The Role of Academic Institutions in Economic Development: The Case of Vietnam

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1. The context

When Vietnam was reunited in 1975, the economy was relied heavily on agriculture and supports from outsides. The central planning economy was then implemented throughout the whole country. Industrial development focused mainly on heavy industry and driven by import-substitution policies. Many ministries functioned like big companies, responsible not only for public services, but also for economic activities which were conducted by belonging SOEs. Academic sector was organized to support such structure and empowered by many young enthusiastic graduates from local and former socialist countries. At that time, unversities were responsible for training knowledgeable personnel, and research institutes were responsible for basic, applied and engineering research. There was quite clear division of labour and responsibility among these academic institutions, so as their management. Universities and colleges belonged to Ministry of Higher Education, most academic research institutes belonged to Vietnamese Scientific Institute and most engineering research institutes belonged to line ministries. Although, the centrally planned economy had many problems, the academic sector functioned quite well with focus to prolem-solving and engineering solutions for productive sector.

Lack of incentives and the rigidities of central planning practices had dragged the economy into severe economic crisis and deteriorating living standards. Foced by domestic dificulties and encouraged by the changes in China and former Soviet-Unions in early 1980s, Vietnamese government has initiated an overall economic reforms known as “Doi Moi” in 1986. Since then, a gradual process of liberalization and stabilization has been implemented which step by step transforms Vietnam from a stagnated central planning economy into a dynamic market oriented economy. An impresive economic growth rate of average 7.2% annually over the last 10 years has been maintained. Most of the economic growth has been generated in the industrial sector, but also services have expanded rapidly (Figure 1). A large part of this growth can be attributed to foreign investment, and more recently, the development of the local private sector. The agricultural sector has been growing at around 4% per annum over the last decade. With liberalization and modernization of the sector, Vietnam has converted from a food-importing nation into the top three rice exporters in the world. However, agriculture still accounts for 22% of Vietnam's economic output, and over two-thirds of employment, primarily on small family farms.

It is hard to envisage *doi moi* without FDI activity. Foreign investors created an imported ‘private sector’ for a country that only had a fledgling private sector of its own at the beginning of the 1990s. With advantages of low distance and cultural similarity, neighbouring countries such as Singapore, South Korea, Taiwan and Japan set their footholds in Vietnam early after its open door policy. By the end of the 1990s, although foreign-invested companies employed less than 1% of the total workforce in Vietnam, they cumulatively accounted for around 27% of the country’s (non-oil) exports, 35% of the country’s total industrial output, they constituted almost 13% of Vietnam’s GDP, and contributed around 25% of total tax revenues (Klaus et al, 2005).

Changes in economic life has brought better life for most of people and more importantly, it links up the country to the innovative global economy. These have put more and significantly

different requirements into the domestic academic sector. Exposing to the global economy opens up more options for enterprises and they now can find solutions for their specific problems from outsides, from international vendors. Solutions can simply be a component, a machine, a type of material, a whole production line or a know-how in making things work, there are all sorts of them. Firms seem to prefer this approach because it can provide quick, ready, and tested solutions for them. More than that, in many cases, it helps them to link up with the international production network, a valuable asset that firms hardly have otherwise. New generation of productive assests also requires new and different skills of personnel. All of these put pressure on academic sector and force it to change. The sector, however, seems fail to adapt quickly and many works need to be done in the near future.

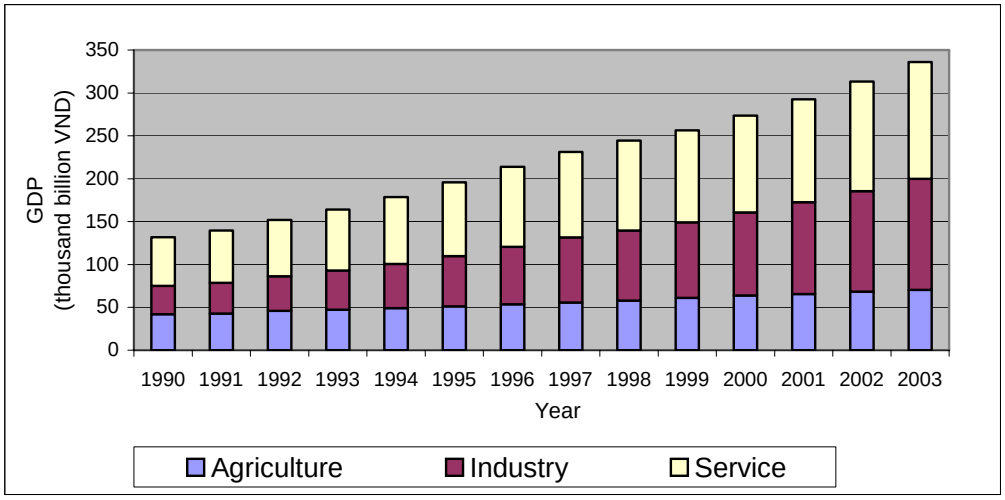

Figure 1: GDP growth by sector (in thousand billion VND, constant price of 1994)

2. Position of Academic Institutions in Innovation System of Vietnam

Since the first born of the term system of innovation (Freeman, 1987; Lundvall, 1992 and Nelson, 1993) there have emerged enormous scientific literature on the subject. Edquist (2004) pointed out that system of innovation is about determinants of, or factors influencing innovation processes, however the concept might have different meaning depending on the specific determinants that have been singled out. While various players certainly have important role, it is the interaction of players which make the system alive. The interaction might be of a market or non-market type which include competition, transaction and networking (Ibid).

As discussed in previous section, specific features of innovation environment in Vietnam (pasive and under-developed innovation system) has made the commercial relationship (including competition) becomes the dominant interaction under the dynamics of innovation. Figure 1 below illustrates the innovation environment in Vietnam, with dominant role of business interaction over other interactions and the lock-out situation of academic institutions.

The diamond in Figure 2 represents the interaction between firms and their business partners. Firms buy capital goods and raw material from suppliers, sell or their products to or do supcontract for customers, and compete with each other. For those local firms which produce components for MNCs and/or large importers, their innovations in many cases are determined by customers. The powerful buyers might request the producers to employ capital goods from reliable suppliers to guarantee quality. For suppliers, in order to sell their capital goods, they

might have to sell on credit, and/or provide access to market, link up the firms with customers. The circle rounding the diamond in Figure 2 indicates that financial institutions, academic institutions, other services provider and government are not involved actively in innovation process. How usefull they are with regard to support to innovations in firms varies from sector to sector (the closer to the diamond, the more the interaction between these institutions and the productive entities).

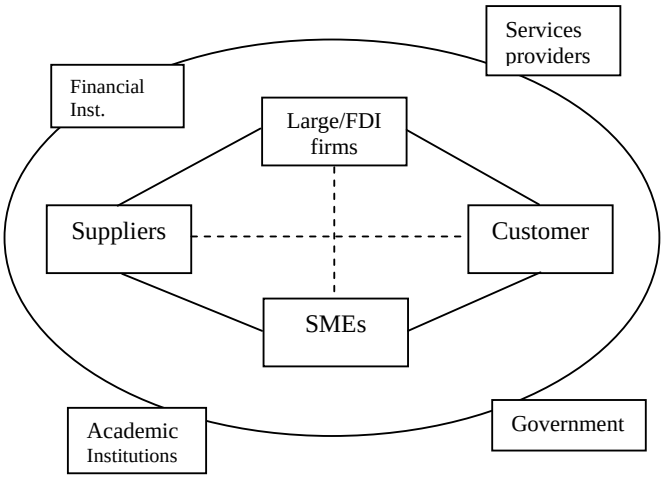

Figure 2: Innovation environment with dominant role of commercial interactions.

So far we have argued strongly that Vietnamese academic institutions find themseves in a “lock-out”positions in the innovation system. What we really means is that they are not effective in providing practical solutions for very diverse and specific prolems that firms usually encourter in their innovation efforts. They are also not very good in providing intergrated solution in form of technological package for firms which are influenced by market. Other than these, academic institutions are still holding an important position in technological advance in Vietnamese economy.

In many traditional sectors like agriculture, forestry, and in some dynamic parts of the country (mainly in the south), academic institutions play a vital role in bringing technical advance to farmers. In Mekong River Delta (the main rice production area in Vietnam), more than 80% of rice varieties in use are bred by Rice Institute of Mekong River Delta (a public research organization). Institute of Southern Fruit Trees is also very active in identifying quality parent trees for breeding, in developing advanced cultivation methods for different type of fruit trees, in disseminating technical knowledge to famers and many more. It can be argued that the academic institutions in agriculture and the extension network has played an important role in the success of Vietnam in rice production. Recently, within the framwork of FAO ‘s South-South co-operation in agriculture, Vietnamese agriculture scientist and technicians have been sent to some African countries where they have helped local communities to plant rice and other plants. The results are highly appricated by African and it is considered as the most successful program of FAO in Africa.

Another strong position of academic institutions is training. Ofcouse training is the domain of universities and we can argue that if university fail to provide training services then what else should they do. However, not all higher education systems and not all universities within a system are capable to train high quality personnel. Although there are many weakness of university system in Vietnam which we will come back later, we can argue that relatively,

Vietnam still has a quite developed higher education system. The system, so far has contributed significantly in providing educated personnel to almost all economic sectors in the country. At least, unversity education has provided students some very basic foundation that allows them to continue their learning in productive sector.

The fast growing economic activities and liberalization process have put university training in Vietnam under great pressure. As described earlier, opening up the eonomy has allowed productive sectors to acquire capital goods with embedded technology from more advanced countries. This allows firms in developing countries to capture the fruits of R&D conducted elsewhere and utilize them for their benefit. Having acquired such production facilities, firms need to learn how to run the production system effectively and this requires direct expose of engineers and workers to the system themselves (things that few academic scientists have). Since that process has gone too fast, university curiculum can hardly be kept up with and quickly become out of date. University graduates lack state of the arts engineering knowledge and it might take them several more years to learn on the job before they can work effectively in productive sector. The higher education system now have dificulties to provide needed highly skill personnel.

3. Mapping the Science and Technology Sector in Vietnam

Following the reform in economic activities, the liberalization of S&T sector were innitiated quite early. Being constructed as a variation of Soviet – style academic model, the sector has experienced several restructuring trials, some were quite serious and radical, at least in what was planned. Among these trials, Degree 35 of Government inacted in 1992 is probably the most acknowledged one. It marked an important change in which rights of S&T organization to involve in commercial contracts with economic entities and their rights to set up affiliate (centre) for commercial purpose are formally recorgnized. Since then, many centres have been established under this regulation (so come their name Centre 35) by public S&T organizations and groups of individuals. However, lack of supporting institutions and commitments, Degree 35 and some other restructuring efforts have failed to deliver expected outcomes. The S&T sector has been lagged behind the reform in economic sector and although there are some improvements, the critical changes are still ahead.

R&D activities are conducted in most research institutes under line ministries, and two national research centers for natural and engineering sciences and social sciences.[1] In the country, there is very modest financing of R&D via the state budget. Vietnam spent around 0.5% of its GDP on S&T activities in 2003 (Asian Productivity Association, 2003)[2], and most publicly funded R&D is conducted in government research institutes. Only a limited number of university faculties have adequate resources for significant R&D. The research infrastructure is below international standards. The research tends to be theoretical, supply-driven, and not connected to the needs of the productive sector. The national R&D system is "organized, financed and managed in such a way that technology transfer is difficult and expensive" (Bezanson *et al*., 2000).

Table 1: S&T Organizations in Vietnam by 31 Dec 2003.

Sector of Administration	2000		2001		2002		2003	
	Num.	%	Num.	%	Num.	%	Num.	%

[1] These are now renamed as Vietnam Academy of Sceince and technology (VAST) and Vietnam Academy of social Sciences (VASS).
[2] Most OECD countries and China spend around 2% of their GDP on R&D.

Public sector	517	60.6	611	58.2	631	56.5	668	55.7
- Line ministries	342	40.1	423	41.3	437	39.1	466	38.9
- Higher education	120	14.1	129	12.3	134	12.0	141	11.7
- State own Enterprises	55	6.4	59	6.6	60	5.4	61	5.1
Collective Sector	311	36.5	399	37.9	440	39.5	487	40.6
Private Sector	25	2.9	41	3.9	44	4.0	44	3.7
Total	853	100	1051	100	1115	100	1199	100

Source: MOST (2004).

It should be noted that the above so-called "centres 35" are also refered to as S&T organizations in some statistics and this practice has inflated the number of S&T organizations quite significantly. In Table 1, it is read that by 31 December 2003, there were 1199 registered S&T organizations, in which 668 were in public sectors, 487 were in collective sector and only 44 were in private sector. The numbers are very impressive, however it includes many centres with one or two staff which are set up mainly for administrative reasons (these centres might enjoy more freedom and autonomy in operations than their parent organizations). This statistics also counts centres of the same institution and the institution itself as S&T organizations, so there are a lot of double counts.

The present S&T organizations of Vietnam can be classified into two groups: (i) general scientific and engineering institutions and (ii) higher education institutions. The classification is relative and based on administrative rules (higher education institutions are under administration of Ministry of Education and Training). In fact, there are overlaps between two groups since the former also involve formally in training and the later in doing research. Details of two groups are described below.

a. General scientific and engineering institutions

This catagory includes organizations of different forms and names such as: research institutions, research centres, conslutant centres, laboratories, experimental stations, observatory stations etc. Using legal status, they can be classified into three sub-categories: (i) State critical scientific organizations which are established by the Prime-Minister; (ii) scientific organizations which are established by (need not belong to) line ministers or presidents of provinces/cities; (iii) scientific organizations not belong to the above categories. This classification is mainly used in process of allocating public funding for S&T where the first two groups are generally the favourite receivers.

Another classification is between public scientific organizations and non-public scientific organizations. Public scientific organizations include: (i) State critical scientific organizations; (ii) scientific organizations set up and owned by line ministries/provinces; (iii) scientific organizations of universities and (iv) scientific organizations of SOEs.

Public Institutions

Among all scientific and engineering organizations, the Vietnam Academy of Science and Technology is the largest one. The institute has 18 research institutes and 9 regional branches in various fields of science and engineering. Their affiliates are located in all parts of Vietnam with concentration in Hanoi and Ho Chi Minh City. The institute sets up 16 enterprises (start-up); 21 scientific centres (under 35 Degree); 16 higher education institutions; 7 administrative bodies and 11 jouranals/magazins. By the end of 2003, this institute had a staff of about 3000 people. Another state scientific research institution is the Vietnam Social Science Institute. By

end of 2003, the centre had 26 research and supporting institutes; 4 administrative bodies; 15 higher education institutions and 30 jouranals/magazins, employed 1380 people.

Traditionally, the above two institutes have privilege to receive funding from central government to carry out the so called "State S&T missions". These missions are usually organized into research programs which aim at providing scientific foundation for policy making and legislation building process (social science), or creating new S&T outcomes which are significant for economic and social development; for defence and national security; and for human resource and S&T talents development. Lacking an effective mechanism to identify such missions as well as mechanisms to distribute such research results, it is criticized that the state S&T programs are not effective. Over the last few years, the whole process of identifying, conducting, and evaluating state S&T missions has been reviewed for better solution.

Table 2: Funding stutus of public scientific organizations of government bodies.

No.	Government Bodies	Parent only	Parent& Affiliate	Number of organizations funded by government		
				funded	semi-funded	not funded
1	Ministry of Agriculture and Rural Development	38	87	1	82	4
2	Ministry of Industry	23	35	1	26	8
3	Ministry of Health	18	20	8	10	2
4	Ministry of Aquiculture		7		7	
5	Ministry of Culture and Information		4	3	1	
6	Ministry of Telecommunication		2	1	1	
7	Ministry of Labour, Invalids and Social Affair		5	4	1	
8	Ministry of Construction	15	15	1	12	2
9	Ministry of Resources and Environment	3	9	1	8	
10	Sport & Exercise Committee	1	1	1		
11	Population, Family and Children Committee	1	1	1		
12	Committee for Ethnic and Highland	1	1	1		
13	State Inspection	1	1	1		
14	Labour Union	4	4	1	3	
15	Youth Union	1	1	1		
16	Ministry of Commerce	3	3	2	1	
17	Ministry of Finance	5	5	3	1	1
18	Ministry of Planning and Investment	3	3	3		
19	Ministry of Transportation	10	23	3	19	1
20	Vietnam Academy of Science and Technology	26	44	23	5	16
21	Vietnam Academy of Social Science	28	28	26	1	1
22	Ministry of Defence	8	19	19		
23	Ministry of Police	10	10	9	1	
24	Ministry of Home Affair	2	2	2		
25	Vietnam Television	1	1	1		
26	The people's Supreme Court	1	1	1		
27	Ministry of Science and Technology	8	33	1	25	7
28	Ministry of Education and Training	18	155	3	21	131
29	National Steering Committee for Clean Water and Environmental Hygine	1	1			1
	Total	230	521	122	225	174

Source: MOST (2006).

In addition to the above two institutions, there are some scientific organizations which were set up and owned by line ministries and provinces/cities. These institutions also get public funding via their ministries/provinces to do research which address the scientific/technical and/or policy problems in the field/areas of related line ministries/provinces. Public scientific organizations also include centres belong to universities and engineering research instituions belong to state owned enterprises. With regard to the former, by the end of 2003, there were 141 centres set up and owned by public universities/colleges. The later are classified as public R&D organizations since their parent organizations, the SOEs, are considered as public entities.

With regard to the governance of public scientific organizations, up to now, majority of them still belong to line ministries and other equivalent government bodies, and as that get subsidies from government budget. Table 2 shows the number of scientific institutions of various government bodies, their affiliates and how they are funded. The merge column "Number of organizations funded by government" show how many of them are fully funded, partly funded, and not funded by government. There are several remarks from Table 2. First, the real number of public scientific organizations (parent only) is much less than statistics in Table 1 above after "centres 35" have been removed. Second, most of them are still relied on dirict funding from the government. Whether this is a negative indicator or a positive indicator is still a debate. Third, the table has not included public scientific organizations set up by cities/province. Although there are few of them, in recent years, budget generating cities and provinces tend to set up research organization under their own administration to support their administrative works and/or to support the local communities.

Non-public scientific organizations

Non-public R&D organizations include: (i) R&D organizations of non-state enterprises; (ii) R&D organizations of political, social and professional organizations; (iii) scientific organizations of professional Associations; (iv) foreign R&D organizations including join-venture R&D organizations. Collective scientific organizations in Table 2 are also included in this catagories since most of them are under the name of professional associations.

Given the small-scale of domestic private enterprises in Vietnam and the weak linkage with public R&D organizations, their R&D activities, if any, are mainly conducted in-house by their own staff who may or may not have any formal education in scientific and engineering fields. R&D as an organized activity is not common in this sector. With regard to foreign sector, there are few foreign R&D organizations in Vietnam, and majority of R&D and engineering works of this sector are conducted in headquaters of parent firms.

Number of scientific organizations of political, social and especially professional organizations are quite numeruous, however their capability is mainly in doing consultants and intermediaries services. Little of them have research facilities which allow them to do serious engineering works.

b. Higher education institutions

As mentioned earlier, although higher education institutions are considered as an important part of S&T system, not all of them are registered as S&T organizations in the above statistics. To give an idea of the scale of this sector, Table 3 shows the number of higher education institutions in academic years from 1995 to 2004.

Except for some special cases, all universities and colleges are under the administration of Ministry of Education and Training (MOET). The Ministry is also responsible for preliminary education and secondary education. For academic year 2004 – 2005, there are 230 universities and colleges (93 universities, and 137 colleges) which employed 47,646 lecturers, among them 6,223 were Doctors (13%); 14,539 Masters (30.5%), and 26,854 having university degrees (56.4%). There are 446 Professors (0.9%) and 1,842 Associate professors (3.9%) (MOET, 2005).

For the last few years, using various sources of funding, the infrastructure and facilities of higher education system in Vietnam has been upgraded significantly. Some laboratories have got needed equipments, electronic libraries, electronic communication network (LAN and websites) of many universities have been set up. The introduction of tuition fees for higher education has also brought substantial extra resources for universities. In general, the government has adopted a policy to create a selective number of strong public universities as a basis for university development in the country (set up of national universities, "area" and open universities are few example of changes in the university system). International cooperation has also been expanded intensively.

Table 3: Universities and Colleges in Vietnam

	1995	2000	2001	2002	2003	2004
Universities and Colleges		**178**	**191**	**202**	**214**	**230**
Public	109	148	168	179	187	201
Non-public		30	23	23	27	29
Teachers (thousand)		**32.4**	**35.9**	**38.7**	**40.0**	**47.6**
Public	22.8	27.9	31.4	33.4	34.9	40.0
Non-public		4.5	4.5	5.3	5.1	7.6
Students (thousand)		**899.5**	**974.1**	**1020.7**	**1131.0**	**1319.8**
Public	297.9	795.6	873.0	908.8	993.9	1182.0
Non-public		103.9	101.1	111.9	137.1	137.8
In which: full-time training	173.1	552.5	579.2	604.4	653.7	729.4
Public		452.4	480.8	493.8	529.6	601.8
Non-public		100.1	98.4	110.6	124.1	127.6
Graduates (thousand)		**162.5**	**168.9**	**166.8**	**165.7**	**195.6**
Public	58.5	149.8	157.5	152.6	152.6	180.8
Non-public		12.6	11.4	14.2	13.1	14.8

Sourse: Statistical Yearbooks (various issues)

Although training still dominates the activities of universities, research has becomed more routine. About 4% of public expenditure for S&T now come to universities which account for approximately 15.3% of universities'expenditure for R&D. The remaining fund of R&D expenditure come from contracts with other organizations, in which, 29.2% is from enterprises; 6.7% is from other organizations and 48.8 % is from international sources (Tran Ngoc Ca et al, 2005). In period of 1991-1996, universities undertook nearly 200 projects of pilot production relying on their own research results. In period of 1996-2002, universities under the MOET and two national universities have implemented 3,800 R&D projects and

involved in 90 pilot production projects. Many universities have established R&D units. By the end of 2002, there are 167 research divisions and 147 centers dealing with technology development and consulting activities within all universities (Ibid).

Research at universities, however, has several drawbacks. In terms of *perception and policy*, R&D activities within universities system has not got its own recognition. Many universities are far from being as R&D excellent centers. The universities in Vietnam lacked an autonomy status. In spite of the fact that their operations have been much more independent than before, they still have to receive many directives and under regulations of MOET. Their staff, especially in public universities, have to face constraints in terms of salary ceiling, human resource management regulations, financial incentives, etc. Basically, they are still deemed as government officials, rather than merely academics. Despite the move to abolish the separation of teaching and research, there has still been observed lack of research and weak linkages between research and teaching.

The present incentive scheme do not promote proactive approach among teaching staff in universities. There is few mechanism to encourage them to interact with other institutions and firms. The cooperation (if any) is usually short term, relies mainly on personal and informal relationship. Other than training new labor force, contribution of the university activities, as such, tends to be one-off nature. In the existing system, universities so far do not see technology transfer activities as crucial for their own existence and their technology (if any) are actually not very attractive to the firms. In many instances, facilities and practical engineering knowledge of universities are ways behind those of firms.

Another drawback of universities is the *human resources* for teaching and doing research. Number of professors and lecturers is relatively small to the number of students[3]. Scope of student enrolment is much larger. From 1995 to 2005, for instance, student numbers increased 4.43 times (from 297,900 to 1,319,754 students), while teaching staff increased only 2.09 times (from 22,750 to 47,616 lecturers).[4] Due to this overload of teaching, the university staff simply do not have time left for R&D or other learning activities. Ageing staff is another issue since the majority of professors and associate professors are above 55 years old with few replacements in pipeline. Over the previous years, many scientific and engineering disciplines have failed to atract young talented students and as such a shortage of human resources in university system is foreseen. Within the higher education system, entrepreneurship is not a tradition. The most entrepreneurial character so far is reflected in the desire of teachers to do "outside the class" teaching to earn extra money. The low basic salary of the academic staff explains this.

In terms of *infrastructure* and other teaching and R&D *facilities*, although the system makes some investment for upgrading lately, this tends to be for big universities only. Many universities still use equipment and facilities of the mid-60 or –70s. Library system in many universities is small, outdated in both quality and scope of coverage. Foreign languages literature is still mainly in Russian dated back mid-70s. There has been lacked the electronic links with national library or central information and librarian system. Moreover, even for those universities having English literature, the rate of use is low due to low English capability of the staff and overload of teaching. As a result, teaching curricula is old, repetitive and lacked of innovative approaches and new knowledge. Weakness in

[3] 1 professor has to teach about 30 students, while in other countries this ratio is about 1/15

[4] Some data from Tsinghua University (China) show that it has 45 academicians, 929 professors, 1,230 associate professors to serve 30,000 undergraduate students, 5,900 graduates and 2,600 postgraduate students. As such the ration is only 1/9.

international cooperation is the challenge of the international changes, causing difficulties in long term planning and unsuitable choices of the counterparts in cooperation.

Recognizing the need for training to be linked closer with research and serving the need of social and economic development, the government has launched an action plan to renovate management of the university system until 2010 with key content such as setting up linkage mechanisms between training, research and production; combining training with R&D organizations and firms to overcome traditional isolation of teaching from research and industry; increasing investment for R&D in the universities. Still, these efforts prove to be difficult to implement due to many constraints on the linkage system.

4. What is wrong

Recently, there are many critics on performance of academic sector in Vietnam, except for few success stories mainly in agriculture and public health. With regard to research activities, it is critized that research of public R&D organizations and university could not to provide what the productive sector need. With regard to higher education training, it is critized that graduates from universities lack practical, engineering and organizational knowledge which require them or their employers to spend much more time and efforts to re-train (them) on the job. In general, it is argued that academic institutions fail to actively support innovations in productive sector. To explore more on this issues, we need to understand the nature of innovations in Vietnamese context.

a. Innovation Environment

The innovation environment in Vietnam, a transitional and developing country is quite different from what is usually described in more advanced economies. Innovations in Vietnamese firms are influenced to a large extend by external factors and by the fact that many supporting institutions for innovation are not in existance. Some characteristics of innovation envirornment in Vietnamese context are summerised below.

- Majority of firms in Vietnam are small (including FDI and SOEs) and they serve a small, underdeveloped and unstable markets; firms compete mainly on their access to cheap labour and availability of natural resources (including land). There are few firms compete on the ground of new technology or differnciated products.
- Many firms (especially those in exporting sectors) are making components for or being subcontractors of foreign business and/or MNCs; their innovations (if any) therefore are determined by these foreign customers.
- Weak national and local innovation system; public resources for R&D and other supports for innovation are limited. Central government funding for R&D mainly go to projects of big public research institutions which usually don’t have the mandate and mechanism to provide services for firms with diversified and specific problems. Local government buget for S&T activities is also limited and in many provices it is used internally within the bodies of local government.
- Market for technical and innovation services is not developed. Alternative public services are also present or not effective.

- The pool of common codified technical knowledge in Vietnamese is not rich and not well organized, making it difficult for firms to refer to.
- Knowledge in engineering is weak, especially among academic institutions.
- Codifying technical knowledge is not a common practice in firms and in academic institutions; a lot of potentially valuable knowledge are not codified, not generalized, not appropriated and so could not be utilized effectively.
- Institutional environment is not transparent, unpredictable and not dissiminated well. Corruption presents in many public agencies making the cost of doing formal business high. As a result, there are many informal economic activities which is not good for innovation.
- Under developed financial market plus informality of business make it very difficult for investors to put their money into innovation projects. As such many promissing innovative projects could not find appropriate money to pursue.
- Not having an level playing field makes rent-seeking become main priority of many firms which erode the incentives for innovations.

Characteristics of Innovation

Operating in a very different context, innovations in Vietnamese economy as well as in any typical developing countries are very different from innovations in more advanced countries, things that have been discussed intensively in innovation literature. It is quite safe to say that almost all innovations in Vietnam are incremental and/or "new to the firm". Table 4 shows some descriptions of what are considered as important innovations of firms in an sample innovation survey conducted in 2002. They illustrate very well our points here.

Table 4: Description of major innovations reported by firms

Firms	Major products	Major innovations
1	Soya sauce, fish sauce, bio-vinegar, chilly sauce	modify process of fermentation to increase production volume.
2	Instant noodle	new package model and new taste; modify equipment to improve productivity and reducing costs
3	Moon cake, biscuit, wafer, jams	upgrade preliminary treatment process for all kinds of moon cake' stuffing
4	Plastic parts for motorbike, sanitation equipment	Investing CNC machine tools and CAD/CAM software for designing complex plastic parts.

Source: Nguyen Vo Hung & Nguyen Thanh Ha (2003)

Analysing data from various surveys and case studies, we put here what we see as the most distictive features of innovations in Vietnamese firms:

- Innovations in Vietnam are either incremental or "new to the firms". Incremental innovations are common when firms try to solve specific technical problems which usually emerge from the operation of imported production system or when firms try to produce "new" products using their existant production facilities. "New to the firms"

innovations are common when firms acquire whole or parts of a production system to produce “new” products.

- It is not technological breakthrough, but technology diffusion and technology learning is the main mechanism of innovation. Acquisition of embedied technology via capital goods is the critical component of innovation. Linking up with international production network or international players are important for technology learning.
- Many firms have to take the “second best” approach in their innovation, that means rely on their own to solve their problems with a lot of “trials and errors”. Most of innovations were conducted informally without an appropriate supporting structure and not systematically follow best practices of technology management; linkage with business partners, especially foreign ones plays an important roles in firms’innovation. Codified technological knowledge is under utilized.

The mis-match of production and S&T sectors

Given the type of innovations described above, we can argue that academic sector should be able to support them effectively. The reason that they haven’t done so, we believe, relies very much on the mandate of academic institutions and their management bodies. It is no supprise that there is a mis-match of production and S&T sectors with regard to supporting innovation.

Since innovations of Vietnamese firms are not science-based but problem solving in nature, firms expect academic institutes to support them to solve their problems with their knowledge and/or technical services. However, academic institutions are not organized and prioritised to do so effectively.

Table 5: Ranking of most wanted services (for firms) and
most capable activities (for academic institutions) of enterprises and PROs

Type of services	Firms’ Rank	Aca. Ins’.rank
Installation of new machines and equipment	2	10
Industrial Engineering	5	11
Maintenance and fixing production machines	3	9
Analyzing, testing product/material sample	1	4
Technical Training	4	5
Modify product design or material specifications	8	7
Modify production machines	11	8
Manufacture production machines or components	10	6
Industrial R&D	6	1
Technology Information	7	2
Advice in buying production machines	9	3

Source: Innovation Survey 2002 & PROs Survey in 2000 of NISTPASS.

Table 5 shows the difference between what enterprises see things that academic institutions can/should do for them and what the academic institutions think what best they can/should do. In Table 5 we can see that while firms rank *"analyzing and testing"* services as the most wanted from PROs (first ranking), PROs rank this service fourth. Similarly, while firms rank *"Installation of new machines and equipment"* and *"maintenance and fixing production*

machines" as secondly and thirdly most wanted, these are ranked tenth and ninth respectively in academic institutions'view. Table 5 also shows the reverse picture that while PROs rank *"Industrial R&D"* as their most capable services (ranking first), it is ranked 6th by firms. Similarly, *"providing technology information"* and *"advice on buying production machines"* is ranked 2nd and 3rd by academic institutions, they are ranked only 7th and 9th by firms respectively.

Reform in academic institutions are badly needed, however, among other things, the intended changes should make them be able to serve the needs which emerged from innovations of local firms and from economic growth in general. A wish list of firms put follow can be a guide for future restructuring of academic sector.

Wish list of firms

Given the features of innovations in a transition developing country, firm would want:

- A better, innovation friendly business environment where the innovation activities would be better supported.
- Access with ease to specific, details information related to firms innovation's efforts. Such information should cover all aspects of innovation activities, not only restricted to technical information, but expanded to information on market, materials, etc.
- Access with ease to the pool of common technical knowledge which has been codified and arranged in appropriate forms and languages, especially Vietnamese.
- Get help to be able to link up with production networks, both domestic and international ones.
- Access to reliable, good price technologies, preferably in form of a pakage of solutions which usually include capital goods, technological know-how, training, supply of key materials, and access to the market.
- Having full range of technical services, at reasonable cost.
- Being trained in technology management
- Access to appropriate financial sources.

5. Conclusions

Although there are many efforts to restructure the S&T sector in Vietnam, it is still influenced by the old former Soviet-style model. The existing situation of academic system in Vietnam shows that universities are contributing significantly to the development of the country, but in a more one-sided pattern. Teaching is the main business of the universities so far and for more years to come. But even this teaching does have problems to rectify: underqualification of lecturers, low quality of students graduated, poor infrastructure and curricula for training, just to name a few. In addition, innovation seems to be neglected, except for some major universities that may like to grow into more regional force in the future.

Re-orientation of academic sector is badly needed and some serious plans are on their ways. However, in this essay, we argure strongly that, the roots of problem come from wrong incentives scheme of academic system and a lack of a mechanism to dignose the needs of innovative firms. Academic system need to develop a mandate of problem solving, things that they used to do quite well in the pass. More autonomy should be given to academic

institutions and with that their responsibility. There should be more study on incentive scheme so that they can balance various activities.

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