Managing the quality of outsourced services: a classification

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Abstract- *The process of managing the quality of services is called service quality management. It deals with the way services are provided to customers and the continuous improvement of the quality to consistently impress customers. Managing the quality of outsourced service is a very important decision problem. Managing the quality of outsourced services that provided by the supplier can be helpful in decreasing costs, sharing resources, exploiting complementary capability and reduction risk. In this research, we focus on the literature of outsourced service quality management supplier selection problem based on quality of service provided by supplier. We first analyze selected contributions of the literature on supplier selection using a systematic analysis based on several dimensions. Next, using this analysis, we propose a classification scheme of these quality management approaches based on their underlying methodological tools. In other words, we propose a classification that emphasizes the methods. This classification can be used as guide for future research.*

Keywords: *quality management, outsourcing, service, systematic analysis and classification*

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1- Introduction

Outsourcing or hiring of another individual or company, either domestically or internationally, to deliver business activities for a company has become a common practice in many industries, both in the service and goods sectors.

Ostrom et al. (2010) suggested that outsourcing is one of the five most fundamental topics that are the basis for corporate organizational success and fostering service productivity. Pointing out that emphasis should not be placed on evaluating the trade-offs between cost savings and quality of services achieved by outsourcing, but on isolating the steps and resources that would contribute to the success of such trade-offs.

In fact, outsourcing has played a major role in the growth of the service sector and has lead business services to a position of prominence (Fixler & Siegel, 1999).

The outsourcing of service is one of the major trends that researchers, scientists and managers are interested in. In a global market, characterized by strong competition, companies had to outsource some of their needs for goods and services to suppliers rather than doing it themselves.

The services sector began to grow at an accelerated rate in the last decades compared to the manufacturing sector (Fixler & Siegel, 1999). For instance, outsourcing the logistics function enables companies to improve their efficiency and effectiveness, by focusing on their core competencies and purchasing their products and services from the suppliers (Yayla et al., 2015).

Outsourcing gives the companies many advantages as equivalent services can be purchased from suppliers, and monitoring costs and other transactions costs are lower. However there are some challenges in associating the changes in the manufacturing productivity rate to outsourcing and testing its effects on the service firms.

There is a variety of rules and factors that contribute to measuring the quality of services in outsourcing.

The quality of services, provided by suppliers, is one of the main challenges in outsourcing (Arya, A. et al., 2008). Quality of service is an important factor for both outsourcing parties. Suppliers can continue

the relationships with the company for a longer time and the company can retain and increase their customers (Jamwal & Meda, 2012). Supplier selection has become a major strategic decision in the outsourcing strategy (Huang & Keskar, 2007).

2- Background of research

Ellram & Billington (2001) defined outsourcing as the transfer of processes and activities a company conducts internally to an external party. The concept of outsourcing began to be implemented in the early 1950s and turn into a means of reducing costs related to service-oriented operations in the 20th century (Lacity & Hirschheim, 1993). Therefore, outsourcing has been transformed from "traditional" in the 1980s to "strategic" in the 1990s and "transformational" in the 2000s, (Hätönen & Eriksson, 2009).

Outsourcing, as a strategy, has an impact on the performance of the supply chain. It allows companies to concentrate on their quality issues, reduce costs, flexibility and responsiveness to changes in the market or customer requirement (Gunasekaran et al., 2015).

The absence of quality control of the services provided by the suppliers will affect the quality of services of the company and thus its performance and the satisfaction of its customers.

The supplier selection process is a multi-criteria decision making problem including both tangible and intangible criteria (Dickson, 1966), and solving this problem and satisfying customer requirements involve using methods which allow exchange between these criteria.

Over the years, several approaches and techniques have been proposed to determine an effective supplier selection process.

2.1- Research methodology

The literature on service quality provided a large conceptual basis for understanding service quality in the service industries, but less amount support is available for the study of outsourcing. In our paper, we study the qualitative and quantitative approaches to investigate the concept of quality service in outsourcing.

This study seek to answer the following questions: How is the quality of outsourced process controlled? And how does outsourcing affect the quality of service?

This study is designed based on researches of the classification schema researches of (Weber, 1991; Khurrum, 2003).

In our review, we found that there are different kinds of relationships between the companies, their suppliers and the services outsourced. These can be classified into four groups:

- One supplier offers one service
- One supplier offers N service
- N suppliers offer one service
- X suppliers offer N service

The main objective of this paper is studding the quality criteria in the supplier selection process by a survey of supplier selection methods in outsourcing products or services based on quality of service provided by supplier and to classify research articles in supplier selection problem according to the literature. In this review, we will not differentiate between the words supplier/provider/vendor selection. This review comprises the following steps:

1- Classification of the international journal articles.

2- Evaluating the criteria for supplier selection with special emphasis on the quality factor.

3- Methodologies/techniques and approach.

2.2- Paper selection

This analysis focuses on the papers, which address the management of quality in outsourcing. Our focus is on the selection of suppliers in the service sector. To do this, we used different combinations of selected keywords including the following words (supplier/provider/vendor; selection; quality; outsourcing; supply chain). To refine our database, we focused on the most cited papers published in international reference journals.

Our database covers the major journals in management science and operations management, such as Decision Sciences, Journal of Operations Management, Production and Operations Management, International Journal of Production Economics, European Journal of Operational Research, Interfaces, International Journal of Operations and Production Management, International Journal of Production Research, Management Science, Operations Research, Transportation Research, etc.

2.3- Period of horizon

This study examined a database covering 17 years. The database period ranges from 2000 to the beginning of 2017 with a view to getting the latest references covering all quantitative and qualitative aspects of the review. Figure 1 shows that supplier selection literature grew extensively in the last two decades and peaked in 2007.

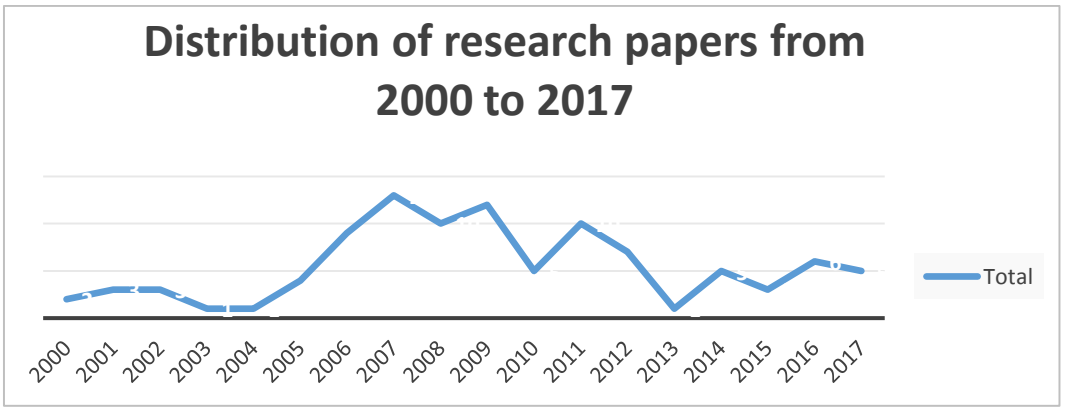

Fig 1. *Distribution of research papers*

3- Literature review

Since the late 1990s, the management of quality in outsourcing of services has drawn the attention of academics and professionals. Kakabadse et al. (2000) explain that the top ten outsourcing deals in Europe in 1998 concentrated on the service sector, and they confirm the importance of service quality in outsourcing even with cost savings. Quality positively affects profitability by reducing operating costs and increasing the company's market share (Voehl et al., 1994).

However, research that focuses on quality issues in a supply chain setting in quality management literature are scarce (Robinson & Malhotra, 2005). Hwang et al. (2006); Forker (1997); Handley & Gray (2013) study the relative effectiveness of several forms of quality management at a supplier or a company contract manufacturer. Trent & Monczka (1999) examined how the buyer can influence the quality of provider through cooperation.

The decision-making process of supplier selection should take into account a range of factors such as quality, cost, goodwill, service, delivery time, and environmental impact (Humphreys et al., 2003).

The starting point for most of studies dealing with supplier selection criteria was the results of pioneering research in this field: (Dickson, 1966; Wind et al., 1968). Weber et al. (1991) confirmed the timeliness of these criteria and the need to apply the methods and techniques of multi-criteria selection. Ware et al. (2012) has reviewed the criteria for supplier decision process, which different authors dealt with from 1991 to 2011. All the criteria were systematized into 8 categories: Cost, Quality, Service, Background, Risk, IT Knowledge, Availability and Environment.

Weber et al., (1991) reviewed 47 articles where more than one criterion were considered in supplier selection models. Abdolshah (2013) discussed the review of decision criteria in supplier selection related to quality criteria, and proposed a quality loss function method to evaluate the quality of suppliers. Wetzstein (2016) provided a thorough systematic review of supplier selection process including the Strategy, R&D and Operations oriented, Green and sustainability. The reviews of (DeBoer et al., 2001; Ho et al., 2010; Bhutta, 2003) targeted mathematical approaches as shown in Table 1.

This literature is representative of the importance of supplier selection process in company operations and competitiveness (Weber et al., 1991; Chai et al., 2014).

Author	**Year**	**Journal**	**Period of horzen**	**Type of information**	**Obective of research**
DeBoer et al.	2001	European Journal		Descriptive	Supporting the supplier selection

		of Purchasing & Supply Management			process
M. Khurrum S. Bhutt	2003	Journal of International Information Management	1986 to 2002	Descriptive	Classification of supplier methodology and techniques literature
Najla Aissaoui et al.	2007	Computers & Operations Research	n-2007	Descriptive	Classification the operation research and models for selection the best mixture of vendors to satisfy purchasing requirements in the outsourcing process
William Ho et al,	2010	European Journal of Operational Research	2000 to 2008	Descriptive	Evaluation criteria and approach for supplier selection
Chai et al.	2013	Expert Systems with Applications	2008 to 2012	Analytical	Classification decision making techniques for supplier selection by the analytical aspects
Mohammad Abdolshah	2013	Journal of Quality and Reliability Engineering	1991 to 2012	descriptive and analytical	Studied methods and factors for assessing the quality of supplier are discussed.
Anton Wetzstein	2016	International Journal of Production Economics	1995 to 2015	Analytical	Systematically review developments in pertinent SS literature

***Table 1**. Background of Literature review*

According to (K. Mukherjee, 2017) the Areas of supplier selection can be classified into eight different categories as follows:

1. Selection of supplier for single item or multiple items for deterministic or stochastic demand and supply.

2. Selection of supplier for manufacturing industry.

3. Selection of supplier for service industry.

4. Selection of supplier with price–order quantity discount.

5. Comparative analysis of single-sourcing and multiple-sourcing strategies.

6. Decision support system (DSS) for supplier selection.

7. Supplier selection for green supply chain.

8. Supplier selection for new product development.

We add to selection of suppliers order quality factor to these areas. In our paper, we have categorized the supplier selection criteria based on their importance and supplier performance into six major sections and each contains multi sub-criteria based on our literature.

4- Supplier Selection Strategy

Supplier selection strategy is the strategy adopted by the manufacturer to evaluate and select the suppliers, who fulfil the requirements of the manufacturer. Organizations are using specific criteria to strengthen the selection process. Over time, these criteria change in the wake of new challenges faced in selecting suppliers who can add long-term value to the manufacturer (Lemke et al., 2000).

4.1- Supplier selection criteria

Supplier selection criteria have direct impact on outsourcers' performance and competitiveness of their suppliers (Prahinski & Benton, 2004). There are many criteria such as price, quality, and process capability and on time delivery, which can affect the selection of the appropriate supplier.

Criteria	Dickson (1966)	Noorul Haq, Kannan (2006)	Lee (2009)	Liu, Hai (2005)	Ghodsypou ,O'Brien (1998)	Chen et al. (2006)	Xia, Wu (2007)	Wang (2005)
Quality	*	*	*	*	*	*		
Cost	*		*		*		*	
Delivery	*	*	*	*	*		*	
Flexibility		*			*			
Lead time								*
Delivery Reliability								*
Technical capability	*	*	*	*			*	

***Table 2**. Top criteria used in the literature of supplier selection*

In our review, we found that some studies that classified the criteria in the main and sub-criteria according to their relative importance, and some researches did not explicitly study the criteria in supplier selection problem Table 2.

We intensely collected and classified the supplier selection criteria according to their relative importance which is shown in Figure 3.

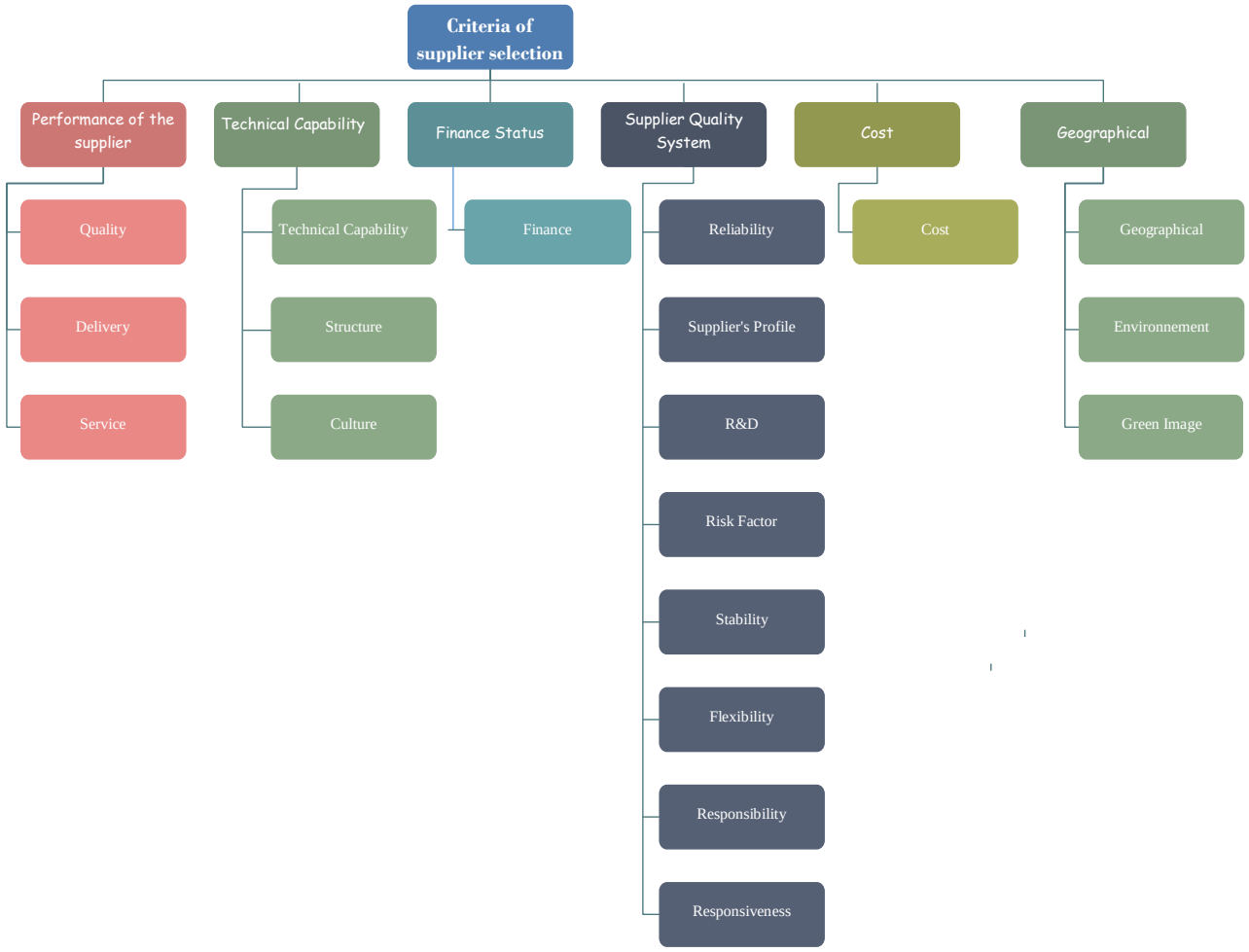

Fig 2 *supplier selection criteria*

4.2 - **Supplier selection techniques**

After collecting the literature, a classification framework is constructed for supplier selection methods. This research focuses only on supplier selection in which quality criteria is taken into account in addition to other criteria. The classification is based on two main categories

a) The Decision Methodology Base

(i) Individual Methodology Approach

(ii) Integrated Methodology Approach

b) Criteria Selection Base

(i) Quality Criteria

The literature review shown in Table 3 is a comprehensive collection of work on supplier selection. Researchers used various methods such as analytic hierarchy process (AHP), multi-objective programming (MOP), data envelopment analysis (DEA), mixed integer programming (MIP), goal programming (GP), genetic algorithm (GA), analytic network process (ANP), case-based reasoning (CBR), data mining (DM), cluster analysis (CA), activity-based costing (ABC), technique for order preference by similarity to ideal solution (TOPSIS), rough sets theory (RST), and quality function deployment (QFD).

Method	Author(s)
Agency Theory	Zu and Kaynak (2012)
AHP	Hou and Su (2007), Liu and Hai (2005), Chan and Chan (2004), Akarte et al. (2001)
ANP	Gencer and Gürpinar (2007), Bayazit (2006), Sarkis and Talluri (2002), Nydick and Hill (1992)
Case-based reasoning	Choy and Lee (2002), Cook (1997) Cluster analysis Zenz (1981)
Conjoint analysis	Boer, Labro, and Morlacchi (2001)
DEA	aglia and Petroni (2000), Forker and Mendez (2001), Karpak, Kumcu and Kasuganti (2001, 200 Talluri, Narasimhan, and Nair (2006), Talluri and Baker (2002)
Decision Analysis	Friedl and Wagner (2012)
e-constraint method	Buffa and Jackson (1983)
Expert Systems	Wei, Zhang, and Li (1997)

Fuzzy set theory	Sarkar and Mohapatra (2006), Florez-Lopez (2007), Chen, Lin, and Huang (2006), Shu and Wu (2009)
Genetic algorithm	Vokurka, Choobineh, and Vadi (1996)
Goal programming	Karpak, Kumcu, and Kasuganti (2001)
Linear programming	Talluri and Narasimhan (2003), Ng (2008)
Mathematical programming	Talluri, Wadhwa and Ravindran (2007)
Mixed integer linear programmin	Hong et al. (2005)
xed integer nonlinear programmi	Ghodsypour and O'Brien (2001)
Multi-objective programming	Narasimhan, Talluri, and Mahapatra (2006)
Neural networks	Ding, Benyoucef, and Xie (2003)
Six sigma	Wang, Du, and Li (2004)
SMART	Barla (2003)

***Table 3**. Presents the commonly methods used criteria reported in literature for supplier quality evaluation*

This study shows that supplier selection methods can be categorized into four category: mathematics methods, single methods, artificial intelligence methods and integrated methods Table 4.

Mathematics methods	Single Methods	Artificial Intelligence Methods	Integrated Methods
nalytical Hierarchy Process (AH	Cluster Analysis	Neural Network (NN)	AHP, DEA
Linear Program ming (LP)	Conjont Analysis	Case Based Programming (CBR)	AHP, GP
Multi-Objective Pro gram- ming (MOP)		Expert System (ES)	AHP, MOP
Goal Programming (GP)		Fuzzy Set Theory (FST)	DEA, MOP
ata Envelopment Analysis (DE		Analytic Network Process (ANP)	DEA, SMART
Analytic network process (ANP)		Genetic Algorithm (GA)	Fuzzy, AHP
		mple Multi-Attribute Rating Templ (SMART)	Fuzzy, GA

			y, QFD (Quality Function Deployn
			Fuzzy, SMART
			NN, AHP, DEA
			ANN, ANP, DEA
			Fuzzy, ANN
			ANP, TOPSIS
			ANP, Delphi
			ANP, GP

Table 4. *Supplier selection techniques*

4.3 - Quality of service models

Quality is one of the main criteria for supplier selection evaluation. As shown in Table 2, quality was the main criteria for supplier evaluation among 23 criteria (Dickson, 1966). Holjevac (2008) defined quality as follows:

- Quality refers to the ability of a product or service to consistently meet or exceed customer expectations.
- Quality means getting what you have paid for.
- Quality is not something that can be adopted as a special feature; instead, it is an integral part of a product or service.

Shokri et al. (2010) defined supplier quality evaluation as total assessment to evaluate a supplier's quality system, safety programmers, the performance of suppliers, the satisfaction of customers, and service specification. In order to assess quality, there are many factors and methods that need to be considered. There are a lots of literature on supplier selection models. In order to evaluate quality that was used by (Lee, 2009), most of these models used rejection rates (Qing & Xiao, 2007), but rejection rate cannot appropriately present the quality.

Conclusion:

In this paper, we provide a literature review of supplier selection process and the methods applied in the selection process based on the criteria used in evaluating the service industry. Hence we can obtain the best supplier selection process approach in the outsourcing industry based on the quality criterion as a key factor to contribute to improving the quality of outsourcing process.

This paper clearly contributes by delivering key insights on the literature of supplier selection by categorizing and examining the supplier selection problems in major academic journals in the last 16 years. We defined the database of our work by reviewing the literature of multi-criteria decision approaches for supplier selection applicable in the services sector. Related articles appearing in international journals from 2000 to 2017 were collected and analysed. We have described the characteristics and constraints of each variant of the problem studied. First, the methods of defining quality in supplier selection can be divided into two main categories: qualitative methods and quantitative methods, but it was found that the quantitative methods is the most prevalent approach in supplier selection.

Second, the study shows that the traditional approach based on quality cannot guarantee that the selected supplier is overall optimal because customer-oriented criteria (reliability, flexibility and stability) have not been centrally taken into account and researchers have focused both on supplier selection criteria, and green/sustainable supplier selection.

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