income will be distributed to creators and 40% to 50% of after \$10,000 will be distributed to creators. The university always receives 33.33% of the net income and remnant will be distributed to the lab.

Besides, AzTE provides a licensing process for industry. The licensing process is designed to achieve two goals: to offer a straightforward legal mechanism for companies to access ASU inventions and to facilitate on-going partnerships for future product commercialization. AzTE shares in the development risk by requiring an initial license fee and a royalty that is received only after a product or process is being sold or otherwise used. There are five steps of licensing process: identifying opportunities (for industry), making non-disclosure agreement, making term sheet draft license agreement, executing license, and managing commitments.

## **2.5 R&D regulations of the university**

While SNU has 38 separated internal regulations & guidelines, ASU has one unified regulation (manual) for the research at ASU, which is “Research and Sponsored Projects Manual (RSPM).” Table 12 shows composition and contents of R&D regulations at ASU. This manual provides policies and procedures relating to funded and unfunded research for all ASU faculty and staff involved in research at ASU.

It consists of 7 categories: Introductory Material, General, Compliance, Proposal, Negotiation, Award, and Collaboration with Other ASU Units, and there are 66 subjects. Except the Introductory Material, General section, which is same as all other regulations at ASU, regulations are divided by each concern/interest of researchers. It means that the readers only need to look up certain section according to their step and purpose so that they can save searching time. For example, when researchers curious about guaranteeing delinquent sponsored projects issue, they just look up “RSP 506-04: guaranteeing delinquent sponsored projects agency/orgs” section then they can find out summarized procedure for dealing with the issue.

Each regulation has similar format: purpose, source, background, applicability, policy, procedure, additional information, and cross-references. Several sections such as background or additional information are often skipped.

The policy part mainly deals with regulations to be abided by. The purpose, source, and background sections which include information about the related federal law and act provide useful background information to understand the policy. This unified and well organized format of the regulation also provides convenience to the readers.

Quantity of the regulations is relatively small in terms of total numbers of regulations which consists of 35,509 words.

Besides, ASU provides the forms and templates of administrative documents collectively through its homepage (<https://researchadmin.asu.edu/documents>), which can contribute to save researchers' time and prevent the confusion between old forms and new forms.

### **3. Summary of R&D supporting systems**

#### **3.1 Organizations for R&D administration**

Both universities have a university organization which takes care of research affairs: Office of Research Affairs (ORA) at SNU and Office of Knowledge Enterprise Development (OKED) at ASU.

While SNU shows simple composition of organizational departments in ORA, ASU shows complicated and detailed composition of organizational departments divided by process or tasks of each research step.

Besides, while most steps for implementation of research funds are in charge of R&DB Foundation at SNU, OKED at ASU directly manages most of the implementation process of research funds.

On the other hand, there are independent institutes which are in charge of Intellectual Property (IP) management and commercialization: R&DB Foundation at SNU and Arizona Technology Enterprises (AzTE) at ASU. Contrary to the above case, organizational composition of R&DB Foundation is much complicated than that of AzTE.

This difference comes from while R&DB Foundation at SNU has both roles of research funds management and IP management while AzTE at ASU seems to focus on IP management only.

Table 13 shows comparison of main R&D support organization in both universities, and table 14 shows comparison of the organizations in charge of university-industry collaboration between the universities

#### **3.2 Policies & programs for R&D supports**

The ways of researcher support look quite different in both universities. SNU trying to publicize various grant programs and internal research funding opportunities. ASU is trying to inform researchers how ASU supports them to get more chances of funding opportunities. For example, ASU publicize how it has made successful investment on fostering entrepreneurship or relationship management with various partners.

The rate of indirect costs (facilities & administrative costs: F&A costs) also looks quite different. Table 15 shows comparisons of the indirect costs rates between the universities. The rate of ASU is much more than that of SNU. For example, while the rate of national R&D projects at SNU is 28.9%, the rate of on-campus research at ASU is 54.5%.

### **3.3 Research fund management**

ASU largely engaged in the research fund management process from linking system to the resources to research advance and development process managed by the Office of Knowledge Enterprise Development, those activity involves enhancing quality of a researcher's proposal. Especially, RAs (research academy staffs) are helping refine proposals, which process could contribute enhancing chance for funding competitions.

SNU also largely engaged in the research fund management process, but the roles of SNU seem to be limited only to connect research fund organizations and researchers compared with the case of ASU.

### **3.4 Technology licensing and commercialization management**

Table 16 shows comparison of the sharing of revenue from intellectual property between SNU and ASU. Similar with the indirect expenses collecting rate, inventors who belong to SNU get more revenue proportion than those of ASU. Creators at SNU will be distributed 50% to 100% of revenue from IP, while creators at ASU will be distributed 40% to 50% of the revenue. Instead, lab of the creator at ASU gets 16.67% to 26.67% of the revenue, which might represent the different perspective to the importance of co-working and support of a university.

### **3.5 R&D regulations**

First of all, ASU has more organized type of the regulation (manual) under only one category (66 sub-regulations) compared with 38 internal regulations of

SNU. Therefore, it is easy to find out information from ASU regulations than SNU since SNU regulations are separately managed. Besides, there are various level of regulations exist in SNU: 18 regulations, 2 criteria, 18 guidelines, and 1 standing rule, while there are only level exists in ASU.

Second, quantity of SNU R&D regulations seems bigger than that of ASU based on the total number of worlds including the regulations. While total R&D regulations of SNU consist of 65,754 worlds, those of ASU consist of 35,059 worlds. Though their languages are different the quantity of ASU is almost half (53.3%) of SNU's when comparing numbers of worlds.

Third, criteria for classification of regulations look different in both universities. Regulations of SNU consist of 6 categories - research fund, special research project, research supports & ethics, intellectual property & entrepreneurship, committee, and other research & university-industry collaboration. On the other hand, those of ASU consist of 7 categories - Introductory Material, General, Compliance, Proposal, Negotiation, Award, and Collaboration with Other ASU Units. It seems that SNU regulations categorized by topic and activities of the research, while ASU regulations categorized by process and issues of the research steps.

Besides, while SNU provides the forms of documents for research administration process through appendix of regulations or each official document, ASU provides them collectively on its homepage, which can save researchers' time and prevent the confusion between old forms and new forms.

To sum up, regulations of ASU are well organized in the view of users, while those of SNU are organized in the view of managers, which leads inefficiency and waste of administration in terms of difficulties to find out what the researchers want to know and high dependency on research administration to resolve this problem.

< Comparisons of R&D supporting systems between SNU and ASU >

	SNU	ASU
<b>Organizations</b>	<p><b>ORA</b> : Simple organizational composition</p> <p><b>R&amp;DB Foundation:</b> Complicated composition in charge of various steps for implementation of research funds and IP management</p>	<p><b>OKED:</b> Complicated and detailed organizational composition, divided by process or tasks of each research step / In charge of most implementation process for research funds</p> <p><b>AzTE:</b> Simple organizational composition only for the IP</p>

		management and commercialization
<b>Policies &amp; Programs</b>	<b>Publicize</b> various grant programs and funding opportunities for researchers Indirect cost collect rate is relatively <b>low</b> .	<b>Inform</b> researchers how ASU supports them to get more chances for research funding Indirect cost collect rate is relatively <b>high</b> .
<b>Research Fund Management</b>	Roles are limited to <b>connect</b> researchers with funding institutions	Largely engaged in research fund management process, involving activities to refine researchers' proposal
<b>Technology licensing and commercialization management</b>	Roles are limited to provide administrative supports to <b>operate</b> the process Revenue proportion for inventors from IP is relatively <b>high</b>	Provides <b>professional consulting</b> and IP management to researchers and provides supports to <b>industry</b> as well Revenue proportion for inventors from IP is relatively <b>low</b>
<b>R&amp;D regulations</b>	Names/Types: Regulation, criteria, guide line, standing rule Consist of 65,754 words <b>Categorized by topic and activities</b> of the research Forms of documents provided via appendix of each regulation or official document	Name: Manual Consist of 35,059 words <b>Categorized by process and issues</b> of the research steps Forms of documents provided collectively on its homepage

# **Chapter V Lessons learned from the comparative Analysis of the R&D Supporting Systems**

## **1. Organizations for R&D administration**

While ORA and R&DB Foundation at SNU work together for R&D research fund management process, OKED at ASU is almost solely engaged in R&D research fund management process. On the other hand, R&DB Foundation at SNU has both roles of research fund management and IP management, while AzTE at ASU are seldom involved in research fund management process. Instead, AzTE is specialized only for IP (Intellectual Property) management.

It is hard to say which one is more efficient system since there might be rationale for establishing current functional distribution. However, even though ORA and R&DB Foundation work closely, there should be some degree of redundant. Moreover, the approaches for the research fund management and IP management are different, therefore, independency and specialization of R&DB Foundation for IP management might be considered to enhance efficiency of both R&D research process management and IP management. This alternative might involve the discussions about transfer of accounting and staffs as well as functions.

In addition, current roles of ORA is much simpler than those of OKED, which means reinforcement for the roles of the Office of Research Affairs as a research headquarter organization of a university also can be considered, which means ORA should contribute to improve the quality of research performance as an academic perspective. Of course, R&DB Foundation also should try to improve the quality of researches as an industrial perspective.

Besides, nowadays, university-industry collaboration is getting more important. Therefore, changes of organizational structure and functions for efficient university-industry collaboration activities are required.

## **2. Policies & programs for R&D support**

One of the conspicuous aspects in current R&D supporting systems at SNU is that it is focusing on direct financial supports to the researchers through various programs. These programs might contribute to attract prominent scholars into the university. Additionally, most of the current supporting & granting programs does not specify areas, which means scholars who study various prominent areas including basic sciences can be the recipients of the programs.

However, if it fails to attract prominent scholars and foster better performance of researchers, these kinds of support can be just consumption not a long-term investment. Another concern is that several kinds of comprehensive incentives can be just distributions of budget not investments. Besides, most of the budget for these programs comes from the government grant, which means sustainability of these programs is doubtful.

In contrast, ASU seems that it is not trying much to publicize various grant programs. Instead, ASU is trying to inform researchers how ASU supports them to get more chances of funding opportunities. For example, ASU publicize how it has made successful investments on fostering entrepreneurship and relationship management with various partners, which can be supportive infrastructure for the researchers.

In addition, with regard to the indirect expenses collecting rate, it looks that SNU is much generous to the researchers than ASU. This generous policy can be a good incentive to the researchers, however, there is concern that it can be related with the lack of R&D investments since the indirect cost can be used to construct and reinforce R&D infrastructures. Of course, increase of the rate requires reasonable and convincible implementation plan ahead of the implementation since there would be intense resistance for raising the rate. However, indirect expenses can be a stable resource for constructing R&D infrastructure and ultimately those investments will benefit researchers as well as a university.

### **3. Research fund management**

While SNU is not much involved in the proposal review process, ASU is much involved in the proposal review process. With regard to the research fund management, the roles of administration at SNU are mainly focusing on supervising appropriate budget implementation. However, those of ASU seem to be focusing on enhancing probability for researchers to be selected funding opportunities. For example, RA (Research Academy Staffs) at ASU supports various activities for researchers to make their proposals better. In that sense, many resources of R&D supporting at SNU seems to be put into direct supports, while ASU put their resources for indirect supports such as assisting proposal process by professionals.

To sum up, with regard to the research fund management, it would be better for SNU to move their focus on how to get more high quality funding opportunities rather than how to enforce supervising functions. For example, adoption of RA system can be a good option since it would contribute for researchers to get professional assistance to enhance the quality of their proposals as well as it may

reduce administrative burdens of both researchers and work forces of each college.

## **4. Technology licensing and commercialization management**

Technology licensing and commercialization management requires professional supports and strategic approaches. With regard to those professional supports and strategic approaches, ASU cases can be good references for SNU. For example, AzTE provides supporting services for industry and students as well as faculty by advertising successful commercialization cases, while SNU is focusing on delivering related information only for faculty. Moreover, AzTE composed of special team such as life sciences team and physical sciences team, which shows strategic approach of ASU for specific R&D field.

Besides, the benefit distribution of commercialization for inventors is more generous at SNU than ASU. This might be a positive incentive to the researchers. However, that money flowing into labs or universities would be used for expanding R&D facilities and infrastructure of universities, therefore, in terms of R&D capacity expanding; the distribution rate might be needed to be reconsidered because both universities and labs require incentives as well to expand their R&D capacity.

## **5. R&D regulations**

In addition, the amount of R&D regulations at SNU seems to be twice as much as ASU. Through in-depth review of whether there are duplicated or unnecessary regulations, reducing the quantity of regulations is required.

Unification of various levels of regulations and guidelines which deal with a same topic also should be considered in that this separation is somehow meaningless from the perspective of researchers. Of course, this issue is about the renovation of the whole regulations system in SNU not just about the R&D regulations. However, the point is that the regulations should be briefly and concisely integrated for the perspective of a user not just a manager.

Besides, providing the forms of documents for research administration process through easily accessible method, via webpage, also be considered to save researchers' time and to prevent the confusion between old versions of forms and new ones.



## Chapter VI Conclusions

Since its establishment in 1946, Seoul National University has played an important role in education and research in Korea for more than 50 years as a leading national university. With the advent of the knowledge-based economy, SNU has played a significant role in research and development.

Recently, there are two major concerns about R&D capacity at SNU. One is R&D expenditures are stagnating for some reasons. The other concern is that there is too much dependency on government for its R&D funding resources. This dependency for specific resource might cause R&D funding crisis if the specific resource suddenly declines. These concerns can be serious threats for R&D development of SNU in the future as SNU is getting exposed to severe competition since its incorporation. SNU should ponder over how to reinforce its R&D capacity in a various way and one feasible way is adapting good cases of abroad universities which show significant growth in their R&D capacity. In this sense, ASU, which shows many similarities with SNU, can be a good reference for SNU in that it shows remarkable growth in its R&D capacity recently. Besides, the funding resources of ASU are more diverse than SNU, which implies ASU has struggled to develop more diverse strategies to meet the various requirements of its clients.

For these reasons, to develop future R&D strategies, SNU might adopt several lessons from ASU about its organizations, policies & programs, research fund, technology licensing & commercialization, and regulations of R&D management. First, the role redistribution of ORA (Office of Research Affairs) and R&DB Foundation may be considered to develop more efficient R&D management process. For example, ORA can be specialized to manage overall funded research process and R&DB Foundation can be specialized IP (Intellectual Property) management. In addition, it might be better for ORA to expand its roles for improving the quality of researches by referring OKED at ASU cases.

Second, the current R&D supporting programs and policies at SNU looks like too much focusing on direct financial supports to the researchers. These programs have a positive role to attract prominent scholars into the university. However, it might be just consumption rather than a long term investment. Instead, it might be better to develop various R&D management programs such as fostering entrepreneurship or relationship management as ASU has done.

Third, SNU is required to be largely engaged in the research fund management process including proposal process not just being limited in connecting research fund organizations and researchers. In that sense, various activities to enhance quality of a researcher's proposals is required at SNU just as

ASU is doing, which can bring more chances for funding competitions.

Forth, technology licensing and commercialization management requires professional supports and strategic approaches, which includes specialization of R&DB Foundation on IP management and deciding selective fields of R&D investment which can bring substantial profit. In addition, technology licensing and commercialization management requires university-industry collaboration, therefore, for better performance, university should provide supporting services and useful information for industry as well as researchers. This means universities should try to attract industry to make further cooperation and investment.

Fifth, SNU is required to change its systems for perspective of users not for managers. For example, R&D regulations at SNU are required to be briefly and concisely refined for the perspective of the user. It includes endeavors for integration of regulations and guidelines and elimination of duplicated or unnecessary regulations.

Last but not least, current indirect expenses collecting rates and royalty distribution rates at SNU can be good incentives to the researchers. However, those rates might be reconsidered for more investments of the facilities and infrastructure to improve R&D supporting environment of the university. I insist that investments to R&D infrastructure are better than monetary incentives for fostering fundamental R&D capacity of the university.

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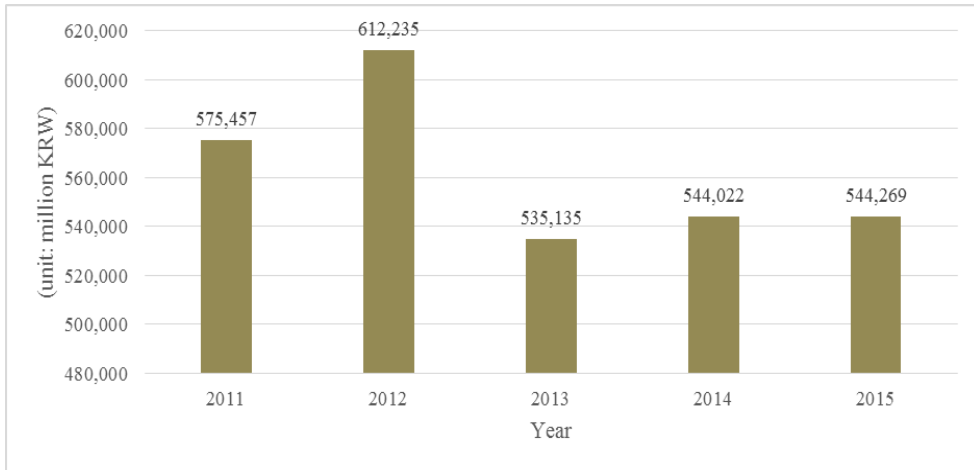
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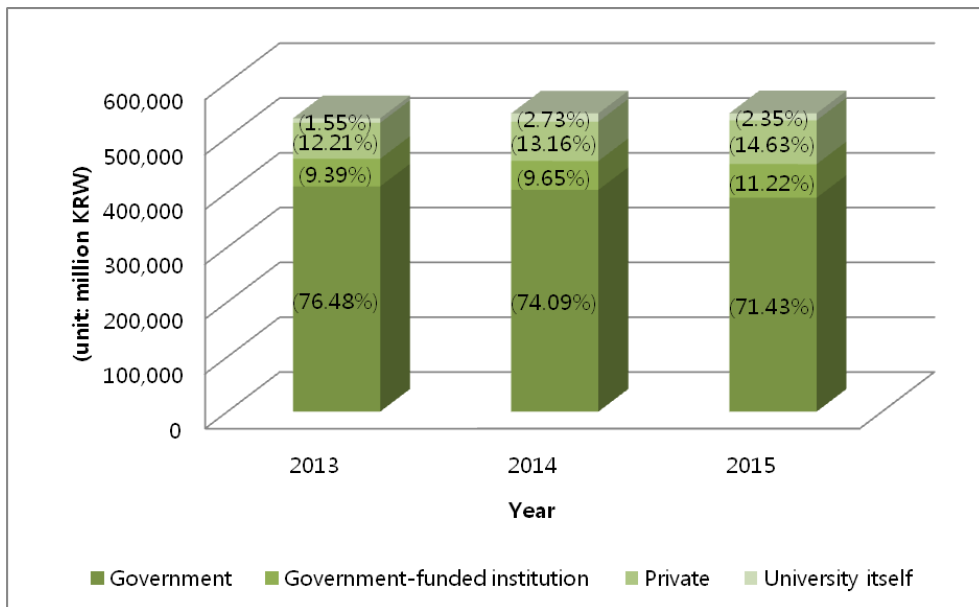
## Appendix

Figure 1: Research funding at SNU



※ Source: 2015 SNU R&DB Annual Report

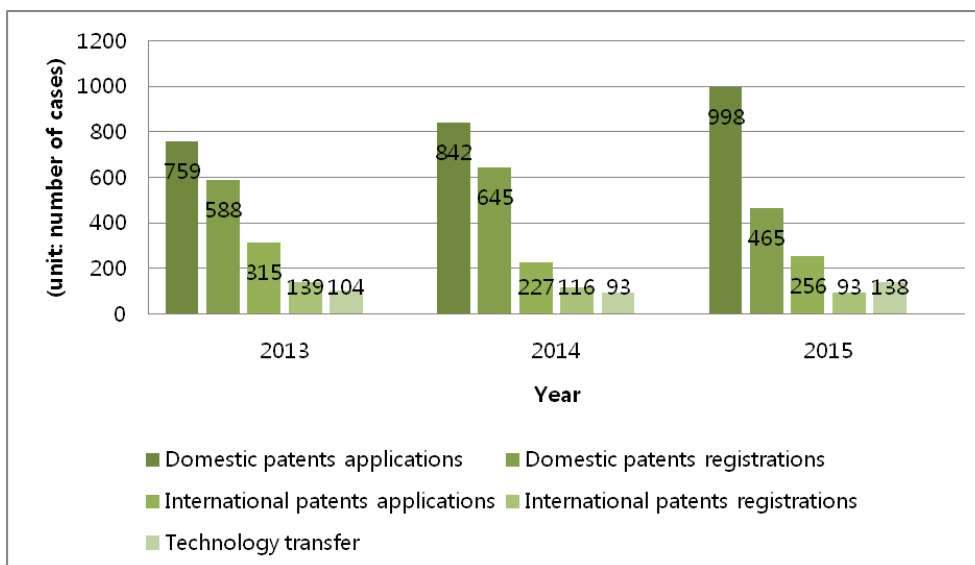
Figure 2: Resources of R&D funding at SNU



※ Source: Research Affairs of SNU / SNU R&DB Foundation

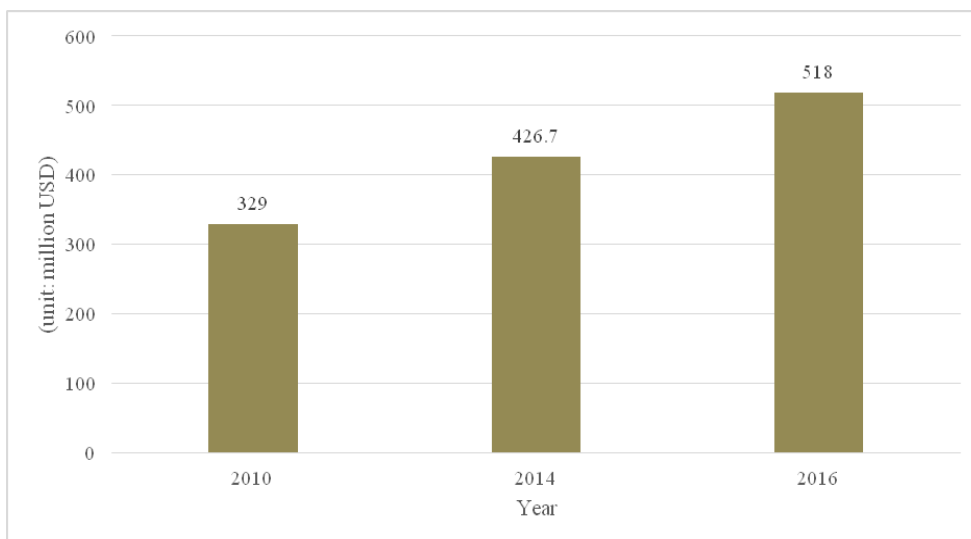
(<http://snurnd.snu.ac.kr/>)

Figure 3: Intellectual property & technology transfer at SNU



※ Source: 2015 SNU R&DB Annual Report

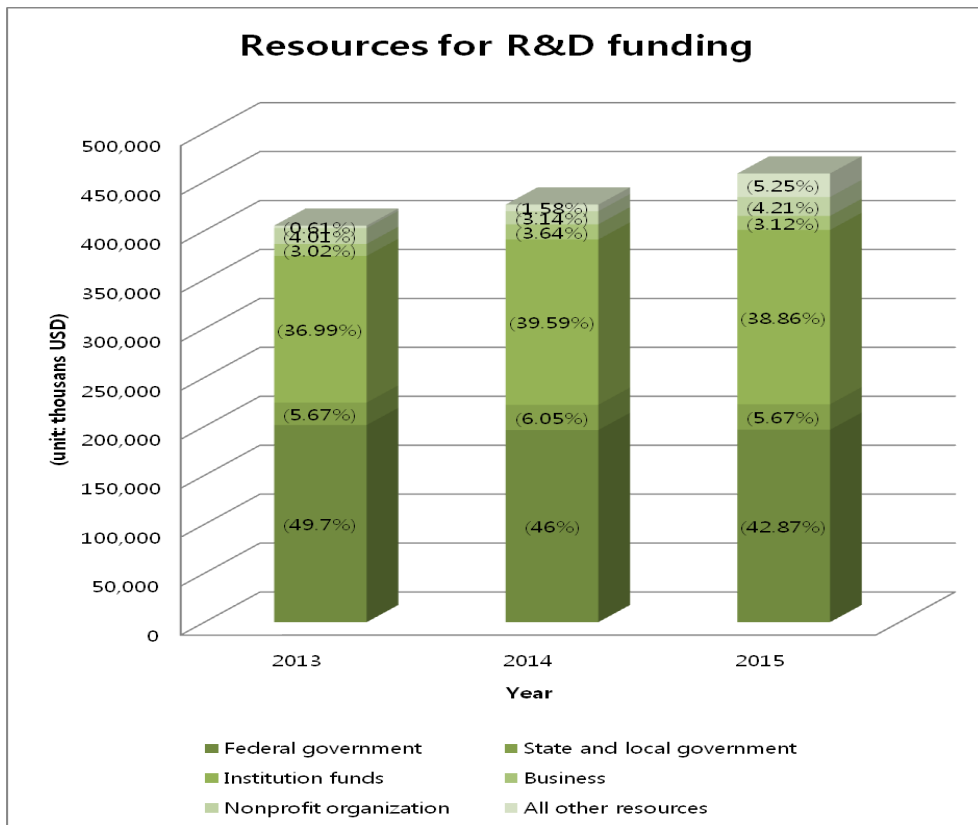
Figure 4: Research expenditure at ASU



※ Source: OKED (Office of Knowledge Enterprise Development at ASU:

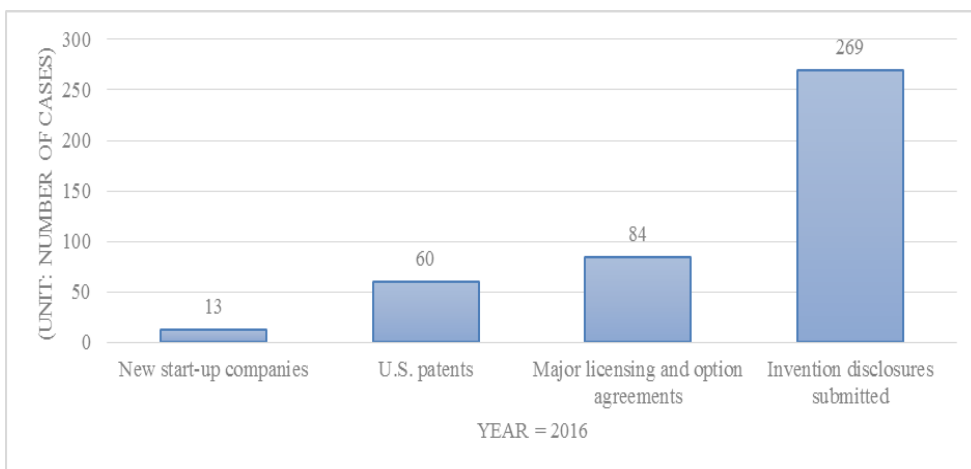
<https://research.asu.edu/>)

Figure 5: Resources for R&D funding at ASU



※ Source: National Science Foundation (<https://ncesdata.nsf.gov/herd>)

Figure 6: Intellectual property & technology transfer at ASU



※ Source: AzTE (Arizona Technology Transfer: <http://www.azte.com/about/metrics/>)



Figure 7: Comparison of proportion of R&D funding resources in 2015

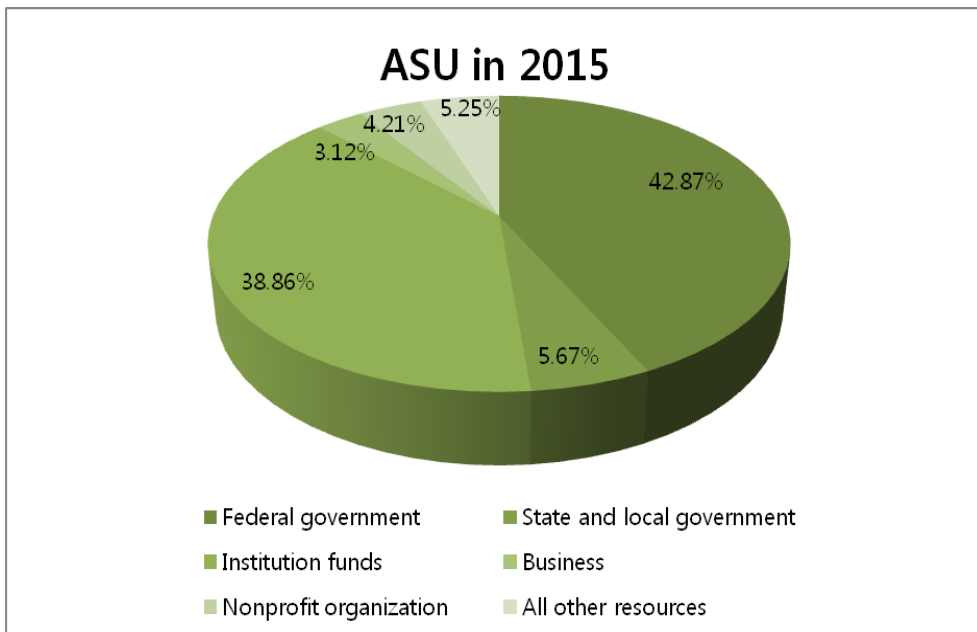
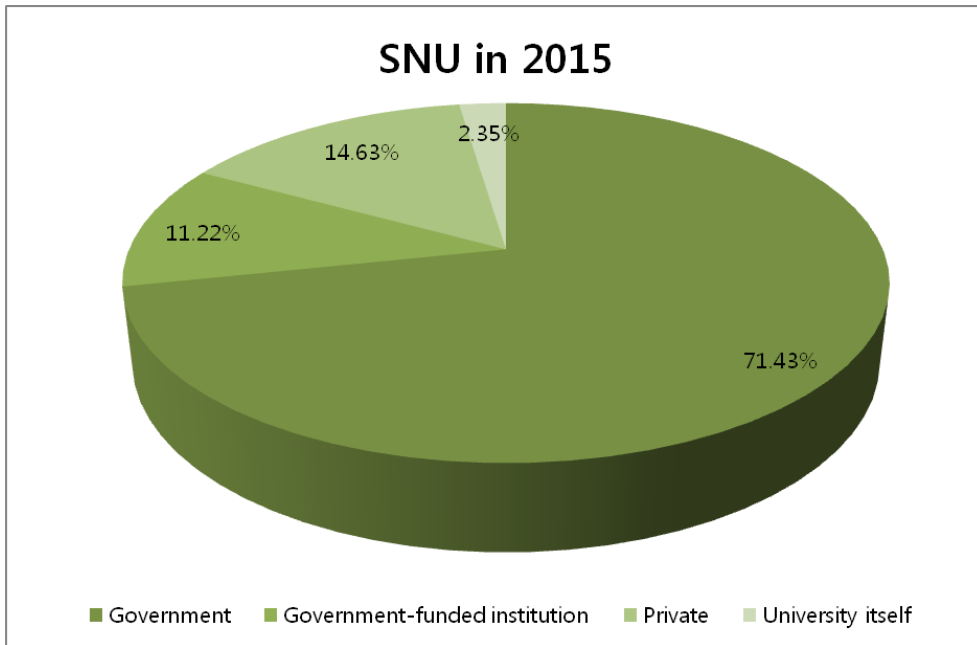
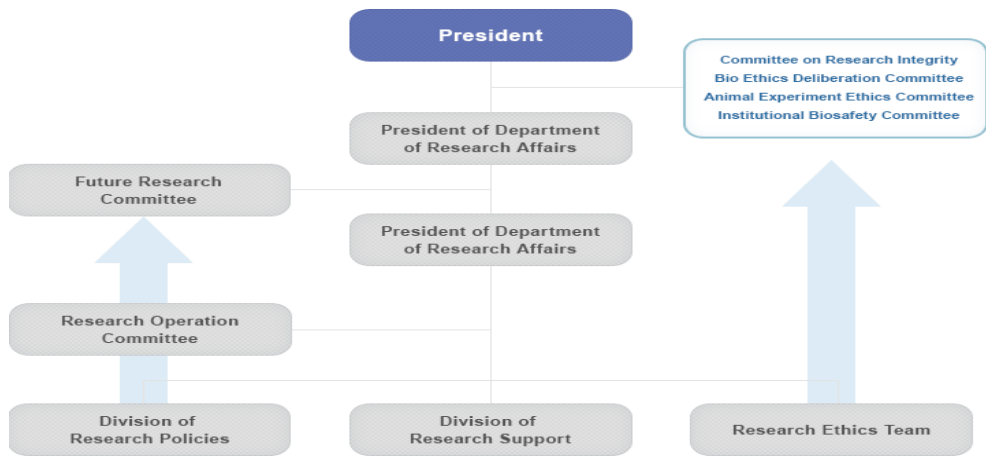
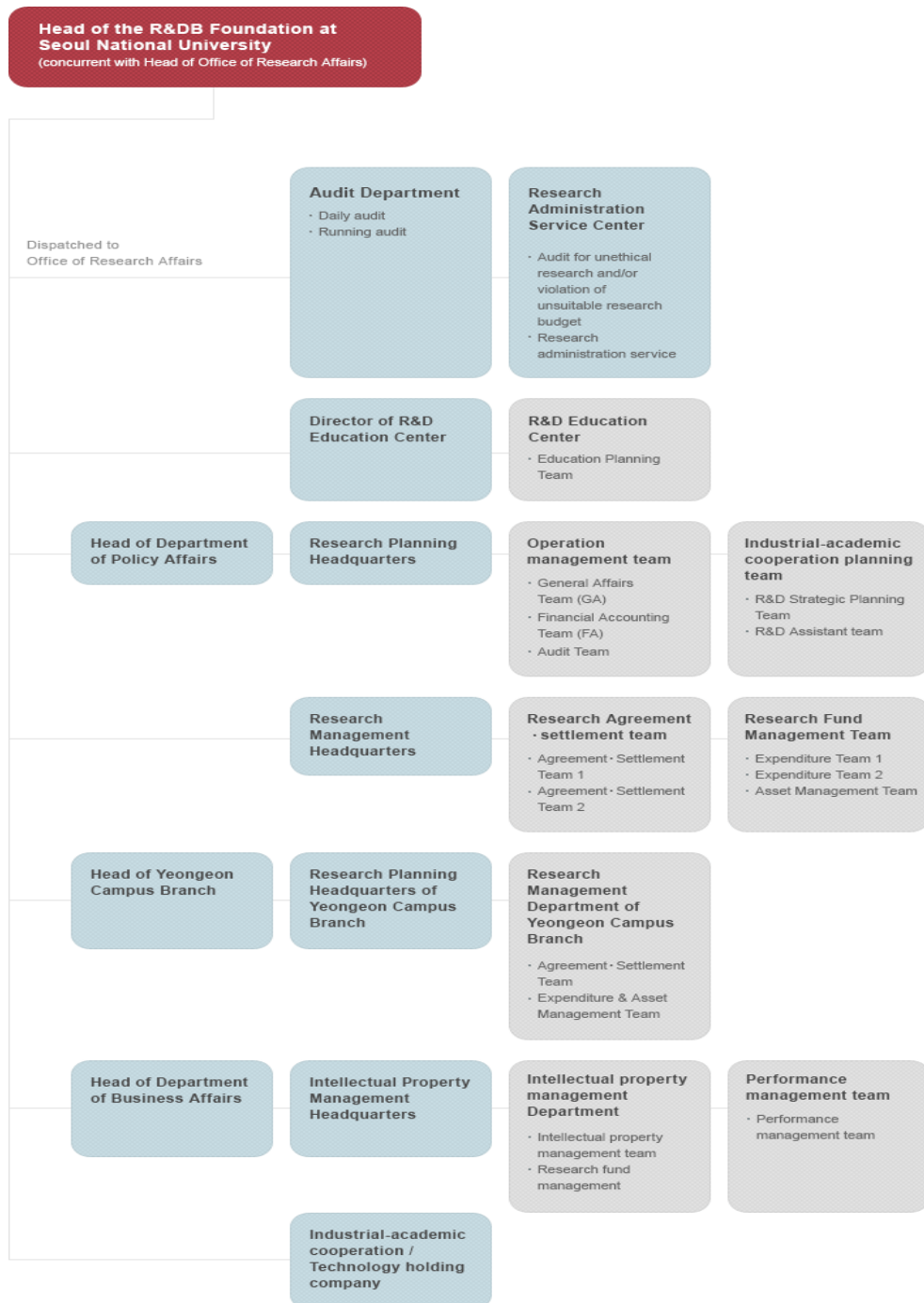


Figure 8: Organization chart of the Office of Research Affairs at SNU



※ Source: Research Affairs of SNU / SNU R&DB Foundation  
<http://snurnd.snu.ac.kr/>

Figure 9: Organization chart of the R&DB Foundation at SNU



※ Source: Research Affairs of SNU / SNU R&DB Foundation

<http://snurnd.snu.ac.kr/>

Figure 10: Research Policy Implementation System at SNU



※ Source: Research Affairs of SNU / SNU R&DB Foundation

<http://snurnd.snu.ac.kr/>

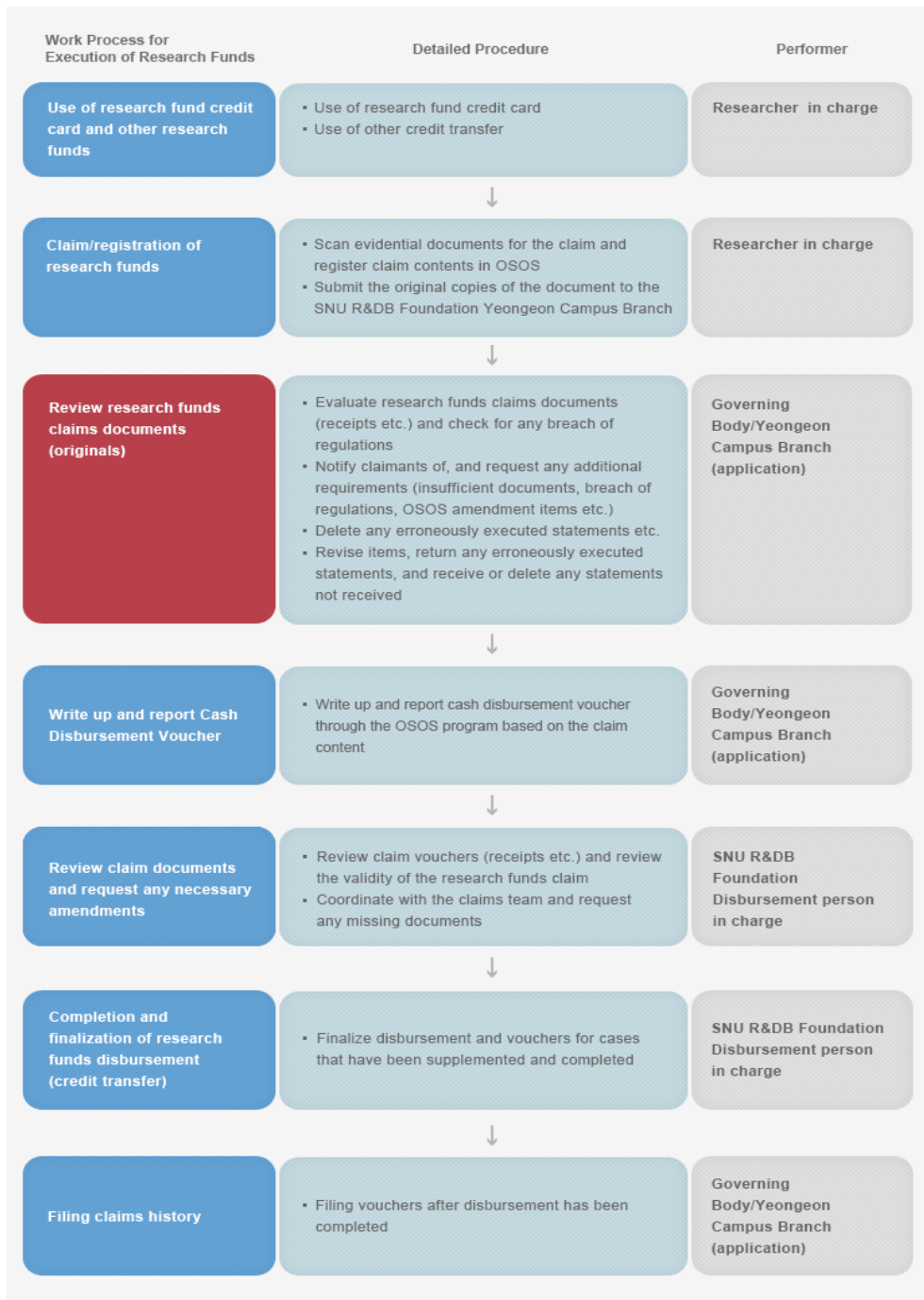
Figure 11: Research Fund Central Management Flow-Chart



※ Source: Research Affairs of SNU / SNU R&DB Foundation

(<http://snurnd.snu.ac.kr/>)

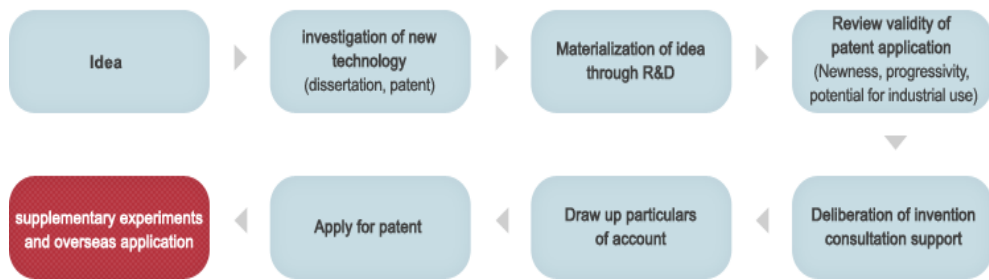
Figure 12: Process for research fund execution



※ Source: Research Affairs of SNU / SNU R&DB Foundation

[\(http://snurnd.snu.ac.kr/\)](http://snurnd.snu.ac.kr/)

Figure 13: Process for intellectual property management



※ Source: Research Affairs of SNU / SNU R&DB Foundation

[\(http://snurnd.snu.ac.kr/\)](http://snurnd.snu.ac.kr/)

Table 1: Basic information of SNU and ASU

	SNU	ASU
<b>Location of main campus</b>	Seoul, South Korea	Tempe, Arizona State, U.S.
<b>Type of university</b>	National University	State University
<b>Founding of university</b>	1946	1958 (1945: Arizona State College)
<b>President</b>	Sung, Nakin (Aug, 2014~ Present)	Crow, Michael (Jul, 2002 ~ Present)
<b>Number of enrolled students</b>	34,634 (April, 2016)	98,146 (Fall 2016)
<b>Number of regular faculty</b>	2,110 (May, 2017)	3,439 (Fall 2016)
<b>Global ranking by U.S. News and World Report in 2017</b>	119	121

Table 2: Comparison of research expenditure between the universities

(unit: million USD)

Year	SNU		ASU
2010	-		329
2011	496.5		-
2012	576		-
2013	511.8		-
2014	499.8		426.7
2015	462.2		458.4
2016	457		518



Table 3: Programs list operated by Division of Research Support at SNU

Category	Program	Supporting Items
Support for Academic Activities	Grants for Participation in International Conferences	*Air fare, accommodations, registration fees within a limit of 5 million KRW per year
	Grants for Holding International & Domestic (interdisciplinary) Conferences	*Support to be provided once a year for only one of either an International Academic Conference or a Domestic (Interdisciplinary) Academic Conference for each affiliated institute *International Academic Conference held by SNU: Within 8 million KRW * Within 4 million KRW in case the conference is jointly hosted * International Academic Conference held by a third party: Within 5 million KRW * National (Interdisciplinary) Academic Conference: Within 3 million KRW
	Invitation Grants for Prestigious Foreign Scholar	*Airfare, accommodations, lecture fees and other invitation related expenses within a limit of 3 million KRW for each prestigious foreign academic
	Grants for Holding Focus Group Meetings	*Once a year. Within 2 million KRW for each meeting topic
	Grants for Thesis Publication through Leading Academic Journal	*Support full amount required for publication of dissertations up to two dissertations a year
	Support for Selecting the winner of "The SNU Research Award"	*Award 20 million KRW and a plaque for each person

Support for Internal Projects	New Faculty Research Resettlement Fund Project	*10 million KRW to be paid at once as basic research expenses for each project (additional 5 million KRW support to be provided for each project in case laboratory experiments equipment and material expenses are needed for experiments and practical application)
	International Professors Research Fund Support Project	*Within 20 million KRW per project individual research and within 40 million KRW per project for joint research
	Support for SNU Brain Fusion Program	*Fund amount Differs depending on the size and the nature of the projects
Support for Research Activities	Establishment, Support, and Evaluation of Research Institutes	*Establishment, Support, and Evaluation of Research Institutes
	Experimentation and Practice Equipment Procurement and Expansion Project	*Replacement and procurement/expansion of experiment and practical application equipment and materials for colleges and joint practice
	Accident Insurance for Research Workers	*Limitation of Coverage -Death and After damage: Over 100 million KRW -Injury: Over 10 million KRW
	Appointment of Research Staff	*Named endowed chair researcher -Named endowed chair researcher -Specially Appointed Researcher -Senior Researcher -Senior Deputy Researcher -Researcher -Guest Researcher -Post-doc

Operating "Research Achievements Managing System(OSOS)	*Subject Achievements Book, dissertation, academic activities, creative exhibitions, other writings, technology transfer, intellectual property, research project, and awards
Payment of Faculty Bonus Research Expenses	*Payment request to be made by each college to the Division of Finance, upon which payment is to be done by the Division of Finance

※ Source: Research Affairs of SNU / SNU R&DB Foundation

[\(http://snurnd.snu.ac.kr/\)](http://snurnd.snu.ac.kr/)

Table 4: Steps for technology licensing and commercialization at SNU

Steps	Process and explanation
Signing Memorandum of Agreement	<ul style="list-style-type: none"> <li>● Define the general procedures of technology transfer</li> <li>● Generally signed during the first meeting of the university (or researcher) and the corporation (especially when agreeing on a technology transfer with foreign corporations), agreements with national corporations normally start with the next step which is the confidentiality agreement</li> <li>● There are no legal implications, and items, such as the definition of technology to be transferred, the method of technology testing, the general technology transfer terms, the compensation method in case technology transfer does not occur after technology testing, and confidentiality are stipulated in the Memorandum of Agreement.</li> </ul>
Signing of confidentiality Agreement	<ul style="list-style-type: none"> <li>● Since technology is an intangible asset, unlike tangible goods, once the contents have been disclosed, they cannot be returned.</li> <li>● A confidentiality agreement must be signed before disclosing know-how or experiment material to a corporation that has not</li> </ul>

	been previously disclosed in dissertations or patents etc.
Technology testing	<ul style="list-style-type: none"> <li>● The corporation test the technology owned by the university to assess validity</li> </ul>
Negotiation of Agreement terms	<ul style="list-style-type: none"> <li>● Type of implementation rights (full transfer, exclusive, and general), agreement period and negotiation of price of technology</li> <li>● The researcher must inform the PIC of the Intellectual Property Rights Headquarter of the research expense, difficulty of technology development, expected price of technology etc., and the actual negotiation shall take place between the corporation and the Intellectual Property Rights Headquarter.</li> <li>● In case the technology to be transferred is a result of a government project, and the rules of the project already include terms for technology licensing, these terms must be checked beforehand.</li> <li>● Although corporations generally prefer to negotiate directly with the researcher, the researcher may be subject to disadvantageous terms; therefore it is strongly recommended that the researcher only explain the technology to the corporation and allow the university to negotiate with the corporation on his/her behalf.</li> </ul>
Agreement signing	<ul style="list-style-type: none"> <li>● National University currently has a standard technology licensing agreement format.</li> <li>● Since technology transfer entails monetary compensation by the corporation, and requires terms, such as warrantee in case of default and guarantee of commercial value etc. which are not covered by academic research, the university provides standards for such items via the standard technology licensing agreement.</li> </ul>

※ Source: Research Affairs of SNU / SNU R&DB Foundation

(<http://snurnd.snu.ac.kr/>)

Table 5: The royalty distribution rate to inventors at SNU

<b>Net income</b>	<b>Royalty distribution rate to inventors</b>
~20,000,000 KRW	100%
20,000,000 ~ 100,000,000 KRW	80%
100,000,000~500,000,000 KRW	70%
500,000,000 KRW ~	50%

Table 6: Summary of R&D regulations at SNU

<b>Category</b>	<b>Title</b>	<b>Purpose</b>
Regulations for research expenses	Regulations governing SNU research expenses	To define necessary matters for the management of research expenditure including indirect cost at SNU
	Criteria for calculating SNU industry-academy cooperation research expenses	To provide specific plans and expenditure of research funds at SNU
	SNU research expenses management guidelines	To provide for effective management of SNU research funds which are funded by organizations belong to SNU
	Guidelines for the management of research funds at SNU	To provide necessary information on management and operation of research funds at SNU
	Guidelines for the	To provide necessary information on

	management of private research funds at SNU	management and operation of private research funds at SNU
	SNU indirect expenses management guidelines	To define the details for management and operation of indirect cost at SNU
	Criteria for operation of a corporation card based on the indirect cost revenue at SNU R&DB foundation	To aim appropriate usage of a corporation card by establishing the details for operation of the card based on the indirect cost revenue at SNU R&DB foundation
	Guidelines for central management of research items at SNU	To establish the details of purchasing, contracting, inspection and property management of research items at SNU
	Guidelines of audit for SNU research funds	To provide necessary regulations for central management and transparent implementation of research funds (including indirect cost) at SNU R&DB Foundation
	Guidelines for security management of a national R&D project at SNU	To provide criteria and procedures for establishment & implementation of security measures for national R & D projects which are performed under the responsibility of SNU faculty or whom belongs to SNU
	Regulations for establishment and operation of	To provide regulations about establishment and operation of government-funded research centers at

	government-funded research centers at SNU	SNU
Regulations for specific research projects	Regulations for BK21 plus project groups (including teams) at SNU	To provide a composition and operation of project groups (including teams) selected for the BK21 plus project at SNU
	Guidelines of a project expense management for a major by a contract at SNU	To determine specific regulations for a project expense management of a major by a contract at SNU
	Regulations for vocational education & training programs at SNU	To determine regulations for vocational education & training programs at SNU
	Guidelines of contract and project expenses management for vocational education & training programs at SNU	To define specific regulations for a contract and expense management of vocational education & training programs at SNU
	Guidelines for operation of a research fellow at SNU R&DB Foundation	To define specific regulations for operation of research fellow at SNU
Regulations for research supports & ethics	Regulations for establishment and operation of a research	To define about establishment and operation of a research center at SNU

	center at SNU	
	Guidelines for establishment, evaluation, and abolishment of the research center at SNU	To establish appropriate guidelines for the operation, evaluation, and abolishment of a research center at SNU
	Standing rules of the research center at SNU	To define matters about an organization and operation of a research center at SNU
	Regulations for appointment of researchers at SNU	To define necessary matters about appointment or entrusting of researchers at SNU
	Regulations for a post doctor at SNU	To define matters about appointment and treatment of post doctors at SNU
	SNU research ethics guidelines	To set a cornerstone of research code of conduct for SNU members to respond to new social demands in changing environment
	SNU's lab note guidelines	To define matters about writing and management of a research note for the systematical management and utilization of the information, data, and know-how gained during research at SNU
Regulations for intellectual	Regulations governing SNU intellectual	(Internally) To foster technology development and to contribute to



property & startups	property rights	secure research resources, (Externally) to protect the rights of inventors and SNU and to foster industry technology transfer, by encouraging intellectual property inventions of SNU members and protecting and utilizing it efficiently.
	SNU intellectual property right protection guidelines	To define specific matters for implementing the regulation for intellectual property management at SNU
	SNU royalty distribution guidelines	To define specific matters for royalty distribution at SNU
	SNU intellectual property management committee guidelines	- To define necessary matters for review important issues about intellectual property at SNU
	SNU guidelines for technology consultancy agreement	To define specific matters for implementing a technology consulting contract at SNU
	Regulations for the management of SNU brand	- To maintain and strengthen the reputation and credit of SNU brand by establishing criteria and procedure for the commercial use of the name, logo, and other labels  - To secure a fair trade order and protect consumers by determining the criteria of fee distribution

	Guidelines for the management of SNU brand	To define delegated and required matters to implement the regulation for the management of SNU brand
	Regulations for supporting entrepreneur at SNU	To define matters about supporting venture companies & future entrepreneurs, duties of tenants, and participation of a professor or a researcher
Regulations for committee	SNU future research committee regulations	To define the composition and operation of the future research committee at SNU
	SNU committee on research integrity regulations	To define composition and operation of the committee on research integrity at SNU
	SNU Institutional Animal Care and Use Committee regulations	To define composition, functions, and operation of the Seoul National University Institutional Animal Care and Use Committee
	SNU Institutional Review Board (SNUIRB) regulations	To define composition and functions of the Seoul National University Institutional Review Board (SNUIRB)
	SNU Institutional Biosafety Committee (SNUIBC) regulations	To define composition and functions of the Seoul National University Institutional Biosafety Committee (SNUIBC)

Miscellaneous regulations for research & university-industry collaboration	SNU management of sharing research equipment regulations	To define necessary matters for sharing and efficient management of research equipment belongs to SNU
	Regulations for constructing SNU industry-university cooperative complex	To define the composition and function of the construction committee and planning bureau for constructing SNU industry-university cooperative complex
	Regulations for travel expenses at SNU	To ensure smooth execution and proper expenditure by defining matters about travel expenses at SNU

※ Source: rule.snu.ac.kr

Table 7: Roles of teams & departments in OKED

Teams and department	Roles and process
<b>Research Academy</b>	<p><b>Research Academy</b> links researchers to the resources, tools and teams researchers need. It helps researchers to find information and professional development events that will assist researchers at all stage of research career. The Kick off research topic series will help researchers:</p> <ul style="list-style-type: none"> <li>● Get started</li> <li>● Find the department Research Advancement Administrator (RA)</li> <li>● Search for funding opportunities</li> <li>● Learn about ASU resources</li> </ul>

	<ul style="list-style-type: none"> <li>● Research the sponsor</li> <li>● Identify potential collaborators</li> <li>● Develop key sections of the proposal</li> <li>● Manage the projects</li> </ul>
<p><b>Research Development</b></p>	<p><b>Research Development</b> supports researchers with funding search tools, limited submissions, sponsor analysis, support for visits to federal sponsors and Research Forum events designed to encourage transdisciplinary research, foster collaboration and create opportunities for ideas to take shape and flourish. Sign up for weekly updates on the website.</p>
<p><b>Research Advancement Teams</b></p>	<p>(1) <b>Unit-Based RA Teams</b></p> <ul style="list-style-type: none"> <li>● Search for and identify targeted funding opportunities</li> <li>● Proposal development services for assigned departments/schools</li> <li>● Assist department in the administrative execution of the project</li> <li>● Manage financial execution of the project</li> <li>● Other department functions may be assigned to this position as well</li> </ul> <p>(2) <b>Centralized RA Team - Research Advancement Services (RAS)</b></p> <ul style="list-style-type: none"> <li>● Proposal development services for departments without RA support</li> <li>● Administration-based project execution assistance</li> <li>● Funding searches based on keywords provided by potential applicant</li> <li>● Interim support for departments with RA vacancies and</li> </ul>

	<p>leaves</p> <ul style="list-style-type: none"> <li>● Back up support, through MOUs, for departments experiencing proposal surges</li> <li>● RA support for campus-wide strategic initiatives and 4M proposals</li> <li>● General guidance and resource support for all ASU RAs</li> </ul>
<p><b>The Office for Research and Sponsored Projects Administration (ORSPA)</b></p>	<p>(1) <b>The Proposal and Negotiation Team (PNT)</b> acts as the institutional official to external sponsors. The primary functions of PNT are:</p> <ul style="list-style-type: none"> <li>● Provide advice and assistance on pre-award issues</li> <li>● Support RA staff in proposal development</li> <li>● Review and submit proposals to sponsors</li> <li>● Review, negotiate and execute incoming grants, agreements, contracts and sub-awards</li> </ul> <p>(2) <b>The Office of Industry Research Collaborations</b> acts as the institutional official to industry sponsors. The primary functions of OIRC are:</p> <ul style="list-style-type: none"> <li>● Provide advice and assistance on pre-award issues for industry proposals</li> <li>● Support RA staff in developing industry proposals</li> <li>● Review and submit proposals to industry sponsors</li> <li>● Review, negotiate and execute incoming industry research agreements, non-disclosure agreements and material transfer agreements</li> </ul> <p>(3) <b>The Award Management Team</b> acts as the institutional official for all post-award management functions, including:</p> <ul style="list-style-type: none"> <li>● Award setup and award modifications</li> </ul>

	<ul style="list-style-type: none"> <li>● Invoicing, financial reporting and all non-technical reporting</li> <li>● RA/BOM support and policy guidance</li> </ul>
<b>The Fiscal Oversight Team</b>	<p><b>The Fiscal Oversight Team</b> acts as the institutional official in the following areas:</p> <ul style="list-style-type: none"> <li>● Cash management</li> <li>● Audit liaison for all audits</li> <li>● Effort reporting oversight and system improvements</li> <li>● Risk management including expenditure and sub-recipient monitoring</li> <li>● F&amp;A rate application</li> <li>● Recharge center support</li> </ul>
<b>The Office of Research Integrity and Assurance</b>	<p><b>The Office of Research Integrity and Assurance</b> administers key research compliance programs and committees for the university to promote responsible conduct of research in the areas of:</p> <ul style="list-style-type: none"> <li>● Animal care</li> <li>● Human subject protections</li> <li>● Laboratory and radiation safety</li> <li>● Financial conflicts of interest</li> <li>● Export controls</li> </ul> <p>The team monitors compliance in accordance with university policy and federal guidelines and partners with faculty, staff and student researchers to develop effective ways to manage risks, provide value to the research enterprise, and minimize the administrative burden on researchers.</p>
<b>Department of Animal Care and</b>	<p><b>Department of Animal Care and Technologies</b> supports animal-based research and teaching. DACT maintains four centralized</p>

<p><b>Technologies</b></p>	<p>vivaria on the Tempe campus and provides:</p> <ul style="list-style-type: none"> <li>● State-of-the-art animal husbandry</li> <li>● Technical expertise to assist in procedures</li> <li>● Training in animal handling and procedures</li> <li>● Assistance in developing studies and Institutional Animal Care and Use Committee (IACUC) protocols</li> <li>● Assurance of regulatory compliance and animal well-being</li> </ul>
<p><b>Research Infrastructure and Facilities Group</b></p>	<p><b>Research Infrastructure and Facilities Group</b> manages research facilities including: ISTB 1 through 5, Bio-design A and B, Arizona Bio-Medical Collaborative, and Macro-Technology Works at the ASU Research Park. Services include:</p> <ul style="list-style-type: none"> <li>● Space assignments and space survey certification</li> <li>● Space planning including renovation and upgrade support</li> <li>● Space management reports, utilization studies and performance metrics</li> <li>● Reports on research space to NSF and ABOR</li> <li>● Planning of new research facilities</li> <li>● Monitoring of research facility costs including operation and maintenance, utilities, and debt service</li> <li>● Coordination of research space issue with University Planners Office and Facilities Development and Management</li> </ul>
<p><b>Project Management Office</b></p>	<p><b>Project Management Office</b> provides competitive intelligence, proposal development and project management support to faculty teams pursuing large, complex projects. This team manages the administrative burden that comes with coordinating large-scale proposals. Project managers work with PIs during proposal</p>

	development to plan the project activities, budgets and management plans. Additionally, they help to monitor budgets, track milestone delivery, and facilitate communications within the team and with the sponsor.
<b>Global Operations</b>	<b>Global Operations</b> reduces the risks and burdens of conducting international business by developing ASU’s infrastructure and delivering global project solutions. The team provides a central coordinating resource for foreign legal, tax, employment, contracting, banking cash management, purchasing, entity creation, and health and safety issues.
<b>ASU Research Computing</b>	<b>ASU Research Computing</b> provides our community a leading academic supercomputing facility, maintaining a traditional high-performance computing environment, high-end data-intensive ecosystem and highly available 100 gigabit network. In line with the nation’s most progressive universities, ASU Research Computing offers ease of access to ubiquitous compute capacity in the cloud, removing financial barriers to entry for faculty and student researchers. The program offers in-house expert support as well as a variety of educational and outreach opportunities.

※ Source: OKED (Office of Knowledge Enterprise Development at ASU: <https://research.asu.edu/>)

Table 8: F&A costs rates of ASU proposal

Kind of proposal	F&A costs rates
On-campus research (All sponsor-funded activity is conducted at a location)	Fiscal year 17: 54.5% Fiscal year 18: 56.0%



considered to be ASU facilities)	Fiscal year 19: 56.5% Fiscal year 20: 57.0%
Off-campus research (ALL sponsor-funded activity is conducted at a location <b>NOT</b> considered to be an ASU facility)	26.0% (until June, 2020)
Transfer in project (This proposal is the result of a new faculty member transferring in an award from another institution)	<p>1) If the project being relinquished by the former institution to ASU/ORSPA was awarded at an F&amp;A rate:</p> <p>a) LOWER than ASU, the transferred project will retain the lower rate for the balance of the project period. Supplements and renewals will use the ASU federally negotiated rate in effect at the time of request/proposal.</p> <p>b) HIGHER than ASU, the transferred project will use of the current ASU federally negotiated rate.</p> <p>2) In the event the other institution will not relinquish the award, but is willing to issue a subcontract to ASU/ORSPA, the award will not be considered a transferred project and the standard ASU policy for new proposals will apply.</p>
Clinic Research (This proposal is for clinical research)	54.5%

Industry (This proposal is funded by an industry or for-profit sponsor and does not involve federal flow-through funding)	67.7%
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※ Source: The Office for Research and Sponsored Projects Administration at ASU (<https://researchadmin.asu.edu>)

Table 9: Steps for research fund management at ASU

Steps	Process
<b>Get started</b>	<p>There are two resources of starting point for a research career at ASU.</p> <p>1. Research Advancement (RA) contact: Research Advancement staff assigned to researchers' unit are available to support research endeavors and assist researchers when they have questions. RAs can provide support in a number of areas such as:</p> <ul style="list-style-type: none"> <li>● Identification and review of funding opportunities</li> <li>● Proposal development, including completion of all required forms, budgeting, routing of the completed proposal for all required signature approvals, and transmission of your completed proposal to the Office for Research and Sponsored Projects Administration (ORSPA) for review and submission to the sponsor</li> <li>● Transfer of your existing sponsored projects to ASU</li> <li>● Serving as the liaison between researchers and ORSPA</li> </ul> <p>2. Research Academy links researchers to the resources, tools and</p>

	<p>teams researchers need at the moment researchers need them. Use the site to find a library of online topics on grant writing and professional development events that will assist you at any stage of your research career. Researchers will find practical instructions for:</p> <ul style="list-style-type: none"> <li>● How to research a sponsor</li> <li>● How to search Pivot, SciVal Funding and other sources for funding opportunities</li> <li>● What to look for in your funding opportunity</li> <li>● How to search for expertise at ASU</li> <li>● Preparing to talk with your program officer</li> <li>● How to write key sections of your proposal</li> </ul>
<p><b>Identify opportunities</b></p>	<p>OKED helps researchers search for funding opportunities, locate potential collaborators and network with successful PIs.</p> <p>1. To find funding opportunities: Research Development supports researchers with funding search tools, limited submissions and events. Research Development can help researchers:</p> <ul style="list-style-type: none"> <li>● Access funding opportunities through Pivot, SciVal Funding and other sources</li> <li>● Sign up for notifications about limited submission opportunities</li> <li>● Understand and gain intelligence on sponsors and programs</li> <li>● Prepare to meet a sponsor</li> <li>● Manage researchers' large or strategic proposal</li> </ul> <p>2. To find collaborators and explore ASU's research landscape:</p>

	<p>Research Analytics provides reporting, analysis and decision support regarding the university’s knowledge enterprise activities. The analytics team offers tools and resources to help researchers understand ASU’s research landscape and identify potential collaborators within and outside of the university.</p> <p>These include:</p> <ul style="list-style-type: none"> <li>● Experts.asu.edu, a searchable database of ASU expertise based on scholarly works and funded awards (publicly available)</li> <li>● SciVal (www.scival.com), a bibliometric tool that pulls data from published scholarly works to provide an overview of the research landscape of ASU and other institutions (accessible through ASU)</li> </ul> <p>When researchers found a funding opportunity, RA would help them for the next steps.</p>
<p><b>Write and submit proposals</b></p>	<p>1. The Project Management Office (PMO) provides project management services to research teams during proposal development and throughout the execution of a sponsored project. PMO assists PIs on administratively complex projects (working across disciplinary lines, with multiple partner institutes, large scale/multi-million-dollar, translational projects with hard delivery dates for project milestones, etc.) PMO provides expertise in:</p> <ul style="list-style-type: none"> <li>● project scoping</li> <li>● budgeting and forecasting</li> <li>● identifying resources and partnering</li> <li>● monitoring and tracking milestone progress</li> </ul>

	<ul style="list-style-type: none"><li>● sponsor reporting and communications</li></ul> <p>2. The Office of Industry Research Collaboration (OIRC) serves as the liaison between ASU and industry and provides guidance to faculty and staff to ensure a successful interaction. OIRC provides advice and assistance on pre-award issues for proposals to industry sponsors. The team also negotiates and executes industry-sponsored research agreements (SRAs), non-disclosure agreements (NDAs), material transfer agreements (MTAs) and external sales agreements.</p> <p>3. ASU offers numerous recharge centers for imaging and analytical tools, collections, clinical services and more. The Core Facilities Group supports the facilities that manage these resources and connects researchers with the tools needed for success. Researchers can find a complete listing on the Shared Resources site.</p> <p>4. The Office of Research Integrity and Assurance (ORIA) administers key research compliance programs and committees for the university to promote responsible conduct of research. Many compliance issues must be addressed before a proposal is sent out.</p> <p>ORIA will help researchers:</p> <ul style="list-style-type: none"><li>● use human subjects in research</li><li>● use live animals or tissues in research, teaching or displays</li><li>● work with biological materials such as pathogens; recombinant or synthetic nucleic acid molecules; or human or nonhuman primate-derived cells, tissues or</li></ul>
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	<p>bodily fluids</p> <ul style="list-style-type: none"><li>● report a financial conflict of interest</li><li>● protect sensitive information or commodities when traveling or working with people from other countries</li><li>● receive training on the legal and ethical regulations around the research</li></ul> <p>5. Submitting completed proposal: When you are ready to submit a proposal, contact your RA. Your RA will coordinate with the Proposals and Negotiations Team or Office of Industry Research Collaboration to review and submit your proposal to the sponsor and notify researchers of any post-proposal submission activities. If researchers have questions or need assistance, work with the RA.</p> <p>6. After awarding grant: Inform the RA, who will coordinate with the Award Management Team (AMT). AMT acts as the institutional official for all sponsored project management functions, including:</p> <ul style="list-style-type: none"><li>● award setup, modifications or amendments</li><li>● sub-award invoicing and closeout</li><li>● serving as the liaison to your sponsor</li><li>● invoicing, financial reporting and all non-technical reporting</li><li>● RA/BOM support and policy guidance</li></ul> <p>If researchers have questions or need assistance during a sponsored project, work with a unit support staff or contact</p>
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<p><b>Conduct a research</b></p>	<p>1. When needed to use animals in the research: The Department of Animal Care and Technologies (DACT) supports animal-based research and teaching and maintains four centralized vivaria on the Tempe campus.</p> <p>DACT can help researchers with:</p> <ul style="list-style-type: none"> <li>● animal housing/husbandry/veterinary services</li> <li>● technical expertise to assist in procedures</li> <li>● training in animal handling and procedures</li> <li>● assistance in developing studies and Institutional Animal Care and Use Committee (IACUC) protocols</li> <li>● assurance of regulatory compliance and animal well-being</li> </ul> <p>2. When needing to design, build or repair scientific instruments or other equipment: The Instrument Design and Fabrication Core facility offers electronics, machining and glassblowing services to researchers.</p> <p>3. When wanting to share equipment, facilities, collections or services: Researchers can share resources with other researchers at ASU and/or externally. If researchers charge a fee, this will be considered a recharge center or external sales activity. The Core Facilities Group can help researchers get started.</p> <p>4. When needing help with a sponsored project's cost sharing, RID, IIA or TRIF funding and accounting: The Finance Team provides:</p> <ul style="list-style-type: none"> <li>● financial tracking and management for cost share and infrastructure funds</li> <li>● funding and accounting services for Technology</li> </ul>
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	<p>Research Innovation Fund (TRIF), Research Incentive Distribution (RID) and Investigator Incentive Award (IIA) funds</p> <ul style="list-style-type: none"><li>● financial management and reporting for AzTE catalyst awards, investments and royalty distributions</li></ul> <p>5. When needing supercomputing capabilities: ASU Research Computing provides leading academic supercomputing capabilities, including:</p> <ul style="list-style-type: none"><li>● ASU Research Computing cloud service</li><li>● highly parallel computing capacity</li><li>● data-intensive computing (Hadoop)</li><li>● highly available 100 gigabit internal and external network, via Internet2 through an ESNET Science DMZ</li><li>● Intel PHI and NVIDIA Accelerators</li><li>● Research as a Service portal</li><li>● access to various software packages</li><li>● support staff with expertise in all areas of computing</li><li>● workshops and training</li></ul> <p>6. When needing web/technology assistance: The Research Technology Office supports faculty and administrators to advance institutional research success through the promotion and application of technological services and solutions. Services for research faculty, labs and centers include:</p> <ul style="list-style-type: none"><li>● file storage</li><li>● virtual machines</li><li>● websites and software</li><li>● contract review</li></ul>
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- security policy
- workflow automation
- data management

Technical advisors are trained to recommend solutions that address the complex and specific needs of faculty researchers and research administrators.

7. When needing to work outside the U.S. or collaborate internationally: Global Operations reduces the risks and burdens of conducting international business by developing ASU's infrastructure and delivering global project solutions. The team provides a central coordinating resource for foreign legal, tax, employment, contracting, purchasing, cash management, and health and safety issues that can arise from:

- foreign travel of ASU faculty and staff
- foreign operations of an ASU project or program
- ASU projects bringing foreigners to the U.S.

8. When being audited by a sponsor or needing help with fiscal operations (sub-recipients, effort reporting, revenue, etc.): The Fiscal Oversight Team works with all sponsored auditors directly and can answer the questions regarding:

- costing analysis, including federal rate negotiation, recharge center support, salary cap monitoring and additional pay reviews
- effort reporting, the federally required process to review after-the-fact interim compensation charges based on budget estimates
- revenue management, including electronic invoicing,

	federal draws and collections support <ul style="list-style-type: none"> <li>● risk management, including sub-recipient monitoring and audit readiness reviews</li> </ul>
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※ Source: OKED (Office of Knowledge Enterprise Development at ASU: <https://research.asu.edu/>)

Table 10: The distribution of Net Income - The first \$10,000 of Net Income received

	1 creator	2 creators	3 creators	4 creators	5+ creators
<b>Creator</b>	50%	50%	50%	50%	50%
<b>Lab</b>	16.67%	16.67%	16.67%	16.67%	16.67%
<b>University</b>	33.33%	33.33%	33.33%	33.33%	33.33%
<b>Total</b>	100%	100%	100%	100%	100%

Table 11: The distribution of Net Income - After \$10,000 of Net Income received

	1 creator	2 creators	3 creators	4 creators	5+ creators
<b>Creator</b>	40%	43%	46%	49%	50%
<b>Lab</b>	26.67%	23.67%	20.67%	17.67%	16.67%
<b>University</b>	33.33%	33.33%	33.33%	33.33%	33.33%
<b>Total</b>	100%	100%	100%	100%	100%

Table 12: Research and Sponsored Projects Manual at ASU

Number	Title	Purposes & contents
000	Introductory Material	
001	Introduction	

	003	Research and Sponsored Projects Directory	
	004	Definitions	
	005	Table of Exhibits	
100		General	
	101	General Research Policy	To maintain institutional eligibility for sponsored projects
	102	Principal Investigator Eligibility	To define eligibility requirements for all ASU Principal Investigators (PIs) and to state the reasons for such requirements - Eligibility for PI
	103	Principal Investigator Responsibilities	To summarize the responsibilities of the <a href="#">principal investigator</a> - The requirements governing proposal preparation, award negotiation, and post-award management
	104	Disclosure of Proposal-Award Information under the Arizona Public Records Act and the Freedom of Information Act	To protect the confidentiality of proposals and awards
	106	Allocation of Recognition, Research Incentive Distribution, and Investigator Incentive Awards	To define how investigators on sponsored projects are identified and assigned to home units and affiliated centers/institutes for the allocation of <a href="#">Recognition</a> , <a href="#">Research Incentive Distribution</a> , and <a href="#">Investigator Incentive Awards</a>
	107	Lead Unit Identification and Responsibilities	To define how the lead unit assigned to a sponsored project is identified and outline the responsibilities of that lead unit
200		Compliance	
	201	Human Subjects in Research	(closed)
	201-01	Human Subjects in Research	

	202	Care and Use of Laboratory Animals	To assure that live vertebrate animals used in research, teaching, and biological testing are used and cared for in an ethical and humane manner and to comply with federally mandated rules and regulations and to maintain accreditation by the American Association for Accreditation of Laboratory Animal Care
	203	Radiation Safety in Research and Teaching	-
	204	Hazardous Waste Management	-
	205	Biosafety	
	206	Objectivity in Research— Disclosure of Financial Interests and Management of Conflicts of Interest	To promote objectivity in research and other sponsored project activities by establishing standards to protect the design, conduct, and reporting of externally funded projects from potential bias by an investigator’s conflicting financial interests, all <a href="#">principal investigators</a> and co-principal investigators are required to disclose their <a href="#">significant financial interests</a> .
	207	Standards for Scientific Diving	To provide policy level standards for underwater research activities
	210	Misconduct in Research	To communicate ASU’s position regarding the ethical, responsible conduct and reporting of research and scholarly activity
	213	Assurances	
	213-01	Security Clearances	To ensure that arrangements made for security clearances in proposals comply with federal regulations
	213-	Certification of Drug-Free	To certify ASU’s compliance with

	02	Workplace	federal drug-free workplace requirements
	213-03	Procurement Integrity	To comply with section 27 of the Office of Federal Procurement Policy Act
	214	Export Control	To explain applicable export control laws and regulations regarding the dissemination of research results and the transfer of items and information
300		Proposal	
	301	Limited Submission of Proposals	To define how to receive institutional approval when the sponsor limits the number of proposals that ASU may submit
	302	Proposal Processing and Submission	To secure appropriate authorization of <a href="#">formal</a> , <a href="#">continuation</a> , <a href="#">supplemental</a> , and <a href="#">revised</a> proposals for projects to be conducted under the purview of the university
	303	Proposal Budget Preparation	To ensure that proposal budgets are accurate and meet university and federal policies and standards
400		Negotiation	
	401	Agreement Negotiation and Acceptance	To protect the interests of the university by ensuring that award terms and conditions are acceptable under the statutes of the State of Arizona and the policies of ASU and the Arizona Board of Regents
	404	Classified and Proprietary Research	To identify the circumstances under which the university will accept agreements requiring access to government classified information and to protect the special interest of the university to carry out research in an open and unrestricted manner.  To outline the limited circumstances

			under which the university may agree to protect the confidentiality of proprietary information in sponsored research.
	406	Publication	To protect the mission of the university to carry out research in an open and unrestricted manner; specifically, to protect the rights of Investigators to publish the results of their research and other sponsored activities
	408	Pre-award Site Visits	To ensure adequate notice to the Office for Research and Sponsored Projects Administration of pre-award site visits from representatives of potential sponsors
500		Award	
	501	Establishment of a Sponsored Projects Account	To fiscally account for each sponsored project according to university, state, and sponsor regulations
	502	Personnel	
	502-01	Personnel Employed on Sponsored Projects	<p>To outline the requirements and responsibilities of principal investigators for personnel employed on <a href="#">sponsored projects</a></p> <p>To assure that project personnel are proposed and employed in accordance with ASU human resources policies, which are in accordance with federal, state, and sponsor employment guidelines and compensation regulations</p> <p>To establish compensation guidelines for university employees to be paid from a sponsored project account, including intra-institution of higher education (IHE) consulting pay and <a href="#">nonexempt</a></p> <p>To outline the types of appointments and</p>

			<p>hiring procedures for employees assigned to a sponsored project</p> <p>To establish the appointment criteria for personnel assigned to sponsored projects to fulfill the external obligation for those funds</p>
502-02	Leaves and Absences for Sponsored Projects Personnel		To provide guidance and define allow ability for charging leave, absences and sabbatical costs for personnel paid from sponsored projects.
502-03	Certification of Sponsored Project Effort		To outline the process for certification of <a href="#">effort</a> for university employees paid from, or with cost sharing committed to, <a href="#">sponsored projects</a>
503	Purchasing		
503-01	Purchase Requests on Sponsored Projects and Internal Grant Programs		To describe the individuals responsible for the purchase of items and authorization of costs on sponsored projects and internal grants
503-02	Sponsored Project Expense Advances		To provide sponsored principal investigators and their departments with the necessary guidelines
503-03	Consultants, Guest Lecturers, and Other Professional Services for Sponsored Projects		To define consultants, guest lecturers, and other professionals on sponsored projects
503-05	Subaward Agreements		To assure university compliance with federal, state, and ABOR requirements for the issuance of subawards
504	Travel		
504-01	Sponsored Projects Travel for ASU Employees		To describe how foreign, domestic, and in-state travel costs incurred by ASU employees are authorized and reimbursed
504-04	Conference Registration Costs for ASU Employees on		To reimburse allowable authorized conference registration costs for

		Sponsored Projects	university employees from sponsored accounts
	504-05	Sponsored Project Travel and Related Costs (Non-ASU Employees)	To reimburse travel and/or related expenses of non-ASU employees, e.g., participants, students, consultants, visiting scholars
	505	Equipment and Property	
	505-06	Equipment Management	-
	506	Sponsored Project Finances	
	506-02	Cost Transfers to Sponsored Projects	To ensure that the reassignments of charges involving a sponsored project account are compliant with the requirements contained in federal regulations and sponsoring entity guidelines
	506-03	Cost Sharing Documentation for Sponsored Projects	To authorize, identify and document university <a href="#">cost sharing</a>
	506-04	Guaranteeing Delinquent Sponsored Projects Agency/Orgs	To establish a procedure for principal investigators, with their department, center, or college, to guarantee coverage of project costs when a sponsor fails to meet its financial obligation
	507	Revisions/Modifications	
	507-01	Sponsored Project Award Changes	To ensure that ASU policies and <a href="#">sponsor</a> regulations are adhered to for any changes to a sponsored project award
	508	Facilities & Administration	
	508-01	Charging Direct and Facilities & Administrative Costs to Sponsored Projects	To ensure compliance with federal requirements concerning consistent treatment of <a href="#">direct costs</a> , and <a href="#">facilities &amp; administrative costs</a>
	508-02	Facilities & Administrative Costs	To require the use of the federally negotiated facilities & administrative rates on all sponsored projects



	509	Closing Project Account(s)	
	509-02	Reports and Deliverables from Sponsored Projects	To outline the responsibilities of the principal investigator and the Office for Research and Sponsored Projects Administration for reports and deliverables required by the funding agency
	509-03	Financially Closing Out Fixed Price Agreements	To describe the disposition of residual balances on fixed price agreements
	509-04	Sponsored Project Agency/Org Deficit/Account Closeout	To establish the responsibility for a deficit on a sponsored project account
	510	External Contacts	
	510-02	External Audits and Programmatic Reviews	Coordination of audits and programmatic reviews on sponsored projects
600		Collaboration with Other ASU Units	
	601	Coordination of Proposal Submissions to Foundation Sponsors by ORSPA and the ASU Foundation	To provide guidelines for determining which administrative office is responsible for coordinating the submission of proposals to corporate and foundation Presidential Prospects
	604	Ownership of Research Data and Materials & Intellectual Property Management Implementation Policy	To provide policy level implementation guidelines to the Arizona Board of Regents' Intellectual Property Policy (6-908)  To confirm and clarify the ownership of research data and materials
	605	Internal Grants	
	605-02	Travel of Research Investigators to Potential Sponsors	To allow principal investigators who otherwise lack the resources to meet with potential sponsors so they may market their ideas or interests and gain a better understanding of the goals of funding organizations

※ Source: Research and Sponsored Projects Manual at ASU

Table 13: Comparison of main R&D support organization in the universities

	<b>SNU (Office of Research Affairs)</b>	<b>ASU (Office of Knowledge Enterprise Development: OKED)</b>
<b>Divisions, departments and teams</b>	<ul style="list-style-type: none"> <li>-Division of Research Policy</li> <li>-Division of Research Support</li> <li>-Research Ethics Team</li> </ul>	<ul style="list-style-type: none"> <li>-Research Academy</li> <li>-Research Development</li> <li>-Research Advancement Teams - Unit-Based RA Teams, Centralized RA Team - Research Advancement Services (RAS)</li> <li>- The Office for Research and Sponsored Projects Administration (ORSPA): The Proposal and Negotiation Team (PNT), The Office of Industry Research Collaborations, The Award Management Team</li> <li>-The Fiscal Oversight Team</li> <li>-The Office of Research Integrity and Assurance</li> <li>-Department of Animal Care and Technologies</li> <li>-Research Infrastructure and Facilities Group</li> </ul>

		-Project Management Office -Global Operations -ASU Research Computing
<b>Committee/Board</b>	-Future research committee -Committee on Research Integrity -Institutional Animal Care and Use Committee -Institutional Review Board (SNUIRB) -Institutional Biosafety Committee (SNUIBC)	-Institutional Review Board (IRB) -Institutional Animal Care and Use Committee (IACUC) -Institutional Biosafety Committee (IBC)

Table 14: Comparison of the organizations in charge of university-industry collaboration between the universities

	<b>SNU (R&amp;DB Foundation)</b>	<b>ASU (Arizona Technology Enterprises: AzTE)</b>
<b>Divisions, departments and teams</b>	-Audit Department -Research Administration Service Center -R&D Education Center -Research Planning Headquarters - Operation management team, Industrial-academic cooperation planning team	-Venture Development Team -Life Sciences Team -Physical Sciences Team -Business Development Consultants Team -Legal Team -Finance/Operations Team -AzTE Santa Monica Office (CA

	-Research management Headquarters - Research Agreement & Settlement Team, Research Fund Management Team -Research Planning Headquarters of Yeongeon Campus Branch - Research Management Department of Yeongeon Campus Branch -Intellectual Property Management Headquarters - Intellectual Property Management Department, Performance Management Team -Industrial-academic cooperation/ Technology holding company	Office)
<b>Head of the organization</b>	Same as the Office of Research Affairs	Independently appointed

Table 15: Comparison of the indirect costs rates between the universities

SNU	ASU
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-National R&D projects: 28.9% of total costs	-On-campus research: 54.5% of Modified Total Direct cost
-Government service projects: 5% of total costs	-Off-campus research: 26.0% of Modified Total Direct cost
-Private projects: 15% of total costs	-Clinic research: 54.5% of Modified Total Direct cost
	-Industry research: 67.7% of Modified Total Direct cost
	-Proposal through ASU Foundation: 11% of Total Direct Costs

Table 16: Comparison of the sharing of revenue from intellectual property between the universities

	<b>SNU</b>	<b>ASU</b>
<b>Creators</b>	50~100%	40~50%
<b>Lab</b>	-	16.67~26.67%
<b>University (University Foundation)</b>	0~50%	33.33%

Table 17: Comparison of regulations structure between the universities

	<b>SNU</b>	<b>ASU</b>
<b>Number of internal regulations</b>	38	1 (66 sub-regulations)

<b>Structures of regulations</b>	Not unified (18 regulations, 2 criteria, 18 guidelines, 1 standing rule)	Unified (1 manual)
<b>Total number of worlds including regulations</b>	65,754	35,059
<b>Criteria for classification of regulations</b>	Topic/activities	Process/issue

# 서울대학교와 애리조나 주립대학교의 연구 지원 시스템 비교 연구

서울대학교 행정대학원

글로벌행정 전공

이동명

1946년 설립 이래 70여 년 간 서울대학교는 대한민국의 대표적인 국립대학으로서 교육과 연구 분야에서 선도적인 역할을 해왔다. 특히, 지식 기반 경제 사회의 도래와 함께 서울대학교는 연구개발(R&D) 분야에서 더욱 중요한 역할을 요구 받고 있다.

이 연구에서는 2011년 12월 28일 법인화 된 서울대학교의 연구개발 지원 시스템을 연구하였다. 서울대학교에 대하여 대학의 법인화로 인한 국가출연금의 감소와 같은 미래의 변화가 연구개발 성과를 저하시킬 것이라는 우려가 있다. 현재의 연구개발 지원 체계는 법인화 이전 시스템의 연장선에 있어, 미래의 연구개발 환경 변화에 대비하기 위해서는 미래의 연구개발 지원 시스템에 대한 변화 방향을 제시할 필요가 있다.

이와 관련하여, 서울대학교는 미국 주립대학교의 조직, 정책, 프로그램, 연구비, 기술특허, 상업화, 그리고 연구개발 관리 규정으로부터 여러 가지 교훈을 얻을 수 있다. 애리조나 주에 위치한 애리조나 주립대학교는 미국에서 가장 유망한 주립대학교 중의 하나이며, 1994년 R1 대학으로 지정된 이래 주목할 만한 연구 성장을 이루어낸 대학이다.

이 연구의 목적은 서울대학교와 애리조나 주립대학교의 연구개발

지원 시스템을 다양한 측면에서 비교함으로써, 서울대학교의 연구개발 지원 시스템을 향상시키는데 도움이 되는 유용한 제언을 제시하는 것이다.

이 논문에서는 이러한 비교를 통하여 다음과 같은 몇 가지 교훈을 발견하였다.

첫째, 연구개발 관리 절차의 효율성 제고를 위하여 연구처와 산학협력단의 역할 분담을 재조정하는 것에 대한 고려가 필요하다는 점이다. 예를 들자면, 연구처는 모든 연구비 집행절차 관리에 특화를 시키고, 산학협력단은 지적 자산 관리에 집중하는 것이다. 또한, 연구처는 애리조나 주립대학교의 OKED 경우를 참고하여 연구의 질을 향상시키기 위한 역할을 늘려나가는 것이 좋을 수 있다.

둘째, 현재 서울대학교의 연구개발 지원 프로그램과 정책은 연구자들에게 직접적인 재정 지원을 하는데 지나치게 집중되어 있다. 이러한 프로그램들은 유망한 학자들을 대학으로 유입시키는 효과가 있지만, 이러한 지원은 장기적인 투자라기 보다는 소비적인 정책에 불과할 우려가 있다. 오히려, 애리조나 주립대학교가 하는 것처럼 창업지원이라든지 유관 기관 관리 프로그램과 같은 다양한 연구개발 지원 프로그램과 전략을 발전시키는 것이 나올 수 있다는 점이다.

셋째, 서울대학교는 연구비 관리 절차에서 단순히 연구비 지원 기관과 연구자를 연결하는 역할을 넘어서서 연구 제안 단계를 포함하여 연구 관리 단계에 보다 적극적으로 개입할 필요가 있다. 이러한 측면에서 애리조나 주립대학의 사례와 같이 연구자의 연구제안서의 질을 향상시킴으로써 더 많은 연구비를 수주할 수 있게 하기 위한 지원 방안을 마련하는 것이 필요하다는 점이다.

넷째, 기술이전과 상업화 관리는 전문적인 지원과 전략적인 접근이 필요한데, 이를 위해서는 산학협력단이 지적 자산 관리에 좀 더 특화되어야 하며, 실질적인 이윤을 창출할 수 있는 분야에 대한 전략적인 선택 투자가 필요하다는 점이다. 또한, 기술이전과 상업화는 산학 협동 관계를 필요로 하므로, 더 나은 성과를 위해서 대학은 연구자에게뿐만 아니라 산업체에게도 유용한 서비스와 정보를 제공하여야 한다. 이는 대학이 산업체와 더 발전된 협력 관계와 투자를 유인하기 위해 노력해야 한다는 뜻이다.

다섯째, 서울대학교의 연구개발 시스템은 좀 더 사용자 중심으로 바뀔 필요가 있다. 예를 들자면, 연구개발 관련 규정은 좀 더 간략하고 명확하게 정비될 필요가 있다. 이는 관련 규정과 지침의 통합과 중복된



규정의 폐지 등과 같은 노력을 필요로 한다.

마지막으로, 현재 서울대학교의 간접비 징수율과 특허권 분배율은 연구자에게 좋은 유인책이 될 수 있지만, 연구 장비 및 인프라에 대한 투자를 늘리기 위해 그러한 비율이 조정될 필요가 있다. 대학의 근본적인 연구개발 역량을 늘리기 위해서는 인프라에 대한 투자가 금전적인 인센티브보다 더욱 중요하다.

주요어: 연구개발(R&D), 연구개발 지원 시스템, 연구개발 장려,  
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