

Case study

Demand for business information service of firms in Taiwan: a case study of Hsinchu Science-based Industrial Park and Hsinchu Industrial Park

Benjamin J.C. Yuan ^{*}, Ming Yeu Wang, Chen Chien Wang

Institute of Management of Technology, National Chiao Tung University, 1001 Ta-Hsueh Rd., Hsinchu, 300, Taiwan

Abstract

Continuous development of technology brings changes in economic environment and market structure. Enterprises should be equipped with speedy and accurate analytical capabilities on business information so that they can foresee the future. For countries such as Taiwan where the majority of the enterprises are small or medium businesses, these enterprises lack the economies of scale and skilled professionals in collecting and analyzing business information in their business environment. External professionals, on the other hand, fit better into their needs. In this case study research, based on organizational buying theory and through questionnaire survey, we try to understand the demand motives, awareness, interest, evaluation items and purchase intention of enterprises for business information in Taiwan. At the end of the case study, we also try to make a few recommendations for information service providers. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

Continuous development of technology brings changes in economic environment and market structure. Enterprises should be equipped with speedy and accurate analytical capabilities on business information so that they can foresee the future. Information, therefore, is the most important resource for enterprises. If enterprises can collect, evaluate information and make proper deduction, then they will gain more competitive

^{*} Corresponding author. Tel.: +886-3-5727657; fax: +886-3-5727653; E-mail: benjamin@cc.nctu.edu.tw

advantages than their competitors. Nomura Research Institute once presented its viewpoint of “information lead manager”¹ and commented that there will be a strong demand for business information by enterprises in the next century.

More and more enterprises continue to downsize their organizations, reduce their core staff to the minimum, and out source marginal activities to external professionals. They do so just because they want to improve the flexibility in their organizations. Along with this trend, when enterprises are in need of business information, they very often just rely on external professional organizations for the collection, compilation and analysis of information.

In addition to relying on external professionals, enterprises can also hire an information specialist to help them identify their information needs. However, only large enterprises can afford to hire in-house information specialists (Everett and Crowe, 1994). For countries such as Taiwan where the majority of the companies are small or medium businesses, hiring in-house specialists is not appropriate. External professionals, on the other hand, fit better into the needs of small and medium companies in Taiwan as they allow smaller scale companies to still enjoy economies of scale in their collection and analysis of business information.

Professional organizations providing business information services have been around for quite some time in developed countries. They have grown to be a pretty large scale industry and will continue to maintain a certain growth rate (Everett and Crowe, 1994). Taiwan, in the past, has very little demand for business information services. But, the situation has changed. Due to increasing competition from peers and strong promotion by the government and non-profit organizations, enterprises in Taiwan have started to recognize the fact that information collection and analysis have become an indispensable tool for strengthening competitive capabilities. Thus, the demand for business information services starts to boom. It is crucial for business information service providers to understand the demand motives of major clients, their interest and how they evaluate such services so as to develop services that meet the clients’ expectations. In this case study research, based on organizational buying theory and through questionnaire survey, we try to understand the demand motives, awareness, interest, evaluation items and purchase intention of enterprises for business information. At the end of this paper, we also try to make a few recommendations for information service providers.

2. Literature review

The term “information” has been used quite broadly. To define “business information” used in this case study, we first discuss “levels” of information and current status in Taiwan so as to define the research scope of this paper. In addition, as enterprises are the major target consumers of business information, this paper will then discuss some

¹ www.nri.co.jp.

important organizational buying theories and formulate research framework based on these theories.

2.1. Definition and levels of information

Scholars have not reached consensus in the definition of ‘‘information’’. Some scholars have a narrow interpretation of the term by thinking that information is merely a pooling of scattered bits of data or knowledge (Weiss, 1992; Fuld, 1994). These scholars tend to classify information into several levels. Weiss (1992) once classified information into four levels. The first level is raw data. The second level is information, which is the compilation of raw data. The third level is knowledge, which involves applying information to improving clients’ situation. The fourth level is wisdom, which is an integration of knowledge on policies, expertise required and client culture and can be accessed by clients. Fuld (1994) classified information into the following four levels: data, information, analysis and intelligence. Under the above interpretations, information seems to have only preliminary and basic contribution to enterprises. However, some other scholars have broader interpretation on information. They believe that information covers nearly everything (Lavin, 1992; Rugge and Glossbrenner, 1995). Under this interpretation, information covers all previously mentioned levels, each of which contributes to enterprises with a slightly difference.

In terms of size, currently the largest information service organization in Taiwan is Industrial Technology Information Service (ITIS). ITIS is a government-sponsored organization, which is engaged in the collection and analysis of industrial information. The purpose is to promote the competitive advantages of Taiwan industries and to promote industrial upgrading. ITIS was established in 1989, involving quite a few non-profit organizations such as Industrial Technology Research Institute, Institute for Industry Information, Taiwan Economic Institute, Development Center for Metals, Development Center for Biotechnology, Development Center for Ships and Boats, Development Center for Textile. Current researches at ITIS include information, industrial materials, chemical industry, biotech, food, photonics, electrical engineering, industrial safety and hygiene, textile, aerospace, autos, communication, consumer electronics, precision machinery, machine tools, semiconductors, metals and non metal industries. ITIS provides its service through publications, electronic media (electronic information network), seminars, consulting services and projects (projects in relation to market survey and investment trend analysis).²

Other than ITIS, there are other organizations that provide business information services as well. Among them are firms that provide services in management consulting, credit check, market research, commercial database, newspaper clippings, periodical index, and information brokerage. These institutions spread across private firms, government agencies, non-profit organizations and academic units. Independent service organizations are usually smaller in scale. The business nature and service items of the previous organizations are not exactly the same and the information they provide is in some aspects overlapping.

² www.itis.itri.org.tw.

2.2. Enterprises' demand for business information service

Enterprises need business information most when they do not understand the business environment they are in. According to Daft et al. (1988), there are six types of information on external environment that enterprises need to understand. They are competition, customer, technology, regulation, economics and social culture. Daft et al. further defined the first three as task environment information, the last three as general environment information.

After we examine the views of various scholars on this issue, we find that the basic function of information for an enterprise is used in examining business environment. Galbraith (1973), Tushman (1977), Hambrick (1981), Culnan (1983), and Jemison (1984) come up with enough business information for managers to identify opportunities, to detect and understand where the problems are. Lavin (1992) put forward that information can reduce uncertainty because it allows managers to understand more related messages to assure possible outcomes, to reduce decision risks in an ever changing environment. Throughout the operation of any enterprise, the most important application of information may be in the field of long term strategic planning. Information that can be used in strategic planning is called "intelligence" according to Lavin.

Business information is very helpful in the scan of environment, the reduction of uncertainty and the formulation of strategic planning. However, enterprises may have to turn to external professionals for help. McGonagle and Vella (1990) pointed out that when enterprises lack professional skills/in-house specialists, are under time pressure, or solicit objective viewpoints, they might as well go out to find assistance in getting business information and competitive intelligence. Lavin (1992) also mentioned that enterprises will be motivated to seek professional business information services if they lack professional skills internally, confront complicated cases, need external objective opinions or even find out their competitors are seeking external information inputs.

Despite the need for external business information services, enterprises still have to carefully evaluate the costs resulting from the services as well as the quality of service organizations. Glossbrenner (1987) proposed nine evaluation criteria on information providers. The criteria are simpatico, communication skills, internal research resource, specialty, internal database, customer satisfaction, customer trust, employees training and experience, and reputation.

2.3. Information service contents

There are quite a few companies in the US that provide information related services. In addition to publishers and database producers, there are three other important information service providers such as market research firms, consultants and information brokers (Lavin, 1992).

Around the world there are many multinational companies that provide business information services. DataQuest, Arthur D. Little, IDC in the US, Nomura Research Institute (NRI), YANO, Daiwa Integrated Research (DIR), Mitsubishi Research Institute (MRI) in Japan are some examples. The service scope of the previously mentioned organizations may not be exactly the same. Each has its own specialty. For example,

being one of the most prestigious institutes in industry survey and analysis, NRI provides two major services. One service is to identify new trends in social, domestically/internationally economic, financial, investment, industrial and technological researches. The second service is to provide solutions to managerial and investment problems of client companies.³ Sanwa Research Institute (SRIC) provides services mainly in the fields of city development, geographical development investigation, survey on industrial and technological trends, economics, industries, related social policies, finance and internationalization (ITIS, 1995).

Information brokers provide real time appropriate information based on customers' demand. They have a wide range of services. Lavin (1992) listed 35 services altogether. The services include abstracting, analyzing information, bibliography collection, and trend analyses, just to name a few.

2.4. Organizational buying behavior theory

Industrial buying behavior includes all activities of organizational members as they define a buying situation and identify, evaluate, and choose among alternative brands and suppliers (Webster and Wind, 1972). Over 25 years ago, Patrick Robinson, Charles Faris and Jerry Wind introduced the Industrial Buying Process as an important area for research in their 1967 seminal work, *Industrial Buying and Creative Marketing* (Johnston, 1994). Within a few years, others began to examine this area through empirical studies and conceptual models. The two best known early models were introduced by Webster and Wind (1972) and Sheth (1973). The model of Webster and Wind (1972) consists of four classes of variables determining organizational buying behavior. They are environmental, organizational, social and individual. The model proposed by Sheth (1973) stresses more on psychological factors and is a more integrated model. Choffray and Lillien (1978) considered the Sheth model too complicated, so they proposed a simplified model, which was called industrial market response model. This model allows actual application of analysis results and helps managers to formulate an effective marketing strategy. In addition, Kolter (1994) studied hundreds of research reports and concluded that both organizations and individuals experience five stages before they accept any innovative products. These five stages are awareness, interest, evaluation, trial and adoption. As these early models have fairly robust nature (Johnston, 1994) and the information that Taiwanese firms need tend to be innovative, this case study therefore used Kolter's model to build the research framework. Industrial market response model is also used as a complement.

3. Methodology

As mentioned before, the research framework of this paper is based on Kolter's model and industrial market response model. The two dimensions from which we

³ www.nri.co.jp.

analyze the demand of enterprises for business information are the enterprise profile and environmental constraint. After finishing literature review and conducting preliminary discussion with information service providers, we determined variables for each dimension. Afterwards, questionnaire investigation was conducted for us to understand how Taiwanese enterprises respond to these variables. In addition to conducting statistical methods to analyze the questionnaire, we also interviewed experts to seek their opinions so as to make our conclusions more valuable.

3.1. Scope of research

The information provided by most information service providers in Taiwan are mostly “information” level as defined by Weiss (1992) or Fuld (1994). However, some other companies do provide “intelligence” or “wisdom” levels of information. This research focuses on information level, with some reference to “intelligence” or “wisdom” levels of information. All of these three types of services are called “business information service” in this research.

3.2. Research framework and variables

The framework of this research consists of four dimensions: awareness and motives, interest, evaluation and purchase intention of enterprises for business information services. The framework is as shown in Fig. 1. The following is the discussion of the variables in each dimension.

3.2.1. Awareness and motives

The variables of this dimension include sources of business information services, sources of purchased information, enterprises’ current awareness of availability of such information, and their motives to purchase such services.

(1) There are 15 possible sources of business information services: private market research firms, domestic consulting firms, foreign consulting firms, competitors, credit check firms, professional databases, ITIS publications, newspapers and magazines, government or financial institutions, exhibitions, associations, seminars, and non-profit organizations.

(2) There are 12 possible sources of purchased information: associations, visitors/sales, DM, periodicals, seminars, exhibitions, experts recommendations, relatives’ or friends’ recommendations, internet, competitors, libraries, and electronic media.

(3) Awareness of existence of such services is classified into three scales: fully aware, a bit aware, and not aware.

(4) Taking into consideration the arguments of McGonagle and Vella (1990) and Lavin (1992), we listed eight possible purchase motives. They are gaining professional knowledge, seeking objective viewpoints, reducing costs, buying time, identifying problems, reference for decision making, reference for investment evaluation, and elevating knowledge of employees. In the questionnaire we conducted, the respondents

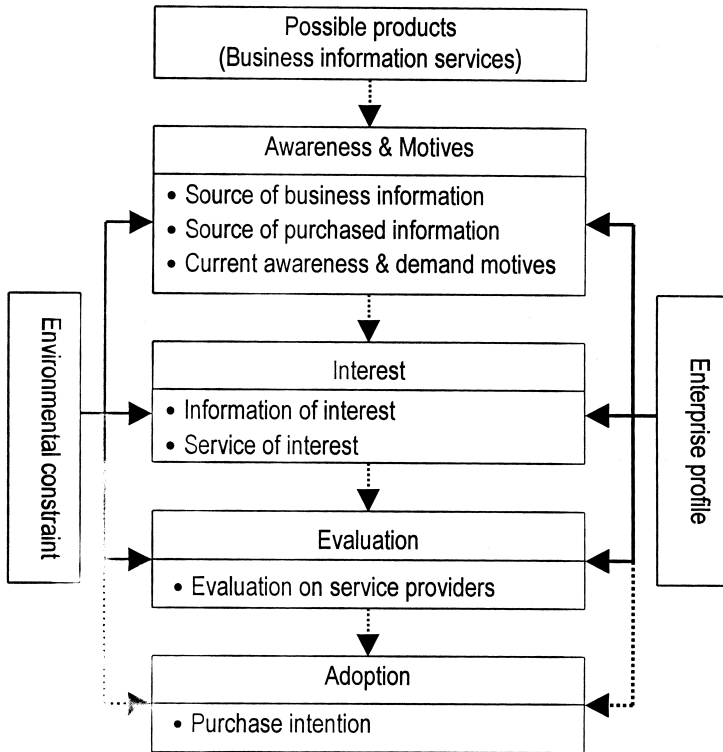


Fig. 1. Research framework. Note: the direction pointed out by the dotted line is not within the scope of this research.

were asked what they think of these eight motives, we used Likert 5-point scale to measure their answers.

3.2.2. Interest

For this dimension, we have variables including types of information and services items that enterprises might be interested in. After going through the service items of most information service providers, we listed 13 types for the former and 11 items for the latter.

(1) The information types that enterprises might be interested in are: trends of economic cycles, trends of finances and loans, up/down stream supply and demand, price trends of raw materials and products, forecasts in production and sales, government industrial policies and related regulations, intellectual property rights and patents analysis, strategic analysis on markets, trend analysis on industrial developments, information on new products, investigation on firms' activities and credit status, trends on technological developments, and investigation on land and geographic developments. In the questionnaire, we use Likert 5-point scale to measure how enterprises value these types of information.

(2) The service items that enterprises might be interested in are: real time information service, professional electronic database index/full-scale service, newspaper clippings/periodicals/librarian information services, seminars on industrial activities, publications analysis on related industries/products/markets, research service provided to one single firm, research service provided to multiple firms, consulting services, services provided on membership basis, training courses on industrial research, and patents map/legal consulting services. In the questionnaire, we use Likert 5-point scale to measure the preference of enterprises for these service items.

3.2.3. Evaluation

For the evaluation on information service providers, we take into consideration the arguments of Glossbrenner (1987) as well as opinions from service providers; we single out 16 criteria that service providers should meet. They are reputation/image, objectivity, confidentiality, reputation of professionals, professional knowledge of analysts, working experience of professionals, comprehensive after-sale service, service quality control, scale of service providers' organization, lower pricing, availability of databases and publications, fully computerized system, availability of real time information, prospective information, prospective information, in-depth technical background support, and international database support. In the questionnaire, a Likert 5-point scale was used to assess the enterprise's perceptions of these items.

3.2.4. Purchase intention

When the information types and service items meet the requirements of enterprises, the discussion on the purchase intentions of enterprises follows. The purchase intentions can be categorized into four levels.

3.2.5. Enterprise profile

The enterprise profile needs to be looked at: years of operation since establishment, type of industry, 1996 sales, level of office automation, and internet equipment availability.

3.2.6. Environmental constraint

Tushman (1977), Culnan (1983), Galbraith (1983), Jemison (1984), and Hambrick (1989) all pointed out that the reason why enterprises need business information is for them to examine the external environments of the enterprises. This research designs seven external environmental variables: government policies, technological trends, social environment, cross-strait economic and trading activities between Taiwan and Mainland China, competition, and dominance of enterprises in the industry. In the questionnaire, the inquires on the first six variables focus on the impact levels of the changes in these six variables on the enterprises. The last variable is aimed to inquire about the dominance degree of the enterprises in the industry. We still use Likert 5-point scale to measure the answers given by the respondents.

3.3. Survey and statistics on recovery of questionnaire

There are two survey targets conducted for this research. One is firms at Hsinchu Science-based Industrial Park, who face highly uncertain and ever-changing technologi-

cal environment and are in desperate need of professional business information services. The second target is firms at Hsinchu Industrial Park, who need business information to help them through the transition from traditional industries to technology intensive industries.

In 1996, this research picked 423 firms from the directories of HSIP and HIP. After first round of phone contacts, it was found that six of them closed down, thus the survey firms were reduced to 417 firms. In March 1997, questionnaires were sent to presidents or vice presidents of these firms.

The returned questionnaires totaled 133, in which nine questionnaires were invalid due to incomplete answers and three indicated that they have no needs for business information. After phone confirmation, these three firms indicating no needs for business information are all subsidiaries and their parent companies provide such information. Therefore, valid questionnaires are 121; the recovery rate is 29%.

3.4. Analysis methods

The analytical tool for this research is the statistics software called SPSS. Based on different analytical demands, the following statistical methods were used.

3.4.1. Descriptive statistics

The averages and frequency percentages of some variables are listed so that we can have preliminary understanding of the distribution of variables.

3.4.2. Factor analysis

We conduct factor analysis on the variables in the dimensions of motives, interest and evaluation. The purpose is to find out the potential characteristics among the variables in the hope that we can use less number of dimensions to present the original data structure and to conduct further analysis. We use principal component analysis to extract common factors and use eigenvalue bigger than 1 (Kaiser's rule) as the factor selection criterion. Afterwards, we use Varimax for rotation.

After the factors were extracted, we calculate the averages of the variables contained in each factor to see whether there is difference among factors. We then use the averages as the factor score for that particular factor. In addition, all subsequent statistical analyses use standardized factor score generated by computer outputs.

3.4.3. One-way analysis of variance (ANOVA)

ANOVA is used to understand whether significant difference exists among factors in each dimension. ANOVA is also used to understand how enterprises with different attribute react to each factor.

3.4.4. Multiple pairwise comparison — Tukey's method

When the ANOVA results show significant difference, we use Tukey's method to identify the source of the difference.

3.4.5. Correlation analysis

This method is used to analyze the relationship between environment constraint variables and all extracted factors.

4. Empirical results

4.1. Descriptive statistical analysis

4.1.1. Analysis on awareness and demand motives

4.1.1.1. *Sources of business information.* The major sources of business information include newspapers and magazines (22.9%), seminars (14.5%), exhibitions (14.5%), competitors (13.3%), associations (10.5%), ITIS publications (8.2%), foreign consulting firms (3.8%) and others (12.4%) (As this question is a multiple-choice question, so the above percentages are derived by dividing the frequency that each answer has been chosen by the total).

4.1.1.2. *Sources of purchased information.* This question is a multiple-choice question. The major sources of purchased information are periodicals (21.4%), seminars (15.6%), DM (14.0%). These are all information channels that firms can access easily. Competitors (7.8%), associations (7.8%), Internet (6.6%), expert's recommendations (6.6%), and exhibitions (6.6%) follow these sources. Other channels account for 13.6%.

4.1.1.3. *Awareness of business information services.* This question aims to find out whether the respondents of the questionnaire are aware of the availability and service contents of business information services in Taiwan. 25.3% of those who responded expressed that they are “fully aware” of that services in Taiwan; 61.6% indicates “commonly aware”; 13.1% indicates “unaware”.

4.1.1.4. *Demand motives.* The demand motives of the responding firms for seeking business information services are (ranked by the averages of each motive): reference for decision-making (4.12), identifying problems (4.09), buying time (3.98), reference for investment evaluation (3.87), gaining professional knowledge (3.80), seeking objective viewpoints (3.58), elevating knowledge of employees (3.44), and reducing costs (3.43).

4.1.2. Analysis on interest

4.1.2.1. *Information of interest.* Business information that interests the responding firms (ranked by the averages) are: price trends of raw materials and products (4.46), trend analysis on industrial developments (4.43), supply and demand in up/down stream industries (4.37), trends on technological developments (4.26), forecasts in production and sales (4.18), information on new products (4.16), analysis on markets (4.08), investigation on firms' activities and credit status (4.00), trends of economic cycles (3.91), policies and regulations (3.60), intellectual property rights and patents analysis (3.59), trends of finances and loans (3.19), and investigation on land and geographic developments (2.74).

4.1.2.2. *Service of interest.* Service items that interest the responding firms (ranked by the averages) are: seminars on industrial activities (4.06), real time information service (4.00), professional electronic database index (3.97), publications of research analysis

(3.93), newspaper clippings/periodicals/librarian information services (3.72), professional consulting service (3.41), research service provided to multiple firms (2.97), research service provided to one single firm (2.95), services provided on membership basis (2.91), training courses on industrial research (2.88), patent maps/legal consulting services (2.86).

4.1.3. Analysis on evaluation of information service providers

The evaluation criteria that the responding firms use (ranked by the averages) are: confidentiality (4.53), availability of real time information (4.43), prospective information (4.42), experience of professionals (4.31), professional knowledge of analysts (4.28), service quality control (4.28), after-sale service (4.27), objectivity of service providers (4.25), international database support (4.21), reputation/image of service providers (4.20), in-depth technical background support (4.12), lower pricing (4.10), availability of database and publications (3.99), reputation of professionals (3.86), fully computerized system (3.74) and scale of service providers (3.45).

4.1.4. Analysis on purchase intention

Suppose that above service items meet the requirements of the responding firms, the purchase intention of the firms are (ranked by percentages): very interested in purchasing (27.3%), somewhat interested (43.7%), uncertain (26.1%), and not interested at all (2.5%).

4.2. Exploratory factor analysis

4.2.1. Analysis on demand motives

After factor analysis is conducted, two factors are extracted. Accumulated explained variance is 65.6%. The factor analysis results are shown in Table 1. There are five variables in factor I. The common characteristic of the five variables are effectively accumulating knowledge, thus they are named as “knowledge motives”. Factor II consists of three variables that are mostly used for business decision-making, thus they are named as “decision motives”.

4.2.2. Analysis on interest

4.2.2.1. Information of interest. Results of factor analysis on business information that interest enterprises are shown in Table 2. Factor I includes six variables, which according to the definition by Daft et al. (1988) are then named “task environment information”. The three variables in factor II are related to information on supply-demand and are thus named as “supply-demand information”. The four variables in factor III focus on the research on macro-economic environment and are thus named as macro-economic environmental information. The accumulated explained variance is 63.3%.

4.2.2.2. Service of interest. The results of factor analysis on services that interest enterprises are shown in Table 3. There are three variables in factor I. These services are

Table 1
Factors on demand motives

Factor	Variables	Factor loading	Accumulated explained variance (%)	Naming of factor
I	Gaining professional knowledge	0.8432	42.8	Knowledge motives
	Buying time	0.8097		
	Reducing costs	0.7828		
	Seeking objective viewpoints	0.7543		
	Elevating knowledge of employees	0.6539		
II	Reference for investment evaluation	0.8698	65.6	Decision motives
	Reference for decision-making	0.7511		
	Identifying problems	0.6570		

requested and specified by clients. As these services tend to be unique to certain firms, they are thus named “customized project-based services”. Factor II consists of five variables. These five services are designed by service providers and can meet the needs of a broader base of customers. Therefore, they are named “general information broker services”. The accumulated explained variance is 64.6%.

4.2.3. Analysis on evaluation of service providers

From Table 4, we know that the three variables in factor I are related to the quality of analysts in the service providers and we name them “quality of professionals” accordingly. The three variables in factor II reflect firms’ requirement of quality of information, and they are thus named “quality of information”. The four variables in

Table 2
Factors on business information of interest

Factor	Variables	Factor loading	Accumulated explained variance (%)	Naming of factor
I	Trends of technological development	0.7864	34.0	Task environment information
	Information on new products	0.7753		
	Trend analysis of industrial development	0.7712		
	Analysis of markets	0.6815		
	Intellectual property rights and patents analysis	0.4542		
II	Investigation of firms’ activities and credit	0.4488	52.4	Supply–demand information
	Price trends of raw materials and products	0.8428		
	Supply and demand in up/down stream industries	0.7810		
III	Forecasts in production and sales	0.6411	63.3	Macro-economic environment information
	Investigation on land and geographical developments	0.7592		
	Policies and regulations	0.6418		
	Trends of economic cycles	0.6374		
	Trends of finance and loan	0.6336		

Table 3
Factors on services of interest

Factor	Variables	Factor loading	Accumulated explained variance (%)	Naming of factor
I	Consulting services	0.7572	49.6	Customized project-based services
	Training courses	0.7496		
	Research services provided to multiple firms	0.7217		
	Services provided on membership basis	0.7200		
	Research services provided to one single firm	0.6693		
	IPR and patents analysis	0.5946		
II	Electronic database index	0.8459	64.6	General information broker services
	Newspaper clippings/periodicals/librarian	0.7879		
	Publications of various analysis reports	0.7137		
	Real time information services	0.6459		
	Seminars on industrial activities	0.5881		

factor III are concerned with the impression that service providers left with clients, and they are thus named “goodwill of service providers”. The variables in factor IV are concerned with the quality of service, and they are thus named “quality of service”. The variables in factor V are concerned with databases, and they are thus named “completeness of database”. The accumulated explained variance is 71.3%.

4.2.4. Comparison between factors

After factors are extracted, this research conducts variance analysis in order to understand whether there is significant difference among factors in each dimension. The

Table 4
Factors on evaluation of service providers

Factor	Variables	Factor loading	Accumulated explained variance (%)	Naming of factor
I	Professional knowledge of analysts	0.8724	38.4	Quality of professionals
	Reputation of professionals	0.7340		
	Experience of professionals	0.6807		
II	Prospective information	0.8415	48.7	Quality of information
	Availability of real time information	0.8214		
	In-depth technical background support	0.3896		
III	Scale of providers	0.7485	57.7	Goodwill of services providers
	Objectivity of providers	0.7077		
	Confidentiality of providers	0.6778		
	Reputation/image of providers	0.4478		
IV	After sale service	0.8456	65.0	Quality of services
	Service quality control	0.7553		
	Fully computerized system	0.5843		
V	Lower pricing	0.7833	71.3	Completeness of database
	Completeness of database and publications	0.6705		
	International databases support	0.4221		

P values of each dimension in Table 5 are less than 0.05 significant level, thus we know that there is significant difference among the factors in each dimension.

Afterwards, we use Tukey's method to figure out the resources of difference. In the dimension of "demand motives", the score of decision motives is significantly higher than knowledge motives. In the dimension of "information of interest", the scores of task environment and supply–demand information are significantly higher than that of macro-economic environment information; supply–demand information has significantly higher score than that of task environment information. In the dimension of "service of interest", general information broker services have significantly higher score than customized project-based services. In the dimension of "evaluation on service providers", the score of quality of information is significantly higher than quality of service and completeness of database.

4.3. Business profile vs. factors

We use ANOVA, Tukey's method, and correlation analysis to examine whether different business profiles make firms react differently towards the factors. The results are shown in Table 6.

4.3.1. Demand motives

In terms of knowledge motives, the factor scores of communications, photonics, semiconductors, materials, chemical industries are all significantly higher than mechanical industry. However, there is no significant difference among different type of industries for decision motives.

4.3.2. Information of interest

Computers and peripherals, communications, photonics, semiconductors, biotech industries all have significantly higher score for task environment information than

Table 5
Results of ANOVA and multiple pairwise comparison in each dimension

Dimension	Name of factor	Factor score	<i>F</i> value ^a	M.P.C. ^b
Demand motives	1. Knowledge motives (A)	3.6479	8.608***	(B, A)
	2. Decision motives (B)	3.9174		
Information of interest	1. Task environment (A)	4.0882	59.025*****	(A, C)
	2. Supply–demand (B)	4.3388		
	3. Macro-economic environment (C)	3.4066		
Service of interest	1. Customized project-based services (A)	2.9959	96.613*****	(B, A)
	2. General information broker service (B)	3.9533		
Evaluation on service providers	1. Quality of professionals (A)	4.1515	2.609*	(B, D) (B, E)
	2. Quality of information (B)	4.3223		
	3. Goodwill of providers (C)	4.1054		
	4. Quality of service (D)	4.0992		
	5. Completeness of database (E)	4.0994		

^a* $P < 0.05$; *** $P < 0.005$; ***** $P < 0.001$.

^bM.P.C. means multiple pairwise comparison. (A, B) indicates that factor A has significantly higher score than factor B at 0.05 significant level.

Table 6
Enterprises profiles vs. factors

Enterprises profile	Dimension Factor	Demand motives		Information of interest			Service of interest		Evaluation on service providers				
		Knowledge	Decision	Task environment	Demand–supply	Macro-economic envir.	Project-based service	Information broker	Quality of professionals	Quality of information	Goodwill	Quality of services	Database
Type of industry	<i>F</i> value	2.973	0.485	4.501	4.134	2.484	2.623	3.988	2.930	1.134	1.121	1.116	1.159
	<i>P</i> value ^a	**		****	****	*	*	***	**				
	M.P.C. ^b	(B,D) (C,D) (E,D) (F,D) (G,D)	–	(A,D) (B,D) (C,D) (E,D) (H,D)	(A,H) (C,H) (E,H) (F,H) (G,H)	(B,C)	(C,D) (E,D)	(A,D) (B,D) (C,D) (E,D) (G,D)	(A,D) (G,D)	–	–	–	–
Years	Corr. <i>P</i> value	0.045	–0.044	–0.069	–0.071	0.007	–0.006	–0.077	–0.188	–0.106	–0.008	0.265	0.018
Sales	<i>F</i> value	0.822	0.485	1.073	1.751	1.064	0.924	1.738	1.740	0.498	4.380	1.930	5.205
	<i>P</i> value										***		***
	M.P.C. ^c										(E,A) (D,A)		(B,E) (D,E)
Computerization	<i>F</i> value	1.407	2.349	4.521	1.004	3.802	3.405	0.954	1.233	0.453	0.939	2.536	0.365
	<i>P</i> value		+	*		*	*					+	
	M.P.C. ^d	–	–	(A,C)	–	(A,C)	(A,C)	–	–	–	–	–	–
Internet	<i>T</i> value	–0.76	1.03	1.92	–0.60	1.09	1.52	1.46	–0.54	1.82	1.36	0.30	–0.81
	<i>P</i> value			+						+			
	M.P.C. ^e	–	–	(A,B)	–	–	–	–	–	(A,B)	–	–	–

^a + $P < 0.1$; * $P < 0.05$; ** $P < 0.01$; **** $P < 0.001$.

^b “M.P.C.” means multiple pairwise comparison. The significant level for multiple pairwise comparison is 0.05. (A, B) indicates that factor A has significantly higher score than factor B at 0.05 significant level. The symbols for type of industries are as below: A — computers and peripherals; B — communications; C — photonics; D — mechanics; E — semiconductors; F — materials; G — chemical; H — biotech.

^c The symbols for 1996 sales (Unit: NT\$). A — below 10 million; B — 10 ~ 40 million; C — 40 ~ 100 million; D — 0.1 ~ 1 billion; E — more than 1 billion.

^d The symbols for levels of computerization are as below: A — fully computerized; B — mostly computerized; C — a little or not computerized.

^e A — firms with Internet access equipment; B — firms without Internet access equipment.

mechanical industry. Fully automated firms also have significantly higher score for task environment information than firms that are less automated or not automated at all. As for product supply–demand information, biotech industry has significantly lower score than computers and peripherals, photonics, semiconductors, materials, and chemical industries. For macro-economic environmental information, communications industry has significantly higher score than photonics industry. Fully computerized firms have significantly higher score than firms that are less computerized or not computerized at all. There is no significant difference among other factor scores.

4.3.3. *Service of interest*

For customized project-based service, the scores of photonics and semiconductors industries are significantly higher than mechanical industry. Fully computerized firms have significantly higher score than firms that are less computerized or not computerized at all. For general information broker services, computers and peripherals, communications, photonics, semiconductors, and chemical industries have significantly higher score than mechanical industry.

4.3.4. *Evaluation on service providers*

In terms of quality of professionals, the scores of computer and peripherals and chemical industries are significantly higher than mechanical industry. There is a significantly negative correlation between duration of firms and quality of analysts. This means that firms with fewer years of operation put much emphasis on quality of professionals. In terms of quality of information, firms with Internet access equipment have significantly higher score than firms without that sort of equipment. In terms of goodwill of service providers, firms with 1996 sales between NT\$0.1–1 billion and more than NT\$1 billion have significantly higher score than those firms with sales below NT\$10 million. This means that larger companies value the goodwill of service providers more. There is a significantly positive correlation between years of operation of firms and quality of service. This means that firms with longer history put more emphasis on quality of service. In terms of completeness of database, firms with 1996 sales between NT\$10–40 million and firms with 1996 sales between NT\$0.1–1 billion have significantly higher scores than firms with 1996 sales over NT\$1 billion. This means that smaller companies have more emphasis on the completeness of database since the databases in the large companies usually have already complete.

4.4. *Environmental constraints vs. factors*

The analysis results for this section are listed in Table 7. In terms of demand motives, knowledge motives are positively correlated to technological trends, social changes, and cross-strait economic/trading activities. Decision motives are positively correlated to all external environmental variables. In terms of information of interest, task environmental information is positively correlated to technological trends, social changes and market competition. Product supply–demand information is positively correlated to cross-strait activities and market competition. Macro-economic environmental information is positively correlated to government policies, social changes; it is also positively correlated to

Table 7
Environmental constraints vs. factors

Environmental constraints	Dimension	Demand motives		Information of interest			Service of interest		Evaluation of service providers				
	Factor	Knowledge	Decision	Task environment	Demand-supply	Macro-economic environment	Project-based service	Information Broker	Quality of Professionals	Quality of information	Goodwill	Quality of services	Database
Policy	Corr. <i>P</i> value	0.138	0.229 *	0.143	0.097	0.416 ****	0.408 ****	0.053	0.228 *	0.058	0.187 *	0.187 *	−0.002
Tech. trend	Corr. <i>P</i> value	0.319 ****	0.226 *	0.401 ****	0.154	0.177	0.338 ****	0.291 ***	0.110	0.345 **	0.266 **	−0.026	−0.009
Social environment	Corr. <i>P</i> value	0.264 ***	0.367 ****	0.221 *	0.111	0.464 ****	0.264 ***	0.202 *	0.245	0.120	0.240	0.262	0.146
Cross-strait activities	Corr. <i>P</i> value	0.316 ****	0.241 ***	0.005	0.27 ***	0.107	0.205 *	0.196 *	0.119	0.080	0.184 *	−0.071	0.211 *
Market competition	Corr. <i>P</i> value	0.056	0.344 ****	0.292 ***	0.232 *	0.115	0.250 **	0.385 ***	0.249 **	0.211 *	0.144	−0.085	−0.035
Dominance	Corr. <i>P</i> value	0.137	0.371 ****	0.120	0.061	0.343 ****	0.353 ****	0.124	−0.028	0.143	0.251 **	0.256 **	−0.045

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.005$; **** $P < 0.001$.

the dominance level of the firms. In terms of service of interest, customized project-based services are positively correlated to all external environmental variables. Information broker services are positively correlated to technological trends, social changes, and cross-strait activities and market competition. In terms of evaluation on service providers, quality of information is positively correlated to technological trends and market competition. Goodwill is positively correlated to government policies, technological trends, cross-strait activities; it is also positively correlated to the dominance level of firms. Quality of service is positively correlated to government policies; quality of service is also positively correlated to the dominance level of firms. The completeness of database is positively correlated to cross-strait activities.

5. Analysis and discussion

5.1. Analysis on awareness and demand motives

Currently, the major source of business information received by enterprises is newspapers and magazines as they are easily accessible and timely. Seminars and exhibitions follow newspapers and magazines. Enterprises also value their verbal exchanges of information, as most firms in Taiwan are small and medium businesses and interpersonal relationships are closely intertwined. Due to frequent contacts among leaders of enterprises, it is quite easy for them to acquire information verbally. Getting information from foreign consulting firms is not common. On the other hand, the sources of purchased information are periodicals, seminars and DMs. Therefore, we know that enterprises usually acquire information through seminars and exhibitions. If an information provider wants to offer service through publications, it is better to consider the timeliness and accessibility of such a channel.

Only 25.3% of the respondents in the questionnaire indicate that they are fully aware of the institutions offering information services in Taiwan. Most enterprises are only a bit aware. Therefore, information service providers need to further improve their functions and to promote their businesses.

After factor analysis is conducted, we found that there are two major motives for purchasing industrial information, i.e., accumulating knowledge and reference for decision-making. Based on the statistical analysis results, the factor score of the latter is significantly higher than the former. This means that the major purpose for purchasing industrial information is for the reference for decision-making. This also corresponds to what Lavin described about American industries.

There is no significant difference among the factor scores for different industries in the use of business information for decision-making. Thus, all industries are in much need of business information to facilitate their decision-making. Mechanical industry usually does not purchase external business information because of the need to accumulate knowledge.

From correlation analysis on the external environmental variables and motives variables, we found that when external environments exert more influence on enterprises, the demand by them for business information services grows stronger. Any

changes in external environment can trigger the motives of enterprises to use external information to assist the decision-making process. With the help of external information in decision-making, the uncertainty resulting from changing external environments can be effectively reduced. Also, the changes in technological trends, social environment, and cross-strait economic/trading activities between Taiwan and Mainland China bring about the demand of enterprises for accumulating knowledge.

5.2. *Analysis on interest*

5.2.1. *Business information of interest*

The information that enterprises are interested in includes information on task environment, product supply–demand, and macro-economic environment. Based on multiple pairwise comparison results, we know that enterprises as a whole are more interested in product supply–demand and task environment information than in macro-economic environmental information. Meanwhile, enterprises have a significantly higher interest in product supply–demand information than in task environmental information. This result reflects the fact that firms in Taiwan have been very sensitive to changes in product supply–demand and in raw material prices because of the shortage of raw materials/resources and market demand, limitations imposed by Taiwan's natural environment. In addition, task environment information is information that concerns the whole industry, which helps enterprises to grasp changes in their own industries and to understand future technological and industrial development trends. Therefore, task environment information attracts more interest from enterprises than macro-economic environmental information. Macro-economic environmental information is the kind of information that is needed for long term planning. Firms in Taiwan currently do not put much emphasis on it yet. This differs dramatically from what Daft et al. (1988) found about the small and medium businesses in the US. The businesses in the US put greater emphasis on economic environmental information, even more than technological environment information.

However, enterprises in different industry sectors do have different preferences for business information. Technology intensive industries such as computer and peripherals, communications, photonics, semiconductors, and biotech are more interested in task environmental information. This is because the firms in these industries confront very fast changes in their respective industries and are usually not dominant players. Constantly examining their industrial environments is pivotal to them. All industries except Biotech put much emphasis on product supply–demand information. The firms in the communications are more interested in macro-economic environmental information. As Taiwan government has been slow in opening communications industry, taking into consideration the government policies is central to their decision-making. In addition, firms with high degree of office automation are more interested in task environmental and macro-economic environmental information than less computerized firms are.

Different impacts that external environments have on enterprises result in their different interest level in various types of information. When the influence that government policies, social environment and market competition have on enterprises becomes stronger, the demand of enterprises for task environmental information is greater.

Enterprises have higher demand for product supply–demand information if cross-strait economic/trading activities and market competition exert greater influence on them. And for firms that are greatly influenced by government policies and social changes, their need for macro-economic environmental information is also greater. As for firms that play a dominant role in their industry, they put more emphasis on macro-economic environmental information that is indispensable to long term planning.

5.2.2. Service of interest

There are two types of services that enterprises are interested in: customized project-based service and general information broker service. Based on pairwise comparison, respondents show greater interest in general information broker service than in customized project-based service. The former can be accessed more easily and does command more demands. The latter, however, does not meet the requirements of most firms. Small and medium firms would not consider it due to cost concern or lack of actual need; large companies are usually equipped with their own in-house information specialists and thus do not eagerly require such services. Since there is very limited demand for customized project-based services, service providers have to spend more efforts in designing service contents.

The mechanical industry shows less interest in customized project-based service than photonics and semiconductors do. It also shows less interest in general information broker service than most other industries do. This suggests that the mechanical industry has almost no motive to seek business information from externals. Highly computerized firms have greater interest in customized project-based service as they usually can afford such services.

From the correlation analysis on external environments and services, there is a positive correlation between customized project-based services and all external environmental variables. Those firms that suffer from more impacts from external environments rely more on customized project-based services to reduce such impacts. When firms suffer from more impacts from technological trends, social environment, cross-strait economic/trading activities and market competition, they have higher demand for general information broker service.

5.3. Analysis on evaluation of information service providers

There are five factors in the evaluation of enterprises on information service providers. The five factors ranked in descending order are quality of information, quality of professionals, goodwill of providers, quality service, and completeness of database. The multiple pairwise comparison results show that the respondents put significantly more emphasis on information quality than on service quality and database completeness.

Computer and peripherals and chemical industries emphasize more on quality of professionals than mechanical industry does. Firms with longer history put less emphasis on quality of professionals, rather they emphasize more on service quality. Larger firms put more emphasis on goodwill of providers than on completeness of database as they usually have an in-house database.

From the evaluation items of enterprises on service providers, we can see what environmental impacts that firms are suffering from. When firms suffer from greater impacts from technological trends and market competition, they will put more emphasis on information quality. Firms that play dominant roles usually put more emphasis on the reputation of service providers. When firms suffer from greater impacts from government policies, technological trends and cross-strait economic/trading activities, they also have significantly greater emphasis on reputation of service providers. If firms are influenced by government policies, they will put significantly more emphasis on service quality. If firms are greatly influenced by cross-strait economic/trading activities, completeness of database will then receive significantly more emphasis — as the actual statistical data for Mainland China are not easy to obtain.

6. Recommendations

The fact that information or intelligence can be traded like commodity is a sign that the “information revolution” has now entered into a mature stage. From previous analysis, we know that firms that are now confronting transition or upgrading have a high demand for business information. However, assuming all currently available information meets the demand of enterprises, most firms (43.7%) are only “slightly” interested in such services. This indicates that most firms still hesitate to adopt such services and they would rather still wait and see for a longer while. As information service industry is a highly professional one, most people feel uncertain toward its quality. Also, firms in Taiwan have limited awareness of such services (only 25.3% are fully aware), we therefore propose the following marketing recommendations on how to promote such professional service:

6.1. Increase values of business information to enterprises

As enterprises put the most emphasis on information quality when they evaluate service providers, it is therefore important to improve the accuracy, depth, timeliness, completeness, and prospect of information. By doing so, the needs of enterprises for information can thus be satisfied, particularly the needs for decision-making.

If information does bring more benefits to enterprises, then it would be easier for service providers to promote such services and to develop markets.

For service providers that have target markets in high tech firms, information quality is peculiarly important. Generally speaking, photonics, communications, and computer and peripherals industries have greater demand for task environmental and product supply–demand information. As these industries have a highly dynamic nature, so the accuracy of information is very crucial to them. For service providers, the key to success in servicing these industries is to provide accurate/visionary information, complete/fast data networks and experienced analysts.

6.2. Establish certification system on service quality

There is so-called “perceived risk” in relation to professional service such as business information service. The risk mainly results from the difficulty in determining

the quality of service. From the evaluation of service providers, the second criterion that firms watch is quality of professionals. Therefore, it helps if a certification system of professional professionals is established. Not only will this improve clients' understanding of quality, but also reduce clients' perceived risk. Also, the certification system helps with the quality control of service.

6.3. Establish track record aggressively

According to Kolter, consumers of business information service tend to make their purchasing decisions on the basis of past track record of service providers. They tend not to believe in the advertisements posted by service providers. Track record, or reputation, therefore, becomes a very important competitive weapon. In addition, expert recommendations are also a good marketing method. Very few service providers in Taiwan have used this method. This method deserves some attention and may prove to be effective.

6.4. Increase clients' confidence

As most firms still have greater demand for product supply–demand information than for other information, it may be wise to start with providing information on product supply–demand first to build clients' confidence and dependence. Other high value added service such as customized project-based service can then be offered at a later date. The strategies to build clients' confidence include soliciting satisfied clients' testimony; providing endorsements by experts or opinion leaders; holding exhibitions for trial opportunities; improving two-way communications, lowering pricing, providing additional services, and emphasizing product benefits.

6.5. Understand needs of each industry, build a niche market

The change in industrial structure in Taiwan brings ample opportunities to business information service industry. However, it is very difficult to a service provider to provide full-scale services that satisfy all clients. Thus, it is necessary to understand the characteristics of each market, information level required, and service contents required before markets can be segmented. Service providers have to consider their own advantages and use them to enter a niche market.

6.6. Utilize information technology unto data processing; improve database and on-line index

Information technology not only changes data processing in a revolutionary way by simplifying and streamlining collection/processing/analysis/storage of data, it also provides a faster and more convenient service channel for service providers. From the respondents in the questionnaire for this research, we know that most firms are already highly computerized. 88.4% of the firms are equipped with network equipment. Information technology continues to advance, so service providers cannot ignore the use of IT in providing services.

Currently, there is very little use of foreign consulting firms (only 3.8% of the respondents), so there is still ample room to grow. Therefore, foreign consulting firms that have years of experience and database can utilize information technology to access domestic markets. In addition, they can also use information technology to build a contact channel with domestic potential clients and obtain valuable first-hand data on the firms.

6.7. Provide services that respond to environmental changes

When greater impacts from external environmental changes fall on enterprises, enterprises have higher interest in soliciting information services. What is special is when firms play a dominant role in their industries, they have much more interest in customized project-based service than in general information broker service. The former has higher value added, while the latter is more common and commands a much bigger market. Therefore, it is recommended to adopt the 80–20 law in marketing tip. Eighty percent of business concentrates on providing general information broker services through low pricing penetration and large volume sales, which hopefully will generate enough profits to sustain provider's daily operation. The rest of the 20% of business then centers on customized project-based services, which command higher premium pricing and gain much higher profits.

6.8. Build up clients' habits in using such services

Business information industry suffers not only from problems in perceived risks and quality instability, but also faces a major problem that all emerging industries will bump into — clients not yet used to using such services. At this stage, we can adopt marketing strategies such as innovation group and early adoption group. The marketing purpose for the former is to induce actual buying behavior and to increase awareness level of consumers. The action plans include developing products that meet consumers' expectations and launching aggressive promotion campaigns. The marketing purpose for the early adoption group strategy is to increase recognition level of consumers by educating consumers through sales force visits and professional seminars.

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