Computers and Electrical Engineering 68 (2018) 140–155

Contents lists available at ScienceDirect

Computers and Electrical Engineering

journal homepage: www.elsevier.com/locate/compeleceng

Risk assessment for global supplier selection using text mining☆

Chuan-Jun Su*, Yin-An Chen

Department of Industrial Engineering & Management, Yuan Ze University, 135, Far-East Rd., Chung-Li, Taiwan, ROC

ARTICLE INFO

Keywords:
Global supplier selection
Text mining
Social media
Twitter Enabled Supplier Status Assessment (TESSA) tool

ABSTRACT

Adequate global sourcing makes a strategic difference to an organization's ability to reduce cost and improve the quality of its product. However, the global sourcing makes the process of supplier selection riskier and more complex. The data required for confronting the criteria needs to be specific and up-to-date. Now that we have entered the Big Data era with the prominence of social media and social networks such as Twitter, Facebook, LinkedIn; we now have access to global insights and knowledge regarding international suppliers. In this research, we propose a Twitter Enabled Supplier Status Assessment (TESSA) tool that can assist companies in their global supplier selection process. TESSA firstly retrieves a target supplier's related information from the most popular microblog Twitter and then obtains potential risk and uncertainty regarding the supplier through text mining. The discovered risks and uncertainties for companies making better decision on their global supplier selection process.

1. Introduction

Due to global competition modern organizations are paying particular attention to Global Sourcing. This practice has been embraced due to the cost savings it generates, the access to technologies and higher quality products in some cases. Organizations can choose suppliers from anywhere in the world, developing countries are becoming more competitive given their low labor and operating costs. Global supplier selection is riskier than the domestic supplier selection, consequently the decision making process is strongly affected by perceived risks. Suppliers with low price products can be offset by a history of delayed deliveries, or suppliers with state of the art technology can be undermined by excessive tariffs and costs.

Risk can originate from economics and political uncertainty in the supplier's country. Natural disasters are also within the risk factor, any natural disaster can have catastrophic consequences in today's interconnected global supply network. All of these types of disruptions can damage profitability, stock price, and market reputation for the organization with significant long lasting consequences.

In [1] Sawik affirms that taking risk into consideration will allow the buyer to decide whether it should cooperate with a low cost yet risky supplier, over a more expensive but possibly more reliable supplier. There is a crucial need to identify these risk factors and take them into consideration when selecting a supplier. However the supplier selection team struggles to obtain precise, complete and up to date information [2]. Data resources are usually only available at a low frequency of monthly or quarterly levels [3]. The data is sparse through reports, external databases, ERP and MIS systems which are limited and not able to provide sufficient information regarding the risks and uncertainty from the suppliers. The supplier selection process demands more transparency and up to date information.

Given the new Big Data era we are in, gathering data is not a problem anymore and we can utilize global insight and knowledge to

☆ Reviews processed and recommended for publication to the Editor-in-Chief by Guest Editor Dr. J-S Sheu.

* Corresponding author.
E-mail addresses: iecjsu@saturn.yzu.edu.tw (C.-J. Su), s998906@mail.yzu.edu.tw (Y.-A. Chen).

https://doi.org/10.1016/j.compeleceng.2018.03.042
Received 5 September 2017; Received in revised form 26 March 2018; Accepted 26 March 2018
0045-7906/ © 2018 Elsevier Ltd. All rights reserved.

assess the risk and uncertainty for each supplier. In regards of supply chain management some researchers have already used the data in social media to revolutionize their organizations. For instance, social media has played an important role in demand prediction for supply chain management [4,5], according to [6] social media offers insight on preferences and consumer behavior. The information in social media is updated rapidly and spreads virally at an exceptional speed; this provides us with first-hand information. We now have the opportunity to analyze this vast portfolio of information to assist the supplier selection process. In this research, we focus on social media rather than conventional online data due to its ability to be generated and diffused in a quicker manner; we mainly focus on the microblogging tool Twitter. This is because up to date and relevant information is required due to the nature of the risk and uncertainty criteria. Tweets are compact and fast. This is why it has become widely used to spread and share breaking news.

The main objective of this research is to provide a tool called Twitter Enabled Supplier Status Assessment (TESSA) that can assist the procurement team when selecting a supplier, TESSA can provide information on the risk and uncertainty for each supplier helping the decision team to reduce their potential supplier list and make a final decision. As a secondary objective we aim to open a new window on the research field regarding supplier selection and the use of social networks, as a result, companies can be more prone to exploit the extensive data social networks has to offer and utilize it in the decision making process.

The remaining of the paper is organized as follows: Section 2 reviews related literature on global supplier selection, text-classification methodologies, and ontology. Section 3 presents the system architecture and methodology of TESSA. Section 4 describes the implementation with the usage scenarios. Finally, Section 5 provides the contributions and conclusion of the paper.

2. Literature review

2.1. Global supplier selection

Global supplier selection is the process in which the buyer identifies, evaluates, and contracts with providers. Monczka et al. [6] have defined supplier selection as an essential task of procurement, it represents a key role in the company's long term strategy and competitive positioning. Supplier selection has gained great attention in business management literature and practice, mainly due to the growing business environment of global sourcing, strategic buyer-supplier relationship, e-commerce, and so forth.

The method of evaluation will depend on the organization's priorities, capabilities, and strategy. The tool proposed in this research is designed to work as an assistant to provide information on the risk of suppliers regardless of the method the organization is deploying.

2.1.1. Global supplier selection criteria

Selecting a new supplier is not a new problem. A great number of conceptual and empirical research has been published suggesting different techniques and approaches. Relying on a single criterion makes the supplier selection process uncertain. Therefore, a multi-criteria approach is recommended.

Developing countries have become a supplying source for many organizations due to their low labor and operating cost. Price is no longer sufficient and total cost has become an important factor for some organizations [7]. Total Cost of Ownership (TCO) is a philosophy to understand the true cost of a particular product, the TCO criteria attempts to look at a life cycle cost considering all costs associated with acquisition, use, and maintenance [8]. This provides a more effective clarification of supplier performance within the organization, however adopting this approach is very complex, the required account system to capture all the relevant cost of each supplier is a major disadvantage, especially when selecting new suppliers due to the lack of information. Aghai et al. [9] also includes a risk criteria in their model for supplier selection, their risk factors are economic, environmental, and supplier satisfactory ratings. And Vinodh et al. [10] also includes risk criteria within their supplier selection process, they consider the supplier constraint and supplier profile.

2.2. Risk within the supply chain

Over the years the market has become globalized and organizations that once focused on domestic sourcing later sought for suppliers around the world, this makes the supplier selection riskier and more complex. The main objective of global sourcing is to exploit both the supplier's competitive advantages and the comparative location advantages of various countries in global competition. As companies seek for international suppliers they must be aware not only of the opportunities, but of the risk and threats as well. Sreedevi and Saranga have proposed [11] the best way of risk avoidance strategy is to take care of risks when selecting the suppliers.

Organizations need to have all the information they can get in order to make an adequate decision. In this research, we focus on the external risks, which are the ones caused from outside the supply chain, usually related to economic issues, social, political, climate, terrorism, and financial stability. Obtaining data related to external risk has been a challenge, however in our current Big Data era we can now take advantage of the global insight and knowledge.

2.3. Microblogging tool, Twitter

Twitter is a free microblogging service that allows users to communicate with one another using short text based messages, or tweets [12]. Among the different microblogging tools available today, Twitter has become the prevalent platform. It has grown at an unprecedented rate. According to Bennett [13], there are 175 million tweets per day and more than one million new accounts are

Download English Version:

https://daneshyari.com/en/article/6883360

Download Persian Version:

https://daneshyari.com/article/6883360

Daneshyari.com