

**Combining Research and Education to Advance Okayama University:
Innovative Strategies to Return onto the Road of Success**

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Abstract

For many years, there have been numerous attempts by the Japanese Government (MEXT in particular) to help Japanese Universities to keep pace with their counterparts in international developed nations. In 2020, only 3 of them remain in the top 100 of the ARWU list, and the ranking of Japanese universities continues to be significantly on decline. Based on the well-known Humboldt model, putting research at the core of the system, an innovative development strategy has been implemented at Okayama University. The paper details the major features of the method and finally concludes on the possible extension of the model to numerous Japanese universities where research teams are significantly present.

Keywords: globalization, global research, international academic competition, Humboldt model, Humboldt model adjustment to Japanese Universities, time scale of reforms.

I. - Introduction

I. - 1 Longstanding situation of Japanese Universities

For many years, Japan has been recognized as a country where the population is highly educated. This is revealed, for instance, by the PISA assessment process: ‘Program for International Student Assessment’². Also, from 2000 onwards, the number of Japanese Nobel Prize laureates has been quite comparable to most advanced countries (except the US, however, which is much higher).

In various programs designed to maintain this reputation of highly educated Japanese, numerous attempts have been performed in the past, by the government and MEXT in particular (MEXT: Ministry of Education, Research, Youth and Sports) to help Universities to remain in the leadership of modern societies where development largely relies on increased levels of education.

In 2013, shortly after he became the Head of the Cabinet, Prime Minister Abe expressed his wish to see within 10 years, 10 Japanese Universities in the top 100 of the ARWU (Shanghai, Jiao Tong) ranking. In 2020, as only 3 of them are in the 100 best, it is clear that the ranking of Japanese Universities remains significantly off target. There are several reasons for this. As usual, reforming universities and getting results of the changes is globally a very slow process,

the announced time scale was likely much too optimistic. In the past, similar statements were made at the top level of the government, but later, international specialists in higher education and academic research noticed that each time meager results were obtained.

And as a sad continuity effect, in 2020, it is obvious that the longstanding decline is still at work and there is no significant improvement in the international ranking of Japanese universities despite Abe's wish.

I. - 2 Okayama University at a glance

Okayama University is a national, comprehensive University located in South-West Japan (Chugoku region). There are about 13000 students, 11 Graduates Schools. The University is steadily ranked among the 12-15 best Universities in Japan and has been granted as TOP-Global University in 2015. The University is strongly committed to improving its international profile and using research as the major powering engine to reach that goal in particular in the field of SDGs (**Sustainable Development Goals.**)

SDG commitment - Sustainable Development Goals

The 17 Sustainable Development Goals serve as a universal call to action to end poverty, protect the planet and improve the lives and prospects of all global citizens. Since 2015, these global goals for sustainable development have been translated and embedded into the strategic direction of institutions at national and local levels. Okayama University is significantly committed in realizing SDGs. Wealth of new knowledge is steadily generated at Okayama University by high-level professors and researchers, thus passing a rich legacy to the next generations. This is considered a primary concern. Beyond the classroom, the faculties are fully committed in bringing innovative ideas to a better life in a broader world, and thereby to improve society. At Okayama University, the SDGs embody core themes of sustainability and well-being.

Okayama University has strong sectors in:

**** Medical studies. The Okayama University Hospital is ranked 23rd in Japan(2019)**

<https://www.okayama-u.ac.jp/user/hospital/en/index.html>

Specialties in:

Robotics assisted surgery

Lung transplant (for instance successful lung transplant between two patients of different size in Japan - 2018)

Cryosurgery

Bio-Bank

Medical Imaging

** Physics: solid-state physics and cosmology -

http://www.physics.okayama-u.ac.jp/member/member_english.html

Research Institute for Interdisciplinary Science

** Materials sciences with a focus on planetary materials (Institute) and geosciences

<http://www.misasa.okayama-u.ac.jp/eng/>

** Biology: in particular Plants biology (Institute)

<http://www.rib.okayama-u.ac.jp/>

** Chemistry:

-- carbon chemistry,

-- catalysis,

-- astro-chemistry

** Engineering:

-- chemistry, bio-chemistry, bio-process engineering

-- materials science

-- computer science, cryptography, cybersecurity

-- ultra-fast electronics and spectroscopy

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The university supports staff to deliver innovative and inclusive research-intensive teaching. The aim is to optimize student learning and prepare students for their future. Okayama University aims at reframing the concept of ‘research-led teaching’ with a shift to the more dynamic concept of ‘research-intensive learning’.

I. - 3 ARWU ranking from 2003

As this paper basically refers to a global situation of Japanese universities in the world academic arena, there is no need to enter details of a full "ranking" analysis that would rapidly become a little delicate. Instead, it provides a table of data to understand the overall situation over a period of nearly 20 years.

By considering Table 1, a few main comments can be made:

a - Global decline: the number of Japanese Universities ranked among the 500 best, declined from 36 in 2003 to 14 in 2019 and 2020. From 2003 the decline was rapid: from 36 to 20 in 2013. As of 2013 the reduction rate was much slower. The period of the regime change (around 2013) coincides with the gradual implementation of "Research Universities" (2012) followed by the "Top Global Universities" (2015) plans of the MEXT.

a - 世界的な衰退：日本の大学の数は、500のベストランクにランクインし、2003年の36から、2019年と2020年の14に縮小しました。2003年から、2013年の36から20に、急速に縮小しました。2013年から、削減率は、はるかに遅くなりました。政権交代の時期（2013年頃）は、文部科学省の「世界のトップ大学」（2014年）計画が後に続く「大学の研究」（2012年）の段階的な実施と一致しています。

Table 1: ARWU - Japanese Universities (from 2003 the beginning of ARWU)

SHANGHAI Ranking		ARWU (released each year on August-15th)												
	2003	2004	2005	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Nbe d'Univ-JAP (<500)	36			20	19	18	16		16	14	14			
1	19			21	21	21	20		22	25	26			University of Tokyo
2	30			26	26	26	32		35	32	34			Kyoto University
3	68			101-150	77	77	72		83	90	83			Nagoya University
4	53			85	78	85	96		101-150	151-200	151-200			Osaka University
5	64			101-150	101-150	101-150	101-150		101-150	101-150	151-200			Tohoku University
6	101-150			101-150	101-150	151-200	151-200		151-200	151-200	151-200			Hokkaido University
7	101-150			151-200	151-200	201-300	201-300		201-300	201-300	301-400			Kyushu University
8	101-150			101-150	151-200	151-200	201-300		151-200	101-150	101-150			Tokyo Institute of Technology
9	101-150			151-200	201-300	201-300	201-300		201-300	201-300	201-300			University of Tsukuba
10	301-350				301-400	301-400	301-400		301-400	401-500	401-500			Chiba University
11	251-300			301-400	301-400	301-400	301-400		301-400	301-400	301-400			Keio University
12	251-300			301-400	401-500	401-500	301-400		301-400	401-500	401-500			Okayama University
13	201-250			201-300	201-300	301-400	401-500		401-500	401-500	401-500			Kobe University
14	351-400			401-500	401-500		401-500		501-600	601-700	700-800			Osaka City University
15					401-500		401-500		401-500	401-500	401-500			Tokyo University of Science
16	301-350			301-400	401-500		401-500		401-500	501-600	600-700			Waseda University
17	251-300			301-400	301-400	401-500			501-600	501-600	501-600			Hiroshima University

b - A slow but steady downward-shift of the University of Tokyo is observed.

c - Chiba, Keio, Kobe, Okayama Universities and Tokyo University of Science have been struggling for several years to remain in the top 500 best.

d - Abe san statement is far to be met ... Long and steady efforts will be necessary before his 2013 objective is achieved!!!

II. - A mission: to develop international research - URA position at Okayama University

II. - 1 URA position

URA: URA is an abbreviation for University Research Administrator. The Japanese title is not used, but normally the position is referred to as URA. A concise definition of the role of the URA is "to vitalize the research activities of researchers and to strengthen the management of research and development".

The role of a URA is frequently described along a few orientations like : Research Management, Formulate business plan for industrial links, Surveys of central and local government industrial policies, Reflection in business plan for symbiosis with industry, Strengthening relationships between research and industry and Guidance of young URAs, classroom lectures, and human resource training.

II. - 2 The mission

I was recruited on a URA position in 2014 with the mission to implement a sustainable, long term reform of research trends and objectives privileging. My background of CNRS researcher (field of Materials Science) and research manager - was considered as a great asset to actually understand the strengths and weaknesses of research at the University. As I was also partner of several international research projects and head of a joint research unit (CNRS - for research - and Polytechnical Institute of Grenoble, an Engineering School Institute - for Education -) at Grenoble - France - for more than 10 years, I could rely on this expertise to complete the research picture I could get of Okayama University research activities and build a full strategy of research development.

II. - 3 Preliminary understanding of the situation

After a few weeks, in my search to get familiar with the university research landscape, it came out that I would have to work on 2 major sectors:

*** - Research teams are active in the field of local and national projects.*

It is in the substantial participation of the research teams - and not only as an auxiliary force - in prestigious research consortia, that the University would find a very powerful nurturing source to strengthen the brilliance of its global image. In that field of International research consortiums, it clearly appeared that the participation in large scale research consortiums was poor. A major reason for that situation is that there is no clearly defined professional team specialised in "International research project engineering", a field where many of the most powerful international Universities have been investing a lot for years. Promoting International research is still largely entrusted to Administrative services that can support and provide infos but by no way - because they are not trained for that kind of mission - are able to initiate, build, negotiate and finally implement research activities.

*** - Switching from a purely Administrative perspective of research management to an efficient and professionally oriented approach*

Administration is supposed to give a global picture of the research landscape. The purely administrative approach based on papers and a few key-words related with the research activities and no direct detailed discussions with the researchers however provides a very rough, oversimplified, sometimes outdated and possibly useless picture. As a result the gap between reality and the administrative picture can be wide.

To get a precise picture of the research team's proficiency, I decided to perform a long term ground fieldwork relying on my background as a scientist and expert in research management. The objective was to collect details about their global research perspectives including mainly,

the major advances in their research topics, their commitment to international joint research, their wish in developing their potential in accepting young researchers (like master graduated students), their wish in engaging in large scale international consortiums.

Over 3 years (the job is still underway) I conducted about 200 interviews, each of them about 45 - 60mn long. This was made possible because researchers were very happy to have a peer to peer relation in the interview. As a result, first, it appeared that in many fields the performed research is of prime quality. Numerous groups have a high performance index in terms of research originality, papers in International journals and participations in high-level international Conferences or Workshops. A second outcome of the fieldwork is a database of research topics including about 40 professors and 130 topics. These data have proven to be essential in the implementation of an ambitious development strategy based on very solid pillars in terms of skills and research potential.

II. - 4 Coming-up with a suitable strategy of development

Once I could get a clear picture of the research landscape, I adjusted my objectives (improving the international image of Okayama University, developing international research) to the operational reality on the ground. I decided to adopt a framework that would bridge reality and objectives and I could do it because from the start, I got the benefit of a wide margin of freedom and decision making. So doing, my plans and orientations went much beyond the administrative limitations of a standard URA mission. I could actually work on the initiation and implementation of research projects and all related matters: research students internships, ERASMUS programs promoting students, faculties and staff mobilities, invitations of professors, organisations of research conferences. As the European Commission proposes the largest support budget to research and research related activities in the "Horizon 2020" program, I encouraged my research colleagues to partner in the European Commission programs. In short, I specifically relied on the Humboldtian model putting research - the strength core at Okayama - at the heart of my strategy.

III. - Adjusting the Humboldtian model to specificities of Japanese Universities

The Humboldtian model of higher education (German: Humboldtsches Bildungsideal, literally: Humboldtian education ideal) or just Humboldt's Ideal, is a concept of academic education that emerged in the early 19th century and whose core idea is a holistic combination of research and studies.

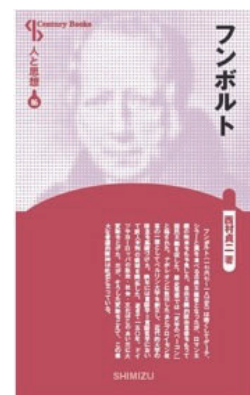


Image 1: Humboldt model

Sometimes called simply the Humboldtian model (see image 1 and [1, 2] and Wikipedia references), it integrates the arts and sciences with research to achieve both comprehensive general learning and cultural knowledge. This deal goes back to Wilhelm von Humboldt, who in the time of the Prussian reforms relied on a growing, educated middle class and thereby promoted the claim on general education.

Johns Hopkins University (USA) for instance is built on the Humboldtian model of higher education and is thus strongly dedicated to research. In 2020, Johns Hopkins is frequently quoted in newspapers as the University developed a well-established statistical system to follow the "Covid" pandemic evolution around the globe [3, 4]

Adopting the concept of a graduate school from Germany's historic Heidelberg University, Johns Hopkins University is considered the first research university in the United States [3]. Over the course of several decades, the university has led all U.S. universities in annual research and development expenditures.

III. - 1 Adjusting Humboldtian model of development

The Humboldtian model is known in Japan [1, 2, 4, 5, 6]. The big matter is however whether it is understood and implemented.

For Okayama University (and thus for many Japanese universities), implementing a Humboldt type strategy of development means:

"Implementing a range of programs directly related to research (for instance large scale H2020 "Research and Innovations" programs supported by the EU commission or any other funding agency) or in connection with research: for instance MSCA-RISE, ERASMUS. Local programs like SAKU [7], the I-Ma-C [8], international course of Okayama and the Invitation program of International students are all very flexible and add a new breathing mode in the University. All those programs, are still considered in most of Japanese university as independent because referring to different sections of Administration - this strongly mitigates the impact of each of one - are strongly interconnected in a Humboldtian approach.

This is the strategy I have followed at Okayama University. This is the strategy that provided lots of outcomes. All implemented programs (SAKU and my Missions abroad, Research Internships, EU Commission research projects, I-Ma-C ...) are all connected: they all aim at strengthening each other to give a strong and dynamic boosting to the University. All of these programs include by some ways, staff training to the best practices in top Institutions abroad, contributing to heighten the global skills and mindsets.

As all sections of the strategy rely on flexible programs, this characteristics should help a lot to alleviate the rigid models usually encountered Japanese Universities, where Research and Education, even International Affairs are conducted as totally independent matters.

III. - 2 Flexibility of the model - A minimum of logistics and bureaucracy

Bureaucracy in the public sector is recognized even by the heads of the Japanese government as being a very important obstacle to rapid development and to the establishment of a certain agility of structures (see for instance reports issued from Abe's cabinet office or from the newly appointed minister of the Reform in the Suga's cabinet - on the use of the *hanko* (seal), the fax and other old-fashion habits).

At meetings of the Council on Economic and Fiscal Policy, Prime Minister Shinzo Abe instructed government ministries to review and adapt laws. preventing simplification of bureaucratic old fashion practices. For instance the one requiring *hanko* personal seals has prevented telework from being fully implemented as it requires employees to visit offices to get documents stamped. After being tapped as administrative reform minister, Taro Kono has wasted little time in waging war on emblems of Japan's bureaucratic red tape — first *hanko* personal seals and now the fax machine. Streamlining administrative work, eliminating vested interests and pushing for a shift toward digitization are among the much-hyped pledges underpinning the identity of Prime Minister Yoshihide Suga's fledgling administration. Kono said his ongoing crusade against *hanko* — which is often cited as a factor behind the rigmarole of municipal paperwork in Japan and a hamper to speed-up procedures in case of pandemic, jeopardizing survival conditions of contaminated people — will go a long way toward phasing out the nation's entrenched fixation on fax, another low-tech practice that's hampering efforts to go paperless.

“To be honest, I don't think there are many administrative procedures that actually need printing out paper and faxing,” Kono told a regular media briefing. Its heaviness has also been recognized as the main cause of the failures of attempts to reform an administrative system very stuck in traditional practices and far from modern methods of university management in particular [9].

Image 2: illustration of one of the numerous bureaucratic features targeted by the recently appointed Minister of reform - 2020



It is clear that such long standing habits among many others such as multiple rules and strains on any decision making as well as the strong and still at work disconnection between Education and Research jeopardize the potential of the universities and the whole public sector as well. The Humboldt method is thus an excellent tool to circumvent those obstacles.

III. - 3 Changing the profile of a University: a long time scale

Changing the profile of a University is a long-term work-task requiring much more than simple programs supported financially for 5 years. The efforts should be long term and planned over periods of 20-30 years: the best Universities did access international notoriety over 50 years periods. For example, Stanford University: since its opening in 1891, Stanford has been dedicated to finding solutions to big challenges and to preparing students for leadership in a complex world. From Nobel Prize winners to undergraduates, all members of the Stanford community are engaged in creating new knowledge [10, 11].

Professionalism: changing the profile of University starts by up-grading the image and reputation. It is a very long effort that requires recruiting a range of professionals in the field of research, research management, science communication, promotion. This also means professionals for recruiting the suitable staff at any position in the University.

Changing the profile of University by relying on the Research resource: to give an example of the time it took to make Okayama University able to propose and participate significantly (participating as an advisor or welcoming a student for a 1 or 2 weeks stay does not contribute of course to the situation improvement) in international large scale consortium: 2 years to build a Data Base, a resource of research skills and competences. Then another 3 years of missions abroad to promote the research quality. And then when participating an additional 2 or 3 years of submission before acceptance. And finally 6 to 8 months of administrative paperwork before a kick-off can take place. In total about 10 years just to get the project started. Then before papers related to that project can be published another 2 years are requested. Globally, it takes ~15 years from the early intention to change the profile until the papers will be published in International Journals, being noticed and cited by the targeted community. Moreover, one has add to some additional delay to observe a possible impact in the global rankings.

So I took great care in implementing a range of sustainable programs, with no deadlines - But whereas advanced international Universities have structured full professional teams to develop project engineering, this type of organization is quite limited in most of the Japanese Universities. At Okayama University, as the workload to prepare large scale research proposal is a very heavy task, the progress is slow and to make it faster a new momentum should be

added: this point is considered in Section V where a project to increase the University power to reach an International profile is proposed (The POLE project). It is designed as sustainable and without time limit.

This is this adapted strategy that I have been developing and implementing for the last 5 years at Okayama University.

IV. - Implementation of the proposed method - A brief summary of the achievements

IV. - 1 Research projects - International consortiums

This section includes some examples of structural projects and research projects. Structural means creation of new structures like Institutes or joint labs to develop collaborative research activities.

I will mention 2 examples of structural projects: IMS and IRP where CNRS and Universities in France are partnering.

Structural projects

IMS the IMS institute (Institut du Medicament de Strasbourg) is a part of the collaboration between Okayama University and UNISTRA [12].

The Strasbourg Drug Discovery and Development Institute (IMS) is based on 3 pillars federating research activities, training and innovation and technology transfer, all centred on the discovery and development of new drugs.

Eleven academic research teams¹ form the IMS, each providing conceptual and technological bases for therapeutic innovation and having demonstrated previous activity of valorisation and transfer. IMS aims at developing finalized projects from the entire Strasbourg scientific community, ranging from in silico studies to setting up of preclinical studies, the creation of intellectual property, legal aspects, the setting up of industrial partnerships and the creation of companies. The field of interest is focused on small molecules and peptides for therapy, diagnosis and related technologies.

IMS aims at developing strong joint programs. From early implication of young researchers in drug discovery and development, a secondary action line will be to initiate common research programs dedicated to technology transfer. Collaborative actions will be initiated with Marseilles (another University of Excellence in France), Freiburg and Karlsruhe (Germany), Basel and Bern (Switzerland), Okayama (Japan) and Quebec (Canada).

The kick-off meeting will take place on January-2021, all International partners will participate in on-line mode because of the Covid sanitary crisis.

MULTIDIM

Drug delivery, imaging and diagnosis benefit of a constant discovery of novel types of nanomaterials. More and more sophisticated multifunctional systems are designed and proposed to overcome some of the challenges still limiting their translation into valid clinical applications. These challenges are linked to aspects like poor accumulation into the site of the disease, to safety concerns associated to potential toxicity, or to the use of nanomaterials in the context of a personalized medicine. MULTIDIM will develop a fundamental research program that brings together three fields at the forefront of chemistry, materials science, and medicine: surface chemistry, nanotechnology, and therapy. The “frontier research” concept behind our proposal is the exploitation of recent advances in chemistry and discovery of 2D materials to design multifunctional conjugates for imaging, diagnosis and therapy.

MULTIDIM: expected breakthroughs

1. Develop and characterize different types of 2D materials
2. Design multifunctional systems
3. Develop a multidisciplinary research for innovative biomedicine
4. Apply the new multifunctional systems in biomedicine (i.e. dentistry/periodontology, cancer and autoimmune/inflammatory diseases)

The kick-off meeting is on a stand-by status because of the Covid sanitary crisis

Research and Research/Mobility combined projects proposed to the European Commission

From 2014, Okayama University contributed substantially in the preparation of a range of large scale research projects.

MSCA RISE: 6 proposals are under evaluation or resubmission - 1 project is running: the so called BE-ARCHAEO project focused on archaeology and more specifically on the Kofun period of Japan [13]. The kick-off meeting took place in February-2019. As most of the archaeology work is performed in a Kofun site located in Okayama area, a substantial number of missions (nearly 300 over the 4 years duration) to Okayama from European researchers, staff and Ph-D students are planned and almost 80 of them have been already performed.

1 MSCA-I-F (Individual Fellowship) is under evaluation.

2 other RI (Research and Innovation) projects are under evaluation.

This substantial list indicates that the University is increasingly committed in large scale international proposals. As the evaluation process is highly selective, the success rate is modest calling for a significant increase in the number of submissions in the coming years. This is the

topic of a new project submitted to Okayama University: after a the present first period to initiate the concept of Humboldtian approach, further developing the potential of International research by increasing manpower in the field of "International research project engineering" appears as a necessary step to anchor even more deeply the University development on research. This is the topic of a next step of development that is currently presented to and discussed with the Presidency team.

IV. - 2 Research and Education interplays

To increase the interplays between Education and Research and in particular in considering, as it is done in advanced Universities that Graduated students are full actors of research in the groups of their supervisors, I implemented several combined programs. I'll give briefly here a few examples:

** Research Internships program for international graduated students [14]: the program is basically oriented to Europe and N-America as those regions are dramatically under-represented in the number of foreign students at Okayama University. This trend is a common one in Japanese Universities. The program invites international students highly motivated by performing research in a Japanese research team. Those students are selected in their origin university after having selected research topics among a list issued from the database I constructed and that I promote around the world during missions of Okayama University promotion I perform on a regular basis about 3 times a year.

Starting with 6 students in 2015, the program met substantial success: in 2019, before Covid, 50 students were enrolled. In 2021 and 202, after Covid neutralisation, recent observations in the contacts performed by students in December 2020, show a steady regime of 50/year will be reached.

** Implementing a Master Education program fully in English: the I-Ma-C program (standing for **I**nternational **M**aster **C**ourse - Okayama) [7].

IMaC-Okayama [8], is an educational program providing a high-level education course to international and Japanese students enrolled together in specific master classes. Through this program, IMaC-Okayama encourages students to learn and understand interdisciplinary science. Lectures offered in English, start from generalities in fundamental natural science and technology, become gradually more specific and finally reach the level of research of the professors. This program provides international students with the ideal setting for studying abroad (in Japan): by enrolling in the program, students are not only given the opportunity to study at one of the most prominent universities in Japan, but they can also have benefits of

personal experience and enrichment. Students will live and interact among Japanese people, and they will experience first-hand life style.

IMaC-Okayama is structured to be highly flexible, specifically for students, as they can select their own education program and combine it or not with research periods.

Outline of the course:

This course consists of (1) lectures, (2) tutorial-studies and (3) group-works. The lectures (1) are typically delivered with Japanese students. The tutorial-studies (2) are planned by each professor and performed as face-to-face seminar or group seminar at the professor's research group. The group-works (3) are task-solving seminars with several students (including Japanese ones) and contains literature searching, discussion and presentation.

Connection with research Internships - the collaboration with Sorbonne University - France - is the most advanced in 2020/2021 as Sorbonne University is sending 3 to 5 students every year combining I-Ma-C lecturing and research internships

** Training Administrative staff from International Office to combined approaches when preparing inter-university agreements. Administrative staff should learn how to work closely with professors and researchers who actually develop the inter-university collaborations.

** School (2 - 3 days) at Oka-Dai to train researchers and URA staff to participate/build large International research consortiums. I organise a yearly training session. Reviews are done to explain how to initiate a large scale project: innovative initiative, explanations of the technical limitations of a European project for instance and so on. The session is not a usual description of what to do. The participants come to the session with their own ideas and suggestions and discuss the logistics and very concrete feature. The session also includes demonstration of the use of Cordis (Community Research and Development Information Service). It is the European Commission's primary public repository and portal to disseminate information on all EU-funded research projects and their results. The Cordis website and repository include all public information held by the Commission (project fact-sheets, publishable reports and deliverable), and comprehensive links to external sources such as open access publications and websites.

IV. - 3 Impact of Research potential improvement on the global image and attractiveness of the University

The positive impact of the strategy implementation on the reputation and prestige of Okayama University appears in a range of fields:

** Selection of students to come for Research Internships at Okayama University

As the International programs such as Research Internships and I-Ma-C are becoming increasingly well-known and appreciated by students around the world, the number of applicants for a period of research or education at Okayama University increases rapidly. Those numbers are however limited by the Inter-University agreements and in particular by the difficulty in balancing the exchanges as Japanese students are by far, mainly for cultural reasons less mobile than European or N-American. This situation sometimes leads to high-level selection of the students wishing to come at Okayama University. Other outcomes are for instance the up-grade of Okayama University as **a privileged University partner** in prestigious universities like Sorbonne in Paris [15].

** ERASMUS-programs, ERASMUS grants on the rise.

ERASMUS interest from European Universities in sending their students and welcoming Okayama University ones is increasing. The number of applications in ERASMUS-ICM (International Credit Mobility) and the number of Japanese students moving to foreign universities is improving

** The number of foreign Professors issued from highly ARWU ranked universities participating in I-Ma-C is gradually increasing.

** High level agreements of cooperation (such as MoU) is increasing. Those agreements are signed for productive collaboration. Strasbourg, Sorbonne, Torino (Italy), INRS (Quebec-Canada) are among those.

** As a results of the new positive evolution of the mobilities, the number of papers co-authored with international research and education institutions is increasing.

V. - Further perspectives

V. - 1 Proposal to further power the research projects potential

As I am the only Okayama University member focused on large scale research project engineering, the potential in the field is limited. Research at Okayama University may accommodate around 10 large scale projects. To meet the "10 projects" objective, a second specialist of research project engineering is necessary. He could join Okayama University when Horizon Europe, the new program of research support is launched. In 2021 or early 2022.

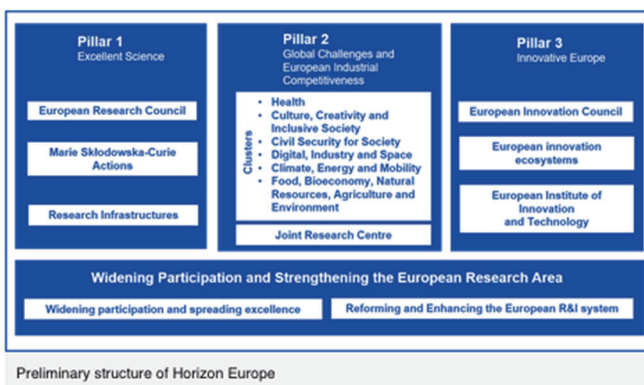


Table 2: Sketch of the future Horizon Europe support program

The strategic planning process will focus in particular on the Global Challenges and European Industrial Competitiveness pillar of Horizon a multiannual Strategic

Plan to prepare the content in the work programmes and calls for proposal for the first 4 years of Horizon Europe (see -gramme as well as relevant activities in other pillars.

Table 2). It will also cover the Widening Participation and Strengthening the European Research Area part of the pro-

V. - 2 Japan and Europe

It is important for Okayama University to rely on highly visible international support programs for which basic logistics are minimal. A high degree of flexibility is also required so that the matching between very different organizational cultures can lead to the best performance. The search for an optimum matching can be performed by investigating research areas where Japan and Europe exhibits complementary needs. The added strengths should generate increased interest from both sides when working on a single topic. A number of high-yields topics are briefly depicted in section *V. - 3*

V. - 3 Privileged Research axis

The panoply of research topics on which Japan and Europe could work in a concerted and complementary fashion is vast and covers many fields ranging from chemistry and physics to the humanities and social sciences. A few examples where combined and complementary research skills, know-how and interests can be very fruitful are given in the following.

Example-1: Health -- Specific Cancer treatments

In the field of Cancer treatments, radiotherapy planning identifies the target by diagnostic procedures. These procedures image different characteristics of the tumor so that size, shape geometry will differ depending on the imaging modality chosen. Inevitably, the target volume defined based on imaging will differ. Finally – and this is a very crucial aspect – the radiation oncologist has to define the volume that will be irradiated. For decades, the clinical use was limited by the need of reactor-based neutron sources. Recently, hospital-based accelerators have become available leading to a renewed and now growing interest from the medical community.

In Japan, BNCT treatments of patients has been steadily performed since the 1970s. A substantial body of clinical experience has been collected but reliable proof of efficacy is still missing. In Europe, there are some strong basic science activities, but limited clinical expertise. There is specifically strong need to advance that specific method in European hospitals by connecting the extensive clinical expertise in Japan with strong basic research activities in Europe. BNCT is extremely interdisciplinary and requires major breakthroughs in a range of

disciplines of science. As a matter of conclusion, there is a lot to gain from both sides in a joint research program.

Example-2: Energy transport - Superconductivity -- High magnetic field for high resolution medical imaging

Superconductivity: in the aftermath of the disruptive discovery of the High Tc Superconductors of the 1980's, research activities in Europe (and in the USA as well) experienced a loss of interest related with the absence of new breakthrough at higher temperature. The situation and concepts are dramatically different in Japan where superconductivity is living a flourishing period: lots of Universities, research institutions and industrial companies are supporting substantial groups focused onto the "holly grail": superconducting materials at temperatures close to room temperature that would help Japan to release the pressure on primary energy supply (like oil supply for instance). And would project Japan as a world-leader in the field of energy saving and convenient use of high-magnetic fields (for high-resolution medical imaging for instance).

Europe could revive the activities by collaborating in joint research projects

Example-3 Strategic materials

Around the world countries struggle to take the lead in the fight against global warming and most advanced ones want to catch up with digital technology. But this ambitious strategy will come up against a major obstacle: the growing shortages of strategic metals and the growing dependence on third countries. Among the most critical strategical compounds are titanium, used in the aerospace industry, gallium and indium, which are involved in LED technologies, or borate, a key product for the manufacture of flame retardants and permanent magnets.

While Europeans want to boost the electric car and have joined forces in a European Battery Alliance, two resources will be even more crucial in the years to come: lithium, which is making its entry into this list, and cobalt, which was already there. Europe will need 18 times more lithium and 5 times more cobalt by 2030, and almost 60 times more lithium and 15 times more cobalt by 2050. The Commission points out that 98% of European imports of rare earths and borate come from China and Turkey respectively.

Japan has similar concerns in that field and so there is lots to gain from both sides in joint research programs.

Example-4 - Humanities and Social Sciences

In Japan, nearly every day National newspapers report about multiple reforms attempts by the Prime Minister Cabinet Office to adapt the Public sector vehicle to modern procedures. It is obvious that such efforts are of prime importance as sharpening public policies would give an even stronger momentum to the performance of the public sector, and would significantly

help improving the ARWU ranking of Universities in particular. It can be planned in terms of a few proposals around a generic theme: "Sharpening Public Policies Evaluation: a springboard to enhance performance in higher education sector".

The project could consider the international aspects: do reforms work in such a way to (re)build the development of sustainable societies, economy and culture? and what kind of political, economic, and social institutions and policy plan is needed, in a situation where international immigration continues in regions where immigration has become a normal phenomenon although disrupted for the moment by the Covid crisis? Also: consideration of the Impact of the Covid crisis on the reforms and whether they remain functional or need to be modified and the impact of the Covid crisis on student and academic mobility could be also analysed.

This would be imagined as a very collaborative world-wide initiative priding a large panorama where Japan decision makers could grab some basic ideas to go into actual reforms of the public sector [9].

VI. - Concluding remarks

VI. - 1 Relevance of the Humboldtian model

Obviously the implementation of the strategy I have been working on at Okayama University for nearly 7 years is successful. It has produced a lot of a positive achievements mainly by referring to a limited number of major orientations.

Research should be recognised by the Presidency team as a master pole of development and the number of performing research teams should be significant. This is actually the case in at least the 15 best Universities of Japan and thus concrete implementation of an Humboldtian type strategy of development could be likely extended to a number of them.

Research as a significant and structured power:

Implementing an Humboldtian strategy, requires a strong basis in research. This is the case of Okayama University and all Universities recognised as research Universities from 2012. A significant number of research teams covering a wide panel of fields is a prerequisite to provide the research managers with sufficient power resource able to initiate and propel new activities.

Flexibility: this is absolutely necessary to in particular put Research and Education in a much more interactive functioning way. Programs combining Education and Research are essential in a modern University. The well-known rigidity of the Japanese administration is terribly efficient in building walls and splitting any programs into virtually independent

sections. This input huge complexity in trying to build global programs attractive for students and professors. Finally, International partners are constantly requiring more flexibility as administrative rigidity and over-bureaucratic procedures are frequently discouraging a lot of initiatives and attempts to include Okayama University in their privileged international academic partners.

Professionalism: developing research activities and combining them with education programs is a heavy work-task requiring highly professional staff. Administration in Japanese Universities have a long way to go before reaching that goal. In the mean-time developing programs where the role of administration is limited to actual paperwork in a minimum perspective can be very helpful.

Peer to peer: the implementation of a new mindset has allowed to remove some obstacles to development of Okayama University. Providing that professionals of research, and research management, work in a flexible peer to peer mode with the researchers, this upward trend can be made sustainable. To observe a significant up-grade of global ranking, a time scale of about a decade years is necessary. In this way, the implementation of a long-term sustainable strategy, relying on high-quality research associated with highly relevant graduate programs, will be successful.

Sustainability and long term perspectives:

To frame with the SDGs initiatives currently underway around the world and in Japan in particular where such collective initiatives are specifically appreciated, the implementation of a significant reform should be understood on a quite long time scale. And consequently sustainability is a prerequisite. This means that 5 years long duration that rhythms the University programs is not adapted. Programs with no time limit, even with little funding should be preferred. They put the dynamic of development on a bright perspective and allow researchers and research managers on a long perspective very encouraging for durable and heavy efforts to improve visibility and reputation.

VI. - 2 Extension of Okayama University strategy to other Japanese Universities

By understanding the substantial achievements obtained at Okayama University, the Humboldtian approach is of course actually the most suitable perspective for Japanese universities engaged in strong restructuring process to fight the observed declines in International rankings and return on the road of success in the next coming years. As public

budgets are slowly and gradually shrinking, Universities have to find innovative ways to expand and strengthen their development perspectives.

As many Japanese universities are using similar models of developments, putting significant power of management in the hands of an over-bureaucratic administration little experienced in actual research management will keep on giving meager results. It looks reasonable that those universities can turn to and use the Humboldtian model of development. The model is known in Japan, as significant amount of documentation is easily available from Internet for instance. But transforming the literature in actual strategies and moreover in concretely implementing them is a huge challenge requiring strong decisions making in particular in professionalising a lot the staff and researchers in charge of the mission.

Implementing a Humboldt-type approach in a Japanese university presupposes that the university is oriented towards innovative and flexible methods of reforming itself. And the presidency team should of course very firmly support the strategy.

An additional wise recommendation would be to recruit more high-level professionals in the field of research management to in particular promote research abroad and initiate high potential project. Professionals in the field of Science communication and Science web editing would also clearly add more power to develop the university.

Careful analysis of the best possible research themes is a professional task. Recruiting more foreign talents would in turn, significantly contribute the Universities global orientations.

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² See for instance the article "Japanese 15-year-olds rank high in math, sciences, but reading down: PISA exam" of the Mainichi Shinbun - <https://mainichi.jp/english/articles/20191203/p2a/00m/0na/014000c>).

References

- [1] - Histories of the University: Kant and Humboldt --- Timothy Bahti
Vol. 102, No. 3, German Issue (Apr., 1987), pp. 437-460 (24 pages)
Published by: The Johns Hopkins University Press - <https://doi.org/10.2307/2905581>
- [2] - "Humboldt's educational ideal and modern academic education" - 2010 - (PDF).
www.drc.uns.ac.rs/presentations
- [3] - "About Johns Hopkins University" 2028 - <http://members.ucan-network.org/jhu>.
- [4] - Johns Hopkins, Covid-19 statistical follow up: <https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>
- [5] - フンボルト - e-Book
<https://elib.maruzen.co.jp/elib/html/BookDetail/Id/3000086224?2>
- [6] - フンボルトの教育理念 ---
Basic Principle / Idea of University Education
https://repository.kulib.kyotou.ac.jp/dspace/bitstream/2433/185476/1/dbk05000_%5B031%5D.pdf
- [7] - SAKU - <http://ura.okayama-u.ac.jp/english/topics-0042/>
- [8] - I-Ma-C (Okayama) - International Master Course (Okayama).
https://www.gnst.okayama-u.ac.jp/en/international/imac_okayama/
- [9] - "L'évaluation des politiques publiques au Japon." Yuki Morita report - (*french*)
Mémoire de maîtrise, École nationale d'administration (ENA). Paris. 53p. -- 2005.
<https://www.perfeval.pol.ulaval.ca/fr/evaluation-des-politiques-publiques-au-japon>
- [10] - Nigel Page. The Making of a Licensing Legend: Stanford University's Office of Technology Licensing. Chapter 17.13 in Sharing the Art of IP Management. Globe White Page Ltd, London, U.K. 2007.
- [11] - Timothy Lenoir. Inventing the entrepreneurial university: Stanford and the co-evolution of Silicon Valley pp. 88–128 in Building Technology Transfer within Research Universities: An Entrepreneurial Approach Edited by Thomas J. Allen and Rory P. O'Shea. Cambridge University Press, 2014. ISBN 9781139046930
- [12] - IMS - 2020 - "Institut du Médicament de Strasbourg" -
<https://fondation.unistra.fr/projet/institut-medicament/>
<https://medalis.unistra.fr/creation-de-linstitut-du-medicament-de-strasbourg/>
- [13] - Be-Archaeo - Project
Project funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 823826
<https://www.bearchaeo.com/>
- [14] - Research Internship Program at Okayama University -- 2020 --- <https://chenevier-ura-okayama-univ.com/research-internships/>
- [15] - Okayama University is a prominent partner of Sorbonne University - (December-2020) -- <https://sciences.sorbonne-universite.fr/faculte/ufr-instituts-observatoires-ecoles/ufr-de-chimie>