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Higher education and research, a tight association: why and how?

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All the developed nations of the world associate strongly higher education and research. This **unanimity**:

- is ancient and is in singular **contrast** with huge **difference** between national political and educational systems.
- is **not contested** though educational systems have been **changing** a lot under the pressure of social, economical and technological transformation of the world. On the contrary it is reinforcing.

This is very surprising and first we will suggest some **explanations**: its our “**why**” a tight association. We investigate the hypothesis that this tie is a **rational** answer to the specificity of research activity.

In the second part, we **induce** of this analysis some guidelines to answer the question: “**how**” higher education and research should be associate to maximise their potentialities.

1. Why a tight association between higher education and research?

Of course for an economist there is the temptation to say that a so old system cannot survive if it is not **efficient**. To explore this hypothesis we have first to describe shortly some specificity of the **demand of research** nowadays; then it is possible to understand why research is, for a large part, produced **in conjunction** with higher education.

1.1. A growing need of research

It's not useful insisting on the eminent role of knowledge in a world where innovation is the engine of growth and competitiveness. Now research is the main factor of maintenance and development of knowledge, exactly as investment is for capital accumulation.

1.1.1. Research and dynamic of knowledge

Our contemporary knowledge is the result of a progressive accumulation of researches that developed in three main domains.

• **Theories** are day after day improved or transformed: in economics we can think of some important jumps:

- the revival of **neo-classical theory**, giving up a lot of the many unrealistic hypothesis, introducing market failures, imperfect information, etc.
- the refinement of **economic policy**, including international, financial, and behavioural dimensions, or interaction between actors ;
- the new start of **growth theories**, with incorporation of technical progress and human capital.

• **Building of models** is perhaps transforming **quicker**:

- the just mentioned theoretical progress allow a large **diversification** of models: they can be applied to **many** fields and to all **levels**, including the most **concrete**: for example game theory or agency theory can solve a lot of common problems

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- encountered by public or private decision makers, or understand many household compartments;
- production of **data** increases exponentially, in number (to cover the new domain), and in depth, because it incorporates these new lightings ;
 - **statistics and econometrics** give new possibilities: modeling and testing with qualitative data, generalisation of computing on individual data, duration models, detection and correction of bias, data mining, etc.
 - of course, this movement is reinforced and widely spread, thanks to the common use of **computers**. For example, complex simulations permit to explore non-calculable configurations (bootstrap).

In brief, all that originated in a flow of research, concerning **many fields**: economics of course, but also mathematics, computing, etc.

1.1.2. A brilliant future

Theoretical and applied researches are not reserved for knowledge with a great K: increasingly they are used to **enlighten the choices** of public and private organisations.

- This phenomenon is not new, but it is taking a new dimension. The first reason was evoked above: it's the capacity of knowledge to cover quite all fields, and to be enough precise and adequate for **operational use**.

At the same time, the **costs** of a bad decision are always higher, much higher than the costs of studies, even sophisticated.

- Governments and administrations want to have precise evaluation of the consequences of **alternative projects** that engages, sometimes for a long time, important expanses (think to urban development, energy policy, etc.).

- For the firms, the main problem is the growth of **risk**: hardening of concurrence, monetary instability, minimisation of inventories, etc. Even if one cannot foresee the emergence of these risks, it's possible to calculate all the consequences of an accident for the firm and so to prepare an optimal reaction without delay.

- Last but not least, we are in a perpetual **changing** world, in all domains: technology, economy and society. It means that at the same time we have to **adapt** our knowledge. Of course the theoretical framework gives us the guidelines: we know that the markets are not perfect, that qualification of manpower is growing, but we want to know precisely the degree of imperfection, or the needs of qualification. For that we can't copy old analysis, but we to adapt them or to produce new ones.

1.2. The combination of higher education and research: a pertinent answer to this need

Three main systems are used to take up this **challenge** of giving to the society proficiency of innovation: **private** laboratories, specialised **governmental** research organisations and... a close association of **higher education and research**. These systems are **coexisting** and will do so in the future, because they are **complementary**, even if, they can be in competition on some project. Each of them has a specific function that the others cannot contest. But the twosome research/higher education, has a **lower cost** and is the **only** able to produce some main attributes of a dynamic of knowledge: **freedom in the choices** of research, freedom and even **obligation** of **divulging** the results.

1.2.1. Freedom in the choice of research

Why is this freedom so important? Because the development of knowledge is **endogenous** and can be **impeded** (obstructed) by exogenous pressure. Both private and public organisations suffer of constraints, have aims, etc. They always have the temptation to subject **the means to their specific ends**, so it's quite impossible for them to tolerate another point of view on the reality.

It's also difficult for them to understand that creation of a new knowledge is not linear, that it implies a lot of surprises, of bends.

Even, if they understand, they **don't like** something that is not under control or very difficult to **control**.

The consequence is that specialised research organisations, private or public, are not adapted for the **unlimited task** of developing general knowledge. On the contrary, they can be very efficient when it is possible to assign them a **precise aim**, a kind of mission. We can note that, even clearly affected to a mission, these organisations are often out of control, because they have the monopoly of the knowledge that is necessary to control... You can think about the NASA.

1.2.2. Freedom and even obligation of divulging the results

For the diffusion of knowledge, the **superiority** of university over private sector is quite clear. Suppose that an important discovery is made in a firm.

- The reactions of the management of the firm are:
 - prepare a detailed patent to protect the invention;
 - ask for the best date for using it.

Conclusion: the **diffusion** of innovation is often **delayed** and **restricted** to the payment of important fees.

- What does an academic laboratory do?
 - He **publishes** his results in a national or international review, that everybody can buy for some dollars or find in a library;
 - More, this publication is made **as soon as possible**, because elsewhere in the world some other laboratory is working on the same subject and is trying to be the “creator”.

Note: a public laboratory is submitted to the realisation of a **mission**, not to discover or innovate. The results are often known **after the end** of the mission.

This superiority is perhaps the most important: we saw the building of knowledge is an **accumulation**. To take an image, when a brick is lacking, a lot of researchers cannot lay their own brick and are losing their time.

1.2.3. University research is cheap

This proposition should be a **surprise**, for all **governments**, that are looking at the high share of PNB devoted to higher education, and for **firms** that hardly finance research centres. Ok! university research is not cheap, but relatively **cheaper**, because it's a kind of **joint product**.

Nobody can contest that it's **necessary** to have high level teachers. What is expected from these teachers: that they are **always** at a high level, namely that they follow the growing stream of knowledge. For that, they have to read the most recent books and papers, or to assist to conference, etc. University teachers, within the framework of their job, climb the **first step of all research**: they know the state of art... As wrote Jean Vincens:

“If it's necessary to know the state of knowledge in some field to have a chance to bring something new, the researcher will be the man who knows before being the man who finds.” (Vincens J., 1997, 2, my translation)

1.2.4. Research is founding higher education

This affirmation will be developed in my second part, but I would like to emphasize that higher education without research **would not exist**. Just before, I have said that a university teacher is a man always “up to date”. What can be his **motivation** for that? Who is able to **control** the result? The motivation is professional consciousness and the control came from the students. The first is difficult to maintain, and the second is not optimal. Students try to learn: they ask well done lectures, good explications and exercises. Their interest for theory, and all kind of difficulties is modest.

Practice of research is a strong **stimulation** for teachers and help to keep up a true higher education system.

1.2.5. A natural way of training new researchers

To end, I will evoke the question of **training** of new researchers. This training has two main characteristics:

- on one side, it is **theoretical**: the capacity of situating his research in the large universe of existent knowledge and to build a really **new** problem on that;

- on the other side, like everything new, a discovery is made of hesitations, trying, etc.
The **only** way for acquiring that is **learning by doing**.

Of course, it is possible to separate what is “teaching” and what is “initiation”, but the combination of the two is much more efficient. A teacher is here to **transmit**, a researcher in a private organisation has to **find** something; a teacher is honoured by a brilliant student, a researcher can be replaced by a smart young researcher, etc.

In brief, analysis shows the virtues of a close collaboration of higher education and research and a long history confirms that our deductions are not an illusion. Does it mean that my first part was **useless**? Fortunately not: we can use the main **arguments** to answer the real question: “how can we associate efficiently higher education and research”.

2. How to manage this association?

When we look at the **management** of research in higher education systems in the world, we can see different **models**. To follow the distinction made by J. Vincens (following Clark, 1983), four main models can be found: a **centralised** model around the State (continental Europe), a **corporate** model (UK), a **market** model (US) and the Japanese model (a mix). Of course, every system is a **mix** of market, State control and corporate control: it’s only the **proportions** that are changing.

My aim will not be to comment or describe these models, but to draw a quick view of the **problems that they try to solve**, and the consequence of their application to research. With the background of my first part, I hope you can by yourself choose the best “cocktail” for your **country** and perhaps the difficulties of shaking it...

2.1. Freedom and control

Of course, research has a cost, and a rather **high cost**. It’s why organisations which finance research try to put it under control, using the standard protocols of evaluation. The market control is not really efficient, because research is long-term investment and the sanction becomes very late. Some market properties can be used, but through specific contracts (invitation to tender). What’s got left are **corporate** control, **direct** control and **contracts**, in a context of **trust**.

Three kind of financing must be combined.

- A long term financing, mainly by the state, under control of the researchers;
- A middle term financing corresponding to crucial objectives;
- A court term, but renewable, flow of study contracts.

2.1.1. Long term financing

As we have seen in the first part, the development of research is endogenous. Who knows at best the streams of knowledge? Those who produce them, the researchers. It means that a part of the financing of research should be completely under their control.

- Of course, they can have the temptation to ask **always more**: it’s not really a problem, because, they can only choose the affectation of this money, **not the level**. The government has to decide a « sufficient » level, which is determined by experience, by comparison with other countries.

Why are the governments incited to leave the control of money? Because, research is a source of positive **externalities**, which are profitable for the whole society, and consequently for the government itself.

- The question of repartition of the money has to be discussed between the researchers. For that, they have to **evaluate** their activities. Of course, this is made year by year, but the main control is for each period of 4 or 5 years: the report must justify the productivity of the team or laboratory involved.

2.1.2. Middle term financing

Governments (mainly) can have a specific need, which suppose some knowledge developments in one **field** (computing, space conquest, energy, sociology of urbanisation, etc.) and an extended

contribution of scientific community, difficult to organise in a decentralised system. In many cases, this is the situation where the contributors decide to create a specialised institution. But, it's also often possible to manage the project by dividing it and contracting for five to ten years with a group of university laboratories.

2.1.3. Short term financing

Government or private firms have discovered a problem, or suffer of a lack of information. If this need is small and urgent, they use consultants. If it's larger, they can ask for collaboration of university laboratories.

Like in the above case, the best way is to have a **scientific council**, which prepares a blue print and evaluates the answers of the laboratories in competition: there is some use of market procedure.

To sum up, a good policy of research suppose to be able to share at best between the three ways of financing, and to **manage the process of control** of each of them. In any case, the control incorporates a large part of **trust**. The only way to found this trust is to design a good **research's management**, whose main part is articulation with the higher education system.

2.2. Organise the links between research and higher education

The management of research at university is a specific one (I will not talk about the management of organisations devoting to research). The question is not only to **discover** something, but also to keep up a permanent **capacity of creating knowledge**. It's important to understand why a strong tie between teaching and research is a rational way for this aim. I will concentrate on one subject only: how research activity is a motivation of teachers.

2.2.1. Career preoccupations

– Practice of research makes a clear **gap** separating higher education from **secondary education**. Cf. difference of « difficulty » that can be contested, the tendency to make a first cycle which is « post-secondary » where the teachers are secondary teachers.

– Research is in general the basis of access to career. For higher education the **pedagogical** capacities are useful, but no so important that they are in primary or secondary school. The main **qualities** are the richness and the topicality of the content, the capacity to show the difference between common sense and scientific approach, to formalise, etc. All these qualities are clearly **correlated** with those of a researcher. It's why all countries **select** their university teachers mainly on research proof: quality of thesis, papers, communications, etc. (example of France).

Note. For all countries, the mode of selection is « **by the peers** ». The organisation can be complex to take in account all problems. For a small country like Laos, the selection comity must associate different fields and give a large part to international experts. All the papers submitted must be in foreign language: a paper in lao cannot be included in the scientific debate.

2.2.2. Connection with teaching

– Training research capacities of students

– **Opinion** of students: the best teacher is only a teacher. A researcher is not only a “knowledge mine”, but also a **thinker**, a man in capacity of having a **wise advice** in his field in any circumstance. We can note that with the exponential development of knowledge, this capacity became **much more important** than encyclopaedic knowledge that is quite impossible.

– Confrontation with **foreign educated** students. On this question I wish to underline something. Quite all underdeveloped countries complain about the “**brain drain**”: they send students outside, the bests, and they do not come back. Of course, it's because they can get more money, but I would insist on **another reason**: if they come back, they are impeached to practise the same job. It is true for a manager, but it's evident for a high level scholar: he was in a laboratory, with an infinite library, last generation computers and softwares, and high-speed connection to Internet. He was working in a team, collaborating with two or three foreign laboratories, etc. If he comes back to Laos, he would have no technical background, no team, and few connections with the scientific community. If you want to take back your students, if you cannot give them a lot of money, add some **professional satisfaction** to their attachment to their country and you have some chance of success.

2.2.3. Personal motivation

- Challenge of adventure: perhaps the **adventure** of knowledge is the last of our finite world.
- **Reputation**. It's a great satisfaction to be recognised by his **peers**: it's really a pleasure always renewed of encountering a colleague who talk you about your last paper, report or book.
- Way of financing **technical means** (computers, library, etc.).
- Indirect way of **earning money**: a good researcher is consulted like expert, asked for organisation of training for managers, or sells books (in foreign language or in Lao).
- **International relations**. A researcher has contacts with other researchers in the all world: he goes to seminars, collaborates with international organisation, participates to projects involving pluri-national teams.

2.3. Structuring the research capacity

I suppose that most of you are **thinking that all that is a dream** for Laos. Of course, it's not to morrow that most teachers will be considered like researchers, that numerous research laboratories will be created et financed by global funding and contracts, and I don't speak of a lao Nobel price.

That's right, but the greater the difficulty is, the greater the interest and the ambition are. I suggest you two means.

2.3.1. Lobbying by convincing

The term lobbying is quite pejorative in French: it has no translation... But it can be necessary to use all relations to promote a project, which is so obviously useful for your country. To day, I have introduced some arguments and I'm sure that you have many others, more convincing for the local authorities: group them all for memory in a paper and defend them everywhere.

2.3.2. Creating a structure (laboratory), even informal

– It's **not expensive**: it's always easy to get a material (private) gift on a good project; don't expect a big help for personal... For management and economics it's the good time to ask for some rooms in the new Faculty...

– You can quickly find some local contracts for **empirical studies**, surveys, etc. The best research is not necessary the most abstract. **Applied** research is useful, efficient for learning and teaching, and is easier to finance than pure theoretical research.

– It will be a springboard to have **contact** with European, American, Japanese, etc., laboratories and sign up for **multinational** projects. Note that a beginning laboratory can benefit from a kind of monopoly if it involves in applied local studies: for the foreign partners, the **specific knowledge of the local background**, of the data sources, formal and informal, etc., can balance a modest theoretical level.

– You can associate the **best students** to these projects: they will earn money, acquire some experience, a plus for integrating in the partner universities.

– When they have finished their **master degree**, they can teach and continue their training in Laos, before achieving their PhD. As I argued above, if the professional conditions are good, they will be interested in working in Laos.

I will now shortly sum up and conclude.

A strong association of research and higher education is the only way of lasting development (in Laos) and more generally, to stay in the movement of knowledge world.

The right way is not to create a "National centre for scientific research", but mainly to develop a capacity of copying, and later adapting a large set of high level knowledge to the local problems. A progressive practice, associating the best students, foreign grants will be the best illustration of the utility of a local dynamic research capacity.

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