

SWOT, PEST AND 5C ANALYSIS OF THE MONGOLIAN NATIONAL SDI

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Abstract

It has been 20 years since spatial data infrastructure (SDI) has spread across the world. During this time, several countries have started to establish their own SDI, all of which are different from each other. In Mongolia, geographic information system (GIS) software has been used for mapping since 1990. Now many government organizations and some private companies in Mongolia are dealing with remote sensing and GIS activities.

Since 2004 there have been discussions and plans on founding the National Spatial Data Infrastructure (NSDI) and work was ongoing starting from 2012. The NSDI is one of seven main key components of the "National Program to Establish an Integrated System of Registration and Information of Mongolia" (2008). The project is to facilitate and support data exchanges within and across organizations, for efficient cadastral procedures, registration and taxation, other related activities, etc. NSDI is a web based, centralized system which covers administration of geoinformation databases all over the country among government departments.

The PEST factors, combined with external micro-environmental factors and internal drivers, can be classified as opportunities and threats in a SWOT analysis. In order to establish a promotion strategy for SDI system implementation projects, internal and external factors are derived through using SWOT and PEST analysis.

This research uses SWOT and PEST analysis to identify the key internal and external factors in the SDI legal system, interrelationship between government organizations, human resources, data resources and security that are important for achieving the NSDI objectives in the Mongolian situation.

Keywords: Mongolia, SWOT, PEST, 5C

1. INTRODUCTION

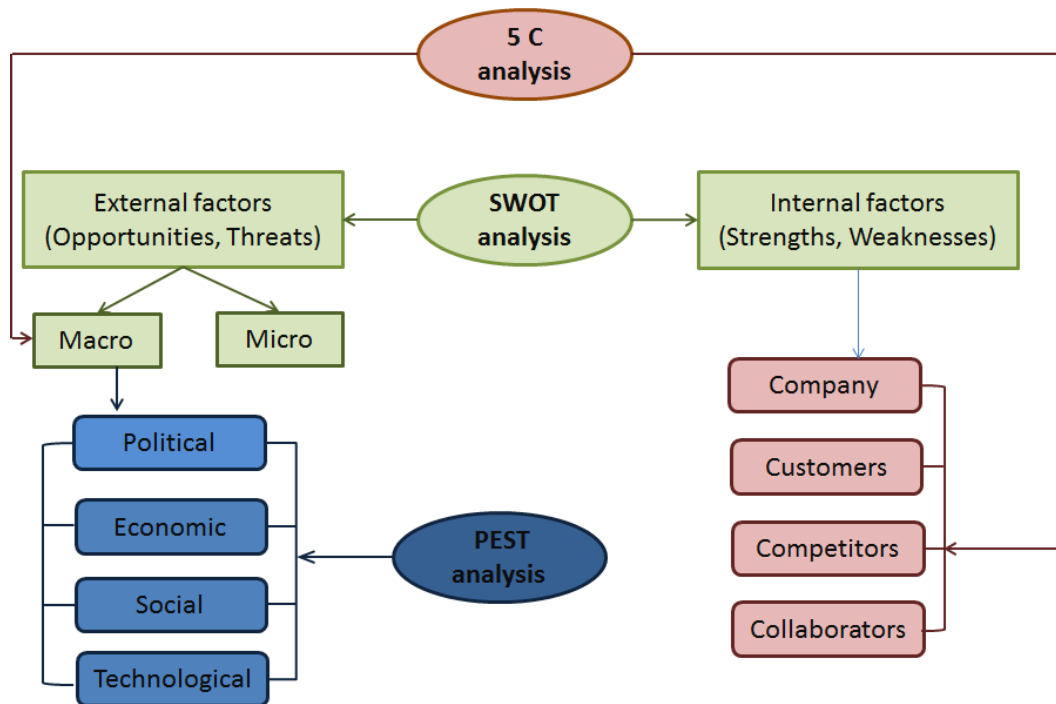
With the reconceptualization of interorganizational Geographic Information System (GIS) as spatial data infrastructure (SDI) in the 1990s, the complexity of the object of evaluation, SDI, as well as of the process of evaluation, increased substantially. Conceptual studies investigated the relationship between valuation criteria and different SDI hierarchical levels involved (Steudler, 2003) or focused on readiness issues related to technological, economical, communicational, and organizational factors (Delgado et al. 2005).

Information technology is becoming more and more complex and advanced as it develops. Just a few years ago, finding data on any location/position was hard. Now, due to nationwide spatial data bases, gathering basic data has become not only possible, but also relatively easy. As for Mongolia, talks and discussions on founding a National Spatial Data Infrastructure began in 2004, and the project started in 2012. Each country has their own spatial data infrastructure, with each having their own unique attributes, and negative and positive sides. The main ways for studying and managing these effects are SWOT (Strengths, Weaknesses, Opportunities and Threats), PEST (Political, Economic, Social and Technological) and 5C investigations and analysis. Therefore, Mongolia should estimate the dangers and possibilities for implementing its spatial data infrastructure, including the positive and negative impacts. One way to improve and advance our spatial data base and thereby increase the positive impact is to compare Mongolia's needs with developments in other countries.

2. STRATEGIC MARKETING METHODS

Analysing and reviewing spatial data infrastructure is done using the following SWOT, PEST and 5C methods.

Figure 1: Relationships between strategic marketing analysis



By using the methods above in a comprehensive manner, the activities of business organizations can be analysed in a comprehensive way from all sides. Based on the results of the analysis, the organizational activities and ways to improve the market are determined and included in the market plan to be improved and implemented. In other words, the analysis is the basis for organizational activity plan development.

Table 1: Strategic marketing analysis limitation

Situation analysis	Analysis	Performed activities
	PEST	PEST analysis (political, economic, social and technological) describes a framework of macro-environmental factors used in the environmental scanning component of strategic management.
	5C	5C Analysis is a technique used to conduct situation analysis. It is an extension of the 3C Analysis that originally included Company, Customers, and Competitors. Collaborators and Climate were later added to the analysis to make it comprehensive. This integrated analysis covers the most important areas of marketing, and the insights generated can help identify the key problems and challenges facing the organization.
	SWOT	A SWOT Analysis is another method under the situation analysis that examines the Strengths and Weaknesses of a company or activity (internal environment) as well as the Opportunities and Threats within the market (external environment). A SWOT analysis looks at both current and future situations, analyzing current strengths and weaknesses while looking for future opportunities and threats. The goal is to build on strengths as much as possible while reducing weaknesses. A future threat can be a potential weakness while a future opportunity can be a potential strength. This analysis helps an organization to derive a plan that helps prepare it for a number of potential scenarios.

Source: “Strategic marketing planning”, Collin Gilligan, Richard Wilson, (2003)

3. STRATEGIC AND MARKETING ANALYSIS OF MONGOLIAN SDI

3.1. 5C Analysis of the Mongolian NSDI

Company

- ALAGAC - Mongolia began discussing forming their SDI in 2004 with the project beginning in 2008. Since 2012, ALAGAC has begun pushing steadily to establish NSDI with the purpose of spreading spatial use to environmental and socio-economic branches of government nationwide.

Customers

SDI customers are divided into the following categories.

- Government organizations – All government organizations use SDI. For example, Cabinet Secretariat of Government of Mongolia, General Intelligence Agency of Mongolia, General Authority for Border Protection, Local governors of aimags and cities, Information, Communications Technology and Post Authority of Mongolia and Ministry of Environment and Green Development of Mongolia
- Private organizations – any private organizations working in the environmental field use SDI.
- Public/citizens.

Competitors

- The national SDI does not have competitors, although some small towns, sectors and aimags might count as competitors, but have not formed yet.

Collaborators

- Foreign – ALAGAC is collaborating with the following foreign country organizations to form/establish/found national spatial infrastructure. These are: Korea's Cadastral Mapping Corporation; ROSCOSMOS; National Geographic Information Institute of Korea; Ministry of Land, Infrastructure and Transport of Republic of Korea; German Corporation for International Cooperation (GIZ); Federal Department of Foreign Affairs FDFA of Switzerland; JICA; KOICA; Eastern Regional Organization for Planning & Human Settlements of Japan.
- Local – ALAGAC is collaborating with the following local organizations to form/establish/found national spatial infrastructure. These are: Mongolian National Agency for Meteorology and Environmental Monitoring; Ministry of Industry and Agriculture of Mongolia; School of Agro-Ecology-University of Life Sciences; National Registration and Statistics Office of Mongolia; National Emergency Management Agency; Ulaanbaatar City Municipality; Information, Communications Technology and Post Authority of Mongolia; Mongolian Association of Geodesy, Photogrammetry & Cartography; and Mongolian Geoinformation Researchers Association.

3.2. PEST Analysis of the Mongolian SDI

Using PEST analysis for NSDI allows national and business organizations research on macro environments to be accurate and decreases negative effects.

Table 2: PEST analysis of the Mongolian SDI

Factor	Positive effect	Negative effect
Policy	<ul style="list-style-type: none"> • Mongolia has a policy run by the government that supports the development of SDI. • Investing for this department increases the probability and opportunity to operate. Creates the ideal condition for activities. • Official legislation currently doesn't exist with policy and planning in its first stage. 	<ul style="list-style-type: none"> • Organizations are observed to do things with personal ambition in mind • Мөн улс төрийн намын ялгаа гаргах явцуу байдалтай байдаг.
Economic	<ul style="list-style-type: none"> • To a certain extent, the state is funding the forming of SDI. • Also many private and national organizations are funding to help the development of SDI. 	<ul style="list-style-type: none"> • Our nation has discussed developing SDI since 2004 but lost a lot of time at the beginning due to many factors. One of the main factors is the economic and financial state of Mongolia.
Social	<ul style="list-style-type: none"> • Lessons on SDI are taught to a certain extent in institutes. • Information about SDI is broadcast via public channels, radio, shows and television. • Since Mongolia's population is still growing, it is possible to develop qualified personnel in this sector. 	<ul style="list-style-type: none"> • There are no qualified specialists for SDI. • Information being lost due to deliberate and accidental actions. • To bring in a secure source of data.
Technological	<ul style="list-style-type: none"> • Technological advancement. • Increase in internet users. • Organizations using fiber optic cables and having internet in the local area network. 	<ul style="list-style-type: none"> • High prices for new technology. • The lack of information about technology. • Slow modernization of technology. • The safety of technology.

3.3. SWOT Analysis of the Mongolian SDI

SWOT analysis of the NSDI helps develop a clear list of scheduled work and problems that need to be immediately corrected. Therefore, it is necessary to further increase the strengths and opportunities identified in the analysis and focus on the potential weaknesses and threats'

Strengths

- Has the attention and focus of the government – ALAGAC is establishing the SDI, one of five sub-projects of an integrated project addressing systems for Mongolia.
- The work follows certain stages - to advance the SDI issued by ALAGAC, the tasks for each year are done in stages in accordance to specified sequences.
- Bachelor curriculum for SDI courses – starting from 2010, an environmental remote sensing undergraduate program at the National University of Mongolia began taking admissions, with SDI included in the curriculum.
- To give citizens SDI data gradually via media organizations – shows featuring SDI are aired on public news networks, broadcast radio and television. The topics appearing in news are used in international and local research conferences.
- Hardware and internet speed – ALAGAC is working to renovate the hardware and internet of LAN that is connected by fiber optic cables.

Weaknesses

- Experienced persons are few – SDI is only taught in the National University of Mongolia. Other private and government institutions and universities do not have SDI in their curriculum.
- Lack of knowledge on NSDI – officials and experts have poor understanding of NSDI and use of GIS within the limits of their job.
- Data quality – no unified data quality standards exist. Thus, data collected does not always meet expected standards.
- Insufficient budget – even though the government is aware of SDI, the budgets they approve are not sufficient, due to Mongolia's financial situation.
- Insufficient software – software in the Mongolian language has barely started.
- Lack in work cohesion – cooperation and data exchange between organizations is sluggish and poor, resulting in work piling up.

- No spatial clearing house – the arrangement, marketing and management is poor between SDI and the organization. There is no standard on clearing house system.
- Policy planning is lacking – SDI began with policy and projects since 2004. But these were conducted during the early stages and with no official laws and acts.
- No established standards – there are no SDI standards.
- Conflicting laws and confidentiality – topographic maps with scales of 1:100000 or bigger are classified as confidential information, by law, yet building or cadaster maps require the use of 1:500 and 1:1000 scales.
- Metadata availability is rare – finding sources of metadata is very rare in Mongolia. The MNS 5774:2007 “Geographic information - Metadata” standard is used in the National Agency for Meteorology and Environmental Monitoring, World Wide Fund for Nature, environmental database of Ministry of Environment, Green Development.
- Data sources and data collection methods are not clear.

Opportunities

- Creating a new labor market – training experienced specialists for SDI development can help increase employment.
- Learn from other nations’ experiences.
- Increase in the number of internet users in Mongolia. Mongolia’s population has increased rapidly in recent years and due to being a developing country, it has a lot of young people. Following this, the number of internet users rises steadily. This has good potential to develop an SDI.
- Having a national authority of law recommendations. Currently no law in Mongolia has a recommendation for SDI, so it is possible to observe other countries and develop a comprehensive policy.
- The population grows at a rapid pace. Rapid population growth has a positive effect on society and the economy.
- A total of seven universities have classes that teach courses at least partially related to SDI.

Threats

- Information security and privacy - SDI has many elements affecting privacy. Therefore it is important to keep basic information elements open for the public,

whereas personal data are to be kept private and protected with security being a high priority.

- Information holder – Not much is known about the SDI information holders.
- Data has an expense – creating a database requires collecting data and this has a high cost.
- Chance of losing information in an informal way – officials and experts can lose data due either to illegal activities or by accident. It is necessary to take precautions and countermeasures against such loss due to the high cost of data.

3.3.1. *The result of comparison between SWOT analysis factors.*

Opportunities / Strengths

- Having effective qualified SDI professionals in the future – Mongolia has the full opportunity to use private and state universities to create a qualified specialist staff and develop this branch even further.
- Cutting off SDI's confidential data and putting it to public use.

Opportunity / Weaknesses

- Using the shared experience of other nations and using it to develop our SDI – It has been 20 since SDI spread across the world. But the stage of development of each nation is different. Since our SDI is in its early stage, its best if we base the development of ours on the experience of other nations.
- Increasing the number of specific courses on SDI – Increase the number of courses that teach /SDI/ in Mongolia's private and state institutions and universities to help create qualified staff.

Threats / Strengths

- Improve the cohesion between organizations and increase the security of LANs – Adding more securities and simplifying the data exchange between SDI's data concentrator agency and other organizations.
- Mentioning and confirming the data's source – The main thing on collecting data about SDI is that the data must be from a valid source and during making a central database, the source must be clear.

Threats / Weaknesses

- Information security and privacy - SDI has basis and all sort of elements from privacy. The private element data must be kept confidential with its security being a high priority.
- If a conflict occurs in SDI or data is lost, there are no laws or legal acts to resolve the situation. There is no legislation in place to resolve the problems that arise with losing national or organization data either deliberately or unintentionally.

4. CONCLUSION

Any national economic government branch should analyse their management and use the results in developing future policy and agenda. This helps the agency to determine the course of advancement and decrease hazards that would impact on success. Therefore, in this research paper we report the analysis of Mongolia's NSDI with SWOT, PEST and 5C analysis methods.

SWOT analysis identifies the strengths, weaknesses, opportunities, and threats separately, before compiling results into opportunities/strengths and opportunities/weaknesses, and threats/strengths and threats/weaknesses, as presented in section 3.3. above.

5C analysis identifies the company, customer, competitors, climate and collaborators. It also has a PEST detailed analysis of the various compositions, and internal and external climate.

PEST analysis results identify the national, economic, social and technology positive and negative effects.

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