Environmental Scanning - An Emerging Discipline for LIS Education

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Abstract

The external environment is become more uncertain and volatile. To be successful and retain competitiveness, organizations have to regularly detect external signals, systematically process and use such information. Environmental scanning is an effective way for organizations to adapt to their external environment by overcoming threats and grasping opportunities. However, some organizations may not be able to conduct environmental scanning due to lack of resources or adequately trained personnel. To satisfy their needs of environmental knowledge, they may have to outsource for such kind of information services, provide training for their existing staff, or hire specialized business information professional. As there is a degree of overlap between information management and environment scanning activities, some of the competencies covered by current LIS programs in Asia would be useful for undertaking environmental scanning activities. Nevertheless, information professionals still need an additional set of competencies to effectively provide this service. For example, LIS professionals would need a basic understanding of business and marketing principles to effectively understand and meet the information needs or their clients; improve their knowledge of various kinds of specialized business information sources and planning. This chapter will first introduce the concept of external environment, the definition and process of environment scanning, and how environmental intelligence could be used for strategic planning and organizational learning. Then it will discuss the role of environmental scanning as an emerging discipline for LIS education, covering topics as environmental scanning based information services and competencies required for conducting environmental scanning. Finally, it will provide an overview of efforts have been made by LIS education programs in Asia in imparting new skills to their graduates for undertaking environmental scanning activities.
Introduction

Organizations, either large or small, have always been collecting information about their external environments to improve their operations and formulate future strategies. Recent years, environment knowledge has become more crucial as the external environment is becoming more uncertain and volatile due to various factors, such as rapid globalization, technological innovations, frequent economic crises, political realignments, terrorism threats and natural disasters. As a result, organizations need to regularly detect signals about their external environmental, systematically process and use such information to maintain survival and success. Environmental scanning is an effective way for organizations to adapt to their external environmental, overcoming threats and grasping opportunities.

However, some organizations may not be able to conduct environmental scanning, due to lack of properly trained information professionals. Small businesses may want to outsource such information activities, while large organizations may need to employ a different breed of information professionals to deal with organizational knowledge as well as external environmental information. Library and information science (LIS), as a multi-disciplinary and dynamic field, should adapt swiftly to keep pace with emerging information market and prepare versatile information professionals who can accept new challenges. One the one hand, proactively accepting changes and venture into new knowledge territories would help LIS discipline to stay relevant and useful in the fast changing society; on the other hand, it will also create new job opportunities for its professionals. Environmental scanning and related information services are an example of the expanding market, and stakeholder of LIS discipline, including education programs, need to respond quickly to such trends.

External Environment and its Perceived Uncertainty

The external environment refers to the relevant social and physical factors outside the typical boundaries of an organization which affect managerial decision-making (McGee & Sawyerr, 2003). Researchers divided external environment into task environment and remote environment (Carpenter & Sanders, 2009; Dill, 1958; Myburgh, 2004; Sawyerr, 1993). The task environment, also known as industry or domain environment, has a direct impact on company tasks and outcomes; while the remote environment has indirect and long-term impacts. Task environment includes customers, suppliers, and competitors, which was commonly recognized as more significant. Remote environment consists of political/legal, economic, social/cultural, and technological impacts (Dill, 1958; Sawyerr, 1993; Myburgh, 2004). Technology environment is useful to monitor technological developments, production changes and the rise of new services and products; changes in regulations and laws may potentially change the overall market structure; economic information could enable the organization prepare for changes happening in local, regional, national and international markets; social shifts may drive market trends; local, national and international politics may also affect an organization directly or indirectly (Albright, 2004).

Environmental uncertainty has long been recognized as a central concept in the organization theory literature, particularly in theories seeking to explain the nature of the
relationship between organizations and their environments (Buchko, 1994; Milliken, 1987). Pioneer studies on environmental uncertainty either measure it “objectively” (Tinker, 1976) or “perceptually” (Child, 1972; Downey & Slocum, 1975). However, as environmental signals are often ambiguous and require interpretation for issue diagnosis, perceptions are critical in guiding decision making (Boyd, Dess, & Rasheed, 1993; Daft & Weick, 1984). Hence, perceived environmental uncertainty has more influence on scanning than objective environmental conditions.

When administrators perceive unpredictability of an organization’s environment, perceived environmental uncertainty will occur (Buchko, 1994; Milliken, 1987). It is the difference between derived information and available information (Daft, Sormunen, & Parks, 1988; Galbraith, 1977). In other words, environmental uncertainty would be perceived when organization’s decision makers found they were unable to fully understand the major events or trends happening in the external environment with their existing knowledge or information in hand, or when they are unable to accurately assign probabilities to the likelihood that particular events and/or changes will occur (Milliken, 1987). Specifically, two environmental characteristics, degree of complexity (the number of external components that are relevant to the organization) and rate of change (the frequency of changes that occurs in the organization’s external environment), influence perceived environmental uncertainty (Duncan, 1972; Robbins & Coulter, 2005).

Perceived strategic uncertainty was a concept raised by Daft and his colleagues (1988). They further proposed that scanning was affected more by strategically important sectors. Rate of change and degree of complexity of an environmental sector may not lead to scanning behaviour, unless they were located in a sector which has great influence on organization’s strategy.

**Definition and Process of Environment Scanning**

The term “environmental scanning” was coined by Aguilar (1967). He defines environment scanning as acquiring information about events and their relationships in a company’s outside environment, the knowledge of which would assist top management in its task of charting the company’s future course of action. According to the definition, organisations scan the environment in order to get an understanding of external influences so that they may be able to develop effective response that secures or adjusts their position in the future.

Aguilar (1967) also identifies four modes of scanning, which enables it to span a range of information activities. In undirected viewing, the manager is exposed to information without specific purpose or information need in mind; in conditioned viewing, the manager is exposed to information about selected areas or certain types of information; in informal search, the manager actively looks for information to address a specific issue; and in formal search, the manager makes a deliberate or planned effort to obtain specific information or information about a specific issue (Aguilar, 1967). In other words, the rubric of environmental scanning includes both looking at information (viewing) and looking for information (searching) (Choo, 1993).
Aguilar’s definition was reinforced by the subsequent studies. However, the scope of environmental scanning was gradually extended to become a completed information management process. Aguilar put more emphasis on acquiring information, while the later definitions enhanced the importance of activities after information acquisition. For example, Aaker (1983) pointed out that environmental scanning should focus on target information needs, assign intelligence gathering task to those who are exposed to relevant information, and have an effective system for storing, processing and disseminating information. According to Daft and Weick (1984), the way an organisation deciphers its environment in order to learn from it may be divided into three phases: scanning (information seeking), interpretation (giving meaning to the collected data) and learning (taking action based on the data). Similarly, Lester and Waters (1989) define environmental scanning as a management process of using information from the environment to aid decision-making with three key components: obtaining the information, analyzing the information and using the information. These definitions highlight the consequent steps after information acquisition.

A majority of studies conducted after 1990s define environmental scanning from a more systematic and comprehensive perspective. Based on the foundation of Aaker (1983), Costa (1995) proposes a strategic information scanning system which consists of six steps, in order to preserve much of the information which is invariably lost within the organisations, and hence enhance the effectiveness of the scanning effort. Steps one and two specify information needs and sources; steps three and four identify the participants of the system and assign them scanning tasks; and steps five and six deal with the processing, storage and dissemination of the information (Costa, 1995). Albright (2004) defines environmental scanning as the internal communication of external information about issues that may potentially influence an organisation’s decision-making process, which can identify emerging issues, situations and potential pitfalls that may affect an organisation’s future. Albright (2004) raises five integrally linked steps by omitting information organisation and storage. Similarly, Hough and White (2004) views environment scanning as a process of identifying, collecting, processing and translating information about external influences into useful plans and decisions. Zhang, Majid and Foo (2010) proposed a six-step environmental scanning process based on Choo’s (2002) information management model, namely, identification of scanning needs, information collection, information processing and synthesizing, information organization and storage, information dissemination, information evaluation and use.

Related Concepts: Business Intelligence and Competitive Intelligence

Business Intelligence (BI) is defined as the process of getting sufficient amounts of the right information in a timely manner, then transforming the information into a usable form that can be proactively used to have a positive impact on business strategy, tactics and operations (Biere, 2003). Through collecting information about the market, customers and competitors, BI enables organizations to form insights and then strategies to assist daily operations and strategic decision making.

As defined by the Society of Competitive Intelligence Professionals (SCIP), Competitive Intelligence (CI) is a necessary, ethical business discipline for decision making based on understanding the competitive environment (SCIP, 2007a), or the legal
and ethical collection and analysis of information regarding the capabilities, vulnerabilities and intentions of business competitors (SCIP, 2007b). The first statement reflects the broad concern for the nature of the discipline, while the second statement reflects the processes and practices with which a CI professional is likely to be concerned.

Business intelligence, competitive intelligence and environmental scanning have somewhat similar and overlapping processes as from information gathering to information dissemination and use. However, there is some dissimilarity in their scope. Competitive intelligence concentrates on a business’s competitive environment; business intelligence focuses on the domain or industry environment; while environmental scanning is a broader term gathering external environmental information about not only the operating domain, but also the general environment which may have indirect impact on an organization (Fig 2). In other words, environmental scanning is an encompassing concept and business intelligence and competitive intelligence are its components.

Fig 1: Scope of CI, BI and Environmental Scanning

Environmental Scanning for Strategic Planning
The concept of environmental scanning has received attention in organizational planning literature and has been variously described as a set of techniques used to determine what is out there. Strategic planning is defined as a ‘disciplined effort to produce fundamental decisions and actions that shape and guide what an organization is, what it does, and why it does it’ (Bryson, 2002). In order to shape and guide the organization better, the fundamental decisions and actions must be done based on clearly and timely understanding of the external environment. From a structural contingency perspective,
one can see that this relationship is one where the organization is seeking co-alignment with its environment and its ‘tool’ for achieving this co-alignment is the strategic planning process (McLarney, 2001).

The early studies on organization performance looked at planning and the environment as two separate activities. They either stated that planning was the determining factor in firm performance or that the environment was the primary force in firm success. The later studies have gone deeper and proposed a link between strategic planning and firms’ external environment, and their integrated contribution to the organizational performance. Effective scanning of the environment is seen as necessary to the successful alignment of competitive strategies with environmental requirements and the achievement of outstanding performance (Beal, 2000).

Environmental scanning is generally viewed by strategic management scholars as a prerequisite for formulating effective business strategies. In essence, researchers into this area have examined the relationship between the organization’s external environment and its strategic planning process. Fredrickson (1984) raised a four-step theoretical model for strategic decision process, i.e. situation diagnosis, alternative generation, alternative evaluation and decision integration, with external environmental information as the basis of the whole process. Elofson (1989) pointed out that at the early stage in the strategic management process it is necessary to conduct environmental scanning to completely enumerate the events and trends that may be pertinent to the company’s performance in the future. Moreover, assessing the business environment is considered as one of the five components of strategic management raised by him. A study by Venkatraman and Prescott (1990) generated robust results strongly support the proposition of a positive performance impact of environment-strategy co-alignment. Douglas and Judge (1995) empirically examined the antecedents and effects of integrating the natural environment into the formal planning process. Bryson (2002) lists assessing the external environment as step four in his description of steps in the strategic planning process.

To ensure the effective use of collected external information, SWOT and PEST analysis are usually conducted to translate scanning information into actionable ideas. SWOT analysis is viewed as a tool for auditing an organization’s internal and external environments. Role of SWOT is to take the information from the environmental scanning, separate it into internal and external issues, and based on the strengths and weaknesses of the organization, to determine if the information suggests any adaptive behaviour (Keeley, 2006). The information may used to assist the organization in accomplishing its objectives (opportunity), or overcome or minimize the potential obstacle to achieve desired results (threat). PEST analysis is a framework used to scan the external macro-environment in which a firm operates, including political, economic, social and technological environments, which play an important role in the value creation opportunities of a strategy (Costa, 1995).

**Environmental Scanning for Organizational Learning**

Organizational learning is also a concept explored while investigating the symbiotic relationship between an organization and its external environment. Giesecke and McNeil (2004) defined learning organization as an organization skilled at creating, acquiring, and
transferring knowledge and at modifying its behaviour to reflect new knowledge and insights. The survival depends on how the organization learns to encapsulate, perceive, create organization-specific meaning, and take adaptive actions to such changes. Environmental scanning supports an organization’s efforts to learn about the changes and developments in the environment through acquisition, interpretation and use of information about events, trends, and relationships. The products of environmental scanning could be used for both short-term single-loop learning at the business level, such as price restructuring, change of advertising channel, and long-term double-loop learning, such as corporate strategy formulation, amendment of mission and vision statement.

Choo (2001) analyzed organizational learning processes by considering the sense making, knowledge creating and decision making based on the four modes of environmental scanning as developed by Aguilar (1967). Moreover, he also pointed out that the process of environmental scanning is in line with organizational learning cycle. A summary and comparison of the two concepts are collated in Table 1, and the mapping exists in a continuum rather than distinct boundaries.

Table 1: A Comparison of Organizational Learning Cycle (OLC) and Environmental Scanning Processes

<table>
<thead>
<tr>
<th>OLC Choo (2001)</th>
<th>Environmental Scanning Process</th>
<th>Key Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>Specify information needs</td>
<td>Identifying the environmental scanning needs of the organization</td>
</tr>
<tr>
<td></td>
<td>Specify information sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify participants</td>
<td>Gathering information</td>
</tr>
<tr>
<td></td>
<td>Assign scanning tasks</td>
<td></td>
</tr>
<tr>
<td>Perception</td>
<td>Processing of information</td>
<td>Analyzing the information</td>
</tr>
<tr>
<td>Organization Memory</td>
<td>Storage of information</td>
<td>Findings exchange with and update organization memory. Proper procedures for storing and routing information.</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Dissemination of information</td>
<td>Communicate the results Ensure information richness by reporting on a timely basis and according to users’ preferred format and channel/mode of communication. Use analyzed information for evaluating and formulating organizational responses to external effects and impacts. Re-iterate if gaps exist.</td>
</tr>
<tr>
<td>Adaptive Behaviour</td>
<td>Making informed decisions</td>
<td>Actions taken to leverage on opportunities and minimize threats.</td>
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</table>

**Environmental Scanning Based Information Services**

Environmental scanning plays a significant role for organizations to survive and succeed in today’s turbulent environment. However, some organizations, especially those in smaller size, may not be able to conduct environmental scanning by themselves, due to lack of resources or well-trained personnel. Negative examples were observed from various workplace context, such as “unable to determine the nature and the extent of the information needed”, “unable to retrieve information effectively from the information systems”, “not aware of the full range of resources available” and so on, which may result in increased operating cost and inability to fully exploit valuable information sources (Cheuk, 2002; O'Sullivan, 2002). As a result, they may ask libraries or information consultant companies for such kind of information service.

As information needs of organizations operating in different industries are quite diverse, libraries and information consultant companies may consider offering a variety of information services. Organization would decide what types of information products and services will be useful based on the attributes of their external environments and their tactical or strategic planning needs. Some of the following services can be used for disseminating intelligence gathered through environmental scanning:

**Periodic Reports about the Environment:** Information consultant companies can issue regular reports about the external environment at regular intervals and covering various topics. The frequency of such reports could be based on the perceived environmental uncertainty. Such reports are usually issued on a monthly or quarterly basis.

**Alerts about the Environment:** These alerts are like “breaking news”. On detecting an important environmental signal requiring immediate attention of their clients, information consultant companies may send an SMS “alert” or push email to all
concerned individuals and departments for taking appropriate action and formulate adaptive strategy. Such an information service could help organizations to immediately respond to an emerging situation at an early stage, and avoid or minimize its negative impacts.

**On-demand Information Service about the Environment:** This service is more suitable for organizations operating in comparatively more stable environment, and as a result, they do not need to acquire and use information about the environment very frequently. Before embarking on a new project or initiative, they may ask information consultant companies to conduct one-off environmental scanning on a given topic. Similarly, at the time of strategic planning, it may also ask its information professionals to provide more comprehensive and in-depth analysis of the external environment.

**Daily Updates about the Environment:** Some organizations operating in a highly volatile business environment arrange daily meeting for briefing their staff about certain important environmental changes, as well as possible implications of intelligence gathered from the environment. Through face-to-face communication, staff have an opportunity to seek clarification and express their own opinions on environmental trends. However, for large organizations, it would be more reasonable to help them transform employees to become knowledge workers with the required information skills, as there is an old Chinese saying “Give a man a fish, feed him for a day; teach a man to fish, feed him his entire life”. In this case, libraries and information consultant companies could provide customized staff training service according to organizations’ real needs. Training could be provided for both employees and managers to create the awareness towards the importance of information, and improve their information and technology literacy skills.

**Examples of Business Information Services in Asia**

With recognition of the significance of small and medium sized enterprises (SMEs) to the local economy, the governments of some Asia countries have implemented many initiatives to provide financial, technological and informational support to local enterprises. Entrepreneurs are encouraged to start up their growth-oriented firms, and internationalize their business to create more famous local brands.

In Singapore, one such information-related initiative is called EnterpriseOne Business Information Services (EBIS, URL: [http://www.ebis.com.sg/](http://www.ebis.com.sg/)). In order to help Singapore enterprises become knowledge-enabled, innovative and information savvy to compete effectively in the global market, on August 2, 2007, Singapore Business Federation, in partnership with SPRING (Standards, Productivity and Innovation Board) Singapore, IE (International Enterprises) Singapore and National Library Board Singapore, set up this information transfer initiative. EBIS provides a suite of information and advisory services to Singapore based enterprises, including consultation services, seminars and workshops where users would be exposed to latest developments in different industry sectors and their impact on Singapore and the global economy. In another words, some of its services are related to environmental scanning for SMEs, and accumulating information for their consumption.
The Business Information Service (BIS) provided by Sarawak State Library is an example from Malaysia (URL: http://www.pustaka-sarawak.com/Pustaka-Sarawak/our_services.php?do=business_information_services). With the mission to provide access to accurate, up-to-date and timely information, BIS, which was established in March 2001, has supported the development of information brokering in the State. Information brokering is a kind of environmental scanning based information service, which refers to the efforts performed by information professionals in creatively gathering, organizing and packaging information and related information services for a fee. Specifically, the services offered include professional information access, document delivery service and so on. Professional information access refers to reference service dedicated to business clients, and document delivery service include both printed and electronic documents delivered in-person, or through fax or conventional mail depending on the choice of the client.

Environmental scanning based information service could also be targeting at foreign enterprises. For example, the Business Services Centre of Japan External Trade Organization (JETRO, URL: http://www.kansai.meti.go.jp/english/politics/jetro-osaka.pdf), Osaka, provides information on investment conditions, the Japanese government’s foreign investment promotion programs and attractive projects initiated by local investment organizations. They also provide domestic and foreign business information through monthly newsletters on investment and business climate in Japan, such as how to set up a business, law and regulations, legal procedures, markets research and so on.

Competencies for Conducting Environmental Scanning as Implications for LIS Education

Environmental scanning solves workplace problems through a series of information management activities. Starting from identification of information needs, to the collection, processing, storage and dissemination of information, and ending at the evaluation and use of environmental information. Each of these environmental scanning steps requires the corresponding information skills as well as basic business operation knowledge. Some of the competencies covered by current LIS programs in Asia would be useful for undertaking those activities. Nevertheless, information professionals still need an additional set of competencies to effectively provide this service. For example, LIS professionals would need a basic understanding of business and marketing principles to effectively understanding the information needs of their clients; they may improve their knowledge of various kinds of specialized business information sources in order to collect more relevant information. Information professionals should prepare themselves better to respond to very specialized information requests, and this also creates an emerging discipline for LIS education. Competencies needed for conducting effective environmental scanning are discussed in two sections: the information literacy skills and additional competencies.

Information Literacy Skills for Environmental Scanning

Information literacy could be briefly defined as “the ability to search for, find, evaluate, and use information from a variety of sources” (Goad, 2002). The famous “big6” information problem solving model raised by Eisenberg & Berkowitz (1990) pointed out
the essential information skills, i.e. task definition, information seeking strategies, location and access, use of information, synthesis and evaluation. The “Big6” model is widely adopted in information literacy studies, and considered as essential skills for information professionals. We will discuss in detail why these skills would be relevant for conducting environmental scanning one by one.

**Task Definition**

There were mainly two steps covered in “task definition”, i.e. define the information problem, and identify information needed to complete the task (Eisenberg & Berkowitz, 1990). People encounter information problem when they found lack of certain information to do their various tasks as well as help them expand and update their existing knowledge (Foo & Hepworth, 2000).

The first step in environmental scanning is to identify the scanning needs, which is appraising the information needs of decision-makers of the organisation. This is similar to the task definition step in “big6” model. In the context of environmental scanning, information needs occur when the existing organisational knowledge is unable to adequately understand and interpret the signals coming from the external environment. In other words, organisations need to acquire more information to analyze environmental uncertainty and its relationship to their operations. A good recognition of scanning needs of the organisation is essential (Fraser, 1996), as they determine the scope and depth of environmental scanning. To clearly understand the information problem and to identify the needed information would be a significant step in developing information strategy and tools for providing effective information services and promoting organisational wide creativity and innovation (Karim & Hussein, 2008). Therefore, we may found that task definition skill is essential for clearly identifying the scanning needs.

**Information-Seeking Strategies**

“Information-seeking strategies” include the skills to determine the range of potential sources, to evaluate their strengths and weakness, and to give priority to the most suitable ones (Eisenberg & Berkowitz, 1990). First of all, the information professionals should be aware of the various kinds of information sources. Information sources could be categorized as textual online and human sources (Choo, 2002) or internal and external sources (Case, 2002). Secondly, they should be able to select the best sources based on their characteristics and the specific context. They should possess the knowledge about the scope and coverage of different information sources, being aware that each kind of information sources has its own advantages and disadvantages. For example, textual sources are usually more suited to situations when structured and formal information is required, or when higher transmission accuracy of information is highly demanded; online sources are especially useful when reasonably complete and up-to-date information needs to be gathered swiftly; human sources tends to be preferred when dealing with ambiguous, unstructured problem situations (Choo, 2002).

The second step of environmental scanning is information acquisition. Information acquisition starts with selection of information sources, which is similar to formulating information-seeking strategy. To serve the defined scanning needs, information professionals should firstly have a clear knowledge of the scope and coverage of potential business information sources, and their quality in terms of accuracy,
reliability, timeliness, cost to access and so on. Only with the knowledge about the strengths and weaknesses of a wide range of information sources, would they be able to pick the best sources for acquiring environmental information.

Location and Access

“Location and Access” refers to the skills to locate selected sources and to find information within sources (Eisenberg & Berkowitz, 1990). After select the most appropriate sources for collecting information, one should be able to get access to the sources and obtain the needed information. Information could be obtained differently as for different sources. For example, information could be routinely acquired through various media channels like newspaper, market reports or television, or obtained through active research methodologies as questionnaires, interviews and participant observation (Myburgh, 2004), or passively received through subscribed alerting services provided by information vendors. Moreover, collectors should be aware that the methods and techniques used to accessing information should be based on legal collection of open-source or public domain information, without involving immoral, unethical or illegal activities (Jaworski & Kohli, 1993; Myburgh, 2004).

The skills related to “location and access” are also essential for the “information acquisition” step in environmental scanning. After selecting the best sources for environmental information, the information professionals should be able to locate the sources, and retrieve the needed information through legal and moral methods.

Use of Information

“Use of information” in “big6” model in fact refers to processing and extracting the relevant information, but not real utilization of the information (Eisenberg & Berkowitz, 1990). Analyzing the collected information and extracting meaning from it is the most important part of information problem solving process. The relevant information from different sources should be extracted and edited to make it comprehensive and accommodated to different viewpoints. Srinivas (2009) pointed out that questions need to be addressed during processing are: Which parts of the collected information would be used? What additional data is needed? The collected information could be processed into information products or services through certain value-added activities, such as filtering, interpreting and repackaging.

In environmental scanning, there is a step called “information processing and synthesizing”, and the “processing” is similar to the “use of information” in “big6”. Today’s complex and turbulent environment places a premium on the reliability and quality of information (Case, 2002). The collected information should be processed for issues and trends that may influence the organisation, to assist users to acquire a better sense of situations and make better decisions, and hence facilitate the creation of a dynamic knowledge capability (King, 2006). However, it is a general observation that many organizations spend more time on collecting than processing information. Inadequate filtering of information would result in information overload; with inadequate time for interpreting, the collected information will provide either a recital of facts or a “dump” of data with little advice or confirmation (Myburgh, 2004). Without proper information processing skills, the gathered environmental information would be underutilized.
Synthesis

“Synthesis” requires the skills to organize information from different sources and present the information in a suitable form (Eisenberg & Berkowitz, 1990). The “synthesis” in “big6” is the same as “synthesizing” in the step of “information processing and synthesizing” for environmental scanning. The processed information from various sources should be combined and presented in a preferred manner of the potential users.

Evaluation

“Evaluation” refers to evaluating the quality and quantity of information, as well as judging the whole process of information problem-solving (Eisenberg & Berkowitz, 1990). The quality and quantity of information could be evaluated in terms of reliability, accuracy, timeliness, comprehensiveness and sufficiency.

In environmental scanning, on receiving the environmental information, the end-users would evaluate it before using it for decision-making. Information professionals should also evaluate the information before sending it to the end-users. If they find the information insufficient or unqualified, they may initiate a new round of scanning, which is judging the whole process of information problem solving.

Additional Competencies

Besides the information literacy skills highlighted in the “big6” model, there are also additional competencies required for information professionals to conduct effective environmental scanning. The additional competencies include other information related skills for organizing, storing and disseminating information, as well as various kinds of business related competencies.

Other Information Related Skills

Two steps in environmental scanning are not covered in the “big6” model, i.e. “information organization and storage” and “information dissemination”. Additional information related skills are required to conduct these two steps.

Information Organization and Storage: The collected and processed environmental information should be organized and stored systematically in order to facilitate future retrieval and use. Stored information reflects a significant and frequently consulted component of the organisation’s memory and its perception of the environment (Stein, 1995; Walsh & Ungson, 1991). In enterprises, hardcopy of documents could be stored directly in traditional filing system, or digitized and archived on electronic file servers. It was found that many large companies had developed their own in-house libraries over the last three decades for information organisation and storage, either in printed or digital form (Parker, Nitse and Flowers, 2005). The design and performance of a organisation’s information storage system, as well as the using of appropriate taxonomies and comprehensive resource description would highly affect the accessibility and retrieval of stored information, especially when the majority of information is collected from electronic sources.

Information Dissemination: The processed environmental information, with potential influences on the organisation, should be disseminated to the appropriate decision-makers of the organization. Myburgh (2004) and Albright (2004) suggest some
points deserving special attention in information dissemination. Briefly, the issue is about getting the right information to the right person at the right time and in a right form. Specifically, the first one is to ensure that the correct information makes its way to the correct receivers, as the decision-makers may be scattered throughout the organisation; secondly, the information should be delivered through channels and in formats that mesh well with the user’s preferences and work habits; thirdly, the intelligence must also match the users’ requirements for presentation, such as its orientation and content.

Moreover, the benefits of a wider distribution of information are also highlighted in previous literature. Nutt (1999), from the perspective of decision-making theory, found that when the same piece of information is distributed to many individuals, multiple interpretations could be resolved and a consensus would be reached. Daft (2001) raised that multiple interpretations of the same information could improve the decisions by redefining the problem. Information professionals in charge of scanning activities should be aware of the above mentioned benefits and try to distribute the information to all needed users.

**Business Related Knowledge**

Business related knowledge is required in the whole process of environmental scanning. For example, to well capture the scanning needs, information professionals should have a clear understanding of strategy formulation process and knowing what kind of information would be relevant for strategic planning. To collect environmental information for assisting strategic decision-making, the information professionals should possess specialized knowledge on business information sources. To process business information, information professionals should have knowledge about the various business analytical techniques and tools, which could be used to glean meaning from the collected data, such as competitor benchmarking, blind spot analysis, and SWOT (Strength, Weakness, Opportunities and Threats) analysis. To disseminate environmental information, information professionals should have business communication skills to understand their preferred forms of presentation. To evaluate the quantity and quality of scanning information, information professionals should acquire additional management competencies related to strategic planning and decision making, which could enable them to understand the requirements of the end-users.

**Preparing Competent Information Professionals in Asia**

Realizing its importance in today’s information intensive society, Library and information science programs in Asia have started using different approaches for preparing LIS professionals with adequate understanding of environmental scanning and related disciplines, such as competitor intelligence and business intelligence. Moreover, the role of business information professionals has changed dramatically as they must be capable of not only identifying and locating relevant information but also synthesizing and communicating it through different information products and services. Besides information related skills, LIS students also need to acquire business and management related knowledge, as well as various ways to translate their information skills and knowledge for providing solutions to complex business needs in diverse organizational settings. Some LIS programs in Asia have started offering full courses on environmental scanning, competitor intelligence or business intelligence; some programs include
environmental scanning and related topics as a segment of a broader course. Some academic institutions have started offering dual degrees in business management and library and information science with the recognition of the need to nurture “hybrid” professionals possessing in-depth knowledge of both information and business management. Graduates from the LIS schools would be able to work as information professionals in libraries or consultant companies providing customer-oriented information services, or to be hired as information specialists in various industry fields. The following are some LIS programs offering environmental scanning or related information management courses or programs, such as business intelligence and competitive intelligence.

**Peking University, China**

As one of the earliest founded LIS education institution in China, the Department of Information Management has more than 60 years history. To meet the market needs, the traditional course structure has been evolved to cover various knowledge fields, including the existing information and media related competencies, as well as management, communication and business operation skills. Besides becoming qualified librarians, graduates are also capable to work in various industries, effectively leading the organization’s environmental scanning and related information management activities. (URL: http://202.116.65.84/research/zg_beijing.htm).

**Nanjing University, China**

The Department of Information Management offers business-oriented Master and PhD programs with specialties related to environmental scanning based information services, such as Information Consulting and Reference, Information Sources Sharing, Competitive Intelligence Research and so on. The department also provides a featured continuing education program aiming at training information specialists, particularly for business information management. Moreover, Competitive Intelligence Studio was established by the department in 2000. Up till 2005, they have finished over 40 working reports, participated over 20 national training projects, had master’s degree students graduated in 5 years, established a doctoral-degree education system with 7 doctoral candidates working at the present. The research fields include: Information Analysis Methodology, Information Service & Consulting Research, Competitive Information Data Mining, Information Legislation, and Counter-Competitive Intelligence. (URL: http://202.119.40.20/shownodir.aspx?contentid=cont20100629291&parentid=tcat20100608165&tcategoryid=tcat20100608165).

**Wuhan University, China**

Under its Master of Information Science program, the School of Information Management offers courses related to Information Research Methods, Information Organization and Sharing, Competitive Intelligence and Strategic Consultation. Electronic Business and Network Economy is also covered as a specialty of its Master Program (URL: http://www.sim.whu.edu.cn/major/major.php).
Nanyang Technological University, Singapore

The Division of Information Studies, Wee Kim Wee School of Communication and Information offers several courses related to environmental scanning under its two Master of Science programs, Knowledge Management and Information Studies, such as Business Information Sources and Services, Management and Business Intelligence. The focus of Information Management course is also on environmental scanning and competitive intelligence. Moreover, with collaboration with Nanyang Business School, the division is offering dual Master Degree in knowledge management and business administration. (URL: http://www.wkwsci.ntu.edu.sg/ProspectiveStudents/Graduate/MasterofScienceinInformationStudies/Pages/Curriculum.aspx#infomanagement).

Hansung University, Korea

In order to cope with the market demands, the Division of Knowledge and Information Studies provides professional education in its LIS program based on an understanding of the theory and practice underlying generation, organization, dissemination and use of knowledge and information in today’s digital age. The program covers the theoretical and technical knowledge necessary for dealing with information, as well as a comprehensive understanding of all areas related to the practical side of information management and applications. Graduates would be able to work as librarians or information specialists in a variety of other fields as research institutes, non-profit organizations and business companies (URL: http://www.hansung.ac.kr/eng/colleges/humanities04.htm).

National Taiwan University, Taiwan

Similar to Nanyang Technological University, Singapore, the Department of Information Management in National Taiwan University offers a global MBA program in cooperation with College of Management for the purpose of nurturing hybrid professionals. The core courses include Management Information Systems, Strategic Management, Marketing Management, Managerial Economics, Managerial Accounting, Organizational Behaviours, International Management and Financial Management (URL: http://web.management.ntu.edu.tw/English/IM/PageDetail.asp?menu1=04&menu2=11).

Summary

The external environment is becoming increasingly complex and turbulent; therefore, companies have to react immediately to environmental changes, grasping opportunities and overcoming threats. The need for timely, accurate and reliable environmental intelligence from business organizations creates both opportunities and challenges for LIS services and education. One the one hand, more job vacancies have been created for LIS graduates. Libraries and consultant companies may want to hire more specialists for providing customized information services, and business organizations, with recognition of the importance of environmental intelligence, would also start hiring their own
information professionals to conduct systematic and continuous scanning activities. On the other hand, LIS programs have to redesign their program structure to keep up with the changing times, and nurture a new breed of information specialists with theoretical and technical knowledge on how to deal with information, as well as a comprehensive understanding of different business and marketing principles to develop more useful information products and services. Moreover, today’s Information professionals, in addition to providing traditional library services, also need to come up with non-traditional and innovative methods to meet highly specialized information needs of their users.

Being aware of the market needs for information specialists equipped with business and management knowledge, some LIS schools in Asia have started preparing professionals for emerging job markets. With the revised curriculum addressing the emerging market expectations, LIS schools would be able to nurture new age information professionals playing an effective role in environmental scanning activities and services for various kinds of organizations. With proper understanding of corporate business, LIS graduates would be able to act as strategic partners in both tactical and strategic decision making through transforming their services in accordance with today’s realities.

**References**


