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By PETER SMITH

What defines complex sourcing – and why does it matter?

Executive Summary

This paper looks at the topic of complex sourcing and considers which factors contribute towards making a particular sourcing task “complex.” It is important for procurement practitioners to understand this for a number of reasons. As complexity also usually means there is inherent risk and opportunity in that category or sourcing event, identifying complexity helps in terms of prioritisation of effort and resource. It also points out where advanced sourcing technology can be best used to help deliver the benefits.

The paper does not get into the deep mathematics behind sourcing optimisation, algorithms and solutions, but it is important that procurement understands the real complexity of these tasks and that such problems need clever solutions to help arrive at the best decisions.

Certain aspects that might, at a cursory glance, appear to drive complexity are actually less important than might be expected, such as the size of the contractual spend arising from the sourcing exercise or indeed the importance of what is being bought. But the paper then goes on to propose nine factors that do drive complexity. Some are determined by internal factors, such as the breadth and diversity of internal users or budget holders who have an interest in what is being purchased.

Then there are external factors, an example here being the number of suppliers in a market or the range of alternative market solutions and offerings. Then the third factor is complexity driven by the commercial models chosen or prevalent in that market, such as multi-level (tiered) supply chain options for structuring the contracts.

In the final section of the paper, the use of “Market-Informed Sourcing” (advanced sourcing technology) is briefly discussed. This uses advanced mathematical techniques to solve such complex problems, and understanding what defines complexity will also help to indicate where this type of technology can potentially bring the most benefit to organisations.

Introduction

What is “complex sourcing?” And, more to the point, if this debate is not to be merely an intellectual exercise, why is it important for procurement practitioners to understand what it is?

A complex sourcing task, process or programme relates to the choice of supplier and contracting phases that we tend to consider as the core of the end-to-end strategic sourcing process. And “complex” means what it says on the tin – a more than usually difficult or challenging example of that task.

If that definition is accepted, then why should we spend time working out what defines “complexity” in this sense, and understanding the factors that contribute towards making a particular sourcing exercise complex? There are a number of good reasons to ensure procurement practitioners and functions do get to grips with this, including:

- ◆ **Prioritisation:** by definition, complex sourcing is more challenging for procurement to execute successfully, so it is important that procurement leaders consider prioritisation of this sort of work in terms of the resources, focus and effort that are put behind it.

- ◆ Closely related to that, **the skills, capability and resource** need to be considered carefully. Complex sourcing requires advanced skills from procurement professionals. It is a very long way from running through a standard “issue a tender and choose the lowest price” process.

- ◆ **Complexity tends to define opportunity:** as we will see, where there are many alternatives, a complex demand picture, multiple suppliers and offerings, there will be many different potential approaches and options, and therefore

more chance of achieving competitive advantage through the sourcing process.

- ◆ **Use of technology:** understanding where specialist technology can be most beneficially used in sourcing is another critical issue, and one that can contribute to achieving that value and competitive advantage.

Respecting Complexity

There is a myth around the procurement world, promulgated not just by practitioners, but by some consultants and solution providers, that sees complex sourcing as merely standard sourcing “but bigger.” If we can run a reverse auction with ten providers, surely one with a hundred is just a bigger version? Now in the case of a simple auction, the answer may well be yes. But when we get into complex sourcing processes, and some of the factors that follow, we move into a whole different field.

The sort of tasks we talk about under the “complex sourcing” banner, such as huge logistics tenders or multi-tier supply allocation or supply chain structuring tasks are not at all like a basic tender or auction. They take us into an area of complex decision theory and in particular introduce the concept of an NP-complete problem.

Without getting too deeply into the formal mathematics of this, what it means is that there is no single algorithm that solves the problem. So while you can solve some problems by applying a rule or algorithm – for example the way we were taught “long division” at school – there is no equivalent in this case, no single mechanism for solving the sort of complex sourcing problems we are discussing here.

Another way of looking at these problems is that the solution may be easy to check – but it is hard to find. It is easy to check that 565442×5345637 equals 3022647676554 . But

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if you are given 3022647676554, and told to find the two factors of that number, it is a much harder problem.

That means that methods that computer scientists might call 'iterative' and we might call "trial and error" have to be used, along with complex mathematical techniques involving estimation and optimisation. It is not impossible to solve such problems, and as Arne Andersson, founder of Trade Extensions, whose software is designed to handle these sourcing tasks says, "there is no problem that we have not been able to address," but it is not simply a case of applying a basic solution and "turning the handle."

The message here is not that we should be scared of complex sourcing problems, rather that we need to understand that complex problems need clever solutions to help us arrive at the best sourcing decisions. We do not need to understand the maths (and few do), but we do need to understand and respect the complexity of what we are working with in these cases.

Which Factors Do NOT Define a Complex Sourcing Process?

Before we get into what defines a complex sourcing process or initiative, it is instructive to consider what does not. That helps us to understand the issues, and clears up some of the confusion that is often seen around sourcing exercises.

The size of the spend in itself is not enough to define complexity. If we were looking to contract for 10,000 tonnes of crude oil, or some gold bars, the value of the contract could be enormous. But if the specification is clearly defined, and we are looking at a single delivery to a single point, then this is not a complex exercise. It might have elements of risk and of course value for money is a key driver, but the sourcing exercise is not inherently complex.

The importance of what is being purchased to the buying organisation is another factor that does not define complexity. A good example of this comes from monopoly supply-type situations. We might have some mission-critical software that is essential to our organisation, and where we are locked into a particular supplier. That is not a good position to be in, and there may be some complex actions we need to take to extract ourselves from that strategic situation. But the actual sourcing of the software would in fact be remarkably simple, with no real supplier choice.

Similarly, **risk factors** in general do not define complexity. Risk can come from supply-side issues, unreliable suppliers, geographic or political factors, and many other causes. But whilst there is a significant intersection here, a high-risk category or item is not necessarily complex; and a complex sourcing event is not necessarily high-risk (see Fig 1).

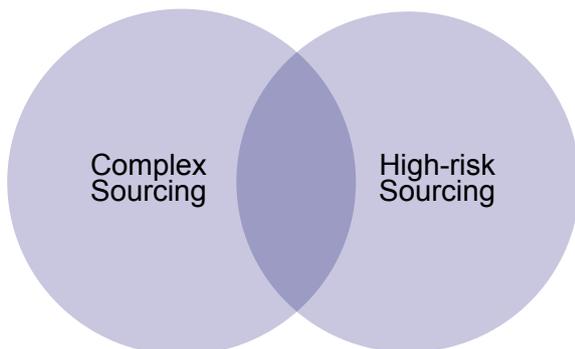


Fig. 1: Sourcing Categorisation and Intersection

Similarly, the **urgency of the requirement** does not impact the complexity. Whether the spend is mundane and not time-critical, or needed as a matter of life and death, does not determine complexity in the way we are considering it.

One point all of this does emphasise is how the **Kraljic Matrix** analysis does not help us to assess or indicate sourcing complexity. Kraljic (and those who have adapted his original work over the years) in his original Harvard Business Review article¹ models the markets from which purchases are made and suggests how the buyer might approach those markets depending on their power, supply security and the competitiveness of the market. But the quadrant of the matrix that a category or item might fit into tells us nothing about the sourcing complexity.

Which Factors DO Drive Complexity?

Understanding what does not drive sourcing complexity helps us to understand what does. In terms of identifying those factors and drivers, it is useful to consider them in three sub-groups: those "**internal factors**" that are driven by the nature of the buying organisation itself; those that are **market driven**; and those that arise from the **commercial models** that can be used for that spend category (usually driven by both market and buy-side factors). Fig. 2 shows a summary of these factors, described in more detail below.

Internally driven	Breadth and diversity of stakeholders - users, budget holders, etc.
	Breadth and diversity of the requirement - different options to consider
	The number of line items / variants / lots – volume-driven complexity
Externally driven	Supplier population - the number in the market or the sourcing exercise
	Alternative market solutions and offerings - the range of available options
	Capacity constraints - supplier limitations on volume
Commercial model	Supply chain options - different tiers or levels at which work can be done
	Pricing models - complex alternatives for pricing are available
	Options for conditionality - "if / then" proposals from suppliers to analyse

Fig. 2: Drivers of Sourcing Complexity Summarised

1. Internal Factors

The breadth and diversity of stakeholders

Perhaps the most obvious internal driver of complexity comes from the range of product or service users, budget holders or other internal stakeholders who have an interest in the category, item or project that we are considering. Experienced category managers know that managing a single stakeholder can be challenging, but

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is inherently a whole lot easier than trying to get multiple stakeholders aligned with a particular category strategy or market approach. Agreeing specifications, capturing personal preferences (and mitigating the risks around any inappropriate preferences), as well as the logistics of gaining agreement, or involving stakeholders in the procurement process appropriately, all add up to potential headaches for the buyer and greater complexity.

The physical breadth and diversity of the requirement

The physical spread of the requirement is often related to the last factor, but is subtly different (and we could conceivably have few stakeholders but a very well spread geographic need). Putting it simply, if goods or services need to be delivered or provided to many different locations, widely spread around many parts of the world, the sourcing will inevitably be more complex than a simple delivery to one point. This factor complicates the pure administration of the sourcing process and opens up more options in terms of supplier strategies, number of suppliers selected, and the like.

The number of line items / variants / lots

Whilst we said earlier that the size or volume of the sourcing requirement in itself does not cause complexity, there is a somewhat different volume factor that is significant. It is the number of line items, variants or lots included in the sourcing process. Now of course we might avoid this by sourcing every line item separately, but that is rarely feasible for resource reasons. And in many cases, it makes absolute sense to aggregate lines or variants, whether that is different parts or complements, logistics routes or lanes, or handling various professional services needs through a lotted framework strategy. But clearly the more line items (or equivalent) included in the sourcing, the more complex it is.

That complexity is increased if the variants have very different specifications; so if we take the logistics example, it is complex enough if we have multiple pick-up and delivery points to handle. But if we also have some that are ambient, some chilled, some frozen, some part-loads, some high-risk ... then we can see how that complexity is increased further.

2. External (Market) Factors

Supplier population

There can be little argument about this factor. As we said earlier, a buyer facing a true monopoly has a simple (if not very easy or pleasant) sourcing task. But the more suppliers there are in the particular market from which we are sourcing who could win the business, then the more inherently complex the sourcing task. That is both from a logistical and transactional point of view and for more strategic reasons. Logistically, handling a bidding process is more complex and resource-intensive with ten bidders or potential bidders rather than three, and more complex again with a hundred.

From a more strategic perspective, more suppliers almost always means more different options in terms of what the market can provide. That may well be good news in terms of ultimate value and opportunity for competitive advantage, but it makes the sourcing task more complex if we have more options potentially to consider.

The range of alternative market solutions and offerings

Complexity can certainly arise where we have a wide range of alternatives in terms of our internal specifications

and requirements. But another driver relates to where the market may have alternative ways of satisfying our needs. This factor is critical, and as we will discuss later, traditional sourcing and category management often puts effort into actually closing down these options, simply because they do generate such complexity. Yet this can be a source of great value. Allowing suppliers to offer their view of what they can most effectively and efficiently supply, rather than following a tender requirement to the letter, can release real benefits for the buyer. That can come from using an output or outcome-based specification, where the supplier has freedom to suggest different ways of achieving what we want. The other flexibility may be to allow suppliers to satisfy just part of the overall requirement, again, something that conventional sourcing processes often discourage.

Capacity Constraints

Complexity can be driven by the capacity situation of the firms bidding to win the work. If the volume required by the buying organisation is such that some or all bidding firms are likely to have capacity limitations (i.e. they cannot supply the entire required volume), then this introduces another factor that must be considered. This is perhaps most acute when there are multiple lots or call-offs within the sourcing exercise and contract. A supplier may bid for multiple lots knowing that they could not actually meet the capacity if they were to win all the lots for which they bid. Clearly, the buyer needs to take this into account when evaluating and choosing suppliers to avoid running into trouble later.

3. Commercial Models

Supply chain options

Where there are different tiers to a supply chain, complexity is increased. So for example, consider a major printing requirement, which could include purchase of the paper, the actual printing, and a logistics-related set of tasks (storage, handling and perhaps even distribution for the final product). What is the best way to source this requirement? Aggregate the different aspects of the supply chain into a single contract, or source the different elements separately? Historically, buyers have had the choice of aggregating but then restricting the market options, as few suppliers could do the entire package of work, or splitting the requirement which increases the volume of work for the buying organisation and procurement function. But intrinsically, this type of sourcing is complex, or, to turn that around positively, presents opportunities to drive value and advantage if the buyer uses a tool that allows them to source all of the elements of the supply chain separately and simultaneously.

Pricing models

If suppliers are required or allowed to make complex offers in terms of costs and prices, then this increases complexity. So this might be driven by the complexity of the market or requirement to some extent, or by the desires of the buyer or suppliers, but it may end up with quotes, bids or tenders that have multiple elements, volume-related price breaks or pricing that is time-variable. All can generate complexity, certainly in terms of how that sourcing and supplier selection process is executed.

Options for conditionality

A somewhat more subtle complexity arises where the nature of the requirement allows or invites suppliers to make conditional offers. So a supplier may wish to put forward various "if ... then" type offers. "If you buy more than 500 tonnes of wheat, we will offer a discount on all your purchases with us across different products." Or perhaps "if you give us at least 10% of your volume in

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Germany, we will hold prices for three years.” This is yet another case where much conventional sourcing practice has actively discouraged suppliers from making such offers because of the difficulty in handling and assessing such proposals, simply because of the complexity that is introduced to the process.

The Opportunity for Market Informed Sourcing

In our previous papers related to this topic (‘Sourcing Optimisation – Extracting Value from Complexity’² and ‘Market-Informed Sourcing: A game changer for Procurement’³), we commented on how traditionally Procurement has addressed complex sourcing. Fundamentally, procurement practitioners, including category managers, have tended to rely on simplifying matters before going out to the market. That has been driven by a need to turn the sourcing exercise into something manageable – rather than because that was the best thing to do.

So a category manager, assuming they are competent, will research the market and suppliers, and make sure they understand the internal dimensions too – the requirements from a volume, timing and specification point of view. They will then work out to the best of their ability how to frame the requirement that is presented to the market. In most occasions, purely to make the sourcing exercise manageable, that will take away some of the options from the market. For instance, the tender presented to the market might say:

- You must be able to deliver to all our factories around Europe.
- A supplier must commit to 12 month availability of the product.
- This tender is independent from other current sourcing exercises we are running and evaluation will be based purely on the figures you submit here.
- We reserve the right to split our business but any supplier bidding must be able to provide at least 20% of our total requirement.

These are all conditions that we place on suppliers, and they all act as restraints in terms of the flexibility, creativity and value that suppliers may be able and willing to offer.

And the more complex the sourcing exercise, the more likely it is that we are losing potential value by restricting suppliers in this manner. That is where **MIS** (market-informed sourcing as we call it – also known as optimisation, advanced sourcing or expressive bidding) comes in. The process and the supporting technology allows potential suppliers to propose alternatives in terms of the scope of their supply, location, pricing options, conditionality and so on.

The complex mathematical algorithms that sit at the heart of the technology can then work out the best (“optimal”) solution for the buyer, and then allow different options to be assessed and considered based on introducing various

constraints. This means that not only is the operational challenge of complex sourcing made manageable, but the opportunity to realise the value inherent in most complex challenges can be released.

So, having analysed which of the sourcing categories and exercises that are required fall into this “complex” category, buyers should consider whether and how MIS can be used positively in those more complex cases. In our experience, even those firms that have adopted MIS often miss opportunities to use it more widely. And any large firm that has not considered the process at all is in danger of losing out competitively to those who are users.

Conclusions and Three Key Take-Aways

There are a number of factors that drive complexity in sourcing tasks and processes. Some are relatively obvious and some less so, but they can all contribute to the challenge of executing sourcing effectively when they apply. Yet by their very complexity, these examples are also likely to provide considerable opportunity for the buying organisation to achieve improved results when an appropriate sourcing process is introduced.

It is also important to recognise and respect this complexity; some of the typical “complex sourcing” tasks represent mathematical challenges of the highest order. The sort of examples discussed here require the most advanced sourcing technology if buyers are going to achieve those results.

So finally, what are the headlines about complex sourcing that procurement executives need to remember? Here are three key points.

- 1. Analyse spend categories and individual contracting events in terms of their complexity as well as size and criticality.**
- 2. Prioritise procurement effort in terms of resource, skills and technology and make sure there is sufficient focus on those most complex sourcing categories and projects, as they will also be those that present the most opportunity.**
- 3. Consider market-informed sourcing technology and processes for the more complex sourcing challenges faced by the organisation.**

¹ Kraljic, P. (1983) ‘Purchasing Must Become Supply Management’, Harvard Business Review <https://hbr.org/1983/09/purchasing-must-become-supply-management>

² Smith, P. (2011) ‘Sourcing Optimisation – Extracting Value from Complexity’, Spend Matters UK/ Europe <http://spendmatters.com/research-library/papers/sourcing-optimisation-extracting-value-from-complexity/>

³ Smith, P. (2011) ‘Market-Informed Sourcing: A game-changer for Procurement’, Spend Matters UK/ Europe <http://spendmatters.com/research-library/papers/market-informed-sourcing/>

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Contact Trade Extensions via www.tradeextensions.com or info@tradeext.com
Tel. +1 (855) 215 8387 (USA) +44 (0)1760 720746 (UK/Europe)