# Effects of Globalization on Surveying and Mapping Profession

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## Abstract

Globalization is a phenomenon that international organizations increasingly set up rules and regulations affecting all aspects of our world. In the trading of goods and services, there is gradually a new and conformed world order that goods and services are provided under the free-trade principles. Coupled with technological advancements and economic changes, survey and mapping institutions around the world have faced reduction of funding and reform for efficiency to various extents. To adapt to the changes of the survey industry, our professionals need to establish a sustainable development path.

## 1 1. Introduction to globalization

Globalization is such wide-influencing trends and forces on government reforms, trade liberalization, technological advancement and information revolution that has impacts on every nation on this globe. Globalization is manifested by the economic phenomena like: production is internationalized, financial capital flows freely and instantly amongst countries, and multinational enterprises control vast economic power. Globalization can be seen from the technological advancements, especially in telecommunications: the advent of powerful and low cost computers and the development of electronic communications and information networks have breakthroughs over the physical barriers of distance. Our world is now called a global village. In short, globalization is just modernization: a simple fact that our world is ever evolving!

Public management reforms are typical globalization phenomenon. It involves governmental efficiency-seeking program, governmental institutional reforms, more free speech and civil liberties, increasing international cooperation in combating environmental degradation, international crime and so on [OECD, 1995]. People do not always welcome globalization. Developing countries and trade unions in the developed countries are often opponents to the new world trading orders. The purpose of this paper is not to promote the cause of globalization but to discuss the effects on our land surveying profession.

With the scientific advancement that human beings are exploring outer space and deep ocean trenches, and with popular science programs reporting changes of our forests, deserts, sea currents and air masses, there are mixed feelings that the knowledge about our world are readily and instantly available, whilst all are changing rapidly. Surveyors who are complacent with maps and plans from which the geographic and positioning information that have underpinned all sorts of human and economic activities, have to confront the constant changes of the acquisition and application of the spatial information.

Technological improvement in spatial data gathering and presentation has made a shift of paradigm on our working procedure and final products. In 1995, 78 countries attended the Cambridge Conference for National Mapping Organizations (NMOs) and reported significant changes and advancements of the NMOs [Rhind, 1997, p.ix]. Survey system reforms, and in particular cadastral survey reforms, are repeatedly reported in many FIG conferences. Technological change and organization reform compound each other, aiming to achieve better performance. No matter the change is viewed as a blessing or a curse to the NMOs, there is a revolution in progress.

Many reforms of the Surveying and Mapping Organizations (SMOs) are proceeded under the framework of deregulation, privatization, and marketization. Governments relocate the survey and mapping functions, many from the public to the private sector, so as to achieve better efficiency. The promotion of a free market condition prevails at a national level as well as at a global level. Since the implementation of the 'National Competition Policy' of Australia, all of their government departments no longer have the privilege or monopoly of the supply of service to the general public. The departments have to compete under a free market to win the contract to the service [Grant & Robertson, 1998].

Cost recovery in itself is not a reform, but it is always coupled with a government reform. Nevertheless, most of the countries take the building up of their national spatial database as a principal government responsibility. Initial government investment is inevitable. Yet in the traditional survey and mapping services, cost recovery is common. In a survey of the cadastral systems conducted by the Commission 7 of FIG, Canada, Denmark, Finland, Ireland, Sweden, Malaysia and many other governments supply their cadastral surveying service not only achieving cost recovery but also making profits [Steudler, 1996].

Tendering the government or professional services under a free market competition is a global phenomenon. The World Trade Organization (WTO), the Organization for Economic Co-operation and Development (OECD), the International Organization for Standardization (ISO) and many of the United Nation sub-organizations are examples of global efforts in fostering international free trade regulation and environment. All services, including land surveying profession, are influenced.

## 2 WTO influence on land survey profession

The World Trade Organization (WTO) deals with the rules of trade between nations. At its heart are the WTO agreements, negotiated and signed by the bulk of the world trading nations and later passed into laws in their parliaments. The goal of WTO is to help producers of goods and services, exporters, and importers conduct their business. Information of WTO can be searched on the web-site **http://www.wto.org/wto/**.

The General Agreement on Tariffs and Trade (GATT) started soon after the 2nd World War. The Uruguay Round GATT was succeeded by the establishment of the World Trade Organization in 1995. The WTO has now 138 members, accounting for over 90% of world trade. Over 30 others, including the People's Republic of China (PRC), are negotiating membership.

The WTO deals with services under the General Agreement on Trade in Services (GATS). Banks, insurance firms, telecommunications companies, tour operators, hotel chains and transport companies looking to do business abroad can now enjoy the same principles of freer and fairer trade that originally only applied to trade in goods.

The Council for Trade in Services reviews that measures relating to qualification requirements and procedures, technical standards and licensing requirements do not constitute unnecessary barriers to trade in services. The Council shall develop necessary disciplines that aim to ensure the requirements:

a) based on objective and transparent criteria, such as competence and the ability to supply the service;
b) not more burdensome than necessary to ensure the quality of the service; and
c) in the case of licensing procedures, not in themselves a restriction on the supply of the service.

Hong Kong, China has actively participated in the Ministerial Conference, 1999, with her objectives for the next round of services negotiations are [WTO, 1999]:

a) to achieve progressive trade liberalization in the whole range of services sectors by broadening and deepening the market access and national treatment commitments;

b) to uphold the fundamental WTO principle of non-discrimination by eliminating the exemptions to the most-favored-nation (MFN) treatment;
c) to tackle vigorously barriers to trade in services arising from domestic regulations and anti-competitive behavior;
d) to ensure that the GATS rules remain relevant and responsive to the needs of he modern business world through clarifying and, if necessary, reviewing certain GATS provisions and developing new rules and disciplines; and
e) to enhance the transparency and certainty of the specific commitments through improving the scheduling methods and clarifying the ambiguities arising from certain commitments.

The services under reviews on specific commitments, as proposed by Hong Kong, China, are energy services, environmental services, distribution services, audio-visual and communication services, postal/courier services and transport services. As for professional services, it is under the scope the Working Party on Domestic Regulations. A set of disciplines for the accountancy sector have been developed and adopted by the GATS. Further development of general disciplines on domestic regulations for other professional services will continue. Hong Kong, China, so far has submitted a paper proposing a way forward for domestic consultation with the professional bodies.

To promote free trade of professional services amongst the WTO member countries, mutual agreements made after negotiations would be signed and later on passed by the legislature of the members. Surveying professions in Hong Kong would participate in the free trade environment, subsequently negotiated after the joining of WTO by the PRC. Unless the professional service is classified as a national service, for example, military service, which cannot be opened to international business participation, all professional services on the market should be subjected to free trade.

PRC has surveying companies now tendering for international contracts, and she will continue to be a large exporter of goods and services under the WTO. And, unless our surveying firms, including both the public and private sectors, start preparing for international trades, Hong Kong would miss the opportunity for the forthcoming free trade with the world.

## 3 ISO influence on land survey profession

The International Organization for Standardization (ISO) is a federation of national standards bodies of some 130 countries. Beginning from 1947, ISO aims to promote the development of standardization in the world. ISO's work results in international agreements that are published as International Standards so as to facilitate the international exchange of goods and services, and to develop cooperation in the spheres of intellectual, scientific, technological and economic activity. Information of ISO can be searched on the web-site http://www.iso.ch/.

An international standard starts from a proposal of Technical Report. It is then accepts as a Technical Specification, and eventually by two third of the permanent members, as a Technical Standard. There are many standards established and have much relations to our daily live, for examples: International Standard Book Number (ISBN), credit card, freight container, metric screw threads, etc.

There are standards developed for the traditional surveying and the newly developed geomatics. Survey standards are contained in the field of Construction Materials & Building (Field 91). In the group of Construction technology (91.200), the standards including the tolerance for building (ISO 3443), the measurement methods for building (ISO 4463), the procedure for setting out, measurement and surveying (ISO 7078), the methods of measurement of building products; position of measure points (ISO 7976) and the measurement instruments including level, theodolite and EDM (ISO 8322) are listed. The geomatics standards are still undergone development. The Technical Committee 211 establishes globally recognized standards in the field of GIS/Geomatics by an open operability standard which supports distributed data management idea [Lam and Tang, 2000].

### 3.1 ISO 9000 Certifications

ISO 9000 or the new ISO 14000 are well known to all production and service professions. In Hong Kong, it would be necessary for a contractor to have an ISO certification to be qualified to bit in various categories of government construction tenders. A certification is a procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements. It is now widely understood that a certification guaranteeing a certain standard may not be a proof of 'good' standard of the product. The 2000AD version of ISO9000 has upgraded the "quality control standard" to the new "quality management standard".

Popularized effects of ISO 9000 certifications can be seen that many SMOs have sought or are seeking the certification. For example, the Australian Surveying and Land Information Group (AUSLIG) has been awarded with ISO9002 since 1995, and the Hong Kong Survey and Mapping Office is in the process to obtain one.

### 3.2 Sustainable development

Sustainable development is about the balanced objectives of social, economic and environmental aims of development at a country and progressively international level. The so-called Earth Summit, a major environment and development forum held in Rio de Janeiro, 1992, endorsed the Agenda 21 such that all the major nations in the world would pursue sustainable development. The PRC is one of the participants and has incorporated sustainable development aims into her national long-term economic and social plans. The Hong Kong SAR Government now carries out a study on Sustainable Development for the 21st Century (SUSDEV 21). Further information can be found on the web-site http://www.info.gov.hk/planning/susdev/.

Although the land survey industry consumes not much amount of energy or contributes little of pollutants to our globe, the environment protection concept should now be built to our industry. The ISO14000 deals with quality assurance with environmental protection procedure. Sustainable development will be a common consideration for all industry as well as our land surveying practitioners.

## 4 FIG influence on land survey profession

FIG is a United Nations-recognized non-governmental organization whose aim is to ensure that the disciplines of surveying and all who practice them meet the needs of the markets and communities they serve [Foster, 1999].

Represented by the Chairman of the Commission 7, Prof. Ian Williamson, the Commission 7 of FIG held a high profile workshop in Bathurst, Australia with participants and representatives from six UN Agencies. The Bathurst Declaration states that sustainable development is not attainable without sound land administration [Dale, 2000]. In that meeting, over half of the national delegates agreed that cost and efficiency as a key reason driving surveying and mapping institution reforms in their countries. Cadastral development is gaining more understanding in the international community of land and economic institutions.

The FIG Task Force on Standardization started working at the Brighton Congress 1998 [Greenway, 2000]. The Task Force works as a part of the ISO TC211, making comments on documents, attending meetings, and serving as liaison to other ISO technical committees.

The FIG Task Force on Mutual Recognition of Qualifications has the terms of reference in recognizing the international market pressures and the regulations towards liberalization of trade driven by WTO. The Task Force reviews the educational and professional qualifications within the world wide surveying community and develops a framework for introduction of standards of global surveying professional competence. The Task Force is led by Professor Enemark and further information can be obtained on the web-site www.ddl.org/figreee/tf/mut-recog/index.htm.

It is the European Union Directive on the mutual recognition of professional qualifications, which requires their member countries to implement mutual recognition policy to every profession. The

Council of European Geodetic Surveyors (CLGE), together with the FIG Task Force on Mutual Recognition, held a seminar by invitation in Delft, November 2000. The adopted principles of mutual recognition are [Enemark, 2000]:

a) Transparency - of the procedures within the process of mutual recognition
b) Justification - of the need for restrictions; and
c) Proportionality - to ensure equivalent standards.

## 5 Global trends of the Surveying and Mapping Organizations (SMOs) reform

Reform and continuous reform are common phenomena in the SMOs around the world. In the developed countries, SMOs undergo various degrees of privatizing and budget cut. Most of them have their cadastral maps digitized. Few leading countries are now converting their cadastral map from map-accuracy to survey-accuracy, and developing internet data communication facilities. The Netherlands, Canada, Sweden and Singapore are these forerunners. The reforms are for better economy and efficiency.

There are also cadastral system reforms. The force, which drives a cadastral system reform, always comes from political changes. Eastern European countries and South Africa are the examples of this group.

Although most of the SMOs have faced budget cut and reform for economic efficiency, USA and Japan are the two exceptions: their SMOs have undergone considerable growth. The US National Imagery and Mapping Agency (NIMA) combined the Defense Mapping Agency (DMA), the Central Imagery Office, the National Photographic Interpretation Center, the Defense Dissemination Program Office, imagery sectors of the Defense Intelligence Agency, National Reconnaissance Office, and the Defense airborne Reconnaissance Office on 1 October 1996. NIMA has established the Global Geospatial Information and Services and its product “Digital Chart of the World (DCW)”. The mission of NIMA is to provide imagery intelligence and spatial information in support of US national security objectives; the information of NIMA is available on the web-site http://www.nima.mil.

*The second example of SMOs' expansion is the Geographical Survey Institute (GSI) of the Japanese Government. GSI has 10 district survey offices responsible for the operation of the Survey Act, registration of surveyors, and the provision of public surveys. GSI also involves heavily in research and development, with its headquarter located in the Tsukuba Science City. Equipped with VLBI stations and super computer, GSI runs researches on global crustal monitoring, global mapping, deformation monitoring and earthquake studies. The 1997 budget of GSI was 94 million US dollars, and with about 850 staff, GSI continues to grow steadily. More information is available from the web-site http://www.gsi-mc.go.jp/.*

### 5.1 Spatial Data Warehouse (SDW) of Alberta, Canada

SDW is a non-profit organization formed jointly by the Government of Alberta and 5 utilities corporations in 1996. The Government of Alberta stopped its traditional funding and management role on the survey and mapping services. SDW thus takes up the mandate to maintain and promote the provincial mapping system. SDW appoints a private company, the Alberta Land Information System (AltaLIS), which is a joint venture by QCData Ltd. and Martin Newby Consulting Ltd., as the sole agent to sell and develop further value-added products to the general public.

Alberta had a mapping development period for two decades by 1996. Four digital mapping data sets were established by the government: Urban Cadastral, Rural Cadastral, Topographic and Small Scale mapping databases. SDW does not have to pay the Government for the cost of development, but the copyrights of the data sets remain on the Government. Apart from the existing 1:20000 topographic data covering the whole province, SDW would have to provide funding for further development if any of the utility company or governmental development projects need more detailed topographic data. The author presumes that it is in essence a user-pay funding model. For the cadastral data sets updating (Land Titles plan registration), "the costs will

be redirected to those who necessitating the change in the cadastral mapping"[AltaLIS, 2001]. Again, it is user-pay.

### 5.2 The Dutch Kadastre

The Dutch Kadastre (The Cadastre and Public Registers Agency of the Netherlands) was first a production oriented organization and operated as a division of he Ministry of Housing, Physical Planning and the Environment. Her chief assignments under the law were judicial and surveying processes. In 1982, the Dutch Government decided to improve the efficiency of government departments and the Dutch Kadastre undertook a series of reform.

The goal of the Dutch Kadastre reform was to achieve cost-effectiveness by providing excellent services using advanced information technology, remaining a cost-effective operation, cooperating well with universities and private companies, and providing international consultancy.

The reform was started in 1982. The organization moved towards the direction of a self-supporting agency with large scale of contracting out of survey and mapping services. A significant move was made in 1988 that the government decided to privatize the surveying and mapping of large-scale topographic base map (1:1000 and 1:2000). The Government reached an agreement with a joint venture of 6 large Dutch commercial surveying companies such that all base maps surveying and mapping were contracted out to these companies. In 1996, the agreement expired and since then tendering out has been subjected to free competition.

### 5.3 The National Land Survey of Sweden (NLS)

Sweden has a history of property survey for 400 years. Cadastral maps are readily available. Sweden is a very first country who started building up land data bank by computer technology since 1968. Started from proposal and investigation committee in 1992, NLS worked on another reform. The main theme of the reform was to separate the services of NLS between official duties and commercial services. The official duties should be operated under the rule of law whereas the commercial services are prepared for open market competition. Before the organizational reform in 1996, NLS had its headquarter in Gavle, 24 regional offices and 110 local offices with a staff force of 3000 [Rhind, 1997, p.237].

**Table 1. Staff force of NLS (Data compiled from http://www.lm.se)**

| The National Land Survey (Lantmateriet) | No. of Staff |
|---|---|
| Director-general, Sedesurvey & corporate services | 100 |
| Cadastral Service 21 county survey authorities | 830 |
| Cadastral Service Central | 50 |
| Land and Geographic Information Service | 220 |
| Metria (commercial service) | 700 |
| Total | 1900 |

Table 1 shows the main tasks of the current NLS which has an annual budget of 160 million US dollars. 70% of the budget is generated from competitive services to the general public and international markets; the rest 30% comes from government grants. The information is available on http://www.lm.se.

The general trend of the surveying and mapping organization reforms can be seen from the change of demands of our society. First, it is the change in user needs for better services. Secondly, the fast improvement of the new surveying and mapping technology drives the change. GPS and Internet technology is a daily life in our profession. Thirdly, the need to trim down government expenditure fuels the reform. Lastly, probably also the consequence of the above three, the political decision of a government, whether the pressure is from the general public or from itself, is perhaps the most important reason to effect a reform in SMOs.

### 5.4 he Australian Surveying and Land Information Group (AUSLIG)

AUSLIG is Australia's national mapping agency that is responsible for the coordination of spatial information and the implementation of the Australian Spatial Data Infrastructure (ASDI). Other duties include the management of national mapping, maritime boundary, remote sensing data and geodesy programmes. AUSLIG now employs 115 Public Service staff and up to 20 contract staff on an 'as needs' basis in head office and 70 contract staff in other programmes. AUSLIG has an annual budget of 27 million Australian dollars and generates about 4 million Australian dollars from sales of products. The information about AUSLIG can be found on website http://www.auslig.gov.au.

### 5.5 The New Zealand Department of Survey and Land Information (DOSLI)

Major public sector reforms, particularly in economic restructuring and reduction in public expenditure, have effected tremendous changes on DOSLI. Before 1986, DOSLI had a full government funding, and since then DOSLI has incrementally moved towards total cost-recovery policy. Government services were identified as "core public good activities for limited and specific crown funding" and "client specific services attracted a charge" [Grant & Robertson, 1998]. In 1996, a restructuring of DOSLI resulted that the commercial activities and 25% of staff were transferred into a government owned commercial company (Terralink), and the remainder of DOSLI was renamed Land Information New Zealand (LINZ). Cadastral survey is provided by the private sector. LINZ assumes only a monitoring and regulatory role. For the production of land information and mapping services, LINZ largely uses contracting out. The highly integrated automation of core survey and land title processing and recording activities of LINZ will have cost recovery from the property transaction users. Information about LINZ is available on http://www.linz.govt.nz. Not all reforms are successful; recently the commercial GIS production firm Terralink has been reported with financial difficulty [The NZ Harald, 2001].

## 6 Conclusions

Fostering free trade by agreeing on new business rules and technical standards are carried on by world organizations like WTO, ISO, UN and thus all country member of this global village. Liberalization of professional services from any local economic system to a global competition service environment is on the way. The SMOs of the developed countries have undergone various degrees of reform for economic efficiency and technical advancements. These are the international trends and forces work behind our profession. Certainly, the globalized pressure for reform acts also on Hong Kong. Especially, after the 1997 Asian Economic Crisis, the Hong Kong SAR Government has an enormous pressure to re-structure her spending. The proposal of the corporatisation of SMO comes in trend.

There are some general trends found from the reforms of the SMOs. Many government services are divided into policy, regulatory and service provision roles. Some governments tend to keep only policy and regulatory roles, whereas service provision would be open for free competition amongst government and private sectors (Australian case) or sole for private sector competition for contracts (New Zealand case).

Corporatisation and privatisation of the government services that are commercial in nature become a significant trend. The trend is that a government involves less in direct service provision. Between the two ends of total private sector competition and sole government service, corporatisation and privatisation is an intermediate step towards further cost efficiency seeking.

The international trend of SMOs' reform is centered at economic efficiency. The authors opine that to improve the efficiency equates 'to do things right'; more importantly is the content of the reform, which is 'to do right things'. A reform of a survey and mapping system should look beyond mere economic factors. Upon the opportunity of change, a detailed research should be done on the design and operation of the surveying and mapping system.

This paper is devoted to clarify the point that globalized competition in the surveying and mapping services is coming soon. Reform of the SMOs, in technological as well as in structural aspects, is a must. Survey and Mapping services will definitely become an item of trade in service under the international free trade environment, and will no longer be monopolized by a government department or professional institutions. As a comment addressed to the Asian bankers, and it is also valid here, Mr. Rubin, the ex-Finance Secretary of the United States of America said that "It's time to change; we have good time for long; focus little on risk [Rubin, 2000]."

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