

Geomatics Education: A Rising Sector of Value Addition in HRD in Nepal

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SUMMARY

The development approach of the 21st century is focusing the general people in line with the agenda's adopted by Millennium Development Goals (MDG's). In the global context, it is trying to address to put efforts for poverty alleviations and to raise livelihood of the people in developing nations. So it is crucial to rethink or reinvent the development vision of such countries like Nepal. The strategies should be designed to leap and come up with the pace of developed countries, not always fall behind but to walk hand in hand. The only magical tool to take off the development actions is no other than education that directs to social transformation. Every development activity depends upon sound policy, appropriate technology and reliable and accurate information system. The spatial information provides the essential and adequate grounds for overall development activities and the base of the spatial information is Geomatics science. So the nation is in strong need of efficient and able geo-professional human resources to translate its deeper commitment and willingness to fully comply with the new technologies into a living reality and which can be only possible through quality Geomatics education. The applications of the Geomatics science plays a pivotal role and offer the great functionality, as a science of visualization for the geo-spatial information related to almost all of the disciplines. The use, application and professional marketing of the Geomatics education are the urgent need to be addressed. It has numerous applications even in government activities from regulatory functions such as law and order maintaining, crime control and conflict management to various development functions. For the development and management of Geomatics education, Land Management Training Centre, an only governmental institution, has been giving full efforts from long time. Land Management Training Centre(LMTC) and Kathmandu University(KU) jointly commenced BE in Geomatics from August 2007, which is a landmark decision in this field. Now it is a high time for creating awareness to policy makers, government and non-government organizations, public and private sectors and concerning all about the application of Geomatics education for the national development process.

This paper focuses to introduce and promote the need of Geomatics education. In the mean time, this presentation intends to draw attention to all international GI-community, donor agencies, universities and especially the organizations like FIG, EU, ADB, WB, UN agencies, etc. for investing their efforts, funds, and any other contributions to promote Geomatics education in Nepal and also to develop quality geo-professionals which in turn may incorporate the whole South Asian region as a potential geo-market.

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1. INTRODUCTION

Development approach of 21st century is focussing the people in accordance to Millennium Development Goals (MDG's). The overarching goal of the nation is to strengthen democracy and poverty reduction. Government has adopted numerous strategies for poverty reduction in the recent years but the level of poverty gap is exponentially increases day by day. It is a real fact that twenty-first century is the age of ICT and now such technologies are playing vital role in providing stimuli to every activity and contributing towards the development of third world as well as developed countries around the globe. Numbers of technologies are evolving day by day and it is a fundamental truth that every technology must be fully backed up by related education system to accelerate the efforts for the maximum yields. Among the many applications of the information technology, Spatial Information System holds the potentiality of rendering significant contribution on policy-making, formulation of plans, infrastructure development, natural resource management and other development activities.

Nepal has already experienced its five decades of structured planning history. During the period, the major challenges, the country faced, are lack of basic services, safe drinking water, road access, health facilities, education, income opportunity, etc connecting with the vicious circle of poverty. Since the last decades, the government's sole objective has been only to reduce the level of poverty but in reality, the data shows that approximately 30% of the people in Nepal are still living below the poverty line. The country has great diversity in geography, plenty of natural resources and large potentialities for the development, which are neither explored nor envisioned and substantial efforts are yet to be made. Whether it be in transportation, electricity, health services or in emergency services, accurate and reliable spatial information is needed for the structured planning process or designing any development program. The quality of the spatial data and the techniques/methods used in this regard are based on the skill, knowledge, capacity building and performance of geo-professionals and ultimately on the Geomatics education.

Geomatics is defined as: *a field of activities, which, using a systematic approach, integrates all the means used to acquire and manage spatial data required as part of scientific, administrative, legal and technical operations involved in the process of production and management of spatial information. (Canadian Institute of Geomatics, 1995).*

2. HISTORICAL DEVELOPMENTS AND CURRENT SCENARIO

Nepal has come a long path with the Geomatics development but even now, the high skilled geo-professionals and Geomatics education are lacking and dependency on foreign experts, institutions and universities still exists. If we go through the history of Geomatics, in ancient Malla era, land surveys were done by Dangol caste, a traditional occupation for them. After

returning from the first world war, the Nepalese army (gurkhas) gained some knowledge on surveying and mapping and then government established the military compass school to provide training, called “compase” and later it was named as Nepal government survey goshwara. During that period greater cadastral survey program was launched and to assist that program, Amin training school was established under army office at Sundhara, Kathmandu. This program was run for three years and then stopped. In 1950, a political revolution happened and the government planning program stressed for the land reform activities. In 1957, Survey Department was established and from the last 52 years, Department has been playing major role in the technological and human resource development- starting from sight rule, chain and PT to modern methods of using satellite data. In 1964, government announced the well known land reform program and then training on surveying and mapping were conducted to support the program in different parts of the country on ad hoc basis, especially for the preliminary record of private land in a island map as a public properties.

In this context, the contribution of foreigners, especially under the UNDP’s assistance program and Colombo plan, was very remarkable and valuable in the development of Geomatics. Truly speaking, the basic foundation of this field was established by the foreign experts. In February 1965, Mr. J. R.G. Harrop had handled the survey department as a Director. For the fulfillment of the human resources in this field, Mr. Harrop took initiation and the government established the Survey Training Center in 1968, under the survey department. At that time, he introduced two fold policies in human resource development, firstly training programs for the capacity enhancement of departmental candidates and secondly fresh candidates were sent aboard for academic degree courses under the Colombo plan especially in UK and India under the Ministry of Education. At that time, he had noted the vision of survey engineering (Geomatics Engineering) but the concept was not fulfilled at that period. Since then, the center has been conducting different types of long term as well as short term training programs in surveying and mapping and also need based trainings on the basis of demand by various institutions. As the scope of surveying and mapping is increasing day by day, the government of Nepal, in 2000, has restructured the Survey Training Center as a Land Management Training Center(LMTC) with a departmental status under the Ministry of Land Reform & Management.

Besides these, since 1979, space technology has adopted and National Remote Sensing Center was established under the forest department. The first GIS laboratory in the country was established within the secretariat of planning commission in 1992. There are various government agencies like survey department, department of road, geology and irrigation, mine, urban housing and planning which introduced space technology from the last decade. Similarly, department of geography under Tribhuvan University, department of environment science under Kathmandu University, institute of forestry and agriculture and more specifically the International Center for Integrated Mountain Development (ICIMOD) are engaged in human resource development and training activities to promote the use of GIS application within the country.

At present condition, various applications in the field of space technology are running in the country. In the new millennium era, highly developed Internet mapping and the wireless

based geospatial data dissemination to the vast array of users accelerate the space technology as seamless disciplines. Digital geospatial data handling have gained momentum on different disciplines. A large numbers of governmental and non-governmental agencies are using geospatial data for their own purpose and requirement. There are various universities and training centers that have included GIS, remote sensing, GPS etc in their curricula as a complementary courses of their respective degree program in their own fashion. Now a days, the necessity and usefulness of the Geomatics application and development of this field has been realized.

Land Management Training Centre(LMTC), an only governmental institution has been giving her full efforts for supporting human resources in this field. Since its establishment, the center has been conducting training programs based on traditional methods for technician and supervisor level. LMTC has trained about 5000 survey personals at different level but the need of higher-level manpower and specialists was greatly felt. After a series of discussions and consultations among various stakeholders the Government of Nepal has realized the importance of this discipline. In August 2007, LMTC and Kathmandu University (KU), is a public non-government university jointly commenced BE Geomatics to produce academic cadre in this field- a milestone for the fulfillment of quality geo-professionals. This program receives full support from the Government of Nepal, which subsidized 75% of the program costs for the 4 batches; currently third batch selection is on the process.

In this regard, International Institute for Geo-information Science and Earth Observation, ITC, the Netherlands has been providing the various opportunities to different level of training and academic programs. Really, ITC's contribution for the development of Geomatics field is highly appreciating and remarkable. In April 2008, a high level Fact Finding Mission from International Institute for Geo-information Science and Earth Observation, ITC, the Netherlands visited LMTC and KU to look for the opportunities of mutual cooperative support and they have suggested some fields of mutual cooperation and improvements in present status. In November 2009, ITC the Netherlands, Kathmandu University, Nepal and Land Management Training Centre jointly organized a workshop on curriculum development of Geomatics Engineering to make BE course more broad, effective, and competitive regarding to global context and also to create awareness to policy makers, governments and non governments organizations and concerning all about the application of Geomatics education for the national development process. Likewise, for the promotion of this sector, an international level short course on “ Adopting GEO-ICT for the Land Administration” was jointly organized by ITC, the Netherlands, United Nations University, Dutch kadaster, Kathmandu University and Land Management Training Centre in June 2009.

Besides these, Land Management Training Centre (LMTC) and Kathmandu University plan to extend the Geomatics program in postgraduate (ME) course in near future and for that purpose LMTC is looking for mutual cooperation and support from various institutions. Likewise, LMTC is also planning to replace one year basic survey training by diploma level in Geomatics. In this way, the Geomatics education at diploma, undergraduate and postgraduate level are expected to foster capacity building in the surveying and mapping field and particularly in land administration through value addition in geo-professionals.

3. NECESSITY OF THE GEOMATICS EDUCATION

As the importance and necessity of the IT commodities- electronic products and home appliances are increasing among the user communities, better management and reliable services of such products and also the planning and implementation of any social and economical development activities rely on the appropriate and adequate information. Better development program and projects can only be planned when realistic and accurate information is available to the planners. The field of geoinformation i.e. production, analysis, dissemination of spatially referenced data broadly termed as Geomatics has become so far a platform for the all kind of disciplines. It also provides and maintains the triangular relation between geospatial data to its producer and end users. So, it is very crucial to use Geomatics education as a means of serving society and as an influence behavior for the policy-making environment.

Every nation is now responsible and committed for the global agenda of Millennium Development Goals (MDGs). The MDGs represent a wider concept or a vision for the future, where the contribution of the global surveying community is central and vital which relates to the areas of providing the relevant geographical information of the built and natural environment. So, in global perspective the areas of surveying and land administration are basically about people, politics and places. (Enemark, 2009). But in practical, in developing countries like Nepal, many engineering works, importance of spatial information and maps has not realized yet. There are various hanging or unsuccessful projects. Most of them were made feasible but technically failed, resulted from the lack of spatial knowledge e.g. there is a canal but no irrigation, there is a pipeline but no water, there is a land in a map but not in a ground, there is a bridge but not across the flow of water. Likewise, pollution increasing, traffic jam and housing and settlements problem are increasing because of not giving priority on spatial information. In many cases it is a bitter truth that maps and spatial data are used merely as a documentation material. Similarly, in the huge projects, on one hand, the country has to depend upon foreign geo-expertise and on the other hand the resources couldn't be used properly due to the lack of geo-information knowledge within the country. Moreover, Good governance depends upon overall service delivery mechanism provided by service centers. One of the major components is land administration and management. In Nepal, around 70 percent dispute cases in court are land related. So the focus on land administration, land related services by the state are in urgent need and for that quality of geo-professionals should be raised and which will be supported by Geomatics education.

Geography and earth sciences rely more and more on spatial data which are acquired from remotely sensed images, analyzed through Geographic Information System (GIS) and visualized on different formats and styles. The technologies supporting the process of acquisition, analysis and the visualization of spatial data are the core elements of geoinformatics. Operational skills alone are not sufficient for organizations involved in the

production and the management of geo-information. The additional capabilities such as understanding of collecting, structuring and framing and also the visualization technique of spatial data are essential to optimize the use of technology. For the fulfillment of these requirements, only Geomatics education can provide the knowledge and skill to the professionals in a standard manner. Thus, the marketing of Geomatics education and also professional exchanges for making skilled professionals are the fundamental inputs to the sustainable development.

Moreover, Geomatics and its application helps to manage and interpret data of certain geographical pockets by providing digital maps of resources and infrastructures, images of a area, watershed, etc. They are very useful for researchers, planners, and scientists and also for planning activities to run development projects at the local level. Besides these, the blending of ICT applications with Geomatics (GEO-ICT) is providing new insights into global issues such as the patterns and degradation of forests, climatic change, home land security and prevention of cultural heritages, monitoring of crops, war strategies and conflict management activities Geomatics finds itself in a multi-disciplinary market along with the other disciplines that is why, it must be aware of the potential cross-disciplinary usefulness of a Geomatics element in many programs and projects. So for the integration and holistic orientation of such applications, a separate academic discipline should be needed, that is not anything else except Geomatics education.

4. EMERGING TREND OF SPATIAL THINKING

Now a days the importance of spatial information is increasing, the developed countries are highly depends upon spatially enabled governance mechanism but in the case of developing world, it is somewhere in the initial stage. There is emerging trend of using spatial concept. Several governments' policies are revised socially and spatially. World Bank and International donor agencies also changed their “one *policy fit for all*” *approach to spatial approach*. Subjects like Spatial Economics are introduced to explore the location specific business in spatial unit (households, firms, plants, clusters, industries, regions, states).

World Development Report 2009: Reshaping Economic Geography classified the policy instruments for economic integration in three categories, based on how explicitly place is considered in their scope and design:

Institutions are shorthand for all the policy instruments that are ***spatially blind***. These are the amenities that governments should provide to everyone, regardless of place.

Infrastructure is the summary term for all ***spatially connective*** investments and associated rules and regulations.

Intervention is shorthand for all ***spatially focused*** incentives. This includes regulations and investment that favor some places, place-based program.

Likewise, the concept of creating space for effective political engagement in development is also discussed now a day, especially in governance reform under real –world conditions. The basic idea behind the reform space model is that reform is facilitated by space in the specific

organizational, policy or governance context. This space is determined by the intersection of *acceptance*, *authority* and *ability*. (Andrew, 2008)

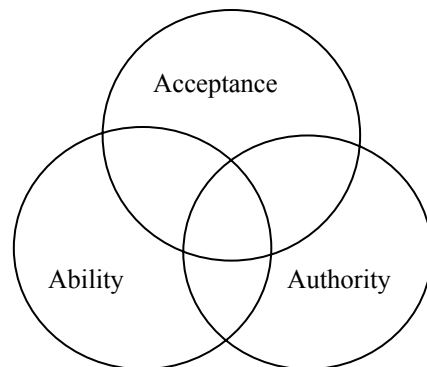


Fig: Reform Space Model

Acceptance: Is there acceptance of

- Need for change and reform?
- The social and other cost?
- The specific reform idea?

Authority:

- Does legislation allow people to challenge the status quo and initiate program?
- Do formal/informal organization structures and roles allow doing what is needed?

Ability:

- Are there enough people, with appropriate skills to conceptualize and implement the new idea?
- Is technology sufficient?
- Are there appropriate information sources to help conceptualize, plan, implement and institutionalize the idea?

Hence it is concluded that the trend of using spatial concepts is increasing and for the better understand and realization of the concepts, Geomatics education is the key factor and for the professional development of any discipline, higher education is a prime requirement. In the case of Nepal, only training and little opportunity for abroad study can't cope up the pace with the development. Thus, it is urgent for academic community to focus on Geomatics education for the fulfillment of human resources in this field.

If there is one aspect of Geomatics, which needs attention, it is education; or more specifically funding for education. - Prof. Ian Dowman, University College of London)

5. POTENTIAL INTERVENTION AREAS

- Introducing Geomatics education in school and side-by-side, including Geomatics science as an extensive academic degree program in university level.
- Foster the importance and usefulness of the spatial information to the end users in their daily activities through the citizen oriented publicity programs.
- Conducting awareness program to geo-information stakeholders such as for engineers, real state brokers, geo-consultants, notary public, IT institutions and others.
- Restructuring traditional training institutions by introducing Geomatics as a collective discipline applied to independent fields of study such as cartography, photogrammetry, remote sensing, geodesy, GIS and other mapping sciences.
- Making efforts to establish sister relation with the foreign institutions for the expansion of education and collaboration between organizations through education exchange programs and moving hand in hand with the international donor communities to promote education and research activities in Geomatics.
- Merging geo-information with ICT education to develop GEO-IT professionals, so that it contributes in the economic development of the nation.
- Encouraging the government, especially the decision makers about the enormous value of geo-spatial data from planning to implementation stage of the development programs such as in road construction, pollution reduction, housing and settlements, traffic management, disaster management, land use planning and consolidation and others so that these programs become more realistic and sustainable.

6. CONCLUSION

Every development activity depends upon sound policy, appropriate technology and reliable & accurate information system. The spatial information provides the essential and adequate grounds for overall development activities and the base of the spatial information is Geomatics science.

This paper focuses on the recent development of Geomatics education in Nepal, which really contributes in the human resource development process in national level and also focuses to promote Geomatics education from the school level to university degree courses. As the country has a great diversity in geography, friendly people, heavenly climate, plenty of natural resources, and cheap manpower, there will be potentiality of the geo-market. So, this presentation also intends to draw attention to all international community, donor agencies, universities and especially the organizations like FIG, EU, WB, ADB and UN agencies for investing their efforts, funds, and any other contributions in order to promote Geomatics education in Nepal, to develop quality of geo-professionals and to accelerate its professional marketing in national and global mode as well.

Thus, it is a high time to focus on creating awareness to lawmakers, government & non-government organizations, public & private sectors and especially those who are development seekers and we professionals engaged in this field from the long time to make a voice for Geomatics education.

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BIOGRAPHICAL NOTES

Name	Sharma, Keshav
Education	MPA, BSc(Nepal) PG Diploma in Development Economies (Japan) MSc student in ITC from sep, 2009-2011 for Governance and Spatial Information Management.
Date of birth	October 30, 1973

Career- to- date

Instructor, Land Management Training Center, 2002 – to- date

- *Designing and conducting different types of training packages; GIS, Land Administration & Management etc.*
- *Take part in planning and coordinating training activities.*
- *Teaching different subjects e.g. land management, public relation, GIS, cartography, etc.*
- *Conducting practical field works for senior, junior and basic survey course.*

Visiting Instructor, Land Management Training Center, 2000 – 2002

- *Involved in teaching different subjects especially land administration and management, cartography, GIS cadastral survey etc. in the invitation of the training center.*
- *Conducted field training for the different survey courses.*
- *Worked for assisting the center in planning and implementation of various training programs*

Survey Officer, Cadastral Survey Branch, 1999 –2000

- *Worked as a survey officer in the cadastral survey activities.*
- *Involved in planning and monitoring activities.*
- *Worked as a field officer in the field study of “Possibility of land consolidation in Nepal.”*
- *Worked as a survey officer in geodetic survey branch.*

Trainings

- *Senior Surveyor Training (16 months)*
- *Basic Administration Training (3 months)*
- *GIS Training (5 weeks)*
- *Basic Computer Training*

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