Good Team Players? The Impact of Team Member Knowledge, Skills, and Abilities on Sourcing Teamwork and Sourcing Task-Work Effectiveness

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Structured Abstract

Purpose:

The aim of this paper is to enhance understanding of the use of sourcing teams by organisations in their procurement and supply chain management. The paper achieves this by exploring, within the context of the supply chain directorate of a global aerospace manufacturing company, GAMC, both the relationship between sourcing teamwork effectiveness (TE) and sourcing task-work effectiveness (TA) and the relationship between individual team member knowledge, skills, and abilities (KSAs) and TE.

Design/Methodology/Approach:

The authors develop a theoretical model positing positive links between both KSAs and TE and TE and TA. The model is empirically validated using partial least squares structural equation modelling (PLS-SEM) in a survey of 108 sourcing team-members from a global aerospace manufacturing company, GAMC.

Findings:

The authors identify that, within GAMC, four of five KSAs drive TE, and further discover the direct effects of TE on improved TA. Additionally, we observe within GAMC indirect effects of KSAs on TA cascading through TE.

Research limitations/Implications:

Limitations include the use of a single firm and self-report measures for data collection. Despite this, the paper has numerous research implications. Previous research on sourcing teams has combined factors related to TE and TA. In this paper, TE and TA were disaggregated and the relationships between them explored. The relationships were found to be positive within GAMC, a finding which strengthens the evidence base supporting the use of sourcing teams by organisations in their procurement and supply chain management. In addition, the paper also strengthened the evidence base regarding the importance of KSAs to TE, which complements existing research highlighting the importance of team-level factors and individual technical attributes.

Practical implications:

Our findings from GAMC suggest that executives/managers should take an individual as well as a team-level perspective when developing sourcing teams and should consider KSAs as well as technical knowledge when judging individuals' suitability for inclusion within a sourcing team. There are established KSA tests in the literature that could be used by managers in this task. The findings also inform executives/managers that TE matters for TA and needs attention and investment, especially where sourcing tasks concern high value spend areas and/or critical incidents within supply chains.

Originality/Value:

This is the first paper to explore the relationship between TE and TA. Establishing that this relationship is a positive one provides critically important evidence regarding the efficacy of sourcing teams, which are widely used within procurement and supply chain management. It is also a rare study looking at TE from a perspective of individual team member KSAs, with further positive relationships revealed. Both findings enhance what is a very limited literature on a widely used practice within procurement and supply chain management.

Keywords
Team member knowledge, skills, and abilities; sourcing teamwork effectiveness; sourcing task-work effectiveness.

1. Introduction

As noted by several authors (Driedonks *et al*., 2010; Kiratli *et al*., 2016; Meschnig and Kaufmann, 2015), including within these pages (van den Adel *et al*., 2023), a rise in the role and status of procurement functions in many organisations over recent decades has been accompanied and arguably aided by an increasing use of cross-functional sourcing teams (STs). Such teams are often part of a strategic sourcing or category management approach, which has replaced reactive, clerical approaches, increased procurement maturity (Gottfredson *et al*., 2005; O'Brien, 2019) and is part of the procurement function and wider procurement activity (where it is cross-functional and involving the extended supply chain) increasingly contributing to the organisation's sustainable competitive advantage via providing both distinctive and dynamic capabilities (van den Adel *et al*., 2023; Fu *et al*., 2013; Teece *et al*., 1997; Wilhelm *et al*. 2022).

The aim of using STs has been to achieve greater sourcing teamwork effectiveness (TE), delivering in turn improved sourcing task-work effectiveness (TA). It is argued that for a team to be effective, it must successfully perform both teamwork and task-work (Fisher, 2014). Teamwork refers to the shared behaviours, attitudes, and cognitions necessary for team members to undertake their work-related activities (Morgan *et al*., 1993). Task-work refers to the specific work-related outcomes a team needs to deliver to achieve its goals (Wildman *et al*., 2012).

TA has, of course, many aspects (see, for example, the agenda of Rozemeijer *et al*., 2012), but is framed here in terms of six features affecting the clarity and completeness of sourcing strategies. A sourcing strategy is a strategy for procuring a product type or service with the aim (although not certainty) of obtaining good value for money. Cross-functional team members come together within a ST and offer different knowledge sets which assist with ensuring a sourcing strategy is robust. For example, a team within the paper's focal organisation, GAMC, produced a sourcing strategy for procuring fan blades, a key aerospace component. This strategy was implemented over time, as events proceeded through the 'RFP', bid comparison, negotiation, supplier selection, contract signing and contract management/joint working. The sourcing strategy informed how these steps were undertaken, either by certain team members (especially the procurement member) or managers outside the team (for example, junior procurement managers handling the RFP or factory managers during contract management).

The six sourcing strategy features we focus upon here are the design of the purchase specification, objective-setting, internal organisational governance arrangements for negotiations and contract management with suppliers (for example, limiting the number of managers within the wider organisation that can be in contact with suppliers during live negotiations), and commercial risk assessment (Contractor *et al*., 2010; Cox *et al*., 2005; Day *et al*., 2011; Dowlatshahi, 1992; Foerstl *et al*., 2013; Meehan and Wright, 2012; Sebenius, 2001; Williamson, 2008). Business surveys have frequently reported that TA is weak or under-developed in organisations (4C Associates, 2023), highlighting the need for this research.

The increasing use of STs has required organisations and procurement functions to develop a deep understanding of the factors driving teamwork effectiveness. This has been the subject of considerable research within the HRM literature (see Salas *et al*., 2015 for an overview). Studies have explored the drivers of, and obstacles to, effective teamwork in various contexts such as new product development (Holland *et al*., 2000) and project management (McComb *et al*., 2008).

A more limited body of research has also been compiled on sourcing team effectiveness (Driedonks *et al*., 2010 and 2014; Kaufmann and Wagner, 2017; Kiratli *et al*., 2016; Meschnig and Kaufmann, 2015; Trent and Monczka, 1994), and on the organisational challenges of using STs (Franke and Foerstl, 2021). This is part of a wider strand of the procurement and supply chain management literature exploring organisational and human resource management practices, which addresses the concern that procurement and supply chain management research often ignores the human dimension (Feisel *et al*., 2010; Foerstl *et al*., 2013; Franke and Foerstl, 2020; Schorsch *et al*., 2017; Stanczyk *et al*., 2015; Tassabehji and Moorhouse, 2008; Wagner and Kemmerling, 2014), a concern that has been discussed within this journal (Flothmann *et al*., 2018; Fu *et al*., 2013).

In this paper, we add to this limited literature on STs by reporting quantitative research on their use within the supply chain directorate of a global aerospace manufacturing company, anonymised as GAMC. At the time of the research, the company had recently overhauled its use of STs and thus provided an ideal research context. GAMC gave the authors extensive access to their STs, not always straightforward within the aerospace sector, allowing them to survey managers from multiple functions and countries.

We contribute to the extant literature on STs in three main respects. First, we add empirical data to what is a limited evidence base when compared to the high usage of STs in practice. Driedonks *et al.*'s (2014, 289) comment that "[Propositions on sourcing teams] have hardly been tested empirically" still stands, as does their earlier contention that academics have yet to "provide guidance for purchasing managers in today's business environment" regarding the use of such teams (Driedonks *et al*., 2010, 110). The paper addresses this important and perplexing deficit within the procurement and supply chain management literature.

Second, we build upon a previous study (Sanderson *et al*., 2022) which explored the importance of individual team member knowledge, skills, and abilities (KSAs) (Aguado *et al*., 2014; Stevens and Campion, 1994; Stevens and Campion, 1999) as drivers of TE, in contrast to the aggregate team-level factors identified in other ST research (van den Adel *et al*., 2023; Driedonks *et al*., 2010 and 2014). If STs are to be expected to function effectively, thought needs to be given to team membership. Such membership partly needs to be based upon individual technical knowledge, as discussed in these pages (Barragan *et al*., 2003; Fu *et al*., 2013). However, the suitability of team members is not merely a technical issue (Englyst *et al*., 2008; Franke *et al*., 2022; McMullan *et al*., 2020) and establishing the individual team member KSAs (which have been defined as encompassing conflict resolution, collaborative problem solving, communication, goal setting/performance management and planning/task coordination (Stevens and Campion, 1999)) that might contribute to effective participation in STs is a critical, yet under-researched issue.

Third, a further contribution of the paper is that we provide a disaggregated sourcing team effectiveness analysis, making a clear distinction between teamwork and task-work and examining the relationship between these dimensions. This responds to the call in Sanderson *et al.* (2022) and differs from other ST research that looks at these dimensions in combination (Driedonks *et al*., 2010 and 2014). To facilitate such an analysis, we adopt a two-stage structural equation model, assessing (a) whether KSAs drive TE and (b) whether TE leads to improved TA, in the form of sourcing strategies to be used in dealings with suppliers for individual products and services. Conducting the analysis in this manner adds important additional nuance to existing research.

2. Theoretical foundations

Sundstrom *et al*. (1990, 120) define work teams as "interdependent collections of individuals who share responsibility for specific outcomes for their organizations." Salas *et al*. (2015, 600) add that these individuals "interact dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission." According to a survey cited by Kiratli *et al*. (2016), 70 per cent of organisations have used STs as part of efforts to develop more proactive and better-informed sourcing strategies.

Research into sourcing team effectiveness to date has typically explored the issue from an aggregate team-level perspective. Important findings have suggested the importance of team autonomy and formalization (Driedonks *et al.*, 2010 and 2014), the creative climate created (Kiratli *et al.*, 2016), the extent to which team decision-making approaches are rational or intuitive (Kaufmann, Meschnig and Reimann, 2014), the degree of internal integration (van den Adel *et al.*, 2023), the degree of consensus between team member objectives (Meschnig and Kaufmann, 2015), and the diversity of team member personality traits (Kaufmann and Wagner, 2017). Where individual team members have been considered, technical attributes (Barragan *et al.*, 2003; Fu *et al.*, 2013) and motivation (Englyst *et al.*, 2008; Franke *et al.*, 2022), both undeniably important, have been the focus. Research has also investigated how cross-functional conflict and politics can impact upon sourcing team effectiveness (Franke and Foerstl, 2021).

This paper builds upon these important findings by focusing upon the contribution of individual sourcing team member KSAs to TE and the relationship between TE and TA.

2.1. Research model and hypotheses development

The research model presented in Figure 1 posits seven hypotheses regarding (a) the relationships between KSAs and TE and (b) the relationships between TE and TA. Each of the hypotheses is theorised as being direct and positive.

Figure 1 about here

In the first stage of the model, we adopt the KSA constructs and indicators proposed by Stevens and Campion (1994 and 1999) and updated and enhanced by Aguado *et al.* (2014). In the second stage, we assess TE by using indicators from Driedonks *et al.* (2010) related to general overall team effectiveness and external cooperation effectiveness. The final stage of the model considers two dimensions of TA, clarity and completeness of sourcing strategy, based on relevant procurement and contracting scholarship.

2.2. Individual team member KSAs as drivers of sourcing teamwork effectiveness

Studies of sourcing team effectiveness have a substantial wider team effectiveness literature to draw upon (see Kozlowski and Illgen, 2006 and Salas *et al*., 2015 for reviews). For example, Driedonks *et al*. (2010 and 2014) examine a range of team-level factors believed to drive effectiveness, including employee involvement context (Cohen *et al*., 1996), organisational context (Workman, 2005), and team composition (Keller, 2001). Our study utilises a different strand of the team effectiveness literature, which focuses upon the individual team member KSAs needed to contribute to effective teamwork (Aguado *et al*., 2014; Stevens and Campion, 1999). Specifically, we draw from the widely used and much tested (for example, O'Neill *et al*., 2012) framework of Stevens and Campion (1994; 1999) and the updated and enhanced framework of Aguado *et al*. (2014). Both of these frameworks draw a distinction between individual KSAs and personality traits or dispositions (Kaufmann and Wagner, 2017), arguing that KSAs are more amenable to training and management intervention and so make a more reliable basis for team selection.

The original framework groups team member KSAs into two types, inter-personal (conflict resolution, collaborative problem-solving, and communication) and self-management (goal setting and performance management, and planning and task coordination) (Stevens and Campion, 1994; 1999). Inter-personal KSAs are understood as "the ability to maintain healthy working relationships and react to others with respect for ideas, emotions, and differing viewpoints" (Stevens and Campion, 1994, 506). Self-management KSAs, meanwhile, are understood as the ability to have "significant control over the direction and execution of [the team's] tasks" (Stevens and Campion, 1994, 514). Aguado *et al.* (2014, p101) comment that such KSAs can help “make an ‘expert team’ out of a mere ‘group of experts’.” In what follows, we develop a series of hypotheses specifying why these team member KSAs might drive TE.

Conflict Resolution: By definition, a cross-functional ST contains members with different occupational backgrounds and work experiences. This ‘demographic diversity’ (Knight *et al.*, 1999) can cause members to possess different perspectives, values and goals and can lead to team conflict (Franke and Foerstl, 2021; Franke *et al.*, 2021), for example regarding product specification (Cox *et al.*, 2005) or supplier selection (Brewer *et al.*, 2019). Such task conflict (Simons and Peterson, 2000), unlike inter-personal conflict, need not necessarily be destructive to team effectiveness. Indeed, it can act as a pressure valve (Stevens and Campion, 1994), lead to knowledge exchange and creativity (De Dreu, 2006; Franke and Foerstl, 2018), and facilitate greater team and stakeholder acceptance of ultimate decisions (Stevens and Campion, 1999). The key is for a team to have individuals within it able to prevent conflicts from escalating to destructive levels by being able to identify both the sources of conflict and suitable conflict resolution methods (Behfar *et al.*, 2008). If teams contain individuals with such KSAs, it can be argued that those teams will exhibit greater teamwork effectiveness. Thus, we hypothesize:

H1: Conflict resolution KSAs positively affect TE.

Collaborative Problem-Solving: Within STs, collaboration can permit different perspectives, higher and more varied levels of relevant information and increased likelihood of team acceptance of decisions (Laughlin, 2011), enhancing ST outcomes (Stevens and Campion, 1994). Conversely, it can lead to ‘groupthink’ (Martin and Hewstone, 2008) and delay (Webber and Donahue, 2001). Such problem-solving should only be employed by teams, therefore, when warranted, for example by the complexity and riskiness of a sourcing decision (Hagemann and Kluge, 2017). In such situations, a team needs to contain individuals who have the KSAs to identify problems that require such an approach, to direct the approach, and steer it away from potential downsides. Thus, we hypothesize:

H2: Collaborative problem-solving KSAs positively affect TE.

Communication: Communication KSAs are relevant to TE, because sourcing is a boundary-spanning and cross-functional activity and STs often operate virtually (Trent, 1998). The team literature calls for greater 'decentralization' in communication channels to facilitate rapid and accurate distribution of information both within teams and with external stakeholders (Grund, 2012), a communication style which is open, informal, relaxed, and supportive to facilitate trust and a willingness to raise issues of concern (Webster and Wong, 2008), and well-developed, non-judgemental listening skills (Kluger *et al.*, 2020). Well-developed social skills are said to sustain morale and commitment (Pullin, 2010). Accordingly, if members possess such communication KSAs, it is argued the ST will be more effective in both its work and its ability to gain the support of stakeholders. Thus, we hypothesize:

H3: Communication KSAs positively affect TE.

Goal Setting and Performance Management: Having a well-defined goal is critical to teamwork effectiveness (Van Mierlo and Kleingeld, 2010), with the goal of a ST typically being to find, select, and contract effectively with one or more suppliers (Driedonks *et al.*, 2010). It has also been shown that an appropriate level of goal difficulty – challenging, but attainable – can be beneficial. Then, once goals are set, team members need to monitor and evaluate the performance of the team and of individual team members. It is important, therefore, that ST members have KSAs relevant to goal setting and performance management if they are to exhibit teamwork effectiveness. Thus, we hypothesize:

H4: Goal setting and performance management KSAs positively affect TE.

Planning and Task Coordination: Finally, Stevens and Campion (1994) propose that the ability of team members to plan and coordinate their tasks, simultaneously allocating clear task responsibility, is a fifth important driver of teamwork effectiveness. There can often be significant task interdependence between members of a ST, necessitating extensive planning and co-ordination, as the alignment of procurement activities with an organization's strategic objectives requires cross-functional integration and coordination between business units (Franke and Foerstl, 2021). A key KSA, therefore, is for ST members to be able to recognise task interdependencies and to coordinate their activities within the team (Fisher, 2014). For example, within a manufacturing context, a design engineer needs to recognise that product design changes will have an impact on the purchase specification that may, in turn, have commercial implications for the tasks of procurement managers within the ST. Thus, we hypothesize:

H5: Planning and task coordination KSAs positively affect TE.

2.3. Sourcing teamwork effectiveness as a driver of sourcing task-work effectiveness

In the second stage of our model, we adopt indicators of TE within two dimensions drawn from the work of Driedonks *et al.*, (2010). First, indicators relating to general overall team effectiveness such as the quality of the team's work, the team's level of output, and the comprehensiveness of the team's planning. Second, indicators relating to external cooperation effectiveness, which concern stakeholder management and the ability to work with others in the organisation, but outside the team (Foerstl *et al.*, 2013). This reflects the dependence of ST success on the level of stakeholder alignment (Franke and Foerstl, 2021).

The third stage of our model concerns TA, a construct built around six critical features of sourcing strategies. Three of these contribute to the clarity of the sourcing strategy. First, the development of clear objectives for negotiations with suppliers. It has been argued that managers and organisations often place too much emphasis on the negotiation event itself, seeking to perfect tactics and non-verbal behaviours at the expense of critical diligent preparation of clear objectives in terms of reservation positions, opportunities for mutual gain and most desirable outcomes (Sebenius, 2001). The second and third practices are about establishing clear roles and responsibilities for both negotiations and contract management, part of what is referred to as internal organisational negotiation and relationship governance (Day *et al*., 2011). This includes deciding who within the wider organisation (i.e. outside of the ST) should and should not be able to have contact with suppliers during the negotiation and contract management phases. Such governance arrangements have been shown to be critical to the effectiveness of sourcing, as they increase the likelihood of appropriate allocation of responsibility, manager confidence in their given remit, and discipline in terms of communication with suppliers (Foerstl *et al*., 2013).

The other three features contribute to the completeness of the sourcing strategy. First, the development of a comprehensive and precise product or service specification that considers both the functional requirements of the buying organisation (Dowlatshahi, 1992) and the commercial implications of potential over-specification (Cox *et al.,* 2005). Second, a considered make-buy decision, exploring whether the product, service or process should be delivered in-house, bought, or sourced concurrently, given the extent to which it is core to the organisation's competitive position (Contractor *et al*., 2010). Third, consideration of the competitive dynamics within the relevant supply market, specifically supply market competition and power relations (Meehan and Wright, 2012) and asset specificity and switching costs (Williamson, 2008).

A clear and complete sourcing strategy, for example, for fan blades (to use the aerospace purchase mentioned earlier) would include a precise blade specification, consideration of whether it should be made by the organisation or bought from suppliers, extensive fan blades market analysis, clear negotiation objectives for when contact with suppliers commences and clear arrangements for who within the wider organisation (i.e. outside of the ST) should and should not be able to take part in negotiations and subsequent contract management.

The final two hypotheses propose that TE is significantly associated with TA. The reasoning is as follows. First, while the inherent heterogeneity of a ST has the potential to bring destructive conflict, it can also be a basis for TA if marshalled by effective teamwork. As Kiratli *et al.*, (2016, 196) note, STs "pool the problem-solving capabilities and specialized knowledge of employees from different functional backgrounds", which is essential when sourcing strategies need to make trade-offs between commercial, technical, legal, and other objectives such as sustainability (Lonsdale *et al*. 2017). In terms of specific links with TA, the inherent heterogeneity of a ST can assist both in the trade-offs involved in developing the specification (which in turn influences levels of asset specificity and supply market competition) and in the compilation of balanced negotiation objectives. It is further argued that the potential of a cross-functional ST to enhance these aspects of TA is better realised when it exhibits general overall team effectiveness in terms of high work quality, quantity, and efficiency.

Meanwhile, we relate external co-operation effectiveness to enhanced TA with respect to two management practices (Driedonks *et al.*, 2010). First, an ability to communicate, co-ordinate and co-operate with stakeholders outside the ST is a critical factor in being able to establish clear internal organisational negotiation and relationship governance arrangements within the sourcing strategy. Such governance requires managers within the wider organisation to recognise the need for, and to agree to abide by, a strict allocation of roles and responsibilities during negotiation and contract management (Day *et al.*, 2011). Second, external co-operation effectiveness will allow the ST to benefit from the input of non-team members regarding specifications, negotiation objectives and commercial risk analysis. We therefore propose two further hypotheses suggesting that TE is a driver of TA:

H6: Sourcing teamwork effectiveness positively affects clarity of sourcing strategy.

H7: Sourcing teamwork effectiveness positively affects completeness of sourcing strategy.

3. Research methodology

3.1 Research design

The hypotheses were empirically tested by gathering quantitative data from a global aerospace manufacturing company (GAMC). Conducting the research within the aerospace sector was deemed appropriate for two main reasons. First, aerospace production involves a high level of technical and commercial complexity, numerous cross-functional tasks and problems, and a high proportion of third party spend (it was over 60% of firm revenue in GAMC). Such circumstances are, as was found in GAMC, likely to lead to long-standing ST use, providing a mature environment within which to conduct ST research. In the case of GAMC, at the time of the research, the company had recently adopted its latest iteration of ST format. Second, past research has not explored ST use within this sector. Previous studies have either used student surrogates (Franke *et al*., 2022; van den Adel *et al*., 2023), mixed industrial samples not including aerospace (Driedonks *et al*., 2010 and 2014; Kiratli *et al*., 2016; Meschnig and Kaufmann, 2015) or samples not named (Englyst *et al*., 2008; Kaufmann and Wagner, 2017). This paper, therefore, as well as providing a theoretical contribution to the literature, also provides a unique empirical contribution by providing a study in a previously unresearched, yet highly appropriate industrial sector. Indeed, it is the first paper to research within a single, named industrial sector of any kind.

In terms of the research design process, following ethical approval from the authors' institution, a survey instrument developed from the literature was pretested on selected academics and professionals to ascertain face and content validity and to hone the survey wording. The final questionnaire was then sent to respondents within GAMC. Several tests were conducted based on the responses to check for any non-response or common method bias in the sample to prevent irregularities during survey administration. After the validation, measurement models were developed and assessed to check their validity. Subsequently, all hypotheses on the research model were evaluated with partial least squares structural equation modelling (PLS-SEM). H1-H7 were tested by evaluating the causal effects of the research variables. These processes are described in detail below.

3.2 Measures

A five-point reflective Likert-type scale was applied to all multi-item constructs, and each item was measured from "strongly disagree" to "strongly agree". For independent variables (KSAs), the questionnaire includes (1) four Conflict resolution items; (2) six Collaborative problem-solving items; (3) five Communication items; (4) five Goal setting and performance management items; and (5) five Planning and task coordination items, which are modified from Stevens and Campion (1994) and Aguado *et al.* (2014). For the focal construct, eight TE items are developed from general team effectiveness and external cooperation effectiveness measures, modified from Trent and Monczka (1994) and Driedonks *et al*. (2010). The TA construct comprises two variables, clarity of sourcing strategy and completeness of sourcing strategy, each containing three items developed from: Contractor *et al* (2010); Cox *et al.* (2005); Day *et al.* (2011); Dowlatshahi (1992); Foerstl *et al.* (2013); Meehan and Wright (2012); Sebenius (2001); and Williamson (2008). These items were operationalised to examine the KSA-TE-TA relationships. The research constructs and indicators are provided in the appendix in Table 1.

3.3 Data collection

The data collection process was managed by an online survey tool and was structured to ensure unique responses from validated GAMC managers. A total of 237 GAMC managers with remits relating to STs were sent an invitation email linking to the survey, with a follow-up reminder email sent two weeks later. We achieved a 45% response rate (108 usable responses), which is line with similar surveys in the field (e.g., Agarwal *et al.*, 2018) and is deemed adequate (Baruch and Holtom, 2008). All the respondents hold management positions; the majority were procurement managers (59), followed by 37 engineering managers, and 12 executive managers. To the best of our knowledge, not many empirical studies have made inquiries in the aerospace sector with respect to sourcing teams given the limited accessibility (Williams *et al.*, 2020). The sample demographics are presented in Table 2.

Table 2 about here

3.4 Data assessment

We tested for non-response bias as the survey invitations were distributed in two waves, 48% early respondents and 52% late respondents. A comparison of the means of the research variables for the two groups was conducted using one-way ANOVA (Lambert and Harrington, 1990). The results of t-tests revealed that the respondents did not differ significantly at the 0.05 level, suggesting that non-response bias was not a problem in this study.

We then checked for common method bias, associated with our use of self-report measures, using several procedures. Initially, to avoid 'common rater' effects due to a perceived need to provide consistent or socially desirable answers, we gave respondents a guarantee of anonymity (Esfahbodi *et al.*, 2023). We then used Harman's single factor test to test the existence of common method bias. An un-rotated exploratory factor analysis integrating all the variables showed no sign of a single factor accounting for most of the covariance in the sample (<22.8%), suggesting a lack of common method bias (Podsakoff et al., 2003). We also conducted the marker-variable test (Lindell and Whitney, 2001) in which the lowest bi-variate correlation among the variables was employed as the marker variable to check for the impact of method variance (Craighead *et al.*, 2011). The adjusted correlation matrix was computed and tested with the significance of the adjusted correlations (Chan *et al.*, 2016). A comparison of the original and adjusted correlations indicated that all correlations remained significant after adjustment, suggesting that our data do not suffer from common method bias.

Additionally, we tested for measurement invariance among the two groups, procurement and non-procurement participants, to ensure measurement equivalence (Knoppen *et al.*, 2015). As suggested by Steenkamp and Baumgartner (1998), we performed a two-group invariance test with multi-group CFA in LISREL 8.50 to assess two models representing configural and metric invariance (Jøreskog and Sørbom, 2001). The configural invariance model serves as the baseline model against which nested models are compared (Podsakoff *et al.*, 2003). First, configural invariance was tested without imposing any equality constraints. The goodness-of-fit results are as follows: $\chi2 = 733.6$, df = 578, $\chi2/df = 1.269$, TLI = 0.911, CFI = 0.924, RMSEA= 0.059. Model fit is considered adequate when the score of the relative Chi-square ($\chi2/df$) is less than 3.0 (Kline, 2016), the CFI and TLI values are greater than 0.90, and the RMSEA value is smaller than 0.08 cut-off (Hair *et al.*, 2010). The model exhibits good fit to the data, thus supporting configural invariance. Second, metric invariance was tested by constraining all free factor loadings to be equal across the two groups. The model fit of the metric invariance model is also considered satisfactory: $\chi2 = 761.5$, df = 604, $\chi2/df = 1.261$, TLI = 0.907, CFI = 0.936, RMSEA= 0.055. A $\chi2$-difference test was also performed, and no significant change was found between the configural invariance model and the metric invariance model ($\Delta\chi2 = 27.9$, $\Delta df = 26$, $p > 0.05$), which supports metric invariance. Overall, the results of the invariance tests were satisfactory and measurement equivalence is confirmed.

3.5 Measurement assessment

Several tests were conducted to evaluate measurement validity. Since all scales were taken directly from prior research, content validity is assumed. First, internal consistency and convergent validity were assessed. An exploratory factor analysis (EFA) using principal components and varimax rotation was conducted on each construct, using SPSS 24 software. This was followed by a confirmatory factor analysis (CFA) to estimate and assess the measurement models. The Kaiser criterion (≥1) is applied to determine the number of factors. Table 3 displays factor loadings, Cronbach's α, composite reliabilities (CR), and average variance extracted (AVE).

Table 3 about here

Based on the EFA results, six measurement items (CR2, CPS5, CPS6, CM4, PTC1, and TE1) were discarded due to either high cross-loadings or low loading on each factor, preventing their respective measure from converging as one factor. The factor loading of each remaining item exceeded the recommended minimum of 0.50., all loadings were significant ($p < 0.05$), and all AVE values were greater than the 0.50 benchmark (Hair *et al*., 2010), suggesting sufficient convergent validity. The Cronbach's α values exceeded the desired cut-off point of 0.70 (Taber, 2018), satisfying the requirement for sufficient reliability. Moreover, the composite reliability (CR) indices were greater than the 0.70 benchmark, indicating the internal consistency of the scales.

CFA was performed with LISREL 8.80 software to test unidimensionality, allowing all scales to be assessed within the context of the full measurement model (Jøreskog and Sørbom, 2001). The CFA results indicate that the Chi-square statistic ($\chi 2$) is 682.32 ($p = 0.000$), with a degree of freedom (df) of 451. Therefore, the relative Chi-square value ($\chi 2/df$) is 1.51, which is lower than the recommended threshold of 3.00 (Kline, 2016). The RMSEA value is 0.066, which is lower than the recommended maximum of 0.08 (Hair *et al.,* 2010). The other fit indices, including Normed Fit Index (0.91), Non-Normed Fit Index (0.93), Comparative Fit Index (0.97), and Incremental Fit Index (0.97), indicate that the measurement model fits the data well (Kline, 2016). Moreover, none of the standardised residuals exceeds the recommended 4.00 maximum (Hair *et al*., 2010), suggesting no concerns regarding degree of error.

Finally, we assessed discriminant validity using two analyses. First, a Chi-square difference test was performed for each pair of scales under consideration. Chi-square difference tests for pairings of each construct returned significant at the 0.01 level, suggesting that discriminant validity was acceptable (Farrell, 2010). Second, we employed the procedure proposed by Fornell and Larcker (1981) and the square root of the AVE correlated to each construct was found to be higher than the correlation between all pairs of variables, exhibiting sufficient discriminant validity.

4. Data analysis and results

The descriptive statistics, including means, standard deviations, skewness and kurtosis coefficients, and correlations analysed in SPSS software, are presented in Table 4. All variables are sufficiently normally distributed with skewness and kurtosis coefficients within the – 2.00 and + 2.00 range (Hair *et al*., 2010). The Shapiro-Wilks test was used to further assess whether the data violated assumptions of normality. The results revealed insignificant p-values for all variables, indicating the distribution of the data was not statistically different from a normal distribution and data normality is thus assumed (Curran *et al*., 1996).

Table 4 about here

We also checked for possible collinearity problems by examining variance inflation factors (VIF). The VIF values ranged from 1.403 to 1.886, significantly below the 10.0 cut-off (Hair *et al*., 2010), indicating that multi-collinearity was not a problem in our data.

4.1. Structural model assessment: hypothesis testing

The data were processed using partial least squares structural equation modelling (PLS-SEM) provided by SmartPLS 3.3.9 software (Ringle *et al*., 2015). PLS-SEM is adopted because it achieves high levels of statistical power with a small sample size (Agarwal *et al*., 2018; Hew *et al*., 2020; Svensson *et al*., 2018), and because it generally overcomes problematic model identification issues (Akter *et al*., 2017). Hair *et al*. (2017) also note that PLS-SEM ensures robust prediction in the context of a small sample size and suggest the minimum sample size should be 10 times the largest number of structural paths directed at a particular construct. Additionally, PLS-SEM is a robust and more advanced generation SEM technique, which allows simultaneous assessment of all causal relationships of underlying constructs and inclusion of all the variance (common, unique, and error) that exogenous variables have in common with endogenous variables in estimating the model relationships (Sarstedt *et al*., 2016).

After the structural model and hypotheses were built in SmartPLS, structural estimates were examined, reporting model validity, regression coefficient (β), t-value, and R-squared (R^2). Figure 2 illustrates the research model with PLS-SEM results specified in the SmartPLS output. The results indicate that the relative Chi-square value of 1.71 (697.75/408) is less than the 3.00 cut-off, and the RMSEA value of 0.074 falls within the acceptable range of 0.05-0.08 (Hair *et al.,* 2017). In addition, the NFI (0.909), NNFI (0.919), CFI (0.942) and IFI (0.941) all exceeded the 0.90 benchmark (Hair *et al.*, 2010), exhibiting a satisfactory model fit.

Figure 2 about here

The PLS-SEM results related to individual hypotheses are summarised in Table 5. H1 and H3 through H5, which predict positive associations between the KSAs and TE, are positive and significant as expected. The exception is H2, CPS → TE, which is not supported. H6 and H7 are positive and significant as expected, indicating that TE positively affects both clarity and completeness of sourcing strategy, leading to higher levels of TA. Additionally, we identify the indirect effects of KSAs on TA cascading through positive and significant pathways of CR→TE, CM→TE, GSPM→TE, and PTC→TE, which indirectly impact TA. The indirect pathways across KSA→TE→TA and direct effects between KSA, TE and TA are presented in Table 6.

Table 5 about here

Table 6 about here

4.2. Post-hoc analysis

To enhance the robustness of our findings, a bootstrapping procedure comprising 5000 sub-samples was applied to test the statistical significance of the path coefficients posited in the model. All the relationships in the model were statistically valid at the significance level (p value < 0.01, $t > 2.57$). Moreover, we conducted power analysis on the research model mindful of the small sample size (Marcoulides and Saunders, 2006). We employed the G*Power 3.1 software (Faul *et al*. 2009) to test the statistical power on each dependent variable in the research model. The effect sizes (f^2) were transformed from the corresponding R^2 values of the dependent variables (Chowdhury and Quaddus, 2017). The results revealed that the power statistics are all above the required level of 0.80 recommended by Cohen (1992), suggesting that statistical power is sufficient in this study. Therefore, our sample size is deemed satisfactory for the aim of our study.

5. Discussion

The findings here provide further evidence of the importance of STs to the effectiveness of procurement and supply chain management. The main findings are that, within GAMC, TE is positively associated with TA, in terms of both sourcing strategy clarity and completeness, and that TE is positively associated with most individual team member KSAs. Team member KSAs were also found to indirectly affect TA, through TE. That there should be such associations was expected given that, as mentioned, aerospace production is technically and commercially complex and involves many tasks and problems arising from such complexity that require cross-functional attention. It is an environment where effective STs are likely play an essential role. These findings are discussed in more detail below.

The first finding, regarding the TE-TA relationships within GAMC, provides further quantitative confirmation of the well-established importance of productive cross-functional input into sourcing strategies, as identified by both academics (Flynn *et al*., 2010; Foerstl *et al*. 2013) and professional institutes (Chartered Institute of Procurement and Supply, 2023). This confirmation occurs however in the much less researched context of STs. As such, the paper provides valuable empirical support for this type of cross-functional input and reinforces the importance of research into sourcing team effectiveness, which still needs further development (Driedonks *et al*., 2014; Franke and Foerstl, 2021).

This first finding aligns with our expectation that the array of technical and commercial elements in sourcing strategies are beyond the knowledge of any individual manager. This means in turn that the inherent heterogeneity of ST membership (Kiratli *et al*., 2016) and the contribution of TE, in the form of general overall team effectiveness and external co-operation effectiveness (Driedonks *et al*., 2010), are expected to play a critical role in facilitating TA. Inherent heterogeneity and general overall team effectiveness are to be expected to be a powerful combination in terms of undertaking analysis and setting objectives. This is then supplemented by an effective ST being able to obtain additional input into decision-making, or getting adherence to procurement governance arrangements, through productive engagement with external stakeholders facilitated by external cooperation effectiveness.

However, while it is clear why TE can lead to TA, TE cannot be taken for granted. The team member heterogeneity that makes such an important contribution to TA is also a potential obstacle to TE. As Franke and Foerstl (2021, 6) comment: "[D]iverse sourcing teams … face challenges from functional misalignment and conflicting motives that potentially interfere with rational decision-making processes." In this context, the second main finding revealed a positive relationship within GAMC between most of the KSAs and TE. We found that individual team member conflict resolution, communication, goal setting and performance management, and planning and task coordination KSAs are all important drivers of TE within GAMC. This confirms the findings of a previous study into KSAs and sourcing teamwork effectiveness (Sanderson *et al.*, 2022), and is consistent with the wider literature on cross-functional teams.

For example, prior research shows that conflict resolution KSAs play an important role within cross-functional teams where conflicting preferences and disagreements over objectives are a common feature of organisational life (Pratt *et al.*, 2006; Moses and Ahlstrom, 2008; Brewer *et al.*, 2019). Similarly, our finding that communication KSAs are strongly related to TE within GAMC is consistent with research showing that the effectiveness of teams playing a boundary-spanning role is heavily correlated with team members' ability to communicate with others internally and externally (Grund, 2012).

Interestingly, however, we found that collaborative problem solving KSAs did not have a significant positive association with TE within GAMC. This runs counter to the argument in the procurement literature that cross-functional collaboration is critical to purchasing effectiveness (Flynn *et al*., 2010; Foerstl *et al*., 2013). Our finding might reflect the risk identified in the wider literature that collaboration within a diverse team can cause delay and groupthink in decision-making (Webber and Donahue, 2001). Alternatively, it might be linked to the strong positive association we found between conflict resolution KSAs and TE. A working relationship between team members with typically conflicting preferences and objectives may have created an atmosphere not considered 'collaborative' by our respondents and one in which conflict resolution is business as usual. It may also reflect that much sourcing work now is executed electronically and that this might reduce a sense of collaboration in the traditional sense of the word.

Finally, while there are no direct relationships between team member KSAs and TA, a third more tentative finding is that there is an indirect path between these two constructs within GAMC through their significant and positive connections with TE. This might be due to the contribution of each of the KSAs individually to the building of TA, as well as the KSAs combining to enhance TE, although this proposition requires further research.

6. Conclusion

The literature on STs is surprisingly limited, especially given their importance to procurement and supply chain management within organisations, and even though the challenges facing such teams make them a rich topic for research (Franke and Foerstl, 2021). In this paper, we make a significant and original contribution to this literature by testing the relationships between sourcing teamwork and sourcing task-work effectiveness and by linking these to an individual team member KSAs perspective on the functioning of such teams. We did so by taking advantage of a unique opportunity to generate quantitative survey data on the use of STs by the supply chain directorate of a major global aerospace engineering company.

Implications for the literature

In the extant sourcing team effectiveness literature, some authors have combined supply base management effectiveness, an aspect of sourcing task-work, with generic measures of teamwork effectiveness (Driedonks *et al*., 2010). In this paper, we build upon and extend insights from this prior research by testing a model that disaggregates sourcing team effectiveness into its teamwork and task-work dimensions and explores the relationships between them. Our findings on STs at GAMC show significant positive relationships between TE and TA. We explain these relationships in terms of general overall team effectiveness and effectiveness in stakeholder engagement (i.e. external co-operation effectiveness) being combined in STs to manage and exploit the inherent heterogeneity of a ST to make better what are often contentious decisions in building sourcing strategies, whose resolution will often create winners and losers in terms of the eventual content of a sourcing strategy (for example, the strategy may exclude a supplier favoured by a ST member). This is valuable confirmation of an important aspect of procurement and supply chain management practice. While there is research that has established the importance of wider cross-functional integration to effective sourcing task-work (Flynn *et al*., 2010; Foerstl *et al*., 2013), a link with the use of STs as a particular form of such integration had not thus far been established. This paper therefore addresses a fundamental gap in the ST literature, which can give greater confidence to future ST research.

The paper also contributes to the literature by providing further evidence, supporting the findings of Sanderson *et al.* (2022), of a significant positive relationship between team member KSAs and sourcing teamwork effectiveness. Such an individual team member perspective is largely absent in the existing ST literature, which instead focuses on team level factors such as team autonomy and communication processes (Driedonks *et al*., 2010), rationality of decision-making (Kaufmann *et al*., 2014), internal integration (van den Adel *et al*., 2023), and team member consensus (Meschnig and Kaufmann, 2015). Where an individual team member perspective has been adopted in the past, it has focused upon technical attributes (Barragan *et al*., 2003; Fu *et al*., 2013) or motivation (Englyst *et al*., 2008; Franke *et al*., 2022), not individual team member KSAs. Interestingly, the case organisation here was operating an external consultant framework that made a distinction between technical attributes and individual team member KSAs, focusing upon the latter. The framework had been adopted as many GAMC STs had been blessed with both extensive information from the organisation's many information systems and extensive technical knowledge on the part of the team members but were often dysfunctional due to poor individual teamworking KSAs.

Our findings from GAMC show the importance of four out of five team member KSAs for TE, with very significant support for communication and planning and task coordination KSAs. We contend that these KSAs are necessary for team members to be able to exploit team-level drivers of effectiveness such as autonomy and communication processes. Taken together with our more tentative finding of an indirect relationship between KSAs and TA within GAMC, our research suggests that the concept of team member KSAs is an important dimension in understanding how to develop effective sourcing teams, although further research on this individual-level perspective is, of course, needed to develop the findings here.

Managerial implications

Our findings from the research within GAMC also have several implications for management practice. First, they both remind managers not to look solely at ST formation from a team-level perspective and highlight four specific KSAs they should ensure are possessed by members of their STs. This is a useful reminder, because while some firms invest significant resources in psychometric testing to select sourcing team members, with personality trait diversity identified as important by Kaufmann and Wagner (2017), it has been argued that team member

KSAs are more amenable to training and management intervention and so make a more reliable basis for team selection (Aguado *et al.,* 2014; Stevens and Campion, 1994, 1999).

In this context, there are tests and checklists providing structured sets of questions and issues to help managers use KSAs as part of their selection of team members (see, for example, McClough and Rogelberg, 2003), with an adapted (for sourcing) version of the Stevens and Campion (1994) checklist provided in Table 7. Such tests or lists can be used alongside psychometric tests to provide information on potential team members in preparation for individual sourcing exercises.

Table 7 about here

Such KSA testing might be seen as a costly exercise for resource constrained businesses. However, given that STs are typically associated with sourcing exercises in strategic categories of spend (Kraljic 1983), characterised by very high value expenditure and/or inputs critical to core business goals, such an investment is surely proportional and wise. A recent business survey reported limited evidence of TA in its sample, and significant associations between procurement organisation and governance, stakeholder engagement, and positive sourcing outcomes (4C Associates, 2023). This evidence suggests you get what you pay for in terms of internal procurement practices, including investments in building effective STs.

Furthermore, as the creation of STs is not cost-free in terms of management time, and sometimes in cash terms, a return on any investment needs to be carefully secured. It is suggested then that firms should keep a rolling record of contract expiry dates to ensure there is sufficient time to select ST members with the appropriate KSAs, especially for strategic contracts. Many poor procurement outcomes occur from lack of time, which, in turn, results from poor planning (Mwagike and Changalima, 2022).

Limitations

There are some limitations in our study. First, rather than surveying a random sample of respondents from several firms, we used respondents from one company. While this allowed us to deeply explore the drivers of sourcing team effectiveness in that company, a disadvantage of this approach is that our findings may have been influenced by this company's organisational culture. Consequently, generalization of our findings should be undertaken with caution. To overcome this limitation, we would need to replicate our survey in a wider range of firms and industry sectors to explore the potential effect of different organisational cultures. Second, even though the response rate to our survey is in the acceptable range (Baruch and Holtom, 2008), a higher number of respondents would have further increased the level of confidence in the findings. Third, our survey uses only self-report measures, which means that the potential for common method bias cannot be entirely ruled out. The use of perceptual measures is common, however, in survey research on STs (Driedonks *et al*., 2010; Kiratli *et al*., 2016), because it is challenging to define and assess objective measures of team effectiveness and drivers of success. Finally, this paper sits in the shadow of artificial intelligence, which may well affect teamworking in the future. This is sure to be a future research direction.

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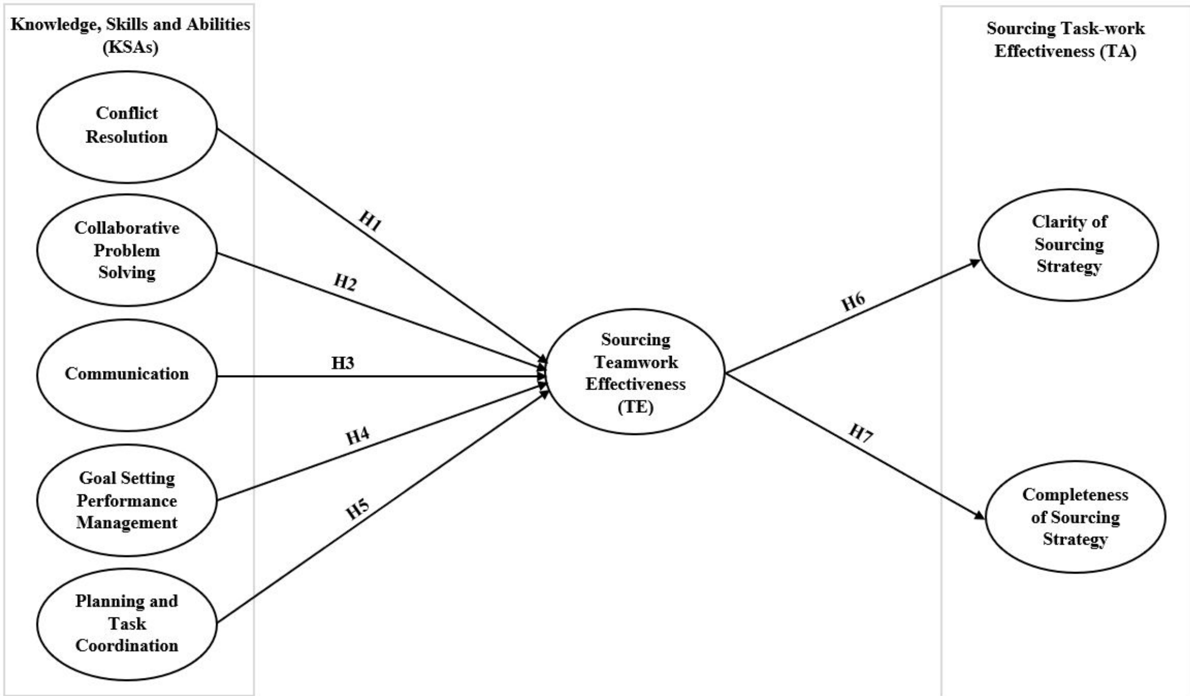


Figure 1. Conceptual model

Table 1. Constructs and Measures

Construct	Item No.	Measure	Reference
Conflict resolution (CR)	CR1	When my sourcing team is in conflict, I try to make the conflict explicit so that solutions can be found	Stevens and Campion (1994); Aguado et al. (2014)
	CR2	*When I disagree with others, I make an effort to focus on what we have in common instead of centring on what separates us*	
	CR3	When we face an internal conflict because of a communication problem or misunderstanding, I try to solve it by asking questions and listening to the people involved	
	CR4	When my personal interests are in conflict with others' interests, I tend to be honest in the sourcing team discussion so that others understand my needs	
Collaborative problem-solving (CPS)	CPS1	I play an active role in sourcing team meetings by offering my opinions, asking questions and expressing my thoughts and ideas in a sincere and open way	Stevens and Campion (1994); Aguado et al. (2014)
	CPS2	When I am upset about something, I express my discomfort to the sourcing team in a constructive way, asking for solution alternatives	
	CPS3	If something upsets me in my sourcing team, I do not like to act as if nothing has happened	
	CPS4	During sourcing team meetings, I encourage all members to provide their opinions to avoid situations where only a few participate actively	
	CPS5	*In sourcing team meetings, I promote cohesion and seek to reach a majority agreement rather than paying attention to divergent opinions*	
	CPS6	*I try listening to my peers' opinions without evaluating their positions as good or bad*	
Communication (CM)	CM1	When I interact with my sourcing team-mates, I ask questions to better understand what they say	Stevens and Campion (1994); Aguado et al. (2014)
	CM2	I try to use the most appropriate mode of communication in my sourcing team to communicate different types of information, avoiding use of the same mode all the time	
	CM3	I make an effort to talk about less important things with my sourcing team-mates for the sake of team spirit and better internal communication	
	CM4	*When working in my sourcing team, I say what I think in an open and sincere way*	
	CM5	I expect my sourcing team-mates trust me enough to tell me about the aspects of my work that they most dislike	
Goal setting and performance management (GSPM)	GSPM1	I often get involved in monitoring the task performance of other members of my sourcing team	Stevens and Campion (1994); Aguado et al. (2014)
	GSPM2	I like to provide my sourcing team-mates with feedback about what they do and to assess and value their work	
	GSPM3	I try to establish milestones in my sourcing team so that we can monitor our assigned tasks	
	GSPM4	I provide my sourcing team-mates with relevant information on how well I think the team tasks are progressing	
	GSPM5	I often provide my sourcing team-mates with feedback on their task performance	
Planning and task coordination (PTC)	*PTC1*	*To address trivial task-related issues, I do not need to talk first with all sourcing team members so we reach a decision*	Stevens and Campion (1994); Aguado et al. (2014)
	PTC2	Having knowledge about my sourcing team-mates' skills and situation requirements is critical to assign tasks properly	
	PTC3	I often help others in my sourcing team to make clear the roles and tasks they have to perform	
	PTC4	When doing my job, I prioritize the tasks most necessary for my sourcing team-mates to complete their work	
	PTC5	I try to ensure that my outputs match the inputs needed by my sourcing team-mates to perform their tasks	
Sourcing teamwork effectiveness (TE)	*TE1*	*My sourcing team produces a large quantity or high amount of work*	Trent and Monczka (1994); Driedonks et al. (2010)
	TE2	My sourcing team produces high quality or high accuracy of work	
	TE3	My sourcing team's reputation for work excellence is high	

	TE4	The efficiency of my sourcing team's operations is high	
	TE5	My sourcing team's ability to meet timing and task schedule targets is high	
	TE6	My sourcing team's ability to communicate and coordinate activities with non-team members across functional boundaries is good	
	TE7	My sourcing team's ability to work with others outside the team is good	
	TE8	My sourcing team's ability to cooperate with other departments and business units is good	
Clarity of sourcing strategy (ClSS)	ClSS1	The objectives of supplier negotiations are well-defined by my sourcing team's strategy prior to supplier contact	Sebenius (2001)
	ClSS2	The roles and responsibilities of those involved in supplier negotiations are well-defined by my sourcing team's strategy prior to supplier contact	Day et al. (2011); Foerstl et al. (2013)
	ClSS3	The roles and responsibilities of those involved in supplier management are well-defined by my sourcing team's strategy by the time of contract commencement	Day et al. (2011); Foerstl et al. (2013)
Completeness of sourcing strategy (CoSS)	CoSS1	The trade-off between technical specification and commercial sourcing difficulty is fully considered in my sourcing team's strategy	Cox et al. (2005); Dowlatshahi (1992);
	CoSS2	Leverage risks (i.e. level of supply market competition and the effects of sunk and switching costs) are fully considered in my sourcing team's strategy	Meehan and Wright (2012); Williamson (1985)
	CoSS3	Competitive advantage risks (i.e. importance of technology to advantage, need to avoid IP leakage) are fully considered in my sourcing team's strategy	Contractor et al. (2010)

Note: The items in italics were dropped.

Table 2. Sample Characteristics

Sample size	108 sourcing team members
Function	55% procurement; 34% engineering; 11% other
Business unit	21% compressors; 11% turbines; 10% controls; 13% structures and transmissions; 14% installations; 13% rotatives; 6% materials; 12% other unit
Tenure in current post	10% less than 1 year; 44% 1-3 years; 24% 3-5 years; 14% 5-10 years; 8% more than 10 years.

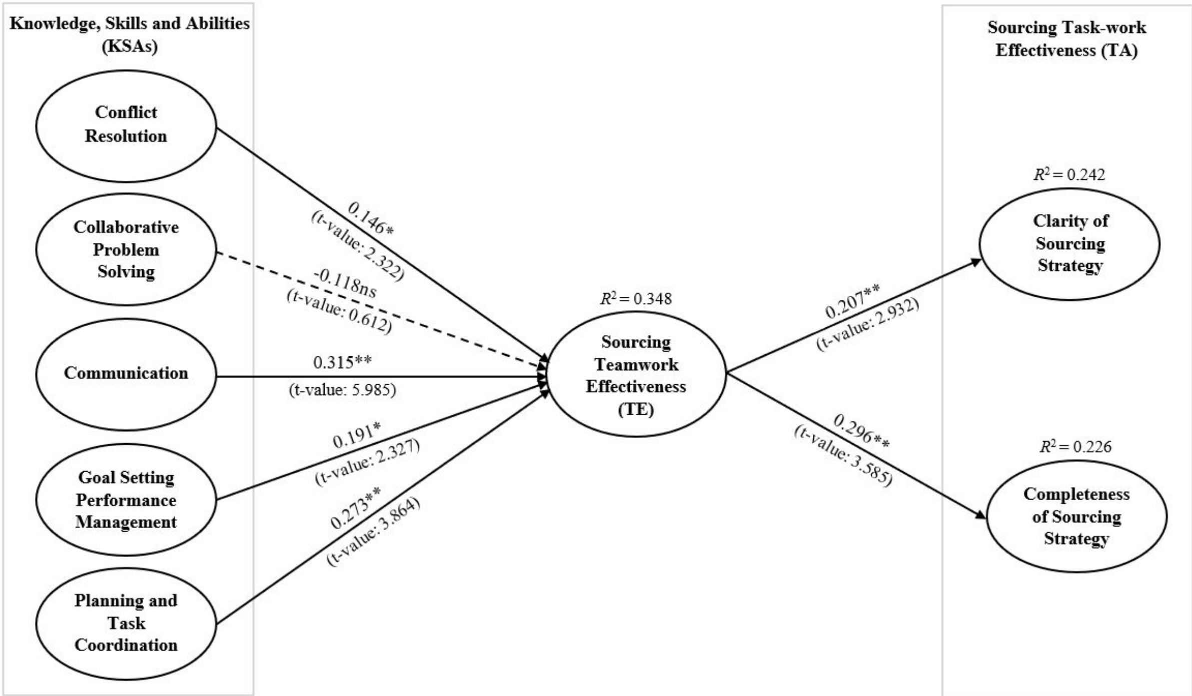
Table 3. Scale Validity and Reliability

Construct	Item No.	Factor loading	Cronbach's α	CR	AVE
Conflict resolution (CR)	CR1	0.682	0.722	0.745	0.592
	CR3	0.608			
	CR4	0.644			
Collaborative problem-solving (CPS)	CPS1	0.618	0.707	0.721	0.523
	CPS2	0.585			
	CPS3	0.542			
	CPS4	0.604			
Communication (CM)	CM1	0.828	0.738	0.764	0.658
	CM2	0.742			
	CM3	0.635			
	CM5	0.684			
Goal setting and performance management (GSPM)	GSPM1	0.746	0.785	0.828	0.645
	GSPM2	0.680			
	GSPM3	0.762			
	GSPM4	0.808			
	GSPM5	0.695			
Planning and task coordination (PTC)	PTC2	0.641	0.742	0.776	0.631
	PTC3	0.755			
	PTC4	0.638			
	PTC5	0.617			
Sourcing teamwork effectiveness (TE)	TE2	0.725	0.884	0.915	0.708
	TE3	0.868			
	TE4	0.915			
	TE5	0.833			
	TE6	0.805			
	TE7	0.928			
	TE8	0.876			
Clarity of sourcing strategy (ClSS)	ClSS1	0.824	0.757	0.792	0.588
	ClSS2	0.841			
	ClSS3	0.688			
Completeness of sourcing strategy (CoSS)	CoSS1	0.712	0.774	0.816	0.629
	CoSS2	0.832			
	CoSS3	0.926			

Table 4. Descriptive Statistics and Correlations

	Mean	SD	Skewness	Kurtosis	1	2	3	4	5	6	7	8
1. CR	3.8856	.37544	-.004	.107	1							
2. CPS	3.8694	.40857	-.152	-.301	0.14*	1						
3. CM	4.0108	.42085	-.055	.138	0.48**	0.29*	1					
4. GSPM	3.2528	.65108	.321	-.214	0.34**	0.12*	0.41**	1				
5. PTC	3.6642	.44886	.029	-.224	0.31**	0.16**	0.45**	0.24*	1			
6. TE	3.6257	.62436	-.336	.308	0.31**	0.11*	0.47**	0.35*	0.39**	1		
7. ClSS	3.6043	.62315	-.402	.795	0.26*	0.16*	0.28**	0.21*	0.28*	0.33**	1	
8. CoSS	3.8566	.69042	.128	-.588	0.22*	0.17	0.19**	0.25*	0.24*	0.30**	0.11*	1

Two-tail t-test was performed.
Number of observations (n) is 108.
* Significant at α= 0.05; ** Significant at α = 0.01. SD: Standard deviation
CR: Conflict Resolution; CPS: Collaborative Problem Solving; CM: Communication; GSPM: Goal Setting and Performance Management; PTC: Planning and Task Coordination; TE: Sourcing Teamwork Effectiveness; ClSS: Clarity of Sourcing Strategy; CoSS: Completeness of Sourcing Strategy.



Notes: ** significant at the 0.01 level; * significant at the 0.05 level; ns: not significant.
Fit Indices: Relative Chi-square = 1.71; RMSEA = 0.074; NFI (0.909); NNFI (0.919); CFI (0.942); and IFI (0.941).

Figure 2. KSAs-TE-TA model with PLS-SEM results

Table 5. Hypothesis Testing

Paths	Standardised coefficient	Support
CR → TE	0.146*	H1: Supported
CPS → TE	-118ns	H2: Not supported
CM → TE	0.315**	H3: Supported
GSPM → TE	0.191*	H4: Supported
PTC → TE	0.273**	H5: Supported
TE → ClSS	0.207**	H6: Supported
TE → CoSS	0.296**	H7: Supported

Notes: ** significant at the 0.01 level; * significant at the 0.05 level; ns: not significant;
CR= Conflict Resolution; CPS= Collaborative Problem Solving; CM= Communication; GSPM= Goal Setting & Performance Management; PTC= Planning and Task Coordination; TE= Sourcing teamwork effectiveness; ClSS= Clarity of sourcing strategy; CoSS= Completeness of sourcing strategy

Table 6. Direct and indirect effects in structural equation modelling

Path	Standard Beta (*β*)	T Statistics (*t*-Value)	*p* Value
Direct Effects			
CR → TE	0.146*	2.322	0.024
CM → TE	0.315**	5.985	0.000
GSPM → TE	0.191*	2.327	0.020
PTC → TE	0.273**	3.864	0.000
TE → ClSS	0.207**	2.932	0.000
TE → CoSS	0.296**	3.585	0.000
Indirect Effects			
CR → TE → ClSS	0.043*	2.151	0.035
CM → TE → ClSS	0.157**	4.564	0.000
GSPM → TE → ClSS	0.071*	2.218	0.028
PTC → TE → ClSS	0.102**	3.066	0.001
CR → TE → CoSS	0.065*	2.201	0.033
CM → TE → CoSS	0.184**	4.885	0.000
GSPM → TE → CoSS	0.088*	2.279	0.024
PTC → TE → CoSS	0.136**	3.494	0.000

Notes: ** significant at the 0.01 level; * significant at the 0.05 level.
CR= Conflict Resolution; CM= Communication; GSPM= Goal Setting & Performance Management; PTC= Planning and Task Coordination; TE= Sourcing teamwork effectiveness; ClSS= Clarity of sourcing strategy; CoSS= Completeness of sourcing strategy

Table 7. Adaptation of Stevens and Campion's Individual Team Member KSAs Managerial Implications Checklist

SELECTION
• Recruitment for sourcing teams should emphasize the importance of KSAs as well as team-level perspectives
• Recruitment processes for sourcing teams should include tests and other selection methods for both teamwork personality traits and KSAs
TRAINING
• Cross-functional sourcing training within organisations that use sourcing teams should include KSAs within the training content
• Such training should also include sourcing and related technologies that assist sourcing team working and KSAs
• Senior managers across different functions with employees within sourcing teams should be trained in the importance of KSAs and how to identify and develop them
PERFORMANCE APPRAISAL AND COMPENSATION
• Performance appraisals should include assessment and reward of behavioural and/or performance indicators of KSAs
• Compensation systems should include factors relating to KSAs
CAREER DEVELOPMENT
• Promotion criteria should consider KSAs and sourcing team contributions
• Opportunities to develop KSAs should be built into career planning, within and outside the procurement function