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The situation of university education in Sweden in land surveying and management

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The situation of university education in Sweden in land surveying and management

Klas Ernald Borges

Abstract

The Swedish university market has increased during the latest decades in more than one dimension. The traditional engineering programme in land surveying has become part of a market oriented educational structure. A diversification of university programmes has lead to new Bachelor and Master of Science programmes in land surveying and management, as well as in GIS and geomatics, with today five universities enrolling more than 200 new students yearly.

Within the profession of land surveying we cannot rely on the traditional concept of the land surveyor as a guarantee for a continued production of these engineers. At the universities we are aware on the challenges at the educational market, and try to integrate our programmes of the professional profile in the changing context.

Keywords

Land surveying, engineering programmes, BSc, MSc, geographical diversification, market, deregulation

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1 The university market in Sweden

Land surveying became an engineering programme in 1932 at the Royal Institute of Technology (KTH) in Stockholm, and it was the only institute/university in this area during 60 years. Vocational courses for surveying technicians complemented the market, but only this institute of technology provided the advanced training in land surveying.

The university educational system was deregulated in 1993, which implied a withdrawal of the central governmental control of university programmes, and an introduction of a market based educational system (Fritzell 1998). Each university and university college¹ had to identify and market its own profile to the youngsters, offering them educational programmes according to the demand. A local perspective on the two markets substituted the governmental control of every educational area and its distribution to the universities. These two markets are:

- 1) The youngsters for the recruitment, and
- 2) The labour market for the graduated engineers.

The Government defines only the objective as a total number of exams for each university, being part of the control of public funding of university education.

In parallel, the expansion of new universities in regional urban centres multiplied the options for the youngsters, and increased the number of university programmes. There was also a perspective of regional diversification of higher education that should increase the development in the regions with qualified manpower. The previous university structure was established in the main cities, including the two traditional university cities (Lund and Uppsala). Today, there are 61 universities, university colleges and other institutes that provide university education, being 20 of them universities with both under- and post-graduate education. The other 41 universities and institutes offer under-graduate education (HSV 2007).

2 Evolution of the Swedish land surveying education and profession

The land surveying educational area at graduate level was limited to the master programme at KTH until 1992, one year before the deregulation. The main reason for launching a new master engineering programme in land surveying and management in Lund was an increased regional competition of new universities, which became even more evident through the deregulation in 1993. The increased offer of university programmes implied that most students at the surveying programme at KTH were from the Stockholm region, and thus preferred jobs in the same region after graduating. It became difficult to find a sufficient number of new land surveyors in other parts of Sweden. The situation was most critical in the Western and Southern parts. A new surveying programme at a university or institute in these areas was studied and proposed in 1991, and implemented at the Faculty of Engineering at Lund University in 1992.

A short historic review will facilitate an understanding of the development of the educational area. The integration in 1932 of land surveying as engineering programme at KTH implied an

¹ The Swedish National Agency of Higher Education (HSV) defines the institutions as universities and university colleges, the former ones entitled to award postgraduate degrees (as well as undergraduate degrees). The latter ones are entitled to award only undergraduate degrees. The latter ones might also be called new universities. In the paper I will mostly call the university colleges just universities.

increase to the general level of four years of studies. The traditional area of surveying, including geodesy and cartography, was mixed with the areas of rural development, as a support to the cadastral reforms dating back to the 18th and 19th centuries. Rural development embraced legal issues, i.e., land legislation, civil engineering techniques, agricultural management, forestry, cadastral development, and some economic and environmental aspects. Still, the urban aspects had limited importance in the curriculum.

Until the 1950's the land surveyors were mainly employed as civil servants at the local branches of the National Land Survey, but the professional market was gradually enlarged. They entered into new areas, where the scientific knowledge of the land surveyor became highly appreciated. These areas were the County Agricultural Boards (1950's), the Municipalities, and Governmental Agencies in the areas of infrastructure (1960's), real estate agencies and land developers (1970's) and gradually into an even more diversified labour market.

The curriculum of the land-surveying programme changed according to the needs of the labour market, as well as the success of the land surveyors in new adjacent professional areas. The broadened professional area and educational profile also permitted an increased enrolment of students. The student group of 20 in the 1950's tripled in 20 years, and the increase continued to a total yearly enrolment of 120 new students in the 1990's.

The major contribution to the increased interest of the youngsters and the labour market was the sector of real estate economics and management. The private market was an incentive for the surveying students. This market became a contrasting challenge to the public sector of land surveying. The municipalities and different governmental agencies broadened the labour market. It was still a predominantly public sector profession, until the 1970's.

The expansion of the curriculum profile matched the interest of the youngsters and the labour market. The land-surveying programme could benefit from this interest by an increased enrolment. During the 1970's and 1980's, the programme was healthy and prosperous.

3 The 1996 comparison of European surveying educations

The review of Mattsson (2001) on the education and profession of land surveyors in Western Europe provides a good outline of the content of the Swedish curriculum in land surveying, compared to most Western European countries. It is based on the 1996 survey of Professor Allan. The countries included in the study are Portugal, Spain, France, Italy, Austria, Switzerland, Germany, Belgium, the Netherlands, United Kingdom, Ireland, Denmark, Sweden, Norway and Finland.

The report shows the special characteristics of the Swedish and Finnish land surveying programmes, with a strong emphasis on the areas valuation, finance and taxation, building economics and management, as part of the specialisation in real estate economics. The programme also contains a specialisation in Land Management, Land Development and Cadastre, with courses in planning, urban and rural development. This specialisation is also classified as the most advanced among the countries studied in the survey. It could also be noticed that the Norwegian and Danish curriculum profiles are similar to the Swedish and Finnish profiles, though with less emphasis on Economics. The consequence of these specialisations is a reduction in the classical surveying engineering area, i.e. in geodesy, instruments and mining/engineering surveying. It is also shown that maps and GIS are given

less attention in the Nordic curriculum profiles. The fast development in GIS might have kept these Nordic profiles at a satisfactory advanced level during the 2000's.

The Nordic Mapping and Surveying/Geodesy specialisations are assessed as having approximately the same advanced level in these areas as the other European profiles. The Allan survey referred by Mattsson (2001) presents curricula of the other European countries as mainly exclusively technically oriented, with some differences.

Valuation is listed as a subject with core knowledge level, but not advanced knowledge, in several countries, e.g., Portugal, France, Italy, Germany, and Belgium. This might be explained by the role of surveyors in fiscal cadastres and assessment of compensation at compulsory acquisitions. Planning, urban and rural development is also listed as a core, but not advanced level in Italy, Switzerland, Germany, the Netherlands, Belgium, and France (advanced level in rural development). The comparison has to be understood in a national context of educational systems, being the areas of urban and rural planning and economics covered by other educational programmes. The profiles might have changed since the 1996 survey of professor Allen, but we know that professional education at advanced level does not change easily, as the professional areas change slowly, according to the demand of the market, how we design the educational programmes, and how we develop our concept of the core area and applications in adjacent areas. The area of real estate economics in the curriculum is an example on how the Swedish and Finnish markets have accepted and appreciated a new competence of land surveyors.

Enemark (2002) has also described the change of the professional profile of the Danish land surveyors in a historical context. In 1967 the cadastral area was the dominating work, occupying about 60 % of the surveyors' working hours, while it had been reduced to about 20 % in 1997. The number of active surveyors in 1997 was almost the double of the number of surveyors in 1967. The professional areas with increased percentage of working hours were planning and land management (about 10 % in 1967; 23 % in 1997), mapping and engineering surveys (20 % to 26 %) and other areas (10 % to 31 %). A similar change could be found in Sweden as well, though with a major impact of land surveyors in real estate economics, real estate broking, mortgage and banking, land developments, etc.

4 Surveying educations at the university market in the 1990's and 2000's

The deregulation of the Swedish university market in 1993 was a confirmation of the increased regionalization of university education. 14 state universities, 22 state university colleges, 3 independent universities and 22 other institutes and course providers in the higher education area offer a variety of educational options. There are in all about 1,800 programmes for the about 60,000 youngsters that yearly start their undergraduate studies. About 35,000 become students at a professional programme. Some programmes are designed as integrated bachelor and master programme, e.g., engineering programmes (HSV 2007).

The MSc engineering programmes has a nominal length of 4.5 years of studies, and from autumn 2007 adapted to the Bologna process, as 5 years master programmes (including the bachelor level). The MSc engineering programmes enrolled about 6,200 new students yearly in 2006, and 3,300 students in BSc engineering programmes. The total number of MSc engineering exams has increased from about 1,500 in the mid-1970's to about 4,700 in 2006. The rate of exams of females has increased during the same period from less than 10 % to

above 30 % (SCB 2007). Still, the number of exams is estimated as unsatisfactory in relation to the need of the labour market, in a strategic and long term perspective.

The expansion of the university market in Sweden has implied a diversification in the land surveying area into five universities. It has also had a major indirect effect on the land-surveying programme at KTH. I will first describe the new programmes.

4.1 Lund University

The programme at Lund University started, as mentioned above in 1992, as some kind of copy of the master programme at KTH. The core scientific area did not exist at the faculty of engineering, but the programme was at least supplied by some engineering areas within the existing engineering programmes, in particular civil engineering. The most relevant scientific areas/courses were traffic planning, urban planning, construction surveying, construction management, computer science and an emerging GIS competence. The existing departments in 1992 were a necessary requirement to fill the curriculum with a relevant mixture of courses.

A new department of real estate science was also created, handling the educational demands with experienced land surveyors as lecturers, and a few associate professors. In 2000, a professor was appointed, being an experienced senior lecturer in real estate law. Currently, the department employs 8 persons. The National Land Survey of Sweden finances two PhD students. The staff is predominantly working with the master programme, while the research activity is limited.

The master programme has expanded from an enrolment of 30 new students yearly during the 1990's to 60 students in 2006. The actual responsibility of courses is 110 unitary full time students, and it will increase to about 150 – 200 unit students within a few years. The constraining factor is the research environment for a significant PhD student programme, producing post-graduate staff to be in charge of the master programme and research activities. The availability of experienced land surveyors with pedagogic qualification could also be a constraint. The master programme has expanded due to good marketing, a huge demand at the labour market and the attractive mixture of courses as part of an engineering programme.

A bachelor programme in geomatics was started in the 2000's in the city of Helsingborg, 40 minutes from Lund and part of Lund University. However, a limited interest of the programme forced it to close, though with continued support to a BSc programme in railway and infrastructure engineering.

The GIS centre at the Lund University has an extended set of courses at basic and advanced levels, serving the land surveying programme, other engineering programmes and programmes at other faculties of the university. They have two master programmes, one as an Erasmus Mundus programme, in collaboration with the Universities of Southampton and Warsaw and the International Institute for Geo-Information Science and Earth Observation (ITC) in Holland.

4.2 University West, Trollhättan²

A bachelor engineering programme in land surveying was created in 1996 at the new University West in Trollhättan, 80 km north of Gothenburg. The Unit of surveying is small with 4 lecturers, all experienced land surveyors or engineers. The yearly enrolment has increased from 30 students in 1996 to 45-50 today. The programme has been successful, filling a gap of a shorter, bachelor programme in land surveying. The role as a regional university with purely educational purpose is fulfilling the demand for youngsters and the labour market. A parallel programme for real estate agents has also been launched.

4.3 The University of Gävle³

The bachelor's programme in land surveying at the University of Gävle was implemented in 1990. It was complemented by a second bachelor's programme in physical planning in 1994. The steadily increase of GIS as a tool in both programmes eventually lead to a merging of the programmes and the creation of the geomatics programme in 2000.

The geomatics programme today (2007) has increased both in student's opportunities as in the number of enrolled students. From being a small programme when it started, it has grown to include more than 120 students of which approximately 40 are in the common first year of the programme. Most of the students at the programme have their roots in the region of the city of Gävle, but two cities with prestigious universities in the neighbourhood, Uppsala 90 km south and Stockholm 170 km south, compete with the University of Gävle in attracting students.

The opportunities given by the geomatics programme are diversified: a two-year technician programme, a three-year bachelor's or engineering programme, a one-year master's programme. Specialisations available are within traditional surveying, land surveying and management, spatial planning, geographical information technology (emphasise on GIS) and geography. These specialisations are not necessarily available at all programmes, but at least at one. A continuous development of alternative ways of delivering education as well as examinations has distinguished the progress of pedagogics at the division, e.g. PBL and LLL are practiced and made possible by distance learning methods. Most of the courses given after the first year are available in English enhancing exchange with universities outside Sweden. The increasing flow of English speaking students has lead to an opening of a full bachelor's programme in English from 2007.

A former cooperation with KTH in Stockholm, whereas two years at the University of Gävle were followed by two and a half years at KTH, has been picked up and adapted to the intentions of the Bologna declaration such that nowadays three years in Gävle, leading to a BSc degree, can be followed by two years at KTH, leading to a MSc in engineering degree. Specialisations available in this cooperation are in land surveying and management and urban planning.

Organizational, the Division of geomatics is one of six divisions at the Department of technology and built environment at the university. The number of staff at the division is 15, of which 13 are involved in the daily lecturing routines. Two professors, three senior lecturers, seven lecturers and one teaching assistant constitute the highly qualified staff. One

² Thanks to Gunnar Starke for checking the description.

³ The following section is entirely written by Stig-Göran Mårtensson, senior lecturer, head of the division Geomatics, and manager for the Study Programmes in Geomatics-Land Surveying

of the professors is half-time engaged by the Gävle-based head office of the National Land Survey of Sweden.

Research at the division is made possible by internal and external funds that will keep approximately three full-time staff busy conducting research within GIScience during 2007.

4.4 Luleå University of Technology⁴

Luleå is situated in the extreme Northern part of Sweden, 910 km north of Stockholm, being the only city with university of technology in Northern Sweden - Norrland. There is one major university (Umeå), one new university, with various branches, and the University of Gävle in the very Southern part of Norrland. Even though Norrland is covering about two third of the area of Sweden, the population is limited to about 1 million (of 9 millions), which is the major restraint for a good yearly enrolment. The University of Luleå has a yearly examination of about 400 MSc engineers.

The recruitment of land surveyors to the labour market in Norrland is facing similar difficulties as in Southern and Western Sweden before the start of the land surveying programmes in Lund and Trollhättan.

Two MSc engineering programmes, in Architecture and Civil engineering, are offered and attract about 80-100 new students yearly. A specialisation in land surveying will be offered for the students that start these two programmes in autumn 2007, as a master level after the bachelor studies at any of the two programmes. The enrolment is not fixed, as land surveying will be an option of the two engineering programmes. It might be expected that 15-25 % of the students will choose the land surveying specialisation.

The Department and Civil and Environmental Engineering, including a core group of GIS and remote sensing, secure the scientific basis. The Esrange space center, a branch of the Swedish Space Corporation, situated close to Kiruna (340 km Northwest of Luleå) provides a challenging scientific connection for the students. The National Land Survey of Sweden has promised to support the University with experienced land surveyors, when required in the specialisation.

4.5 Royal Institute of Technology, Stockholm

As referred above, the Royal Institute of Technology (KTH) is the ancient institute of technology, offering the land-surveying programme for 75 years. As the major institute of technology in Sweden, with excellent international reputation, KTH is highly concerned on its domestic reputation, including a prestigious quality in student enrolment. This means that they want the best youngsters, in order to produce engineers for the society and for a continued quality in post-graduate research activities.

The regionalisation and deregulation at the market university education had a major impact on the enrolment of students. Youngsters do not choose programmes exclusively according to a specific professional area, but they also consider the broad offer at the university market and

⁴ Senior Lecturer Glenn Berggård has checked and provided some parts of the description.

might make their primary choice on the attractiveness of the student city, and then look for the best offer at the available university. The youngsters search for attractive “symbols”, professional areas and job opportunities that provide pleasure during the student period and challenging future perspectives (Borges 2002).

The changes in the university market gradually affected the land-surveying programme at KTH. The enrolment dropped at the end of 1990’s and beginning of the 2000’s. The minimum, bottom peak was in 2002, when the offered enrolment exceeded the application of youngsters. All of them were admitted, which lowered the general high school quality of the youngsters. The main concern of KTH was the general decrease of well-prepared youngsters, threatening the general reputation of KTH as a prestigious institute of technology. The decrease in applications was not exclusive for the land-surveying programme. The same occurred at the programme of civil engineering, as well as some other engineering programmes. The broadened offer at the university market affected the institute seriously.

KTH had to take some measures. The most evident was to reduce the enrolment. During the first years of the 2000’s, the enrolment was reduced to 90 at the Land Surveying programme, but it was not sufficient. The board of KTH decided to merge the programme with the civil engineering program. The new programme was introduced in 2003 as MSc in Civil Engineering and Urban Development. The total enrolment was also reduced from the previous about 250 students of the two programmes to 120 for the merged programme. This increased the lowest admittance rate of high school marks, and turned the programme back to a prestigious programme for youngsters with good high school marks.

One of the key concerns was to guarantee the engineering science, which implied a general course in Physics and more Mathematics. The idea was also to keep all the students of the programme in the same set of basic courses during the first two years. Most of the area of civil engineering was covered, while the traditional curriculum of the land-surveying programme suffered, by reduction or exclusion of several of its core courses, postponed to the specialisation in the 3rd and 4th year. The consequence has been that the students get into the classical engineering area, and they do not find it worthwhile to change to the area of law and economics. The most interesting specialisations of the final two years are those within construction and civil engineering, but also in economics. It may reflect the idea of a future in the private market, while the specialisation of land management and cadastre attracts less than 10 students yearly. The specialisation in geomatics has since long ago had a limited attraction, and it continues at a low level of less than 10 students. The only attractive specialisation based on the previous land-surveying programme is building and real estate economics with 20-30 students yearly. It is a mixture of the previous two areas in the land surveying and civil engineering programmes respectively.

The total enrolment in the core areas of the previous land surveying has decreased considerably. Some specialisations are mixtures of the two engineering programmes, which means that the graduated engineers will cover the demand that the previous two programmes. A rough estimation indicates that the expected graduation of engineers as “land surveyors” will drop from a yearly number of 60-70 to 30-35, i.e., half of the previous number.

The change of the land surveying programme has fulfilled the general purpose of KTH as a continued prestigious institute of technology at graduate level, while it has caused a real drop in graduated “land surveyors” to the market that increasingly needs more of these engineers.

The unit of Real Estate Science and Land Law and the unit of Building & Real Estate Economics face a negative trend, as the student enrolment has dropped, and less attention is given to these areas, due to its marginal value as “symbols” for KTH. The market still needs land surveyors with specialised competence in land management and real estate economics.

The unit of Building and Real Estate Economics has introduced a specialised bachelor programme in Banking and Finance, as a separate programme to the engineering programmes. The unit has established a settled scientific competence with good reputation and research fundings, but the idea of a separate bachelor programme, without the engineering profile, is not easy to defend at central KTH level.

The unit of Real Estate Science and Land Law has developed its activity through a Master Programme in Land Management for students from Eastern Europe. The programme started in 1996 and has so far enrolled a total of about 400 students. It has financially been supported by the Swedish International Development Agency (Sida). Lately the unit has also supported development of new teaching programmes in Russia, Ukraine, Estonia, Belarus, Moldova, Georgia and Ethiopia. There is also a post-graduate programme. (Mattsson 2007)

4.6 Other university programmes

The change to a university education market has also lead to new programmes with a couple of core or relevant courses to the traditional land-surveying programme. Most of these programmes are offered as bachelor programmes at new universities. The most successful programme in enrolment is real estate broking, partly as an amendment in the law requires formal university qualification of real estate brokers. The attraction of the sector of real estate broking is high, with examples and student dreams of high earnings. The extremely increased value on the property market has also fostered this interest.

Some universities are also offering a real estate management programme in parallel to the programme in real estate broking.

Many universities and university colleges have introduced programmes in GIS, some with a good enrolment, other as minor courses, supplementary to other main subjects Brandt, Karlsson and Ollert-Hallqvist (2006).

5 The double degree programme of Lund and Aalborg Universities (Denmark)

The Nordic countries have a relatively small population of about 25 million people, headed by Sweden with 9 millions and Denmark, Norway and Finland with 5-6 millions each. The area of Sweden (450,000 km²) is divided into 3.2 million property units, while Denmark has 43,000 km² (excluding the Faroe Islands and Greenland). The average of population per parcel is similar in the two countries – almost 3 persons per property unit (Steudler, Williamson, Kaufmann & Grant 1997).

The number of land surveyors is about 2,500 in Sweden and 850 in Denmark. The governmental cadastral authorities are the main providers of the cadastral system in Sweden, while Denmark has a private system of chartered surveyors. The gradual changes of duties of the Danish surveyors has lead to a decreasing number in private surveying firms, from two

thirds of all surveyors in 1967 to about one third in 1997. The other surveyors are employed by the public sector or in other private businesses (Enemark 2002). Private land surveying companies are still an important sector of the surveyors' labour market. The tradition of private entrepreneurship is more emphasised in Denmark than in Sweden, even though the expansion in real estate economics and management area has had an important impact on the labour market for Swedish surveyors.

The language similarities between Sweden and Denmark (and Norway) facilitate economic activities in the Nordic market. The curricula of land surveying programmes and the professional profiles are similar, even though some differences are identified. The language barrier is a reality, but it does not create a major obstacle for ambitious students.

A geographical area of special interest is the Øresund region, along the Øresund belt. Copenhagen and other urban areas on the island of Sjælland constitute the Danish side, with a population of about 2 million people. The Swedish side, the region Skåne, with the main city Malmö, the university city of Lund, other cities and rural areas, has a total population of about 1 million.

The link between the two areas was enforced by the construction of the Øresund Bridge, inaugurated in July 2000. The integration has increased since then, and commuting has become more common. The bridge is linking the main cities, Copenhagen and Malmö, in 35 minutes by train, and another 15 minutes to Lund. There has been a considerable increase in Danish people moving to Malmö. About 5,000 Danish citizens moved to Skåne in 2006, mostly to Malmö, Lund and surrounding urban centres. There is also a considerable increase of Swedish people employed in the Copenhagen region. The Øresund region is becoming a more unified metropolitan centre.

The economic market in the Øresund region is challenging the land surveying profession. At the universities we try to support the market with more skilled land surveyors with professional competence in the two legal systems.

For this purpose we have developed a joint degree agreement, signed in December 2005, for the MSc programmes in Land Surveying and Management of Aalborg University and Lund University. The agreement was preceded by collaboration between the two universities on pedagogical development.

The objective with double degree programme is to provide an opportunity for the Swedish and Danish students to broaden their MSc degree to formal and practical qualification to the two labour markets. It is also assumed that the two universities could complement each other in marketing and enrolment of new students, as well as developing complementing course curricula. The students will study courses at the "host" university in order to qualify at the labour market in both countries. This will demand focus on basic courses in the legal and cadastral system of the 'host' country.

The first students are likely to start in autumn 2007, and graduate as double MSc engineers in 2009. We still don't know the forthcoming enrolment. It is likely to be a small group of 2-3 students at each university. It might become more popular, depending on the academic profiles and job opportunities. The city of Aalborg is situated on the Northern part of Jutland; about 4 hours drive from Copenhagen. Being the only land-surveying programme in Denmark, the total enrolment of students has not been able to keep up to the demand. They

have therefore decided to start a branch in the Copenhagen area, integrating the agreement with Lund University as an asset, in particular in the area of real estate economics and management. For the Swedish students, studies at the branch in the Copenhagen area will be more attractive and easily accessible.

There are some differences in salaries and housing costs between the two countries, being Sweden the less costly and with a lower salary level. This difference is also evident in the context of the public land surveyors in Sweden and private surveyors in Denmark. In a macro economic perspective, such differences have to equalize in a long-term perspective, as the threshold costs of commuting become lower.

Property developers and construction companies have long ago been involved in commercial activities in both countries in the Øresund region. There is an evident need of professionals with working knowledge in the two different national systems. The twinning idea of the land surveying educational systems is viewed as a way to contribute in the economic integration process, and to facilitate for these individuals, as well as for companies and public authorities to continue the integration process. In our paper (Borges and Sørensen 2006) we present a more detailed description of the double degree agreement.

6 Concluding remarks

The market of university education is a reality in Sweden since 1993. The diversification of regionally based new universities with a broad spectra of education programmes at bachelor and master levels has been supported by a public policy of increased education level of the population. The Bologna process is also demanding an increased mobility at the university market. The special agreement of double degrees between the universities of Aalborg and Lund is a practical example on how we, as universities, identify the demands of the labour market and try to provide a feasible mixture of curricula that will give the students a double perspective. We do believe that the predominant choice of the surveying students will be to continue within the same national educational system, but we offer an interesting alternative. The different master programmes, e g, the Erasmus Mundus GIS programme in Lund, the KTH Land Management programme for Eastern Europe, the master programmes at the University of Gävle and the master options at the Luleå University of Technology, are creating a widespread and interesting offer to the student and the labour markets.

The Bologna process aims at a more radical mobility of students, pushing them to change university after the bachelor level. All universities face the challenge and are in progress to adapt the new educational market. Brandt et al (2006) present a good review of the harmonization of the Swedish education market in the GIS area. The studies at master level (as well as post-graduate level) are supposed to increase in value if the student faces a new university, with a new set of courses and eventually a different academic tradition. The youngsters have a settled interest for exchange studies, as personal experience, but also as a strategic step for an increased academic portfolio. We have to understand the desires of the youngsters, and also try to provide the labour market with internationally trained land surveyors. The double exam agreement Lund-Aalborg, and the MSc programmes at Lund, KTH, Gävle and Luleå are a contribution for the apt students, but it is also a challenge to our universities to understand how we could collaborate in education and research.

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