FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP

VENDOR EVALUATION AND SELECTION

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DECLARATION

"I declare that this project paper entitle "Vendor Selection and evaluation" is the result of my own research expect as cited in the references. The project paper has not been accepted for any degree and is not concurrently submitted in candidature of any other degree"

SIGNATURE : 

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DATE : 30/12/2011

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ABSTRACY

This work presents an evaluation of supplier selection processes in corporate environments using a multiple exploratory case study in one of the foundry in Malaysia and the approach in ISO 9000 standards. The corporate environments examined were a iron casting foundry or organization. This research indicates that the supplier performance measurement criteria most commonly used by these industries are environmental, quality, delivery and information. Also, depending on the corporate environment of the foundry, the importance of these performance metrics can be varying. In general, quality is important criterion in the organizations studied. But information and communication is a critical supplier's performance measure in the foundry, since the reliability of the suppliers is affected in case of information system failure in these industries. Finally, these organizations continuously review and implement effective quality systems following the rigorous ISO 9000 series of standards and most companies have developed in- house procedures for the supplier selection process.

ABSTRAK

Kertas kerja ini membentangkan penilaian terhadap proses pemilihan pembekal dalam persekitaran korporat dengan menggunakan kes kajian penerokaan dalam salah satu faundri di Malaysia dan juga mengkaji pendekatan dalam piawaian ISO 9000. Persekitaran korporat yang dikaji adalah organisasi atau faundri untuk besi. Kajian ini menunjukkan bahawa kriteria pengukuran prestasi untuk pembekal yang sering digunakan oleh industri-industri ini adalah faktor alam sekitar, kualiti, penghantaran dan informasi. Namun demikian, ia juga bergantung kepada persekitaran korporat faundri, kerana Metrik performa adalah berbeza-beza untuk setiap faundri. Secara umumnya, kualiti adalah kriteria yang penting dalam organisasi yang dikaji. Tetapi informasi dan komunikasi merupakan pengukur prestasi pembekal yang kritikal dalam industry faundri, yang akan memberi kesan terhadap kebolehpercayaan daripada pembekal yang terlibat sekiranya terdapat kegagalan dalam sistem informasi dalam industri-industri ini. Akhir sekali, organisasi ini akan sentiasa mengkaji semula dan melaksanakan sistem kualiti yang berkesan berikutan siri ISO yang ketat 9000 standard dan kebanyakan syarikat telah membangunkan in-house prosedur untuk proses pemilihan pembekal.

CHAPTER 1: INTRODUCTION

1.1 RESEARCH BACKGROUND

The vendor selection process has undergone significant changes during the past twenty years. Strategic management decisions impact all areas of a firm. Once such decisions have been made, the criteria for making subsequent operational decisions must be re-examined. One major aspect of the purchasing function is vendor selection, the acquisition of required material, services and equipment for all types of business enterprises. By its very nature the purchasing function is a basic part of business management. In today's competitive operating environment it is practically impossible to successfully-produce low cost, high quality products without satisfactory vendors.

Supplier selection and evaluation have become one of the major topics in production and operations management literature, especially in advanced manufacturing technologies and environment. The main objective of supplier selection process is to reduce purchase risk, maximize overall value to the purchaser, and develop closeness and long-term relationships between buyers and suppliers, which is effective in helping the company to achieve "Just-In-Time" (JIT) production. Choosing the right method for supplier selection effectively leads to a reduction in purchase risk and increases the number of JIT suppliers and Total Quality Management (TQM) production (Farzad Tahriri, et. al., 2008), (Ozden Bayazit & Birsen Karpak, 2005).

In this paper, the focuses are more on the iron or steel industry, or to be more specific are the foundry. Steel industry had been constantly increasing from time to time

due to increase of demand in automation and construction. Many foundries had developed in Malaysia as well may foreign investor had come to develop their foundry here. The competition and demand for the material are increasing tremendously.

> *"The advantages of short delivery time, lower warehousing cost, sale in smaller batches, readily available credit terms compared with the need for LC for payment of imported goods allow local steel manufacturers to retain a large portion of their domestic customers in many cases up to 70%".*

The above statement were taken from a news topic "Steel – a hot issue" reported in the "The Star news online" by Hanim Adnan on 23 July 2011. Topic was discussed regarding the demand of iron or steel in the market are increasing as per time and competition in the steel industries are getting stronger. The statement also means that the important to consider every service provided to be the key to sustain in this type of business or industry within Malaysia.

Therefore purchasing decisions is mainly selection and maintenance of a competent group of suppliers. The selection of competent suppliers has long been regarded as one of the most important functions to be performed by a purchasing department. Supplier selection problem has become one of the most important issues for establishing an effective supply chain system. The supplier selection problem in a supply chain system is a group decision according to multiple criteria from which a number of criteria have been considered for supplier selection in previous and present decision models (Ozden Bayazit & Birsen Karpak, 2005). The analysis of criteria for selection

and measuring the performance of vendors has been the focus of many academicians and purchasing practitioners (Farzad Tahriri, et al., 2008).

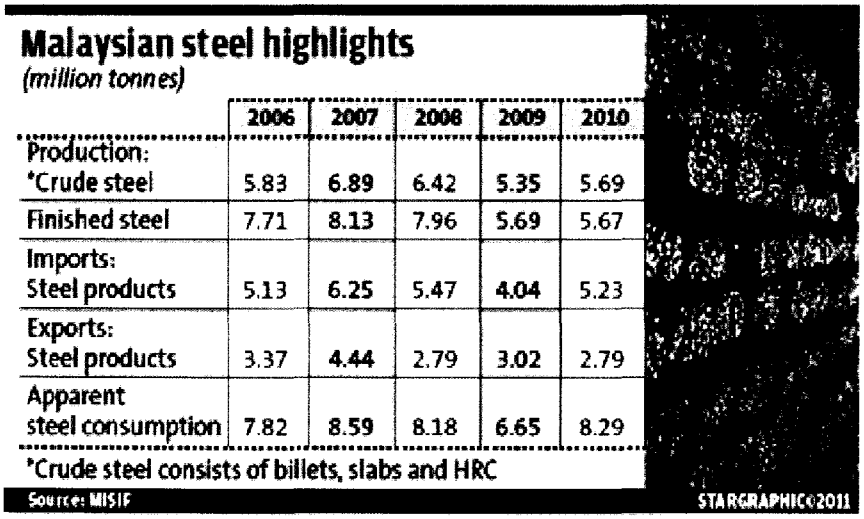
1.1.1 Research Industry Background

For the purpose of understanding this study, here is a brief explanation of the basic or major purchased material for the foundry. The iron or steel industry in Malaysia can be categorically subdivided into two main segments, namely the long products and the flat products. Long products include billets, bars, wire rods, sections, nails, wire mesh, bolts, nuts, etc. which are for the most part used in the construction industry. On the other hand, flat products are products consumed generally by the manufacturing, construction and oil & gas sectors like hot-rolled plates and sheets, cold-rolled coils, tubes, pipes, boiler and pressure vessels, etc. The table below showed the structure of the steel industry in Malaysia up till 2002 (http://www.icapitaleducation.biz/index.php).

Category	Type of products	Number of establishments	Rated capacity ('000 MT)
Primary Products	Direct Reduced Iron (DRI)	1	1,200
	Hot Briquette Iron (HBI)	1	720
	Billets	6	4,400
	Blooms	1	750
	Slabs	1	2,500
Rolling/Finished	Rolled Products (bars, wire-rods)	51	7,180
Products	Light Sections	5	200
	Medium to Heavy Sections	1	700
	Hot-Rolled Coils	1	2,000
	Cold-Rolled Coils	2	680
	Plates	1	200
Secondary Product	Wire Mesh	40	500
- Longs	Galvanised Wire	6	250
	Hard Drawn Wire	40	120
	Bolts and Nuts	15	150
	Nails	14	84
	Welding Electrodes	10	40
	High Carbon	4	154
	Shafting Bars	7	60
	Others	6	120
Secondary Product	Steel and Cement-lined Pipes	31	2,300
- Flats	Pipe Fittings	4	N.A.
	Tinplates	1	250

Table 1: Structure of the steel industry in Malaysia (http://www.icapitaleducation.biz/index.php).

Consumption of iron or steel in Malaysia grew rapidly from the late-1980s to mid-1990s, fuelled by strong growth in both the construction and manufacturing sectors and driven by public and private sector infrastructure projects. However, steel consumption peaked in 1997 at 8.3 million metric tones (MT) as the economic crisis of 1997-98 cause to be the growth of steel consumption to a practically decline. Recovering from the industry's worst downturn, aggregate steel consumption (ASC) return to normal from its depths in 1998 of 4.6 million MT to register 7.0 million MT in 2002 (http://www.icapitaleducation.biz/index.php). As in The Star Online news show the continues growing of demand from year of 2006 till 2010 show in the table below.



Malaysian steel highlights
(million tonnes)

	2006	2007	2008	2009	2010
Production: *Crude steel	5.83	6.89	6.42	5.35	5.69
Finished steel	7.71	8.13	7.96	5.69	5.67
Imports: Steel products	5.13	6.25	5.47	4.04	5.23
Exports: Steel products	3.37	4.44	2.79	3.02	2.79
Apparent steel consumption	7.82	8.59	8.18	6.65	8.29

*Crude steel consists of billets, slabs and HRC

Source: MISIF

STARGRAPHIC©2011

Taken from http://biz.thestar.com.my/news/story.asp

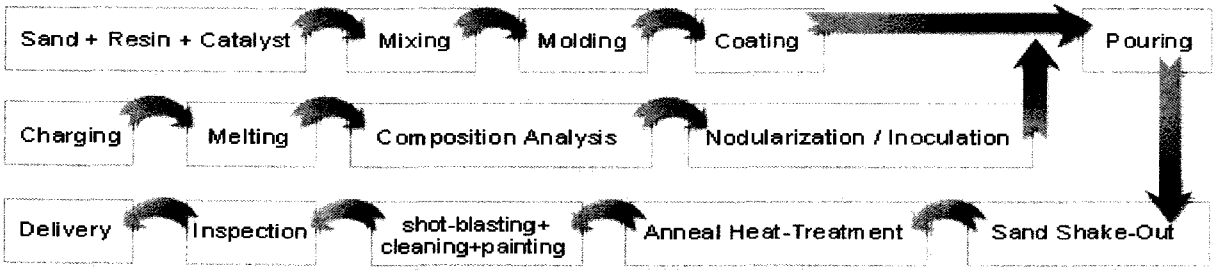
1.1.2 Industries Materials

Steel is an alloy of iron usually containing less than 1% carbon. It is used most frequently in the automotive and construction industries. Steel can be cast into bars, strips, sheets, nails, spikes, wire, rods or pipes as needed by the intended user. The process of steelmaking has undergone many changes in the 20th century based on the political, social and technological atmosphere. In the 1950s and 1960s, demand for high quality steel encouraged the steelmaking industry to produce large quantities (Chatterjee, 1995).

Cast iron is derived from pig iron, and while it usually refers to gray iron, it also identifies a large group of ferrous alloys which solidify with a eutectic. Cast iron is made by re-melting pig iron, often along with substantial quantities of scrap iron and scrap steel and taking various steps to remove undesirable contaminants such as phosphorus and sulphur. Carbon (C) and silicon (Si) are the main alloying elements, with the amount ranging from 2.1 to 4 wt% and 1 to 3 wt%, respectively. Iron alloys with less carbon content are known as steel. Cast iron tends to be brittle, except for malleable cast irons. With its relatively low melting point, good fluidity, castability, excellent mach inability, resistance to deformation and wear resistance, cast irons have become an engineering material with a wide range of applications and are used in pipes, machines and automotive industry parts, such as cylinder heads (declining usage), cylinder blocks and gearbox cases (declining usage). (http://en.wikipedia.org/wiki/Cast_iron)

1.1.3 Foundry Processes

A **foundry** is a factory that produces metal castings. Metals are cast into shapes by melting them into a liquid, pouring the metal in a mold, and removing the mold material or casting after the metal has solidified as it cools. The flow chart will show the rough idea how are the flow of process in the foundry in producing an iron and steel casting. The sand, resin and catalyst is an indirect material that use to make mold of the casting shape for the melted iron to be pour into the shape as the mold. When the melted iron pour in to the mold, after cool down it will harden and form the casting as the shape we desire. After that the casting will go through a few more process before packing and sent to customer. As we can see from this process flow the raw material whether the direct or indirect sand for developing of mold, is a very basic material and does not need very high technology to prepare. Most foundries will have the same process flow, the only different are the technology of the machine.



Flow chart: Iron or steel casting process flow.

Casting involves pouring liquid metal into a mold, which contains a hollow cavity of the desired shape, and then allowing it to cool and solidify. The solidified part is also known as a casting, which is ejected or broken out of the mold to complete the process. The casting process is subdivided into two main categories: expendable and non-expendable casting. The final step in the process usually involves grinding, sanding, or machining the component in order to achieve the desired dimensional accuracies, physical shape and surface finish.

Removing the remaining gate material, called a gate stub, is usually done using a grinder or sanding. These processes are used because their material removal rates are slow enough to control the amount of material. These steps are done prior to any final machining.

1.2 PROBLEM STATEMENT

This study was made on one of the Manufacturing of Iron Casting Foundry in Malaysia, which had been certified under ISO 9001:2008, which had practice the vendor or supply audit since 1996 to assist the top management to do the decision making. In the ISO 9001:2008 had emphasized in the clause 7.4.1 Purchasing Process is a mandatory for the company to comply. As what people always say "garbage in, garbage out". However, in ISO 9000, there is no actual specification on how to control the selection of vendor, and it is totally depend on the individual company on the method of control. In the ISO 9001:2008 standard guideline do mention that,

"The organization shall evaluate and select suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection, evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained", (Taken from the Malaysia Standard of ISO 9001:2008 Quality Management systems).

Vendors for the foundry can be divided into 2 categories, which is the direct material and indirect material. The direct materials are referring to the raw material and the main material for the production. The indirect materials are including the maintenances and other materials are not directly contact with the product. For this study, are focusing on the vendors who supply direct material to the production of the firm. The list of vendors are mainly from recommendation from the head quarter in Japan, recommendation from sister Plant Company, requirement from the local government and others. The selections are mainly base on the costing, delivering, quality and also the environment aspect either within the firm or toward the external environment as shown in the figure 1.

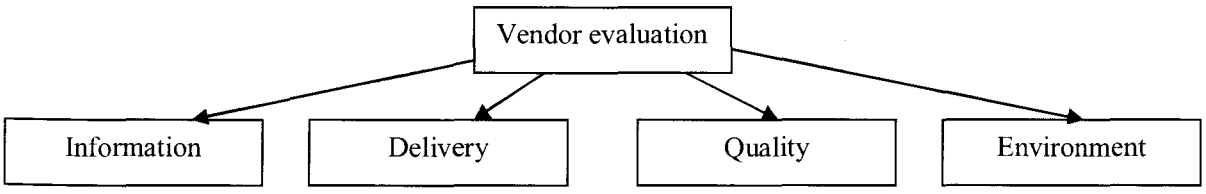


Figure 1: Foundry's Vendor evaluation

In order to stay compliant with the new ISO 9001:2000, has to be performed some sort of data analysis on suppliers. The standard gives no suggestions with respect to what to monitor or measure since it is not prescriptive.

On the draft ISO 9004, it can lead to doing analysis of problems, improvements, and supplier contributions and so on with little effort on our part to dig out what we could include in the measurement system for supplier performance. It does not yet suggest any measures of total supplier performance or supplier rating systems.

1.3 RESEARCH OBJECTIVE

The objective of this research is to perform a comparative evaluation of supplier selection processes of Foundry's evaluation of their supplier selection processes using the ISO 9001:2008 standards again Analytical Hierarchical Process (AHP) of selecting vendors. Therefore the overall objective from this study will be:

- Identify the effectiveness of supplier selection processes used by the companies.
- Evaluate the identified key performance measures.
- Recognize in which criteria the company focuses.
- Identify the company's purchasing policy.
- Compare the companies' supplier selection processes vs. ISO9001:2008.
- Examine the continuous improvement efforts in these companies.

1.4 OUTCOME

In general, this research intends to provide empirical evidence of the criteria and the procedures for the supplier selection process used in different corporate environments. Also, it plans to evaluate if these processes fulfill the regulations as the ISO 9000 standards requirement. Finally, identify the suitability of the Analytical Hierarchical Process (AHP) to assist in decision making to resolve the supplier selection problem. The overall outcome of the study will be:-

- **Evaluating Needs and Defining Objectives**

  OUTCOME: list of requirements, objective and criterias to evaluate the vendors and the way to score different criterias

- **Gathering a Limited Pool of Vendors**

  OUTCOME: vendors pool

- **Interviewing with Vendors**

  OUTCOME: criteria-score list for each vendor

- **Selecting and Applying the Method**

  Select one among various methods:-

  (AHP, Analytic Hierarchy Process**)** Calculate overall vendor score using selected method Select the vendor with best score

1.5 SCOPE

The scope of this project is to study and evaluate the effectiveness of vendor selection process in one of the foundry in Malaysia of selection vendors applied. Also, the focal point process in this research is the selection and evaluation of vendors who provide or supply the direct material to the company.

CHAPTER 2: LITERATURE REVIEW

2.1 SUPPLIER OR VENDOR SELECTION

Supply Chain Management is a set of approaches utilized to efficiently integrate suppliers, manufactures, warehouses and stores, so that products is produced and distributed at the right time, right location, and to minimize the system extensive costs fulfilling the customer requirements (Alper Murat, 2001). A supply chain is a network of departments, which is involved in the manufacturing of a product from the procurement of raw materials to the distribution of the final products to the customer (C. Elanchezhian, et. al., (2010). The most important processes in organizations today is the evaluation, selection, and continuous improvement of suppliers, therefore selecting the right supplier had becoming the main process in the supply chain management. Many issues in the supply chain are influenced by the proper selection of Vendors. In other words, the selection of vendor will directly reflect the overall performance of the organization (Hadi Shirouyehzad, et al., 2011). In the process of vendor selection, the most important issue is to determine a suitable decision making method and select the right vendor. Basically the vendor selection problem is a multi-criteria decision making problem under an uncertain environment (Chakraborty T., et. al., 2011) (Farzad Tahriri, et al., 2008) (Arpan Kumar Kar, 2009).

Supplier selection methods are a models or approaches used to conduct the selection process. The methods chosen are extremely important to the overall selection process and can have a significant influence on the selection results. For the current

method used by the selected foundry for vendor selection are similar to linear weighting models in which suppliers are rated on several criteria and in which these ratings are combined into a single score such as the categorical model. This method is simple and it is the quickest, easiest, and least costly to implement. However the effectiveness of this method is doubtful, because it may be influenced by recent events and usually involves a high level of bias and therefore it is inaccurate.

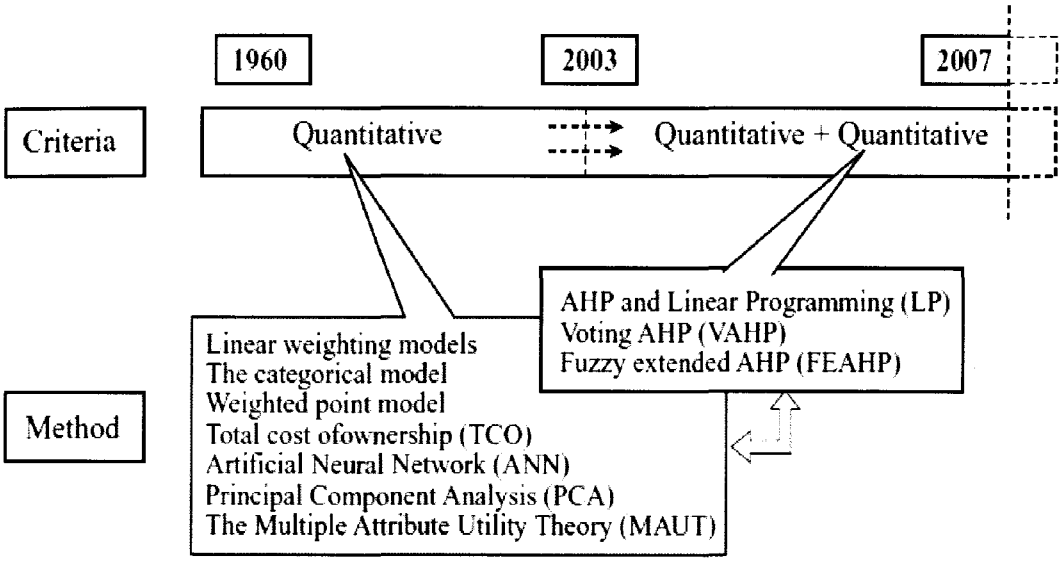


Figure 2: Classification of supplier selection criteria and methods since 1960

There has been an evolution in the role and structure of the purchasing function through the nineties. The purchasing function has gained great importance in the supply chain management due to factors such as globalization, increased value added in supply, and accelerated technological change. Purchasing involves buying the raw materials, supplies, and components for the organization. The activities associated with it include selecting and qualifying suppliers, rating supplier performance, negotiating contracts, comparing price, quality and service, sourcing goods and service, timing purchases, selling terms of sale, evaluating the value received, predicting price, service, and

sometimes demand changes, specifying the form in which goods are to be received and many more (Chin-Nung Liao, 2010) (Charles A., et. al., 1991). A key and perhaps the most important process of the purchasing function is the efficient selection of suppliers, because it brings significant savings for the organization. The objective of the supplier selection process is to reduce risk and maximize the total value for the buyer, and it involves considering a series of strategic variables. Among these variables is the time frame of the relationship with suppliers, the choice between domestic and international suppliers, and the number of suppliers, that is, choosing between single or multiple sourcing and the type of product.

Experts agree that no best way exists to evaluate and select suppliers, and thus organizations use a variety of approaches. There are many combination and modification to the selection method as well to suit to the condition toward vendor selection but the overall objective of the supplier evaluation process is to reduce risk and maximize overall value to the purchaser (Sharon Ordoobadi). Therefore organization must select suppliers that can do business with over required period of time (Giuseppe Bruno, et. al.). The table below shows the number of research and study done on the AHP and other type of vendor selection methods.

Year	2003	2004	2005	2006	2007	2008	Total
Papers using AHP	6	1	3	9	13	19	51
Total number	21	13	18	37	47	65	201
% of papers using AHP	28.6%	7.7%	16.7%	24.3%	27.6%	29.9%	25.4%

Table 1: Historical series of papers using AHP and its variants about the SSP (Giuseppe Bruno, et. al.).

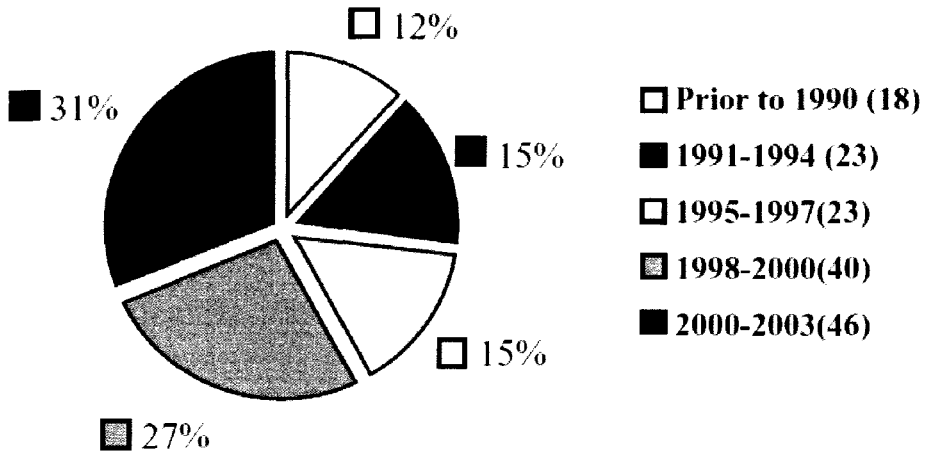


Chart 1: **Distribution of review papers on the use of AHP method over the years** (Farzad Tahriri, 2008).

The above chart had show the distribution of review on the use of AHP method over the year. The use of AHP is increasing with time since a lot of journals are bringing out special issues, on this topic (Farzad Tahriri, 2008).

Supplier evaluations often follow a rigorous, structured approach through the use of a survey. An effective supplier survey should have certain characteristics such as comprehensiveness, objectiveness, reliability, flexibility and finally, has to be mathematically straightforward. (Chin-Nung Liao, 2010) To ensure that a supplier survey has these characteristics is recommended a step-by-step process when creating this tool.

2.2 SUPPLIER SELECTION WITH AHP METHOD

The **Analytic Hierarchy Process (AHP)** is a structured technique for helping people deal with complex decisions. Rather than prescribing a "correct" decision, the AHP helps people to determine one. Based on mathematics and human psychology, it was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The AHP provides a comprehensive and rational framework for structuring a problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. (http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process).

The analytic hierarchy process (AHP) has found widespread application in decision Making Problems, involving multiple criteria in systems of many levels. This method has the ability to structure complex, multi-person, multi-attribute, and multi-period problem hierarchically (Maggie C.Y. Tama & V.M. Rao Tummala, 2001). The AHP can be very useful in involving several decision-makers with different conflicting objectives to arrive at a consensus decision. The AHP method is identified to assist in decision making to resolve the supplier selection problem in choosing the optimal supplier combination. Considering the existing problems in the company initiating from incorrect supplier selection, owing to the human mistakes in judging the raw materials, or paying too much attention to one factor only, such as price, cost and other similar and unexpected problems, the AHP model is highly recommended to handle the supplier

selection more accurately in order to alleviate, or better yet, eradicate the mistakes in this line (C. Elanchezhian, et. al., (2010), (Chin-Nung Liao, 2010).

Users of the AHP first decompose their decision problem into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. In making the comparisons, the decision makers can use concrete data about the elements, or they can use their judgments about the elements' relative meaning and importance. It is the essence of the AHP that human judgments, and not just the underlying information, can be used in performing the evaluations (http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process).

Analytic Hierarchy Process (AHP), since its invention, has been a tool at the hands of decision makers and researchers, and it is one of the most widely used multiple criteria decision-making tools. Many outstanding works have been published based on AHP. They include applications of AHP in different fields such as planning, selecting best alternative, resource allocations, resolving conflict, optimization, etc., as well as numerical extensions of AHP. (Chin-Nung Liao, 2010).

The AHP converts these evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way. In the final step of the process, numerical priorities are derived for each of the decision alternatives.

Since these numbers represent the alternatives' relative ability to achieve the decision goal, they allow a straightforward consideration of the various courses of action (http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process).

Tam and Tummala (2001) have used AHP in vendor selection of a telecommunication system, which is a complex, multi-person, multi-criteria decision problem. The authors have found AHP to be very useful in involving several decision makers with different conflicting objectives to arrive at a consensus decision. The decision process, as a result, is systematic and reduces time to select the vendor.

There was study done by researcher name Dickson related about categorizing the criteria for vendor selection. The Dickson study was based on a questioner sent to 273 purchasing agents and managers selected from the membership list of the National Association of Purchasing Managers. Table 2 summarizes the findings of Dickson's study regarding the importance of the 23 criteria for vendor selection. The study in order to provide a comprehensive view of the criteria that academicians and purchasing practitioners feel are important in the vendor selection decision (Charles A., et. al., 1991).

To summarize, the categorical model is a simple method, is also the quickest, easiest, and less costly to implement, but may be influenced by recent events, usually implies a high level of subjectivity and is imprecise. The weighted point model is also easy to implement, flexible, and rather efficient in the optimization of supplier selection

decisions, is more costly than the categorical, but tends to be more objective, even though it relies on the buyer's assessment of the supplier performance.

Rank	Factor	Mean rating	Evaluation
1	Quality	3.508	Extreme importance
2	Delivery	3.417	
3	Performance history	2.998	
4	Warranties and claim policies	2.849	
5	Production facilities and capacity	2.775	Considerable importance
6	Price	2.758	
7	Technical capability	2.545	
8	Financial position	2.514	
9	Procedural compliance	2.488	
10	Communication system	2.426	
11	Reputation and position in industry	2.412	
12	Desire for business	2.256	
13	Management and organization	2.216	
14	Operating controls	2.211	Average importance
15	Repair service	2.187	
16	Attitude	2.120	
17	Impression	2.054	
18	Packaging ability	2.009	
19	Labor relations record	2.003	
20	Geographical location	1.872	
21	Amount of past business	1.597	
22	Training aids	1.537	
23	Reciprocal arrangements	0.610	Slight importance

Table 2 summarizes the findings of Dickson's study (Charles A., et. al., 1991).

2.3 ISO 9001:2008

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies, which prepares international standards to facilitate trade. The ISO 9000 standards provide a tool that can be used in supplier-customer contracts since many of the clauses focus on this relationship. ISO registration helps suppliers demonstrate their capabilities to meet quality requirements. In addition to specifying product and service requirements, a customer (e.g. buyer) can also require that a supplier has a quality management system that meets the requirements of one of the ISO 9001 standards.

It is in the best interest of the suppliers to pursue ISO 9000 certification, particularly if buyers value the certification. Buying firms can also benefit from ISO 9000 registration since few buying firms have the size or resources to develop and conduct comprehensive supplier certification audits. ISO 9000 provides insight into a supplier's quality system conformance that a buyer may otherwise lack.
The latest version of these standards is the ISO 9001:2000 which have modifications in the Purchasing section as presented in the following clauses.

Purchasing:

1. **Purchasing control:**

The organization shall ensure that purchased product conforms to specified requirements. The type and extent of control applied to the supplier and the product shall

be dependent upon the impact of the purchased product on subsequent product realization or the final product.

The organization shall evaluate and select suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection, evaluation and re-evaluation shall be established. The results of evaluations and subsequent follow-up actions shall be recorded.

2. **Purchasing information:**

Purchasing information shall describe the product to be purchased, including where appropriate:

a. requirements for approval of product, procedures, processes, facilities and equipment

b. requirements for qualification of personnel

c. quality management system requirements.

The organization shall ensure the adequacy of specified requirements prior to their communication to the supplier.

3. Verification of purchased product:

The organization shall establish and implement the inspection or other activities necessary for ensuring that purchased product meets specified requirements. Where the organization or its customer intends to perform verification activities at the supplier's premises, the organization shall specify the required verification arrangements and method of product release in the purchasing information.

In the purchasing section, there are several added requirements:

a. Need to establish criteria for selection of our supplier's

b. Need to have records of evaluations against the selection criteria

c. Need to describe the approval requirements for product, procedures, process, facilities and equipment, along with qualification of suppliers' personnel

If it is decided that any of these requirements are appropriate, or that we have had requirements imposed on our company from the customers or standards under which we work, we need to establish clear methods of control.

For "criteria", we can range from price and availability to pre-qualification by customer to full qualifications as suggested in (c) above.

"Records" will depend on the qualification methods. They can range from simple listings showing price comparisons done annually to full history files of control plans,

process analysis, materials analysis, and statistical studies to copies of operator and inspector qualifications.

It suggests that the evaluation criteria may extend to include a wide range from relevant experience with your type of product or service to logistics as follows:

These processes may include:

- Evaluation of relevant experience,
- Review of product quality, price, delivery performance and response to problems,
- Audits of supplier management systems and evaluation of their potential capability to provide the required products efficiently and within schedule,
- Checking references for customer satisfaction,
- Financial assessment to assure the viability of the supplier throughout the intended period of supply,
- Service and support capability,
- Logistic capability including locations and resources."

In addition the new standard states in a separate section an added supplier management criterion.

4. **Analysis of data:**

The organization shall determine, collect and analyze appropriate data to determine the effectiveness of the quality management system and to evaluate where improvements of the quality management system can be made. This shall include data generated by monitoring and measuring and other relevant sources.

The analysis of data shall provide information relating to:

a) Customer satisfaction;

b) Conformance to product requirements;

c) Characteristics and trends of processes and products including opportunities for preventive action; and

d) Suppliers.

In order to stay compliant with the new ISO 9001:2000, has to be performed some sort of data analysis on suppliers. The standard gives no suggestions with respect to what to monitor or measure since it is not prescriptive.

On the draft ISO 9004, it can lead to doing analysis of problems, improvements, and supplier contributions and so on with little effort on our part to dig out what we could include in the measurement system for supplier performance. It does not yet suggest any measures of total supplier performance or supplier rating systems.