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Multiple case study of the supplier selection decision process

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Summary of the presentation:

- ✓ Introduction
- ✓ Methodology of the research
- ✓ Context of the research
- ✓ Results: supplier selection criteria and decision strategies
- ✓ Conclusions and future work
- ✓ References

Why supplier selection decisions matter?

Supplier selection is a key decision of the ***purchasing and supply management*** (PSM), affecting:

- ✓ ***Cost competitiveness of a buyer***: goods and services acquired represent between 20-90% of product costs.
- ✓ ***Downstream performance of a buyer*** is a function of the performance of its suppliers on quality, delivery and flexibility dimensions.

Shift to the ***competition between supply chains*** draw attention to such supplier-related dimensions as:

Financial stability, R&D and technological competences, long-term integration potential.

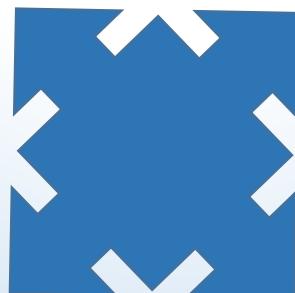
Why supplier selection decisions are difficult to make?

Every dimension, in which a supply decision may affect the buyer's competitiveness, is eventually a criterion of supplier evaluation and selection.

Thus, supplier selection is an intrinsically ***multiple criteria decision problem***:

Quantitative financial criteria

Quantitative non-financial criteria



Qualitative criteria

Legal and sectorial standards and requisites

Supplier selection decisions + multiple criteria decision analysis (MCDA)
= supplier selection problem (SSP)

- ✓ The main MCDA approaches to the ***supplier selection problem***:

Analytic Hierarchy
Process (AHP)

Analytic Network
Process (ANP)

Data envelopment
analysis (DEA)

Mixed integer
programming

Goal programming
(GP)

- ✓ ***Statistical methods*** (e.g., cluster analysis) and ***Artificial Intelligence methods*** (e.g., case-based reasoning) are also applied, but to the less extent.
- ✓ The research trend is to combine different techniques in the ***integrated approaches***, e.g.: AHP/GP, fuzzy AHP.
- ✓ ***Fuzzy set theory*** is gaining the relevance in the SSP research.

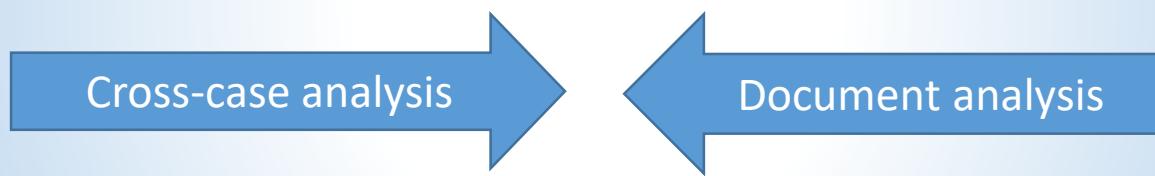
Problem of relevance: **the gap between the SSP research and PSM practice**

- ✓ The MCDA-based approaches are applied to some real or simulated datasets, and mainly with the ***illustrative purposes***.
- ✓ There is little empirical evidence of the practical relevance of this theoretical research.
- ✓ Existing SSP research is highly prescriptive, i.e., ***describes how supplier selection decisions should be made***.
- ✓ To address the problem of practical relevance of the SSP research, descriptive analysis is needed:

Multiple criteria nature of the supplier selection expected,
actual decision strategies should be explored.

Why multiple case study type of research?

- ✓ Lack of empirical research and complexity of the topic => ***semi-structured interviews***.
- ✓ Necessity to enhance analytical generalization potential of the study:



- ✓ The set of support documents concerning reliability of the research: protocol of the multiple case study, the guide of the semi-structured interview, bulletin of the participant of the study.
- ✓ The research dataset: transcriptions of the interviews and internal supply-related documents.

Topics covered by the semi-structured interviews	
Contextual questions	T01 Description of the company from the purchasing perspective
	T02 Organization and internal regulation of the purchasing function in the company
	T03 Initial sourcing decisions
	T04 Contracts and legal tools applied to the purchasing
Substantial questions	T05 Evaluation criteria of the potential suppliers
	T06 Supplier selection as a formalized process: internal regulation and procedures
	T07 Underlying principles of the supplier selection
	T08 MCDA techniques and decision support software applied in the supplier selection
	T09 Post-contract sourcing analyses and supplier performance evaluation

- ✓ Eight cross-industry enterprises, operating in Portugal, participated in the research:

Case	Description of the multiple case study participants	Sales, €/year
C01	Electrical equipment manufacturer, infrastructures and engineering solutions	800M
C02	Multinational technological holding: industry, mobility, consumer goods; 4 plants in Portugal, generating €750M	750M
C03	Multinational automotive OEM company, with one plant in Portugal	100M
C04	Cutlery manufacturer, exporting about 90% of production	5M
C05	Textile manufacturing group, with its own trademark, also working for world-known labels	40M
C06	National paints and coatings manufacturer, 5 production facilities	180M
C07	Portugal-based international group in food distribution and manufacturing	12000M
C08	Portuguese production facility of one of the world's leading automobile manufacturers, exporting up to 99% of cars assembled	n/a

- ✓ 5 participants are Portuguese enterprises and the remaining 3 are subsidiaries of international holdings.
- ✓ All companies-participants purchase on global markets and are export-oriented.
- ✓ The Portuguese enterprises, with exception of C04, have abroad production and distribution facilities.

It was reasonable to assume that the respective purchasing and supply management practices of the participants are up-to-date and representative.

- ✓ The companies-participants were represented by senior purchasing managers as interlocutors of the interviews.

- ✓ The concept of **key suppliers** was based on different reasons:

Relative financial importance

E.g., a supplier with turn-over
≥ than 1M €/year for C01 case

**Criticality to the quality of a final
product or to a production line**

E.g., products considered as
potential *job stoppers*

**Domination of a supplier on
the respective market**

E.g., assembly line robotics
producers

- ✓ There was noted a dichotomy of **active** vs. **non-active** suppliers, e.g.: in C01 case active suppliers represent about 37% of the total supply base.
- ✓ The weight of key suppliers in the active suppliers was estimated about 1.8% for C01 case and 4.2% for C08.
- ✓ From 250 active suppliers in C06, there were from 3 to 5 key suppliers for each of 5 main purchasing areas.

- ✓ The ***decentralized organization of the purchasing function*** was common for global operating companies
- ✓ ***Central purchasing departments*** were commented as responsible for the key suppliers, methodological support, and aggregation of purchases (to gain major discounts)
- ✓ ***Local purchasing departments*** were seen as responsible for back-up, equipment and services suppliers
- ✓ ***Web-based supply portals*** were identified in four cases: C01, C02, C04 and C08

In C03 case, the central purchasing department was directly responsible only for the share of 6-7% of the plant's total acquisitions.

Meanwhile, up to 70% of the plant's actual purchases are electronical components, for which the respective suppliers are chosen by the central department.

- ✓ PSM managers are specialized and assigned to some *strict type of purchase*
- ✓ There are *organizational and distance barriers* between purchasing managers and other functional areas

These factors do not facilitate neither the multi-disciplinary approach to analysis of some buying situations nor the earlier involvement of PSM managers in a new product development

- ✓ *Cost-reduction programs* are an important performance indicator for internal evaluation of PSM managers

It was reasonable to expect that purchasing managers tend to choose an alternative with a lower cost of acquisition, as soon as minimal requirements and mandatory requisites are fulfilled

- ✓ **Quality** and **price** were mentioned as the most important criteria in 4 cases each

Price criterion was not seen as simple unit price, but in the sense of the total cost of acquisition (or formal total cost of ownership model in case C02).

With many commercial conditions and long-run considered, it was more the **cost criterion**.

- ✓ The relative importance of the quality criterion, one of the always mentioned top priorities, tended to decrease drastically as soon as **minimal quality requirements** were fulfilled.

The same controversy was mentioned in the study of Verma and Pullman (1998), with a survey and a discrete choice analysis experiment.

It was related with the minimum acceptable quality level - once the component/raw materials satisfy it, management's focus shifts to the cost reduction.

- ✓ ***Delivery performance*** was seen as one of the most important criteria, but the baseline performance was implicitly expected to be high - as a kind of a pre-requisite.
- ✓ ***Qualitative criteria*** were seen as pre-requisites and as post-bidding criteria: whether for adjusting the final decision or for distinguishing between some similar offers.
- ✓ ***Qualitative analysis*** was based on expert opinions, with documental analyses and site visits.
- ✓ The ***Likert-type scales*** were employed to express qualitative criteria numerically.
- ✓ ***Standards and certifications***, varying from industry to industry, were seen as qualifying requisites:

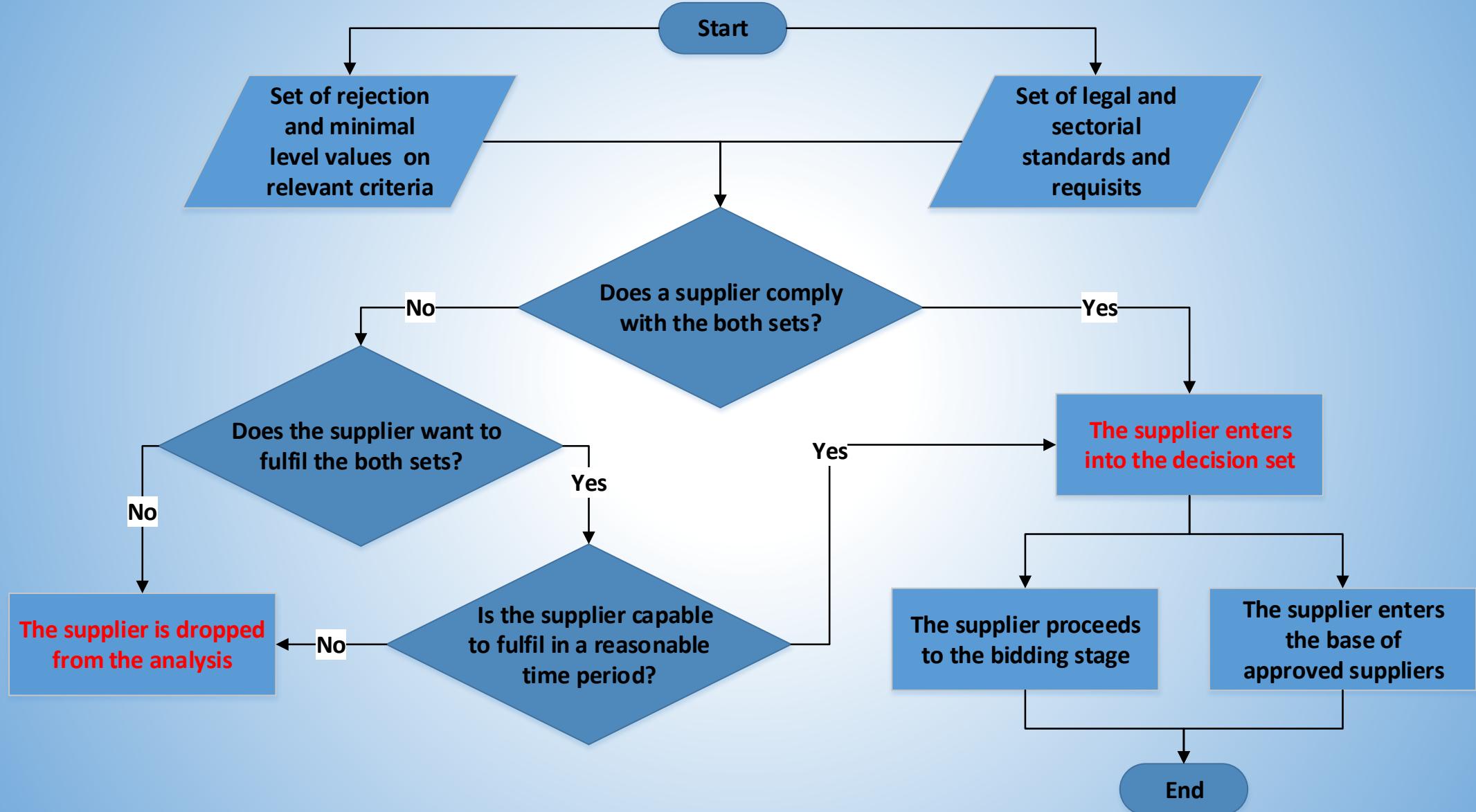
ISO9000, 14000, 22000 and 26000 families, SA8000 Standard, VDA6 Quality Management System and Good Manufacturing Practices (GMP)

The observed *ad hoc* decision strategies had much in common with ***bespoke approach***, described by Holt (1998), within the study of contractor selection methods.

- ✓ Beside some contextual differences, the observed decision strategy is mainly ***non-compensatory*** and ***sequential***, with 3 steps being distinguished.

Step 1 – Screening (qualifying) of available supply alternatives

- ✓ Non-compensatory decision making based on the ***conjunctive decision rule***.
- ✓ In order to be qualified, a supplier is expected to meet all relevant rejection and/or minimal criteria levels.
- ✓ Also, mandatory legal and sectorial standards and requisites should be satisfied.



Step 2 – Bidding stage

- ✓ Suppliers, qualified for the occasion or from the base of approved suppliers, are requested for quotation.
- ✓ The best bid wins.
- ✓ Alternatively, some bids follow to the Step 3.

Step 3 – Qualitative analysis

- ✓ The final choice decision *might be* adjusted by experience-based qualitative analyses, if grounded.
- ✓ Such decision adjustments are of the compensatory nature, but they are subjective and do not involve formal decision models.

Example: a *slightly* less costly supplier has *considerably* lower quality and/or delivery performance.

- ✓ Multiple criteria nature of supplier selection decisions was present in all cases.

However, the relative importance of the supplier selection criteria was seen under the prism of achieving the established rejection and/or minimal levels of performance.

- ✓ Interaction and integration of the multiple points of view with respect to supplier selection decisions might be compromised:

Eventual organizational and distance barriers between purchasing managers and other areas.

The impact of the cost-reduction programs on the perception of purchasing managers.

- ✓ The observed decision strategy was based on non-compensatory conjunctive screening, followed by bidding.
- ✓ Compensatory decision making was possible, but it was subjective and did not involve formal decision models.

In all cases, neither purchasing managers were familiar with multiple criteria decision techniques, nor decision support systems solutions were identified.

- ✓ The described bespoke approach to supplier selection should be analysed more carefully – under which conditions it can represent the complex supplier selection decisions objectively and comprehensively?

In the context of the present study, **the problem of practical relevance of the existing supplier selection problem research was not discarded**, further research being justified.

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Análise de decisão multicritério

Função compras

Supplier evaluation

Qualidade Avaliação e seleção de fornecedores

Flexibilidade Data Envelopment Analysis

Multiple-criteria decision analysis

Competitividade

Sourcingment Fiabilidade AHP-based mixed approaches

Critérios de avaliação

Thank you for the attention!

Weighted scoring models

Tomada de decisão

Supplier Selection Problem

Estratégia de compras

Otimização multiobjetiva

Goal programming Analytic Hierarchy Process