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# Supplier selection: key literature review, practical issues and some empirical findings from Malaysia

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*Abstract:* -Supplier selection can be considered as the foundation of supply chain management. The decisions made at this stage regarding the appropriate suppliers will inherently affect the other aspects of the business. In this paper, we will showcase some of the relevant issues highlighted by conducting pilot interviews in Malaysia, targeting companies in the steel and rubber industries, two of the largest manufacturing areas of the country. The main areas include: the current state of the use of information technology and business intelligence tools; the use of artificial intelligence tools or technologies in decision support; and practical supplier selection criteria and processes. Many research articles have addressed relevant issues by providing solutions to the existing problems, some of which are information technology tools, frameworks, and the use of social media. However the understanding of supplier selection criteria and the use of advanced tools are still under the spotlight. This paper will discuss the key literature about supplier selection issues, and our findings of pilot interviews in the steel and rubber industries in Malaysia.

*Keywords:* -supply chain; supplier selection; information technology; business intelligence; Malaysia

## 1 Introduction

Supplier selection can be viewed as one of the most important aspects of supply chain management. It can be considered as one of the areas that is most taken for granted (Harwood, 2009). Nevertheless, selecting the right suppliers to fit business needs the benefits will have a positive impact on the supply chain. Most companies, when looking at their supply chain, are able to identify what are their needs, but in most cases their decisions are not based on long term objectives.

Recent studies have suggested that business must be aware of the pertinent criteria to enable the most effective and efficient supply chain (Guner, and Kuzu, 2009; Kahraman, et al., 2003).

A pilot study was conducted in Malaysia in May of 2013 targeting the following areas; the presence of information technology tools, presence of business intelligence tools, supplier selection processes, supplier monitoring, supplier selection criteria, who are the decision makers, and the current issues that are encountered when selecting their suppliers.

The steel and rubber industries were chosen for our studies due to their nature of being highly competitive

and also because an effective and efficient supply chain is very important to productivity, financial growth, and customer retention [9].

Pilot interviews were undertaken by the first-named author with twelve different small to medium companies in Malaysia in May of 2013.

In the following sections of this paper, we will cover a key literature review, and report the empirical findings.

## 2 Literature Review

The current literature have placed great emphasis on the importance of supplier selection, in accordance with the overall needs of the organisation and their the short and long term objectives of the organisation [14]. Vonderembse and Tracy [14] note that many of the issues are consequential to lack of structure and inconsistencies in the selection criteria. These factors have affected the effectiveness and efficiency of existing frameworks, designed to maximise the productivity of the supply chain.

De Boer, et al. [4, 5] state that initial purchasing decisions are usually unstructured and complex. The review of the existing frameworks has employed the outranking method by using different multi

dimensional criteria's and categorized by using cost ratio, linear weighting, mathematical programming, Multi attribute Utility, Data Envelopment and decision Trees[1, 2]

Decision-making can be a challenging task and, decisions that are made under the realm of uncertainty can have a large impact on an organisation. A solution to this issue can be the support of ICT tools and technologies, which will enable organisations to make informed decisions. Kauffman et al. [12] argue that, the lack of ICT systems along with the human decision making process results in ineffective decision making due to high levels of uncertainty.

Many studies have attempted to address these problems, by developing frameworks, presenting solutions of streamlined and structured approaches to be applied to the supplier selection process. Researchers have tackled issues in the supplier selection area and applied their own area of expertise, some of these include, addressing the price to quality issue, being a large concern for suppliers, this is a symptom of uninformed decision making [10]. Studies have looked at the situation of information technology under various lights, and the benefits have outweighed the disadvantages. Many institutions are suffering from an overload in information, and the information that is stored, is stored in an unstructured way [6].

Artificial intelligence has also offered solutions to supplier selection, applying the fuzzy logic approach. Carter and Easton [3] states that the fuzzy logic approach extracts the supplier selection criteria from existing literature reviews, but the resulting solutions are proved to be incomplete due to unstructured decision making by the management.

The literature has highlighted various issues in supplier selection, and many research projects and studies have tried to create and implement solutions. However, many of these solutions are predicated on only on the known factors, which in many cases, is the criteria of the suppliers. One of the gaps in the literature is the combination of different information tools and technologies to cater to the tangible and intangible factors. Ghodsypour and O'Brien [7], supports that supplier selection is a multi- criteria problem which includes tangible and intangible factors, that includes, natural disasters, and economic financial crisis.

### 3 Empirical Findings

In alignment with the existing literature a series of

questions were created to reflect the issues and problems of supplier selection. The over all aim was to investigate the presences of ICT, the current problems, the supplier selection criteria, who were the decision makers, and the processes that are involved when selecting suppliers.

Managers of twelve companies in the steel and rubber industries addressing a small niche of suppliers were interviewed. The interviews were conducted Malaysia in May 2013 over a two week period. The key findings are reported below.

#### *Key Criteria*

Most of the twelve organisations identified their common key criterion as quality, cost, technical support, delivery time, whilst two other organisations identified, technical support and ISO registration.

When asked: "What are the key criteria that you consider when selecting suppliers"? One procurement manager answered: "Firstly, it depends on pricing and quality. Also we would need to ensure that the supplier is a part of the ISO requirement quality management system 9001."

A general manager of a steel company responded: "As my area is a niche market, the two most important criteria for me would be price and quality".

Another response from an export manager stated:, "The cost of the product is one of the factors that is considered, actually it is our first. Secondly, as this is a rubber company, we look at environmental issues, we are very concerned with the environment, in Malaysia, the OEM market is trying to do something new with is environmentally friendly. So we are trying to push all our suppliers to try to be OEM registered, this is one of our key criteria".

A sales manager of a rubber company spoke about intangible factors, and its adverse effect on cost and availability of a product.

"Price, quality, sales and service, environmental awareness, these are the factors that we take into consideration when we are approached by suppliers. But I must mention, we are in a part of the world that is faced with natural disasters. The tsunami in Japan affected the prices, as the material was in shortage. Companies in the rubber industry looked for other means of suppliers. We must always take natural disasters into account, whether to buy or not to buy."

#### *ICT presence*

Most of the companies interviewed were not supported by any ICT in their decision making process, some companies were completely manual, whilst some used some support in some aspects.

Question: “What ICT tools or technologies are currently used to choose, monitor and track suppliers”? One sales manager responded: “We do have a network to support to track our suppliers. We have different factories in various locations, someone will update the stock, and the purchasing requisitions will be updated to the network and I as the purchaser will ensure that the quantity makes sense. We do not have a tool that supports our decisions”.

A general manager of a rubber company replied: “At the moment we are using one called Customer System, which is very similar to SAP. But we are in the midst of looking at a new computer system, at the moment there is a lot of limitation, like inventory management. We are looking at a system called Safan and Epicor. This system will act as our core system to link each department together, so we can keep track of inventory and past transactions with suppliers and our customers”.

Another general manager said: “Our system is completely manual. We use white boards, to write our suppliers, and our purchases from them, we do not have a system to support decision making”.

### *Supplier Evaluation*

This pilot identified various processes or in some cases no process by which companies evaluated their suppliers.

We asked: “What process or procedure is undertaken after a supplier is selected, and how are they evaluated”? A procurement manager of a group of six companies answered on the process of their subsidiaries: “We set conditions to control our yearly vendor’s performance. We only evaluate on the condition, of their purchase of 50K. If it is less than that we are not going to evaluate, we are wasting time to do that.”

A general manager responded: “ We look at their past, we look at their transactions, we check with their warehouse, as this is a small niche, we do not have much suppliers, so all remains on our list, and we are aware what we can and cannot buy from certain suppliers, due to reputation”.

Another export manager answered: “Yes we do evaluate our suppliers, when we are doing our yearly audits, we do not have a process to overall evaluate

our suppliers”.

### *Processes*

In most cases, there was no defined process, a supplier would approach the organization, and they would place on to the preferred list, and would be used when necessary to the company.

Question: “What process or processes are undertaken after a supplier is selected after they’ve met criteria”? One sales manager answered: “There are no processes at the moment, it is more of if I am happy with their performance. We do have a lot adhoc based work. My suppliers work with me, for example, sometimes I do have a space issue, my suppliers would work with me to stagger my deliveries to accommodate my needs. For very important orders that I need immediately some suppliers are really accommodating, these are things that I look at to have them on a long term basis, it is more about the relationship”.

Another export manager replied: “Because we do not have an overall system, after we have selected our supplier, we then key the supplier details into an excel spreadsheet. This will then be the supplier file, we will then store all of the orders there”.

These interviews indicated a lack of structure when making decisions on most of the cases, whilst some of the companies are aware of the benefits, but prefer to place their resources elsewhere.

## **4 Conclusions and further work**

In conclusion, this paper has provided an overview of the practical issues in the existing literature and has reported our main findings from the pilot interviews in Malaysia.

According to our interview findings, there is an obvious lack of structured methods or approaches towards supplier selection decision making in most cases. Advanced tools such as business intelligence and artificial intelligence techniques and technologies have not been used widely in supplier decision in these companies. Moreover, although some firms are aware of the benefits of using structured methods and decision support tools, they still prefer to allocate their resources to other activities of their business.

Taylor and Farrell [13] argue that the use of ICT processes and systems help identify, coordinate, and exploit information, which will add value and gain competitive advantage over competitors. The pilot

study has indicated that with most companies there is a lack of structure but a clear presence of unstructured and uninformed decision making. Most of these businesses rely on human relationships that have been built over years.

We believe that supplier selection will benefit greatly from a more structured and effective approach, which can help identify what are the most important criteria and how to make the right choice. The use of ICT tools, and business intelligence and artificial intelligence methods will be able to support decision makers in taking more informed and better decisions. This would also allow for transparency and sharing of information and knowledge, so that the effectiveness and efficiency of the supplier evaluation and selection process will be improved.

As a priority of the next stage of this study, a large scale questionnaire survey on relevant issues is being undertaken. A conceptual and practical framework for the use of ICT, business intelligence and artificial intelligence in support of supplier selection is also under development by the authors of this paper.

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