

# Supplier Selection Process Towards a Multi-Criteria Decision Making Model for Manned Guarding Services

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## Abstract

This study seeks to identify the most important criteria for selecting private security service providers, specifically manned guarding. Previous research on provider selection has been generic focusing on multi-criteria model decision development, but not on the previous stage where industry related criteria should be identified. Given that manned guarding is a service that affects our daily lives, it is important to focus attention on this area of activity. Selecting a private security service provider should therefore be a process in researchers' agenda. We contribute to the literature by identifying relevant criteria in manned guarding provider selection and by using a methodology than can be applied in other industries to identify sensitive criteria besides traditional factors (eg. price, quality, delivery). We gathered a panel of 15 experts in this field to apply Delphi method by gathering their opinion in ordering the most important criteria to select manned guarding service providers.

Results shows price as the most important criterion, but it was closely related to the professional experience of the operations managers (supervisors and directors), the geographic location and the financial stability of the companies.

**Keywords:** Supplier selection; Multi-criteria decision making; Customer preference; Purchasing; Outsourcing

## 1. Introduction

In a globalized economy, where competition for market leadership is going stronger, organizations are pressed to reduce costs, increase profitability and gain (or maintain) their market position (Guo and Li, 2014). On this context, an adequate supplier can add value and eventually contribute to business development. On the other hand, one weak supplier can prejudice the organization, causing problems on the supply chain and firm reputation (Chen, Wee and Lee, 2014). Efficiency and supply chain competitiveness are influenced by their supplier performance (Yu and Wong, 2014). As such, flexibility and efficiency on supplier management on these areas is crucial to obtain competitive advantage (Chen, Wee and Lee, 2014).

Thus, the challenge is in the selection process. However, these processes are usually complex because they incorporate multiple aspects to assess. So, the identification of critical and relevant criteria for decision making is considered an important step in supplier evaluation and selection (Omurca, 2013).

In this research our focus is on the identification of the best criteria to select service providers in the private security sector, particularly manned guarding. This sector was selected due to its specificities and importance in our daily life.

This paper is structured as follows. In the next section we conduct a literature review, which is the basis for the identification of existing criteria for selecting service providers in the private security sector. The following section we detail our methodology. Then, results are presented and discussed. At the end, the section is dedicated to conclusions and future research.

## 2. Framework

### 2.1 Supplier selection

One crucial factor in the creation and development of a reliable supply chain is supplier selection, since firms tend to source their products and services at a global scale, searching for the most competitive options (Hammami, Temponi and Frein, 2014). In a global and competitive business environment, at least partially, firms depend on their suppliers. As such, wrong decisions or poor supplier selection can result on serious implications on firm competitiveness (de Boer, Labro, and Morlacchi, 2001). On this vein, Kang, Hu, Deng and Zhou (2016), defends the growing dependence from suppliers, meaning that poor decisions in their selection can lead directly or indirectly to lower performance levels.

According to this context, supplier selection is increasingly complex, and conflicting criteria can coexist (Omurca, 2013). An organization needs to acquire a vast bundle of products and services, some of them with an important impact on firm cost structure and competitiveness. As such, purchasing is gaining strategic relevance both in private and public sectors (de Boer, van Der Wegen, and Telgen, 1998). This strategic importance underlines the role it plays in long term viability, especially when purchasing costs represents a significant part of operating costs (Hammami et al., 2014), with a high impact on firm performance (Castro, Gómez and

Franco, 2009).

As a complex process, supplier selection attracts the attention of many researchers (Yu and Wong, 2014), proposing several decision-making models (Guo and Li, 2014). The attention increased constantly along the last three decades (Sen, Basligil, Sen and Barali, 2008). As such, supplier selection is one of the most researched area in the supply chain management field (Ksoy, Sucky and Öztürk, 2014). Additionally, its relevance is also due to the growing percentage of purchasing department on firms' total budget (Pitchipoo, Venkumar and Rajakarunakaran, 2012). These situations enhance not only the utilization of qualitative and quantitative criteria, but also that supplier selection is a challenging area, since it generally uses inaccurate and limited information.

The main objective of supplier selection processes is to reduce risks and maximize firm value. Several strategic variables should be considered (Kannan and Haq, 2007). There are situations where product and services destination is internal consumption, however, most of them are production process inputs. This should not be a basis for considering a strategic selection criteria, since there are support products and services with strategic importance.

All supplier processes are important and should be treated as such, especially by firms starting their certification process, where their politics and competences are scrutinized (Kasirian and Yusuff, 2013). Depending on product and service relevance, organizations adopt different methodologies and technics to select their suppliers, searching for the best possible solutions in the market. Considering the relevance of supplier selection in supply chain management Shahmardan and Zadeh (2014) underlines response capability as an important criterion. These authors also consider that there are two dimensions in supplier selection: the first is based on the specification of the most adequate criteria. The second is related to the technics and methods used to classify and rank suppliers. The methods used are extremely important along the process, once they influence the supplier ranking (Tahriri, Osman, Ali and Yusuff, 2008).

Ghorbani, Arabzad and Shahin (2013) points six approaches to supplier selection: AHP (Analytic Hierarchy Process), ANP (Analytic Network Process), DEA (Data Envelopment Analysis), fuzzy group theory, genetic algorithms and mathematic programming. In general, supplier selection processes, consider some previous decisions, p.e., the desired number of supplier for each product and service. It is common the existence of simultaneous purchasing processes according to the particularities of each product or service. Supplier selection process should reduce the number of qualified suppliers, using a pre-selection phase, identifying the most competitive to the final selection phase (Yu and Wong, 2014). By rule, after pre-selection phase, technical and commercial specifications are sent to the short list (Pal and Singhi, 2015). Another important issue on supplier selection is the decision about the quantity order to each supplier (Guo and Li, 2014). This decision depends on the existence (or not) of exclusive suppliers at a global or regional level.

In the same vein, Rouyendegh and Saputro (2014), analyzes supplier selection from two points of view: (i) selection of a single supplier (unique source), that accomplishes all the necessities. Its only necessary to select the best one. (ii) selection of several suppliers because

none of them can satisfy all the needs. However, in most cases firms tends to have multiple suppliers, avoiding the dependence of a single source.

Castro et al (2009) consider that the purchasing process development is based on three central topics: (i) supplier management as a core aspect of supply chain management; (ii) supplier selection as a strategic decision and an important base for competitiveness; (iii) techniques and methods to support supplier selection decision making. According to Boer (1998), supplier selection criteria can be structured in four steps: problem definition, criteria formulation, supplier qualification and supplier selection. The second step is the core of our research, which will be detailed in the next sections.

## *2.2 Criteria for supplier selection*

According to the previous section, where we analyzed the framework of supplier selection process. To our best knowledge, few attention have been paid to criteria selection on the private security sector. Nonetheless it is considered one important part of the overall process (Sen et al, 2008).

Dickson (1966) established an early proposal of 23 criteria to select suppliers. His research was centered in USA and Canada, and proposed a ranking for those criteria based on inquiries to purchasing directors. On the top of the list appears quality, followed by delivery and past performance. Price occupied the sixth place on the list. However, based on a literature review between 1966-91 Weber, Current and Benton (1991) found evidence that price was the most preferred criteria, followed by delivery and quality. Supplier evaluation depends on several criteria (Shahmardan and Zadeh, 2014).

Several authors studied this subject for several reasons (Pal and Singhi, 2015), especially the existence of conflicting factors, tangibles and intangibles (Pitchipoo et al, 2012; Pal and Singhi, 2015). The existence of conflicting criteria creates a more complex field for researchers, because one criterion can gain more importance than others. For example, the best priced supplier is not necessarily the one who offers the best quality (Alcaraz, Iniesta and Macías, 2013). Earlier research (Wind and Robinson, 1968) identified possible contradictions in price/quality or in quality/delivery binomials and concluded that it is necessary to evaluate quantitative and qualitative criteria to find the best supplier.

Among several studies Vahdani and Zandieh (2010), identified the most important criteria such as quality, price, delivery, service, technical capabilities and financial stability (Wang, 2016). However, the majority of scholar research identified price, quality and service as the principal criteria (Chan, Kumar, Tiwari, Lau and Choy, 2008). As such, quality, price, delivery and technical capabilities are factors that obtains a general consensus Guo and Li (2014) also enhances supplier competences. In summary, price, delivery and quality are the most consensual ones (Kasirian and Yusuff, 2013).

According to this framework, the multiple criteria prevail among the majority of researchers (Rouyendegh and Saputro, 2014). It is possible to use only one criterion, probably price. However, when purchasing products and services that are strategic, it is recommended the use of other criteria, even if they are conflicting (de Boer et al, 1998). On this vein, Guo and Li

(2014) defend the importance of using a multicriteria approach on the supplier selection process.

It is recognized that the identification of relevant criteria is at the top of researchers agenda (Pitchipoo et al, 2013; Azadnia, Saman and Wong, 2015). Sen et al (2008) establishes two types of criteria: (i) quantitative and (ii) qualitative. For them economic and financial criteria are important to select suppliers (Azadnia et al 2015; Bruno, Esposito, Genovese and Simpson, 2016).

### *2.3 Criteria for buying private security services*

In the field of private security relevant research has been scarce. With the support of the European Confederation of Security Services (CoESS) and Euro-FIET, Weber (1999) proposed a methodology for the selection of service providers in the private security area for firms that opt to select quality services at a fair price, not only the lowest. On this document, several causes to use price as a decisive criterion were identified such as: the difficulty of purchasing firms to identify quality levels, scarce resources and instruments to analyze service quality, difficulties to compare quality among several service providers, and also the lack of transparency in the sector.

The predominance of price in the supplier selection was a major concern, contributing to diminish the service quality. Of course, price is an important criterion, however it should be considered when others criteria are accomplished. By other words, price is important when two or more suppliers offer equivalent competencies (Johnston and Lewin, 1996). On the same vein, Weber (1999) defended that the supplier selection based only on price impacted negatively on the average quality levels. As a consequence, firms tend to reduce their investments on human resources qualification, especially in training and supervision. Additionally, this author revealed that, in order to reduce costs, firms hired the cheapest workers they can find, with serious implications on human resources motivation and turnover. He also alerts about the existence of practices such as ‘ghost-guards’, when firms ascribe an inferior number of guards when compared to the contract.

Weber (1999) concluded that these practices are negative for the sector image. To invert this situation, he points four quality criteria: guard personnel, contract and operations management, contractual infrastructures and the firms. He also suggests three phases to adjudicate a private security contract:

- Phase 1 – Exclusion criteria – taxes and social security payments, existence of serious previous legal, ethical and professional misconducts, licenses and registrations required by local authorities;
- Phase 2 – Selection criteria – economic and financial capacity based on bank and fiscal documents, technical capabilities based on educational and professional qualifications, track record in the last three years or the average number of personnel in the last three years, among others;

- Phase 3 – Award criteria – implies avoiding the exclusive use of price, adding other aspects like quality, technical details, functional characteristics and deadlines.

In 2015 CoESS in partnership with UNI-Europa (previous Euro-FIET) launched a new document on this subject, updating the 1999 manual, reinforcing the idea that the selection of service providers in the private security field, should be based on quality/price criteria and not only on price. This new proposal underlines the importance of service quality and alerts to the consequences of price competition: tax evasion, illegal practices and the use of ‘shadow-guards’.

## **1. Methodology**

### *3.1 Method*

On this research we opted by Delphi method. It has already been used and tested in previous research related to the selection of suppliers (cf. Seuring and Müller, 2008; Lee, Kang, Hsu and Hung, 2009; Yu and Wong, 2014) using an adaptation of Q-sort technic. According to this approach we asked a group of specialists in the field to order the criteria presented in order of importance in a supplier selection process. To apply the Delphi method we conducted an extended literature review about supplier selection in the proposed field of research – private security in the area of manned guarding. The next step was the selection of the group of experts to integrate in the study. Then, we sent them the first round, including a list of criteria based on literature review and asked them to point additional criteria in order to complete the list. The list was delivered in hand, individually, and it was evaluated in the presence of the researchers. The option for this approach was due not only to the eventual necessity of explaining concepts and respond immediately to any doubt, but also to get their commitment in order to obtain an effective and fast response. It also helped to assure the participation on the second round.

In fact, the second round was successful, with a 100% participation. The new version of the list was now sent by email. The first round was done between 31/10/2016 and 29/11/2016, and the second round occurred between 1/12/2016 and 15/12/2016. The results obtained on this round were consensual, so we didn't send more lists to participants, as concordance coefficient (Kendall's W) among specialists was satisfying.

#### **1.1.1. Delphi Method**

Delphi method is usually used when the problems or research questions are complex and difficult. It's based on expert knowledge on the field of research. The method also intends to assure consensus among their perspective, by searching and extracting knowledge from the group of experts, specifically on criteria and sub criteria (Lee at al., 2009). The use of experts is important because they have a deep knowledge, experience and intuition around the theme in research, giving to the panel quality and reliability (Brown, 1968).

In practice, this method promotes a structured and indirect interaction between a pre-defined panel of experts on one subject. The members are elected according to their experience or technical competences related to the study theme. Anonymity is guaranteed on the process,

especially when responses are obtained and feedback is sent on each round. On each round, the responses are sorted according to average answers, providing a summary of the previous round to each participant (Gordon and Pease, 2006).

By assuring anonymity through indirect participation it is possible to obtain specialists involvement on the process, otherwise it would be difficult to get. The feedback is important on this method. On the one hand, it permits to present the result from previous round and, on the other, it helps to reach consensus and opinion convergence. The indirect participation is also important because it avoids the prevalence of dominants and the absence of more passive elements. So, it permits to obtain a more homogeneous participation between the participating elements.

It's normal that feedback promotes a tendency of convergence on the opinions, which tends to the average opinion of the group (Pivo, 2008). However, reaching consensus is not necessarily the core objective or a success measure of the method (Gordon and Pease, 2006). In fact, results go behind consensus, underlining that the existence of agreement or not between participants is also relevant information.

Given the characteristics and assumptions of this method, it is not supposed to draw inferences from the results achieved for the general population, however, the generalization of the results can be tested in subsequent studies, repeating the method with different members in the panel of experts or using different methodologies (Pivo, 2008). This method has been used for many years and generalized to issues where scientific knowledge is scarce, may well be incorporated into the structure of an investigation and may be subject to some of the safeguards that are commonly used to ensure objectivity in any scientific research (Brown, 1968).

Given all these characteristics, accepted and understood as strengths of the Delphi method, distinguish it when compared to other methods (Seuring and Muller, 2008).

### 1.1.2. Q-sort Technique

The Q-sort is a technique where respondents are asked to classify and sort a set of ideas or statements of opinion, thus revealing their point of view on the subject or the problem under study (van Exel, Baker, Mason, Donaldson, Brouwer, and Team, 2015).

It is a quantitative technique, supported by subjective assessments and personal reflections, such as opinions, ideas or attitudes. In the classic form of the Q-sort technique, participants are asked to rate the topics presented in the discussion in a way that approximates a normal, previously defined distribution. The ideas, opinions or criteria presented to the panel deliberately selected for this purpose, which is invited to classify or to rank them according to their individual points of view, allows to obtain a stronger overall idea on complex issues or problems (Suprpto, Bakker, Mooi, and Moree, 2015), with increased reliability based on individual reflections. In order to facilitate the application of the classical technique, where cards were used with the items under discussion, asking the participants to order them in the form of a pyramid, representing the aforementioned normal distribution, it was advisable and considered as a good practice that the participants Divided the cards into three groups

according to the degree of importance, among the most important, neutral and less important.

### *3.2 Experts selection*

In the identification of the experts, we sought to find a heterogeneous group of experts, in order to allow a broad global perspective, with diverse experiences in areas such as human, financial, commercial and operational resources, respecting the previously defined assumptions. The assumptions to participate in the study were recognized experience in leadership, coordination and management of private security services, to have no more than one specialist from each organization and to have a balanced group of experts from services and specialists of companies that are clients of this kind of services, and who are aware of the difficulties and vicissitudes of a private security service.

We purposely leave out individualities of the purchasing departments of the client companies. The sample was then made up of the 15 specialists, with all those invited willing to participate in the study.

The expert team consisted of eight specialists from client companies and seven experts from private security companies, with four of them with professional experience both in companies providing private security services and in client companies. None of the specialists had professional experience in private security for less than five years and the group average was 18 years of professional experience in the activity.

### *3.3 Measures*

The questionnaire used in the first round had 27 criteria drawn from the literature on supplier selection and also articles related to private security activity. There was a concern to include criteria referring to several dimensions under analysis in a supplier selection process, such as the size of the company, the management structure, the economic-financial area, human resources management practices, permits and certifications, operations with direct responsibility in the management of manned guarding services, the price and awards and recommendations.

As already mentioned, one of the advantages of using the Delphi method was that it was possible for experts to get involved in the study, because it was innovative, where they could contribute with new criteria. This really happened, the group of 15 experts proposed nine new criteria for selection of private security providers (manned guarding). They were integrated the second round. The initial criteria for the first round questionnaire and the 36 criteria included in the second round questionnaire are in Appendix 1.

### *3.4 Results*

At the end of the first round, with the ordering of the 27 criteria according to their importance in a selection process of private security providers (manned guarding), the coefficient of agreement achieved among the 15 experts was, as expected, low Kendall's  $W = 0.194$ ;  $P = 0.000$ , which led us to reject the null hypothesis, with a negligible agreement among specialists.



In the second round, with the inclusion of the nine criteria suggested by the experts during the first round, totaling 36 criteria, the coefficient of agreement rose considerably, achieving Kendall's  $W = 0.375$ ;  $P = 0.000$ , which led us to make only two rounds not advancing to a possible third round.

With regard to the average ranking of the group of experts during the first round (Appendix 1), one can see that in the first five positions regarding importance were: "Professional experience of the Contract Manager Supervisor", in the second position the "Total price of the service", in the third position the "Geographical location (subsidiaries, delegations, secondary establishments and operational facilities)" in the fourth position "Professional experience of the Operations Director" and lastly in the top five, the criterion "Financial Autonomy (Equity / Assets x 100) of the last 3 years".

In the second round, we noticed that of the nine criteria suggested by the specialists during the first round, which was ranked in a position of greater importance, was in ninth position and was "Experience in providing services in the sector / activity of the Contracting Company." The top 5 of the second round (Appendix 1) was ranked as follows: first position - "Total price of service", second position - "Professional experience of Contract Manager/Supervisor", third - "Geographical location (subsidiaries, branches, secondary establishments and operational facilities)", fourth position - "Professional experience of the Operations Director", and in the fifth position - "Financial Autonomy (Equity / Assets x 100) of the last 3 years".

In both rounds there were criteria with the same final average, which implies that there was more than one criterion in certain ranking positions, as in positions 7 and 9 in the first round and in positions 10 and 16 in the second round.

### *3.5 Discussion*

Analyzing the results obtained, we can point out the experts contributed with a significant number of criteria for the second round. However, once they were aware of the average order achieved by the group, they adjusted their individual ordering, which allowed to change from a value of 0.194 in the Kendall's  $W$  coefficient in the first round to 0.375 at the end of the second.

The nine criteria suggested by the group of experts were as follows: 9, 10, 15, 22, 25, 29, 33, 34 and 35.

It is also worth to mention that between the two rounds, the same five criteria were kept as the most important, however, there was an exchange of positions between first and second position, ie, in the first round the most important criterion was "Professional Experience of the Contract Manager/ Supervisor" and, second most important was "Total Service Price", which was reversed in the second round being chosen as the most important criterion in a selection process of private security service providers (manned guarding), the "Total Service Price".

The experts ordered the criteria related to the price of the services in the summit positions. Additionally, there were a preponderance of factors related to the professional experience of

the superiors of the guarding personnel, ie, the elements of permanent contact between the company that provides the services and the client company, assigning more importance to contract managers / supervisors than to operations managers.

Analyzing the average ranking of this group of experts, we also verified that, for the same functions, they attribute a higher importance to professional experience than to academic qualifications and professional training, which is evident for all the cases under study: contract managers / supervisors, operations managers, the rest of the management team, and also for administrators and managers.

We also emphasize that in both rounds the criterion ordered as the least important is related to the safety area, through the burden of this situation.

## **2. Conclusions**

Our research aimed to list a set of criteria that can be used during a private security selection process, especially in manned guarding. The traditional resistance to participate in academic research, particularly in the private security sector, was overtaken. In fact, we observed that respondents were very receptive to the project, and participated actively. All the professionals initially invited to participate agreed from the first moment, and none of them abandoned the project along the two rounds of questions. They also gave important insights, which permitted to include nine criteria that we haven't included initially.

As seen, the majority of studies about supplier selection criteria are generalist, and very few are focused on the private security area. On this framework, our research based on the opinion of 15 experts permitted to identify a list of criteria to select private security suppliers in the area of manned guarding.

One principal conclusion is that supplier selection is one very important topic from the academic and professional points of view. However, price is still the most important criterion. The distance from the second criterion is not significant, but it evidences that price is more important than managers professional experience and firms geographic dispersion (eg. delegations, operational facilities).

Experts were consensual about the five most important criteria to use in a supplier selection process. Changing only the order between the first two criteria between rounds.

According to our results, the selection criteria of a supplier for manned guarding, in descending order of importance, highlight the price, professional experience of the link between on-site and client guarding teams, geographic deployment, the operational experience of the operations director as guarantor of operational stability and financial autonomy. In these financial matters, stable companies that can honor their commitments are preferred.

## **3. Limitations and future research**

Our sample of specialists can be one of the limitations of our research. For several reasons it was difficult to identify and get in contact with the members of the specialist panel in this area of private security. It was necessary to work hardly to obtain not only a heterogeneous group, but also that covered several functional areas, but also belonging both to supply and

demand firms. Our major concern was their relevant experience in firms in the research area. Further research should replicate this methodology with specialists from purchasing department only, in order to obtain insights about their opinions, and how they differ from our sample of professionals that coordinate and manage manned guarding services, directly or indirectly.

Further research can be developed using this primary work as a practical resource to generate a multi-criteria model decision.

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**Appendix 1**

Criteria	Second round ranking	First round ranking
Total service price	1	2
Professional experience of the Contract Manager/ Supervisor	2	1
Geographical location (subsidiaries, delegations, secondary establishments and operational facilities)	3	3
Professional experience of the Director of Operations	4	4
Financial autonomy (Equity / Assets x 100) of the last 3 years	5	5
Client and ex-clients opinion achieved by the user organization (Customer) in their network contacts	6	7
Licenses beyond what allows to run the manned guarding service	7	9
Professional experience of the Directors	8	7
Experience in providing services in the sector / activity of the Contracting Company	9	a)
Current liquidity (Current Assets / Current Liabilities x 100) for the last 3 years	10	9
Provision of services to large customers, very close to the services to be contracted	10	a)
Extra services charges (hour by day-night; regular day-holiday)	12	14
Certification in Quality, Environment, Occupational health and safety, Social Responsibility	13	6
Academic qualifications and professional training of the Operations Director	14	11
Financing warrantees to support the services provided	15	a)
Academic qualifications and professional training of Contract Manager (s) / Supervisor (s)	16	13
Turnover in the last 3 years	16	17
Academic qualifications and professional training of Directors	18	12
Solvency (Equity / Liability x 100) of the last 3 years	19	15
Customer recommendations (delivered by the private security entity)	20	20
Firm age	21	16
Prestige in the market	22	a)
Number of private security guards at 31/12 of last 3 years	23	21
Absenteeism in the last 3 years	24	19
Professional experience of the Administrator (s) / Manager (s)	25	a)
Accidents of work in the last 3 years	26	22
Investment in organizational training (funded by the entity) in the last 3 years	27	18
Number of employees in 31/12 of last 3 years	28	23
Recruitment and selection procedure for Guarding Personnel	29	a)
Other certifications	30	26
Average number of workers in the last 3 years	31	25
Awards received	32	24
Quality of the Employee Handbook for Guarding Personnel	33	a)
Academic qualifications and professional training of the Administrator (s) / Manager (s)	34	a)
Image / Design of the approved uniform	35	a)
Total health and safety charges at work in the last 3 years	36	27

a) Criterion suggested by the experts during the first round

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