Offshore Outsourcing Innovation by SMEs: An Empirical Investigation of Governance, Complementarity and Knowledge Sharing

A Thesis Submitted to the University of Manchester for the Degree of

Doctor of Philosophy (PhD) in the Faculty of Humanities

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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Long Form</th>
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<tbody>
<tr>
<td>α</td>
<td>Cronbach's alpha</td>
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<tr>
<td>3D</td>
<td>Three Dimensional</td>
</tr>
<tr>
<td>4Fs</td>
<td>Fit, Firm, Flexible, Fragile</td>
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<tr>
<td>AMOS</td>
<td>Structural equation modelling software</td>
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<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>AVE</td>
<td>Average Variance Explained</td>
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<tr>
<td>b</td>
<td>Unstandardised regression coefficient</td>
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<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
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<tr>
<td>CFI</td>
<td>Comparative Fit Index</td>
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<tr>
<td>C.I.</td>
<td>Confidence Interval</td>
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<tr>
<td>CR</td>
<td>Composite Reliability</td>
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<td>e.g.</td>
<td>Exempli gratia; for example,</td>
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<tr>
<td>EFA</td>
<td>Exploratory Factor Analysis</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<td>GFI</td>
<td>Goodness of Fit Index</td>
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<td>H</td>
<td>Hypothesis</td>
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<td>HR</td>
<td>Human Resources</td>
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<tr>
<td>ICT</td>
<td>Information and Communications Technologies</td>
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<tr>
<td>IP</td>
<td>Intellectual Properties</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KBV</td>
<td>Knowledge Based View</td>
</tr>
<tr>
<td>n.s.</td>
<td>not significant</td>
</tr>
<tr>
<td>MATLAB</td>
<td>Matrix Laboratory (Mathworks Software)</td>
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<tr>
<td>NPD</td>
<td>New Product Development</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OI</td>
<td>Offshore outsourcing innovation</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Square</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
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<td>--------</td>
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<tr>
<td>p</td>
<td>Statistical significance test</td>
</tr>
<tr>
<td>$R^2$</td>
<td>Coefficient of determination</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RMSEA</td>
<td>The Root Mean Square Error of Approximation</td>
</tr>
<tr>
<td>RQ</td>
<td>Research Question</td>
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<tr>
<td>SMEs</td>
<td>Small and Medium-Sized Enterprises</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Science</td>
</tr>
<tr>
<td>SRMR</td>
<td>Standardized Root Mean Square Residual</td>
</tr>
<tr>
<td>TCE</td>
<td>Transaction Cost Economics</td>
</tr>
<tr>
<td>TLI</td>
<td>Tucker Lewis Index</td>
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<tr>
<td>UK</td>
<td>The United Kingdom</td>
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<tr>
<td>$z$</td>
<td>The number of standard deviations from the mean</td>
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Abstract
Offshore outsourcing innovation by SMEs: An Empirical Investigation of Governance, Complementarity and Knowledge Sharing

Pursuing innovation through offshore outsourcing complicates buyer-supplier relationships. In terms of interorganisational relationships, offshore outsourcing innovation (OI) offers buyer SMEs the benefits of improving their innovation performance. However, at the same time, SMEs must consider the challenges of controlling and coordinating innovation activities through OI. To shed light on the complexities and trade-offs surrounding the management of OI relationships, this research empirically examines the links between interfirm relational mechanisms (i.e. governance, complementarity, and knowledge sharing) and OI performance in SMEs. The analysis in this research utilises conceptual models and existing theories through which the interplay between these relational mechanisms is explained. The developed models in this research could provide a holistic picture of managing ongoing OI relationships. Based on data collected from 200 European SMEs across the manufacturing sector in Germany, France, Italy, and the United Kingdom, this research explores relationships between formal and informal relational mechanisms and their implications on OI performance.

Through relationship focus, this research contributes to the existing body of knowledge in strategic supply chain management and innovation management research by developing the 4F governance model- *fit, firm, flexible and fragile*. The research findings demonstrate that it is essential for SMEs that aim to succeed in OI to learn how to leverage offshore suppliers’ complementary capabilities. Furthermore, the empirical evidence of this research encourages SMEs to innovate internally to be successful in external knowledge sharing with offshore suppliers. The present research adds to the strategic supply chain management literature by showing that SMEs need to adequately allocate their limited resources to structure and implement formal and informal relational mechanisms in managing OI relationships. The findings of this research provide support to the notion that existing general theories can be adapted to the context of SMEs and still offer valid solutions to smaller firms as well as important implications for the SMEs’ practice and future research.
Declaration

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Dedication

To my wife, without her love and unbounded support, this thesis would not have been possible.
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On the road to the completion of this thesis, I was very fortunate to have the genuine guidance and support of two great scholars, my supervisors: Professor Antony Paulraj and Dr Fahian Huq. I am very indebted for their intellectual contributions to honing my research skills. I have learned all that I know about conducting business research and writing research articles from them. I am very grateful for their patience in putting up with reading, reviewing, and commenting on my work several times. I am very thankful for their trust and friendship.

As a postgraduate researcher (PGR) at the University of Manchester and in Alliance Manchester Business School, I always felt privileged to be a member of such vibrant, supportive, and resourceful community. I am very appreciative to the tremendous help I received from two PGR directors: Professor Stuart Hyde and Professor Anne Mcbride, and the wonderful PGR staff throughout my PhD journey.

Finally, as a teaching assistant I am very grateful for the valuable guidance and mentorships I experienced from many scholars in the Management Sciences and Marketing Division (MSM) in this exceptional higher education institution.
The Candidate

The author of this research is a PhD candidate in operations and supply chain management at the University of Manchester Alliance Manchester Business School (AMBS). He completed an MBA from Rotman School of Management at the University of Toronto in 2012 and a BSc in Chemical Engineering from Jordan University in 1994. The author has studied and published on developing country supplier and location decision models in outsourcing manufacturing relationships (Kulwant S. Pawar, Fahian Anisul Huq, Ahmad Khraishi & Janat Shah (2019) Contextualisation of the complexity in the selection of developing country outsourcees by developed country outsourcers, International Journal of Production Research, 57:13, 4310-4332, DOI: 10.1080/00207543.2018.1529444). Prior to joining the PhD program at AMBS, the candidate was the chief operating officer of Saudi Mechanical Industries, a large international manufacturing organization.
Chapter 1: Introduction

1.1 Research background

The connection between innovation and economic growth in Schumpeter’s theory (Schumpeter, 1934) is explained by the disruptive nature of innovation and its impact on the firm’s competitive position within an industry in the long run (Barney, 1986). In the 21st century’s turbulent and disrupted markets, no in-house innovation system can predict, evaluate and cover all possible new ideas for design, product and process innovations (Quinn, 2000). Moreover, the increased complexity and speed of modern technologies, the unbounded scope of global markets, and the continuous evolution of customers’ demand and preferences have put firms’ internal innovation systems under immense pressure. Therefore, firms of all sizes are increasingly benefiting from offshore innovation relationships as a strategic source of innovation (Quinn and Hilmer, 1994; Quinn, 2000; Cassiman and Veugelers, 2006; Lewin et al., 2009; Whitley and Willcocks, 2011; Nieto and Rodriguez, 2011).

This research defines offshore outsourcing innovation (OI) as the act of transferring to offshore suppliers any element of the innovation process, including research and development (R&D), new product development (NPD) and the commercialisation of innovations (Quinn, 2000). The phenomenon of OI, have become increasingly popular due to four main drivers: (1) increase in global supply of knowledge and talents (Lewin et al., 2009), (2) low barriers of global trade in both dyadic and network supply chains (Quinn, 2000), (3) low cost of knowledge services in offshore countries (Bunyaratavej et al., 2007; Martínez-Noya and García-Canal, 2011; Geishecker and
Görg, 2013; Wang et al., 2016), and (4) the advancement of information and communications technologies (ICTs) (Gassmann et al., 2010; Jean et al., 2014; Zhang et al., 2016).

Extant offshore technical alliances and offshore outsourcing innovation literature documented that (OI), as a phenomenon, is not recent; it goes back to the 1930s when large American and European firms relocated some of their R&D activities abroad (Ambos and Ambos, 2011). However, captive arrangements dominated the early years of OI (Lewin et al., 2009). Hagedoorn (2002) presented a 40-year analysis of significant trends in inter-firm R&D relationships from the 1960s until the 1990s. His study showed that since early 1980s companies seem to increasingly prefer contractual partnerships for innovation over joint ventures. Moreover, the growth of newly made R&D partnerships since the 1980s is linked with a considerable increase in non-equity relationships (Hagedoorn, 2002).

The strong trend toward adopting OI through interfim collaboration gained its momentum since early 2000s (Lewin et al., 2009; Bertrand & Mol, 2013; Musteen & Ahsan, 2013). The OI phenomenon is largely driven by firms attempts to tap into emerging markets for knowledge, technologies and specialized talents to improve innovation performance, achieve long term growth and sustained competitive advantage (Lewin et al., 2009; Bertrand and Mol, 2013; Sartor and Beamish, 2014; Gusenbauer et al., 2015). Central to OI is the idea that in the wake of globalisation the world has become flat and hence offshore inter-firm collaborations for innovation have become a popular source of innovation given free international trade policies and the emergence of science and technology hubs in developing countries (Lewin et al., 2009; Gassmann et al., 2010).
Additionally, the advances in ICTs promoted further decentralization of the innovation processes and extensive modularisation of nearly all design and production stages including knowledge creation and transfer (Lewin et al., 2009; Gassmann et al., 2010; Jean et al., 2014). Besides, one of the main drivers for OI is the fact that creative knowledge services are provided at low cost in offshore developing countries (Jean et al., 2014; Wang et al., 2016). Consequently, OI can serve as an effective and fast route to new product introduction (Lewin et al., 2009; Gassmann et al., 2010; Martínez-Noya and García-Canal, 2011).

Despite the growing benefits from OI strategies, managing OI relationships poses major managerial challenges to focal firms, due to the distinct business and institutional environments in offshore countries (Lewin et al., 2009; Martínez-Noya and García-Canal, 2011; Bertrand and Mol 2013; Jean et al., 2014, Sartor and Beamish, 2014  Wang et al. 2016). For example, Lewin et al. (2009) argued that in the face of varieties of risks and uncertainties in managing OI relationships, firms evolve and change their organisational practices and decisions responding to their own experience and environmental factors. Martínez-Noya and García-Canal (2011) concluded that offshore outsourcing firms apply their accumulated experience in governing domestic outsourcing agreements as key factors in determining their propensity to engage in OI. Jean et al. (2014) and Wang et al. (2016) documented that weak protection of intellectual property rights (IP) in the legal and institutional environments in emerging markets increases the risks of OI. Sartor and Beamish (2014) proposed that underdeveloped informal institutions in offshore markets exert significant impact on the offshore outsourcing firms’ organisational control levels and consequently, influence their OI performance. Despite
these challenges, Bertrand and Mol (2013) argued that the risks in managing OI relationships are outweighed by the depth and breadth of innovation resources and competences offered through OI, especially when compared with domestic outsourcing of innovation.

As a strategic offshore outsourcing decision, the issue with OI is less about whether to make or buy innovations than it is about how to structure OI relationships on an optimal basis of flexibility and control (Quinn and Hilmer, 1994; Yeo and Saboori-Deilami, 2017; Oshri et al., 2015; Bertrand and Mol, 2013; Lai et al., 2009; Gooroochurn and Hanley, 2007). Consequently, the integration of suppliers' knowledge and resources into the focal firm's innovation process improves the coordination of complex and interdependent innovation tasks and assist in setting metrics and targets for innovation projects (Petersen et al., 2005; Jean et al., 2014; Kim and Lim, 2015). To shed light on the complexities and trade-offs surrounding the management of OI relationships, this research empirically examined the links between dyadic mechanisms (governance, complementarity, and knowledge sharing), and OI performance in small and medium-sized (SMEs). The general underlying assumptions of SMEs' specific managerial characteristics have motivated this research to study hypothesised relationships between relational mechanisms and OI performance. The same relationships might have been considered in the context of large firms. However, findings from this research point out that dyadic governance, complementarity, and knowledge sharing could enhance OI performance for SMEs. Moreover, these relational mechanisms may also increase the risk of losing knowledge if the offshore suppliers took advantage of the buyer SME.
1.2 Literature review

1.2.1 The nature of offshore outsourcing innovation

The distinctive characteristics of OI offer a conceivable approach to understand the mixed results in OI studies (Stanko and Calantone, 2011; Weigelt and Sarkar, 2012; van der Valk et al., 2016). To that extent, OI has three specific characteristics. First, it is necessary for firms pursuing innovation through offshore outsourcing to access the knowledge and valuable resources of offshore suppliers, even while typical offshore outsourcing is driven by cost savings and efficiency (Gooroochurn and Hanley, 2007; Mykhaylenko et al., 2015). Second, OI is a coupled process; therefore, its success requires higher levels of cooperation than offshore outsourcing low-value activities (e.g. production) wherein disintegration is rather prominent (Gassmann et al., 2010; Palmie et al., 2016). Third, through OI, firms face a performance paradox between offshore outsourcing efficiency and innovation adaptability (Weigelt and Sarkar, 2012; Aubert et al., 2015). Drawing on the complexity of OI, the innovation management literature deployed several prominent theories of firms’ strategic, economic and interorganisational behaviours in explaining why firms would choose to offshore innovation activities (Calantone and Stanko, 2007; Gooroochurn and Hanley, 2007; Lai et al., 2009; Stanko and Calantone, 2011) and how could focal firms achieve success in OI relationships (Carson, 2007; Weigelt and Sarkar, 2012; Jean et al., 2014; Aubert et al., 2015; Lawson et al., 2015; Oshri et al., 2015)?

In answering this question, the outsourcing/offshore outsourcing innovation literature focused on three aspects of the management of outsourcing/offshore outsourcing innovation:
(1) The principles and practices of strategic management of outsourcing/offshore outsourcing innovation. For example, the management of the fundamental paradoxical tension between outsourcing efficiency (e.g. low uncertainty, process standardisation, and measurability), and innovation adaptability (e.g. risk-taking, flexibility, and slack resources) (Aubert et al., 2015; Weigelt and Sarkar, 2012). Through outsourcing efficiency, firms monitor and control suppliers to achieve low transaction costs and economic gains. Alternatively, innovation adaptability entails having sufficient resources, decentralised governance structure and unrestricted knowledge sharing (Aubert et al., 2015). This paradox between outsourcing efficiency and innovation adaptability appears to be rooted in outsourcing innovation relationships due to the contradictory elements of pairing outsourcing with innovation which exist and persist over time (Aubert et al., 2015). Consequently, firms pursuing innovation through outsourcing must manage this paradox by establishing governance mechanisms that satisfy a dual need for outsourcing success and innovation capacity. For example, using complex contracts control suppliers 'opportunism (Kloyer and Scholderer, 2012); yet highlights for suppliers the payoff from their contributions towards fulfilling their promises in achieving the outsourcing agreement targets (Aubert et al., 2015). On the other hand, relational trust facilitates complex exchange of tacit knowledge through beliefs in suppliers' just behaviour (Kulangara et al., 2016), it also enhances parties' readiness to accept uncertain outcomes of innovation, and adaptation to cope with the iterative process of innovation (Kulangara et al., 2016).

(2) Management of knowledge sharing/leakage in offshore outsourcing Innovation. Outsourcing innovation research also, applied Agency theory (AT) to solve for the trade-
off between risks of knowledge leakage and benefits of suppliers' specialisation through outsourcing innovation (Lai, Riezman, and Wang 2009). Lai, Riezman, and Wang (2009) proposed an optimisation model for the outsourcing innovation contract using the agent-principle framework and revenue sharing contracting to reduce costs of information leakage for the outsourcing firm and deter opportunistic supplier behaviour. Some outsourcing innovation studies employed resource dependence theory (RDT) to explain two more possible hazards of outsourcing innovation due to the buyer firm increased dependence on the supplier firm innovation resources. First the loss of control over the innovation process (Kulangara, Jackson, and Prater 2016), and second the erosion of the outsourcing firm innovation capabilities due to missing "learning by doing" opportunities (Becker and Zirpoli 2017). Outsourcing firms must be aware of these risks and plan governance structures and organisational systems to mitigate them (Kulangara, Jackson, and Prater 2016, Becker and Zirpoli 2017).

For example, supplier knowledge integration enables buyers to exploit and apply knowledge resided externally to improve product innovation and commercialise new products quickly and efficiently (Zhang et al., 2018). However, sharing innovation knowledge is often problematic. First, though knowledge is one of the most significant resources of competitive advantage that a firm can have (Grant, 1996; Grant and Baden-Fuller, 2004), knowledge resources (especially tacit knowledge) are hard to transfer since they are informally and individually embedded within the firm (Kogut and Zander, 1992). Second, sharing innovation knowledge is difficult due to its non-codified nature and risks of spill-over (Kogut and Zander, 1992; Ritala and Hurmelinna-Laukkanen, 2013; Ritala et al., 2015; Frishammar et al., 2015). Moreover, although knowledge sharing facilitates
buyer-supply joint learning, it can also lead to imitation, which could harm the buyer firm competitive advantage (Zhu et al., 2018).

(3) Governance of offshore outsourcing innovation. In the context of OI, earlier literature established that firms are confronted with two different approaches. The first approach is in favour of limiting supplier involvement in the innovation process to non-core and low-cost innovative activities as in offshore outsourcing upstream engineering and design services (Steinberg et al., 2017). Stanko and Calantone (2011) concluded that this approach for OI employs the logic of transaction cost economics (TCE) in explaining the OI relationship as a function of adaptation costs (e.g. contract adjustments), safeguarding costs (e.g. curbing opportunistic supplier behaviour) and measurements costs (e.g. monitoring contract implementation). Accordingly, the focal firm under high transaction costs will favour a "make" instead of a "buy" strategy (Lai et al., 2009; Stanko and Calantone, 2011).

The second approach to OI, however, values the supplier's early involvement in new product development (NDP) through leveraging the supplier's strategic competencies as in the case of specialised first-tier suppliers in the automotive industries (Sako, 1994; Dyer, 1996). Therefore, the second approach structurally integrates suppliers in the innovation process. However, this approach comes at prohibitive transaction costs and therefore, constitutes a breakdown of TCE's traditions (Stanko and Calantone, 2011). Hence, firms adopting this approach are motivated by survival or profitability considerations that are stronger than transaction cost economics (Gooroochurn and Hanley, 2007; Lavie, 2006). Moreover, the proponents of TCE argue that innovation complicates interfirm relations since with innovation, a variety of disturbances are co-
occurring when timely responses are needed (Williamson, 1991). Furthermore, Williamson (1991) concluded that relying on TCE and equilibrium contracting is not sufficient in this case and that one or more organisational theories must be encompassed to facilitate dealing with multiple parameter shifts associated with OI agreements.

OI can also be explained using the relational view (Dyer and Singh, 1998). According to the relational view, firms resort to interfirm collaboration as an ideal platform for cooperation so as to achieve long term competitive advantage and mutually beneficial innovation rents (Dyer and Singh, 1998). In a similar vein, Powell et al. (1996) argued that firms are continually using collaboration to expand their competencies via accessing suppliers' knowledge that is usually difficult to produce internally and not readily available to buy through arm's length ties. Accordingly, the relational view highlights the need to balance between contractual and relational governance to encourage suppliers to share their complementary innovation knowledge and enhance their ability to perform the OI tasks (Carson, 2007; Jean et al., 2014). Also, the relational view incentivises firms engaging in OI strategies to invest in developing their suppliers' innovation capabilities (Lawson et al., 2015).

The knowledge based (KBV) is another theory that can explain OI. By applying KBV's perspective to OI, effective knowledge sharing becomes the basis for achieving positive interfirm learning outcomes. For example, Martínez-Noya and García-Canal (2011) concluded that accessing new knowledge and technological capabilities is a critical determinant of firms' propensity to adopt OI strategies. Following the tenets of the KBV, OI is viewed as a learning collaboration that emphasises the importance of external knowledge as a source of innovation. Consequently, the division and re-organisation of
labour and tasks between the SME buyer and the offshore supplier in OI are crucial to knowledge sharing (Grant, 1996). However, while OI can facilitate new knowledge creation via effective knowledge transfer and integration (Hardy et al., 2003), it can also cause leakage of knowledge and harm the focal SME (Ritala et al., 2015; Frishammar et al., 2015). Table 1.1 lists key strategic outsourcing/offshore outsourcing innovation literature that guided this research focus on the management attributes of the OI relationship.
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<tr>
<th>Dimension</th>
<th>Literature Perspective</th>
<th>Key Literature</th>
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<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td>Interfirm cooperation can be a source of strategic relational rent and competitive (collaborative) advantage. External knowledge sources (suppliers’ knowledge) is a valuable source of innovation</td>
<td>(Powell et al., 1996; Dyer and Singh, 1998; Lavie, 2006) (Grant, 1996)</td>
</tr>
<tr>
<td><strong>Strategic Purchasing</strong></td>
<td>The issue in offshore outsourcing innovation (OI) is less about whether to make or buy innovations than it is about how to structure OI relationships on an optimal basis of flexibility and control. Successful buyer-supplier alliances could be developed by managing attributes of the relationship.</td>
<td>(Quinn and Hilmer, 1994) (Mohr and Spekman, 1994; Monczka et al., 1998; Carr and Pearson, 1999)</td>
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<td></td>
<td><strong>Knowledge Sharing</strong> Knowledge is one of the most significant resource of competitive advantage a firm can have. Knowledge resources are hard to transfer since they are informally and individually embedded within the firm. Also, due to the non-codified nature of innovation knowledge</td>
<td>(Grant, 1996; Grant and Baden-Fuller, 2004) (Kogut and Zander, 1992)</td>
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<tr>
<td>Relationship Outcomes</td>
<td><strong>Risk of knowledge leakage because of knowledge exchange in outsourcing innovation (intentional and non-intentional spill overs)</strong></td>
<td>(Ritala et al., 2015; Frishammar et al., 2015).</td>
</tr>
<tr>
<td></td>
<td><strong>Relationship Outcomes</strong></td>
<td>(Calantone and Stanko, 2007; Stanko and Calantone, 2011).</td>
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</table>
| Opportunities (Outsourcing/Offshore outsourcing innovation) | **Supplier’s Asset Specificity**  
Supplier’s asset specificity overcomes shortages in buyers’ resources by offering distinct capabilities.  
Supplier’s asset specificity fosters partners’ interdependence and hence, cultivate dyadic complementarities.  
Supplier’s asset specificity signals the supplier's commitment to invest in the relationship intentionally and mobilise specialised capabilities for the collaboration’s benefit and performance.  
**Supplier’s Complementary Capabilities**  
Supplier’s complementary capabilities facilitate for the focal firm superior innovation performance at a competitive cost in offshore markets.                                                                                                                                                                                                                              | (Teece, 1986)                                                                                                                                                                                                                              |
|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (Dussauge et al., 2000; Rothaermel and Boeker, 2008; Dyer, 1996).                                                                                                                                                                        |
|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (Lavie, 2006; De Vita et al., 2010; Spithoven and Teirlinck, 2015; Van Beers and Zand, 2014).                                                                                                                                                                                                        |
|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (Nietoa and Santamaria, 2007; Rothaermel and Boeker, 2008; Mitsuhashi and Greve, 2009; Mindruta et al., 2016; Cobena et al., 2017).                                                                                                          |
| Relational Mechanisms (Factors)               | **Formal Contract Complexity**  
Contracts are unavoidably complex in case of OI due to asset specificity, behavioural uncertainty, performance ambiguity and risks of outcome.  
Complex contracts can enhance the performance of outsourcing/offshore outsourcing innovation relationships.  
**Formal Knowledge Sharing Routines**                                                                                                                                                                                                                                                                                                                                                     | (Poppo and Zenger, 2002; Bidault and Castello, 2010)                                                                                                                                                                                     |
<p>|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (Carson, 2007; Van Der Valk et al., 2016).                                                                                                                                                                                                  |</p>
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<td><strong>Formal</strong></td>
<td>Formal knowledge sharing routines establish a set of rules and procedures to ensure efficient transfer and integration of alliance partners’ knowledge.</td>
<td>(Grant, 1996)</td>
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<td>Formal knowledge sharing routines can simultaneously address knowledge transfer and protection in global outsourcing of innovation.</td>
<td>(Roy and Sivakumar, 2011)</td>
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<td>Formal knowledge sharing routines can positively affect knowledge sharing in strategic alliances.</td>
<td>(Janowicz-Panjaitan and Noorderhaven, 2008)</td>
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<td>Excessive formalized knowledge sharing routines can result in decreased and even adverse knowledge sharing outcomes.</td>
<td>(Yang et al., 2014)</td>
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<td><strong>Relational Trust</strong></td>
<td>Relational trust reflects buyers’ confidence that suppliers will choose the collective gains over self-gains when the possibility for opportunistic behaviour is present.</td>
<td>(Gulati and Sytch, 2008; Zaheer et al., 1998)</td>
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<td>Relational trust provides an effective means to manage the interdependence between interconnected firms, allowing effective pooling of complementary tacit knowledge resources under reduced fears from opportunism.</td>
<td>(Dyer and Singh, 1998)</td>
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<td>Relational trust also explains firms’ behaviour in making business decisions in interfirm relationships beyond their contractual obligations.</td>
<td>(Saparito et al., 2004).</td>
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<td>The interpersonal nature of relational trust highlights the role played by executives involved in managing interfirm innovation projects.</td>
<td>(Bidault and Castello, 2010)</td>
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<td>Trust has been recognised as an important ingredient for the success of strategic buyer-supplier relationships.</td>
<td>(Mohr and Spekman, 1994; Monczka et al., 1998)</td>
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<td><strong>Supplier Joint Action</strong></td>
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<td>Dimension</td>
<td>Literature Perspective</td>
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<td>Supplier joint actions - aimed at supplier development - are critical drivers of collaborative success. Supplier joint actions are likely to add higher value to the alignment and effectiveness of governance mechanisms in buyer-supplier relationships. Buyers’ cooperative efforts such as supplier joint actions encourage suppliers to deploy specific assets since they can safeguard supplier’s asset specificity. <strong>Goal Compatibility</strong> Goal compatibility in buyer-supplier relationships can be perceived as the possibility of accomplishment of joint innovation creation and collaborative advantage. Compatible goals help partners to recognise their interdependence in NPD projects and consequently facilitate effective cooperation to achieve collaborative outcomes.</td>
<td>(Nyaga et al., 2010; Flynn et al., 2010) (Mooi and Ghosh, 2010; Kim et al., 2015) (Lui et al., 2010; Mooi and Ghosh, 2010; Wagner and Bode, 2014) (Jap, 1999; Sarkar et al., 2001; Cao and Zhang, 2011) (Wang et al., 2016)</td>
</tr>
<tr>
<td>Organisational Capability (Factor)</td>
<td><strong>Internal Knowledge Creation Capability</strong> Buyers’ efficiency in external knowledge absorption depends upon their ability to add new knowledge to existing knowledge. Building internal knowledge creation capability is positively associated with the integration of innovative suppliers’ knowledge. Internal knowledge creation promotes R&amp;D outsourcing. <strong>Absorptive Capacity</strong> Absorptive capacity is the dynamic capability that allows buyers to create value from incorporating suppliers’ knowledge for new knowledge creation. Buyers with high absorptive capacity understand suppliers’ knowledge applicability and could participate in intensive knowledge sharing to achieve joint innovation success.</td>
<td>(Grant, 1996, Zahra and George, 2002) (Camisón and Forés, 2010; Bengtsson, Lakemond and Dabhilkar, 2013; Wuyts and Dutta, 2014) (Grimpe and Kaiser, 2010) (Schilke and Goerzen, 2010; Schildt et al., 2012) (Grunwald and Kieser, 2007; Ritala and Hurmelinna-Laukkanen, 2013; Forés and Camisón, 2016).</td>
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</table>
1.2.2 Offshore outsourcing innovation in SMEs

It is accepted that SMEs are not merely small versions of large firms (Gusenbauer et al., 2015). Consequently, offshore outsourcing innovation processes and governance is expected to be considerably different in SMEs than in large firms (Lee et al., 2010). SMEs can benefit from offshore outsourcing innovation more than large firms given their shortages in human, knowledge, physical and financial resources (Lee et al., 2010; Musteen and Ahsan, 2013). Therefore, while SMEs engage in OI strategies to substitute for in-house deficiency in innovation resources and capabilities, large firms utilise offshore outsourcing innovation to complement their innovation activities (Lewin et al., 2009). Also, while SMEs tend to either focus on in-house innovation or OI, large firms have enough managerial resources to pursue a portfolio of internal as well as offshore innovation activities (Stanko and Calantone, 2011). Furthermore, innovation studies have shown that although SMEs have higher productivity in terms of ideas generation, they often lack necessary resources for the commercialisation of innovations, which, in turn motivates their OI decisions (Lee et al., 2010).

Even though SME’s contributions to innovation vary depending on the industry sectors, their innovatory advantages always stem from their inherent managerial flexibility and entrepreneurial behaviour (Rothwell and Dodgson, 1991; Buckley, 1997). While not all SMEs are successful entrepreneurial firms, barriers to entrepreneurship are far less in SMEs than in large firms (Morris and Trotter, 1990). Therefore, the decentralised and flexible structure of SMEs encourages the flow of new ideas, which is crucial for innovation (Fairlough, 1994). Moreover, SMEs benefit from the role of entrepreneurs in motivating innovation generation more than large firms (Marcati et al., 2009).
Finally, the entrepreneurship mindset of SMEs explains their inclination to OI which is in line with their higher propensity to search and explore new ideas, opportunities and new markets (Mykhaylenko et al., 2015).

Previous studies documented a growing shift in SMEs’ innovation strategies toward adopting OI practices through interfirm collaboration (Rothwell and Dodgson, 1991; Lewin et al., 2009; Gassmann et al., 2010; Musteen and Ahsan, 2013). Moreover, recent research on SMEs’ offshore outsourcing strategies widely agree that SMEs’ adoption of OI provides them with significant ability to enhance their innovative capabilities and performance (Di Gregorio et al., 2009; van de Vrande et al., 2009; Gassmann et al., 2010; Musteen and Ahsan, 2013; Gusenbauer et al., 2015). For example, Di Gregorio et al. (2009) concluded that offshore outsourcing technical services is enhancing SMEs international competitiveness through opportunities of tapping into talent pools of offshore suppliers. Moreover, through socialisation and interaction with offshore suppliers, SMEs benefit from a higher level of knowledge sharing and knowledge creation (Di Gregorio et al., 2009). Musteen and Ahsan (2013) found that through OI, SMEs overcome human, social and organisational capital deficiencies and improve their innovation performance. Rodriguez and Nieto (2016) concluded that offshore outsourcing R&D stimulates higher sales growth for SMEs more than domestic R&D outsourcing. A recent survey of more than 130 academic experts in OI documented that SMEs’ decision to offshore innovation is predominantly influenced by “soft” managerial factors (Gusenbauer et al., 2015). Chief among these factors: (1) firm’s managerial skills instruments and capacity, (2) its planning and strategic thinking, (3) its
entrepreneurial mindset, (4) its organizational learning competencies and (5) its management of innovation and change (Gusenbauer et al., 2015).

Despite the strategic benefits of OI, managing OI relationships carries significant organizational challenges to SMEs, including finding suitable suppliers, constructing reliable contractual agreements, managing day to day interactions, and recruiting required technical personnel (van de Vrande et al., 2009). Most of these managerial challenges are related to organisational and cultural issues that arise when SMEs start to interact with the offshore suppliers (Gusenbauer et al., 2015). Traditionally, SMEs find their most significant shortcomings in combining internal and external knowledge and in coordinating long term relationships (Rothwell and Dodgson, 1991). For example, to manage an OI relationship, valuable management resources (usually scarce in SMEs) need to be allocated exclusively to control and coordinate the offshore supplier performance (Gusenbauer et al., 2015). Additionally, the qualified technical personnel are required to effectively access, assimilate and use suppliers’ innovation knowledge (Musteen and Ahsan, 2013). Another critical challenge that SMEs face in OI is the identification and selection of qualified suppliers (Gusenbauer et al., 2015). In summary, while OI offers SMEs a viable route to achieve higher innovation performance, failure to address the organisational challenges in managing OI relationships can hinder OI success. Table 1.2 lists key conclusions of previous studies on SMEs innovation and offshore outsourcing strategies and outcomes.
<table>
<thead>
<tr>
<th>Study Title</th>
<th>Authors</th>
<th>Journal</th>
<th>Key Conclusions</th>
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<tbody>
<tr>
<td>Small businesses as a research subject: some reflections on knowledge of small businesses and its effects on economic theory</td>
<td>Julien, P. A. (1993)</td>
<td><em>Small Business Economics</em></td>
<td>SME entrepreneurs make good use of goal compatibility as a motivational tool to form interdependencies, engender flexibility, and drive both parties’ contributions. Relational mechanisms such as goal compatibility are in line with SMEs’ entrepreneurial mindset and the less risk averse behaviour.</td>
</tr>
<tr>
<td>International technology transfer by small and medium-sized enterprises</td>
<td>Buckley, P. J. (1997)</td>
<td><em>Small Business Economics</em></td>
<td>Even though SME’s contributions to innovation vary depending on the industry sectors, their innovatory advantages always stem from their inherent managerial flexibility and entrepreneurial behaviour.</td>
</tr>
<tr>
<td>Innovation, collaboration and SMEs internal research capacities</td>
<td>Bougrain, F. &amp; Haudeville, B. (2002)</td>
<td><em>Research Policy</em></td>
<td>For SME entrepreneurs, goal compatibility acts as an informal control mechanism for maintaining a collaborative climate conducive to superior innovation performance.</td>
</tr>
<tr>
<td>Offshore outsourcing as a source of international competitiveness for SMEs</td>
<td>Di Gregorio, D., Musteen, M. &amp; Thomas, D. E. (2009)</td>
<td><em>Journal of International Business Studies</em></td>
<td>Despite the tangible gains in cost saving from the offshore outsourcing strategy, SMEs who offshore technical services are achieving other greater gains such as organisational learning and access to networks and capabilities.</td>
</tr>
<tr>
<td>Outsourced innovation in SMES: a field study of R&amp;D units in Spain</td>
<td>Albors-Garrigos, et al. (2011)</td>
<td><em>International Journal of Technology Management</em></td>
<td>Most innovative SMEs, usually pay special attention to factors affecting technology transfer between buyers and suppliers such as cultural, strategic, and technological differences.</td>
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<tr>
<td>Study Title</td>
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<tr>
<td>Alliance governance and performance in SMEs: Matching relational and</td>
<td>Pittino, D. &amp; Mazzurana, P. A. M.</td>
<td><em>Entrepreneurship Research Journal</em></td>
<td>SMEs rely on interpersonal and social relational mechanisms in managing their interfirm relationships. However, they also apply formal contracts to safeguard their sensitive information and innovation knowledge.</td>
</tr>
<tr>
<td>contractual governance with alliance goals</td>
<td>(2013)</td>
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<tr>
<td>Innovation offshoring by small and medium-sized enterprises -</td>
<td>Gusenbauer, M., Massini, S. &amp; Fink,</td>
<td><em>Global Sourcing Workshop- 2015</em></td>
<td>SMEs offshore outsourcing innovation decisions are influenced by the antecedents and consequences of smallness. These are primary factors such as managerial skills, top managers strategic and planning, internal learning capabilities such the management of innovation and change.</td>
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<tr>
<td>Establishing the research gap</td>
<td>M. (2015)</td>
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<tr>
<td>Does R&amp;D offshoring lead to SME growth? Different governance modes and</td>
<td>Rodriguez, A. &amp; Nieto, M. J.</td>
<td><em>Strategic Management Journal</em></td>
<td>Offshore R&amp;D outsourcing exerts a positive direct effect on SMEs’ sales growth via improved competitiveness. Also, Offshore outsourcing R&amp;D outsourcing has indirect effect on SMEs’ growth once the offshore outsourcing R&amp;D efforts translated into innovation outcomes.</td>
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<td>the mediating role of innovation</td>
<td>(2016)</td>
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<td>Coordination mechanisms for international innovation in SMEs: effects</td>
<td>Palmie et al., (2016)</td>
<td><em>Small Business Economics</em></td>
<td>International innovation in SMEs is a coupled process; therefore, its success requires higher levels of cooperation than offshore outsourcing low-value activities (e.g. production) wherein disintegration is rather prominent.</td>
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<td>on time-to-market and R&amp;D task complexity as a moderator</td>
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<td>Exploring intellectual capital management in SMEs: an in-depth Italian</td>
<td>Stefano Zambon D, Marzo G &amp; Scarpino</td>
<td><em>Journal of Intellectual Capital</em></td>
<td>SMEs are prominently motivated by their exploitation of intangible resources and knowledge. Therefore, they focus on their organisational capabilities to access, and leverage external knowledge to achieve internal value creation.</td>
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<td>case study</td>
<td>E. (2016)</td>
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1.3 Research context

The specific choice to study OI within SMEs offers this research an excellent opportunity to explore the complexity of managing OI relationships. This research focused explicitly on OI relationships between developed European SMEs and offshore suppliers. For example, consider the significant impact on new product and process innovations in manufacturing industries due to the rapid advancement in electronics and software technologies (Nietoa and Santamaria, 2007). Also, the offshore outsourcing of upstream engineering and design services (Van Beers and Zand, 2014; Steinberg et al., 2017). Moreover, the transformation of innovation knowledge into real innovations (e.g. offshore outsourcing prototyping services) (Roper et al., 2008). Supplier's lead innovation sometimes refer to the investments made to match the buyer's specific requirements at the actual site, or in physical and human capabilities (e.g. installation of new design software, or updating a piece of existing production equipment with the latest technology) (Joshi and Stump, 1999; Jane et al., 2012; Jean et al., 2014).

According to the European economic statistics, the SMEs manufacturing sector in Europe included more than 2 million enterprises and generated € 725 billion or 44.5% of the manufacturing sector value added in 2013 (Eurostat, 2016). Furthermore, the European innovation data reported that 49.1% of all European enterprises reported some form of innovation activity between 2012 and 2014 (Eurostat, 2017). The report added that the same percentage was consistent among the SME population. Additionally, product and process innovations constituted a total of 45.5% of all innovations that took place in European enterprises for the same period (Eurostat, 2017). Also, based on the European Manufacturing Survey (EMS) data, Dachs et al. (2006) concluded that one
quarter to half of the manufacturing firms in Western European countries are engaged in offshore outsourcing relationships.

From a strategic offshore outsourcing point of view, OI seems to present SMEs with a consistent trade-off between control and flexibility (Quinn and Hilmer, 1994; Quinn, 2000). To control OI, SMEs, due to lack of financial resources are often restricted to choose from a much-limited spectrum of OI contractual arrangements compared to large firms with abilities to implement ownership and contractual control options (see Figure 1.1). However, SMEs are often more flexible and have fewer organisational barriers to succeed in OI as opposed to large firms (Quinn, 2000). Therefore, the context within this research highlights the complexity of the problem of managing OI relationships and therefore, its empirical investigation can offer possible general solutions and implications for SME managers and future research. Additionally, this research focuses on the buyer-supplier context since non-equity OI relationships can be more attractive to SMEs than captive relationships. Abiding by this context, the present research is limited to existing OI relationships. In other words, the studied SMEs have already passed the stage of strategic evaluation of the OI decision and have already selected the offshore supplier.
1.4 Research gap

Extant research focuses on aspects of effective management of OI relationships to enhance OI performance. Moreover, recent OI research investigated the crucial role of governance mechanisms, collaboration and knowledge sharing in improving OI exchange performance (Olaisen and Revang, 2017; Sumo et al., 2016b; van der Valk et al., 2016; Rodriguez and Nieto, 2016; Oshri et al., 2015; Weigelt and Sarkar, 2012; Griffith et al., 2009; Enkel et al., 2018; Pihlajamaa et al., 2017; Bunduchi, 2013; Bstieler and Hemmert, 2010; Cheung et al., 2011; Kull and Ellis, 2016; Becker and Zirpoli, 2017; Yang et al., 2014; Janowicz-Panjaitan and Noorderhaven, 2008; Azadegan et al., 2008).

Previous studies documented that firms pursuing innovation through offshore outsourcing must devise useful interfirm governance structures to mitigate OI risks and
improve its outcomes (Kulangara et al., 2016; Oshri et al., 2015; Sumo et al., 2016a; van der Valk et al., 2016; Wang et al., 2011). Additionally, extensive research studied suppliers’ complementary capabilities as essential antecedents to successful OI collaborations (Jap, 1999; Nietoa and Santamaria, 2007; Rothenberg and Boeker, 2008; Mitsuhashi and Greve, 2009; Van Beers and Zand, 2014; Mindruta et al., 2016; Cobena et al., 2017). Furthermore, Studies of collaborative innovation in buyer-supplier dyads/networks have focused on the role of knowledge sharing as a primary mechanism for joint learning (Azadegan et al., 2008; Dyer and Nobeoka, 2000; Bengtsson et al., 2013; Hottenrott and Lopes-Bento, 2016).

Despite these studies, OI relationships are less researched in the case of SMEs (Gusenbauer et al., 2015). For example, the role of the supplier's complementary capabilities remains underexplored in the case of OI in SMEs (Musteen and Ahsan, 2013). Moreover, SMEs use their relatively flat and flexible structure in motivating fast OI decisions (Marcati et al., 2008; Gusenbauer et al., 2015). These specific characteristics of SMEs could mean that managing attributes of OI relationships in the case of SMEs might differ from managing OI in case of large focal firms. Moreover, SMEs are more likely to benefit from OI more than large firms due to SMEs resource shortcomings and their higher propensity to explore new ideas (Mykhaylenko et al., 2015; Lee et al., 2010; Musteen and Ahsan, 2013). However, in light of the same characteristics SMEs may have limited control over the offshore supplier performance (Quinn and Hilmer, 1994; Quinn, 2000; Gusenbauer et al., 2015).

The OI literature has given limited attention to the interplay between supplier joint actions and antecedents of dyadic performance, such as the supplier’s asset specificity.
and goal compatibility (Stump and Heide, 1996; Shepherd and DeTienne, 2005; Johnson and Medcof, 2007). Additionally, studies of buyer-supplier collaborations for innovation remain generally silent about the effectiveness of supplier joint actions in enhancing supplier performance in OI relationships (Gilliland and Kim, 2014). Furthermore, while the technology alliance literature emphasised the central role of social interactions between boundary spanners of collaborating firms in achieving effective knowledge sharing (Uzzi, 1997; Dyer and Nobeoka, 2000; Hardy et al., 2003; Luo and Deng, 2009; Johnson and Medcof, 2007; Jean et al., 2017; Dyer and Singh, 1998), few researchers had studied the effect of formal knowledge sharing routines in the context of OI relationships (Janowicz-Panjaitan and Noorderhaven, 2008).

In an attempt to bridge these gaps in OI research, the present research investigates the interorganisational management challenges that SMEs face when offshore outsourcing innovation tasks to cross-border suppliers. This research proposes and tests frameworks that could provide solutions to these challenges and the impact that these solutions may have on OI performance. In so doing, this research extends the supply chain innovation literature by exploring governance mechanisms, dyadic complementarity and knowledge sharing in buyer-supplier OI relationships. Furthermore, this research explicitly studies buyer-supplier OI relationships in manufacturing SMEs, where such relationships become increasingly relevant and an important means for strategic relational gains (e.g. knowledge transfer and innovation) (Cao and Zhang, 2011). Researchers of strategic supply chain management argued that successful buyer-supplier alliances could be developed by managing attributes of the relationship (Mohr and Spekman, 1994; Monczka et al., 1998; Carr and Pearson, 1999).
Previous research has cited factors such as trust, knowledge sharing, goal congruence, collaborative communication, incentive alignment and joint problem solving as key mechanisms that build effective buyer-supplier collaborations (Mohr and Spekman, 1994; Monczka et al., 1998, Chen et al., 2004; Paulraj and Chen, 2007; Cao and Zhang, 2011). Despite these clear concepts, management of buyer-supplier relationships is challenged by the uncertainty of outcomes and the risk of opportunism in OI relationships. Therefore, there is a strong need for additional insights and a deeper understanding of how buyer-supplier relationships can be managed in the OI context to deliver innovation gains. To address this need, this research applies the relational view (Dyer and Singh, 1998) as its main theoretical lens to test whether and how the relational view’s basic assumptions hold in the context of OI by SMEs. Besides, offshore outsourcing manufacturing as a productive structure provides a rich medium to explore how offshore outsourcing relationships are governed to enhance OI performance. Furthermore, the present research delineates the supplier's asset specificity and goal compatibility as significant factors of suppliers' complementarity in OI relationships. Moreover, this research examines how the interplay between internal knowledge creation capability, formal knowledge sharing routines and absorptive capacity impacts the OI performance.

1.5 Research aim and objectives

The present research aim is to investigate the management opportunities and challenges of OI relationships within SMEs. This research intends to study existing theories in the field and conducts an empirical study of the present situation of OI within European manufacturing SMEs. The focus of this research is on the governance structure, the
supplier’s complementary capabilities and the knowledge sharing process in OI relationships. Based on this focus, the conceptual models and hypothesised relationships that incorporate these relational constructs are tested. Consequently, OI performance is measured as an indicator of OI success. Therefore, the objective of this research is to:

1. Examine the impact of contract complexity/relational trust governance combinations on OI performance.
2. Empirically investigate the effect of supplier’s asset specificity, goal compatibility and supplier joint actions on supplier’s complementary capabilities in OI relationships.
3. Examine the impact of internal knowledge creation capability, and formal knowledge sharing routines on the relationship between absorptive capacity and OI satisfaction and performance.

1.6 Research questions

The following overarching research question (RQ) guides this research effort: How can SMEs manage OI relationships to enhance OI performance? To address this overarching question, the present research asks three sub RQs:

- RQ1 (first paper): How do SMEs implement contract complexity and relational trust governance to enhance the innovation performance of OI relationships?
- RQ2 (second paper): How do supplier’s asset specificity and goal compatibility impact the supplier’s complementary capabilities in OI relationships and impact OI performance?
• RQ3 (third paper): How do linkages between SMEs internal knowledge creation capability, formal knowledge sharing routines and absorptive capacity impact the satisfaction and performance of OI relationships by SMEs?

1.7 Research methodology

1.7.1 Philosophical paradigm

The philosophical position of a research will influence the research approach (Saunders et al., 2009, p124), as it will direct the utilization of employable research methods and defend the rationale for their use as opposed to other available research methods. Moreover, the philosophical stance guides this research methodology based on suitability in addressing the research problem, viability and theoretical goals (Saunders et al., 2009, p125). Both inductive and deductive research methodologies are compatible with the philosophical position of this research. However, given that this research is theory driven, and the topic under examination was produced by in-depth literature review, a deductive research option is chosen. The theoretical perspectives applied here are used to sustain the proposed premises while attempting to empirically authenticate the direction and effect of causal relationships between the measured constructs. The present research inquiry is upheld by theories and is dealt with the application of logical, coherent, and explicit arguments (Loasby, 1984)

Considering the postulation that reality is independent from the observer’s discernment and all that is required is to reveal it, this would indicate epistemological warrant for positivism ontology (Balashov and Rosenberg, 2002, p211). Positivism originates from natural science and presumes that all knowledge is external and attained through logic or our senses (Balashov and Rosenberg, 2002, p494). Therefore, this school
of thought applies the methodology of natural science research to social phenomena (Balashov and Rosenberg, 2002, p446). As a result, this approach favours objective and quantitative methods like surveys and experimental models (Meredith, 1998). Hence, constructing knowledge in the positivism school of thought dictates introducing logical reconstruction to ascertain its certainty. Causal arguments are established by matured theoretical premises that ultimately support the core of this research argument. Accordingly, all significant arguments are either supported or opposed by experiences. In addition, these arguments need to undergo empirical verification and must also have a logical form. Subsequently, the produced knowledge should be substantiated by empirical evidence that reinforces, to a certain degree, the important statements (or hypotheses) under test (Hollis, 1994, p94). However, the logical verification principles can be disjointed because of the flawed analysis of a social phenomenon. Essentially, hypotheses are used as a means of supporting a significant statement and not to prove it (Loasby, 1984).

1.7.2 Research approach

The research questions of this study are formulated based on theoretical perspectives and current industry practice and trends. Therefore, the present research applies a deductive logic approach (Figure 1.2). The studied phenomenon, namely OI, has been described in previous research using well established economic and organisational theories. Moreover, the research questions aim to explain what might be happening, what is likely to happen and evaluate the impact of what is happening in the context of OI relationships within SMEs (Blaikie and Priest, 2019, p88). Therefore, the research inquiry lends itself to a quantitative approach. With quantitative research, it is assumed that the relationships
between variables can be measured systematically and statistically. Moreover, there are

clear effects to establish causality:

"When quantitative research is used with deductive logic, a hypothesis
is tested by operationalisation its concepts, collecting the appropriate
data, and then exploring the nature of the relationship between the
measures of the concepts by some statistical analysis." (Blaikie and
Priest, 2019, p169)

Figure 1.2: Deductive logic (Source: https://socialresearchmethods.net/kb/dedind.php)

Quantitative research plays a vital role in supply chain management studies. Some

of the major advantages of quantitative research are the precision it can achieve in its
variables by specifying measurable values and then precisely testing them (Meredith,
1998). Another major advantage is the knowledge and wide acceptance of quantitative
research’s standard procedures and variance reduction techniques in social science
disciplines, particularly in operations management (Meredith, 1998). Despite these
advantages, quantitative research usually experiences drawbacks (e.g. obtaining valid
empirical generalizations, lack of comparability across studies, failure to achieve much inference validity, restrictions of statistics such as normality, low amount of explained variance, etc.) (Meredith, 1998).

1.7.3 Data Collection
The research followed an online survey strategy. Survey research has rapidly grown as the methodology of choice in supply chain management research (Kotzab, 2005). Survey data collection provides a systematic and efficient approach for collecting a large amount of data from numerous cases (Neuman, 2014, p167). Online or web-based surveys are faster than traditional mail surveys (Cobanoglu et al., 2001; Grant et al., 2005). Moreover, online surveys are context-driven, interactive and can be monitored in terms of date, speed, and quality of responses in real-time (Cobanoglu et al., 2001; Grant et al., 2005). Accordingly, online surveys provide opportunities to improve response rate, response accuracy and consequently, improve the internal and external validity of research results (Grant et al., 2005). Despite these advantages, surveys are subject to methodological disadvantages such as sampling accuracy and the tendency of respondents to answer surveys the way they think the researcher wants to hear from them (Blaikie and Priest, 2019, p188). This research followed a rigorous procedure in data collection and analysis to ensure mitigating these shortcomings.

The cross-sectional survey of this research was designed and administered using online survey tool and panels (www.qualtrics.com) (Jackson et al., 2016; Abbey and Meloy, 2017; Wang and Hubbard, 2017; McDowell et al., 2018; Nieroda et al., 2018). Increasingly, data collection through survey method has become difficult in recent years due to lack of access to respondents' database and over-sampled populations which lead to survey fatigue and overall unwillingness to respond to surveys (Ellram and Tate, 2016).
Therefor, the use of survey companies such as Qualtrics and Amazon's Mechanical Turk (MTurk) for data collection is widely used by researchers for a wide variety of topics (Ellram and Tate, 2016; Abbey and Meloy, 2017). Using Qualtrics recruited sample allowed data collection in a shorter time. The unit of analysis was the offshore outsourcing SME with existing OI relationship. The survey targeted manufacturing SMEs in four developed European countries; the United Kingdom (UK), France, Italy, and Germany. The survey was designed to be answered by top managers of the SMEs.

The survey link was sent to 2,384 SMEs, which were identified and recruited via Qualtrics Panels. A total of 1,466 firms were screened out since they did not meet the SME size class criteria and the study criteria for offshore outsourcing innovation governance mode, leaving us with a starting sample size of 918 firms. To ensure complete and good quality responses we enabled forced response for all questions, added an attention check midway through the survey to make sure that respondents are paying sufficient attention (Abbey and Meloy, 2017). Further, all completed responses in less than 1/3 of the median time of all completed responses were screened out. After screening out incomplete responses and responses that failed quality and attention checks; the final sample contained 200 firms, giving an effective response rate of 21.8%. The data collection process started on 3rd January and ended on 27th January 2018. Due to the short time of data collection (3-4 weeks), concerns of responses bias between early and late respondents were minimal.

Respondents included chief executive officer (4.0%), managing director (34.5%), managing partner (owner) (47%), and general manager (12.5%), and other top management positions (2.0%). The surveyed sample of SMEs belonged to a variety of
manufacturing industries, including plastic, paper and rubber (16.0%), textile and wearing apparel (16.0%), food and beverages (11.5%), machinery and mechanical equipment (12.0%), pharmaceutical and chemicals (10.0%), wood and furniture (10.0%), metal (9.0%), electrical and electronics (8.0%), coke and petroleum (5.0%), and other manufacturing (2.5%). All sampled SMEs and respondents were initially qualified per the study context. Only SMEs that fit the EU definition of SME, i.e. has a total number of employees between 10-249, and an annual turnover of €10 - €50 were included (European Commission, 2016). Additionally, the survey excluded SMEs with a captive or equity-based OI relationships since the main aim of this research is to examine offshore outsourcing innovation in an offshore outsourcing (buyer-supplier) context.

The cross-sectional survey questions used a continuous 5 and 7-point Likert scale with endpoints "strongly disagrees" and "strongly agrees". The first part of the survey (questions 1-10) was dedicated to collecting general data about individual SMEs and respondents. In the second part (questions 11-14), respondents were instructed to select a significant offshore supplier with whom they have an existing OI relationship. Respondents were asked the country and industry of their offshore supplier. 52% of the offshore suppliers in the final sample came from non-European country (different continent). Also, out of the 48% European offshore suppliers in the sample, only 16 suppliers or 8% of the total sample came from Germany, Italy, France, and the UK.

Moreover, maintaining the cross-border context of the study, none of the offshore suppliers in the final sample came from the same country of the buyer SME. Finally, while the offshore supplier's firm size might have an impact on the OI performance, it was not part of the research scope. Furthermore, to focus the respondents' attention on offshore
outsourcing innovation, respondents were asked if in addition to innovation, they offshore other services with the same supplier. In the following sections of the survey (questions 15-30), identified research constructs were operationalised using multiple-item scales. Scales were selected by reviewing existing literature and identifying relevant scales. All scales used in the survey were based on previously validated scales. Moreover, the final scale of each of the research constructs included a minimum of three items (Baumgartner and Homburg, 1996).

Furthermore, before launching the live data collection, the survey was pre-tested with eight executives from European SMEs. The executives were asked to comment on the survey presentation, wording, and validity of items. The final survey incorporated some of the suggestions made by the SMEs' executives (see Appendix A for the full survey).

1.7.4 Data analysis

For data analysis, the research used IBM statistical analysis software SPSS and AMOS. In each of the three research papers, the data analysis procedures started by eliminating concerns around common method bias by conducting Harman's one-factor test (Podsakoff et al., 2003). Confirmatory factor analysis (CFA) was then used to reject common method bias concerns and assess unidimensionality; reliability, and validity of the survey measures. Unidimensionality was evaluated for all multiple-item constructs using model fit indices: 1) Comparative Fit Index (CFI), 2) Tucker-Lewis Index (TLI) and 3) Root Mean Square Error of Approximation (RMSEA). In all three research papers, values of CFI and TLI indices were close to 1 (greater than 0.90) indicating a very good model fit (Arbuckle, 2017, p651-652; Bnetler, 1990). RMSEA values were less than 0.08,
indicating a reasonable error of approximation and good model fit (Browne and Cudeck, 1993; Arbuckle, 2017, p644). Additionally, Cronbach Alpha values for all constructs were equal to or more than 0.70, establishing the reliability of the research's composite scores. Also, the values of composite reliability were equal to or more than 0.70 (Bagozzi and Yi, 1988). Discriminant validity for each of the research constructs was assessed by average variance extracted (AVE) estimates of .50 or higher (Fornell and Larcker, 1981). The results demonstrated that 9 of 11 constructs equalled or exceeded AVE of 0.50 and only two constructs (supplier’s asset specificity and goal compatibility) had an AVE estimate of 0.48. Moreover, the discriminant validity of constructs was checked by comparing the squared correlation between each pair of the constructs in the three studied models to their AVE (Fornell and Larcker, 1981). According to this test, the AVE of any two constructs should be higher than the squared correlation between them. The correlation coefficients of all pairs of constructs were lower than the AVE values of the corresponding constructs in all three papers (Gimenez, 2005).

For hypothesis testing the present research applied generalised linear regression analysis in SPSS Statistics 23 (IBM SPSS Version 23.0, IBM Corp. NY, USA) for the first paper. In the second and third paper with mediation and moderation hypotheses Hayes ’s Process v3.0 tool (Preacher and Hayes, 2008) were used. Process v3.0 utilises bootstrapping (a computer-intensive resampling from the data set for thousands of times) to build confidence interval of the empirical estimation of the mediation and interaction effects between variables (Lockwood and MacKinnon, 1998). For bootstrapping 5000 resampling iterations were used and a 95% confidence interval for the approximation of the indirect effects. Where possible, two tests were conducted to establish support for one
hypothesis; for example, to test for complementarity between contract complexity and relational trust in the first paper, two tests were conducted. Also, all mediation results were verified using Sobel’s tests (Sobel, 1982; Sobel, 1986) in addition to the mediation testing procedure of Baron and Kenny (1986). Finally, two- and three-dimensional graphs and surface plots were produced to visualise the results and the inferred relationships between studied constructs.

1.8 Overview of the research

The present research follows the journal paper format (alternative format) and is based upon three working and publishable papers. The choice to follow the journal format route was a collective decision taken by me and the supervisory team towards the end of the first year of the study. The refined research proposal I prepared and discussed during the first annual review meeting in 2017 identified three sub research questions (see 1.6). Each of these sub research questions aimed at investigating a major challenge and opportunity that face SMEs in managing OI relationships. The first sub research question aims to tackle the challenge of devising effective governance of OI to control and coordinate the involvement of the offshore supplier in the SME’s innovation activities and consequently enhance the OI performance. The second sub research question addresses the opportunity of leveraging offshore suppliers’ complementary capabilities by implementing relational mechanisms that are affordable for SMEs and could substitute for deploying extensive resources in searching for and selecting champion offshore suppliers. The third sub research question explores the challenge SMEs face in striking an optimal balance between the coordination and control of knowledge sharing in OI relationships. Knowledge sharing in OI relationships is often problematic; therefore, it is important that
the management of knowledge sharing in OI be aligned with the complexity of the offshored innovation tasks. Given the above arguments, the three-paper format was selected as the more suitable route for this research to facilitate a deep and dedicated examination of the three managing attributes of OI relationships (i.e. governance, complementarity, and knowledge sharing) that could lead to successful buyer-supplier OI.

Furthermore, the three papers revolve around the main research aim, which empirically investigates the management opportunities and challenges of OI relationships within SMEs. The relational view (Dyer and Singh, 1998), serves as the central theoretical lens of the research (Figure 1.3). The relational view highlights the need to balance safeguarding contracting (e.g. complex contracts) with relational governance (e.g. relational trust) to encourage suppliers to share their innovation knowledge and to enhance their ability to perform the innovative offshored tasks (Dyer and Singh, 1998). In OI, SMEs manage to gain competitive advantage through leveraging their relational capability to establish and coordinate OI relationships despite their lack of ownership and control over their offshore suppliers' valuable innovation resources (Dyer and Singh, 1998). Moreover, Dyer and Singh (1998) documented that inter-organisational learning is a critical source of sustainable collaborative advantage (Dyer and Singh, 1998). Each of the three research papers addresses one of the four sources of relational rents following the relational view: (1) relationship-specific assets, (2) knowledge sharing routines, (3) complementary resources and capabilities, and (4) effective governance. The first paper investigates the effectiveness of contractual and relational governance in managing OI relationships. Furthermore, the first paper studies the moderating effects that formal knowledge sharing routines may have on governance mechanisms in OI relationships.
The second paper explores the impact of supplier’s asset specificity on supplier’s complementary capabilities and consequently, how both operate directly and indirectly in enhancing OI performance. The third paper explores the management of the knowledge sharing process in OI by testing the linkages between internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines.

Figure 1.3: Research overview

By capturing the motivations, challenges, and actions of the management of OI relationships, the relational view serves as a useful theoretical lens that explains several dyadic aspects of OI. The relational view extends four of the major organisational theories that have been used in explaining offshore outsourcing strategies. First, the relational view extends the TCE (Williamson, 1979) by proposing that firms in buyer-supplier alliances can rely on specific asset investment and knowledge sharing routines to reduce risk of suppliers’ opportunistic behaviour. Second, the relational view expands the resource-based view (RBV) (Wernerfelt, 1984) by arguing that firms in dyadic alliances can
accumulate relational rents by accessing and combining each other’s complementary idiosyncratic capabilities (Dyer and Singh, 1998). Therefore, OI allows SMEs to accrue relational rents from utilising the heterogeneous and immobile resources of the offshore suppliers (Dyer and Singh, 1998). Third, the relational view encompasses relational exchange theory (RET) (Emerson, 1976) by articulating that under self-governance regimes such as relational trust, partners in OI relationships are motivated to exchange knowledge through informal interactions (Dyer and Singh, 1998). Fourth, the relational view uses resource dependence theory (RDT) (Pfeffer and Salansik, 2003) in cooperative OI relationships, by postulating that OI grants SMEs access to skills and resources that reside with the offshore suppliers but are strategically essential for their own survival and growth (Dyer and Singh, 1998).

Despite the comprehensive theoretical account of the relational view in explaining OI, based on RQ1 of the first paper, this research employs TCE to address how SMEs uses complex contracts in OI to curb offshore suppliers’ opportunistic behaviour and protect SMEs’ competitive advantage through legal control (Williamson, 1999). Furthermore, the third paper also adopts the tenets of KBV to test how effective knowledge sharing becomes the basis of achieving positive OI outcomes (Grant, 1996). Moreover, the third paper investigates the role of formal rules and routines in enhancing joint learning and moderating OI outcomes. Although each of the three papers develops and tests a separate conceptual model to answer a specific research question, all three papers emerge from the relational view theoretical perspectives (Dyer and Singh, 1998); as the main theoretical foundation of this research. The three research papers tackle three central issues in the management of OI relationships: (1) effective governance, (2)
complementarity, and (3) knowledge sharing. In this way, the three papers form one body of work using the same contextual settings and dataset.

1.8.1 Student’s own contributions
As the student, I was the first author of the three papers. I submitted the full papers and presented them in four international research conferences in tracks relevant to the management of innovation alliances, Interorganisational collaboration and offshore outsourcing. Also, I was the corresponding author in journal submissions. My contributions included the following tasks:

- Writing the full manuscripts of the papers.
- Develop the papers’ conceptual model and the rationale for the proposed hypotheses.
- Design the papers’ survey instrument including measures and scales.
- Run statistical data analyses.
- Prepare results tables.
- Discuss the papers’ findings, conclusions, implications, and directions for future research.
- Suggest to appropriate conferences and business research journals as potential outlets for presentation and publication.
- Prepare and submit the papers to conferences and journals in accordance with the provided guidelines to authors.
- Review, revise and improve the papers’ manuscript in accordance with supervisors’ comments, feedback from conferences and journals reviews.
My supervisors’ (co-authors of the three research papers) valuable comments provided directions for strengthening the research papers’ theoretical arguments, positioning of each paper among the corpus of operations and supply chain management research as well as providing insights for writing clearer contributions and implications sections. In the following sub-sections, a summary of each paper’s aims, conceptual model and findings are provided.

1.8.2 First Paper- Offshore outsourcing innovation by SMEs: A 4F perspective of governance

The first paper aims to investigate how SMEs implement contract complexity and relational trust governance mechanisms to enhance OI performance. The paper argues that despite the growing benefits for SMEs from OI, pursuing innovation through offshore outsourcing is characterized by experimenting, risk-taking and unpredictable outcomes. Consequently, the cost of coordinating and monitoring OI relationships can be challenging for SMEs. The paper’s conceptualised model extends TCE and the relational view of buyer-supplier dyads in the context of OI in SMEs. The paper examines the effect of different combinations of contractual and relational governance on OI performance in SMEs.

Results from this paper suggest that SMEs choose to maximise and balance both contract complexity and relational trust to enhance OI performance. Also, complex contracts and relational trust are necessary for the continuation of OI relationships. Furthermore, findings from the first paper suggest that under conditions of formal knowledge sharing routines and supplier joint actions, complex contracts become more efficient in driving increased suppliers' compliance and higher OI performance. However,
the same contingent factors do not seem to have the same moderating effects on the relationship between relational trust and OI performance. The first paper hopes to contribute to the strategic supply chain innovation and management research and practice by developing the 4F four governance types involving contract complexity and relational trust - fit, firm, flexible, and fragile (4F). Moreover, results from the first paper indicate that the robustness of governance mechanisms of OI can be strengthened through partnering factors (e.g. formal knowledge routines, supplier joint actions), which can significantly contribute to shaping the OI performance.

1.8.3 Second paper- Offshore outsourcing innovation: An empirical investigation of dyadic complementarity within SMEs

The purpose of the second paper is twofold. First, the paper aims to delineate why the supplier's asset specificity and goal compatibility impact the supplier's complementary capabilities in OI relationships. Second, the paper empirically examines the role of supplier joint actions in enhancing OI performance. The paper subscribes to the strategic alliance literature, which advanced that supplier’s complementary capabilities imply that two distinctive capabilities of alliance partners are complementary in that their joint performance generates a value that is greater than each one by itself (Dyer and Singh, 1998). The paper argues that OI provides SMEs with access to skills and resources that reside with the offshore supplier but are strategically essential for SMEs survival and growth. Therefore, in the case of SMEs, supplier’s complementary capabilities can act as a shifting parameter towards adopting a "buy" innovation strategy, given that SMEs generally have limited innovation resources internally.
Additionally, strategic supply chain management scholars have widely recognised that joint actions aimed at supplier development are critical drivers of collaborative success (Nyaga et al., 2010; Flynn et al., 2010; Huq et al., 2014; Joshi and Stump, 1999; Heide and John, 1990). However, the supply chain innovation management literature has given limited attention to the interplay between supplier joint actions and antecedents of dyadic performance (Stump and Heide, 1996; Shepherd and DeTienne, 2005; Johnson and Medcof, 2007). Moreover, studies of buyer-supplier collaboration remain generally silent about the effectiveness of supplier joint actions in enhancing supplier performance (Gilliland and Kim, 2014). The second paper attempts to investigate these gaps and contribute to the SME and offshore outsourcing innovation theories by conceptualising and examining OI in SMEs from the theoretical perspective of the relational view (Dyer and Singh, 1998).

1.8.4 Third paper- Strengthening knowledge sharing in offshore outsourcing innovation: The role of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines

The third paper aims to examine the effects and interactions of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines on the level of satisfaction and the performance of OI relationships. The paper argues that in light of the SMEs financial resource constraints, they are expected to be less concerned about knowledge acquisition and more interested in knowledge application than large firms. Therefore, SMEs might seek a quicker way for suppliers' knowledge application, which in turn highlights the importance of internal knowledge creation capability and absorptive capacity as critical capabilities to achieve OI success.
Results from this paper show that the relationship between the internal knowledge creation capability and the SME’s satisfaction is thoroughly explained through absorptive capacity. However, findings from this paper suggest that the relationship between the internal knowledge creation capability and the OI performance is partially explained through absorptive capacity. Additionally, results from this paper underscore the need for a thorough understanding of the effects of formal knowledge sharing routines on the relationship between absorptive capacity and OI performance. The paper hopes to draw a deeper and more detailed insights into the management of the knowledge sharing dynamics in OI relationships.

1.9 Thesis structure

The thesis has five chapters which are structured following the journal format thesis (Figure 1.4). The conclusions chapter (Chapter 5) includes a general discussion of the overall research findings and contributions to the body of research in fields of innovation management and strategic supply chain management. The conclusions chapter includes theoretical and practical implications as well as several directions for future research.

Figure 1.4: Thesis structure
Chapter 2: First Paper- Offshore outsourcing innovation by SMEs: A 4F perspective of governance


An earlier version of this paper was submitted and presented at the 25th Innovation and Product Development Management Conference (IPDMC) in Porto, June 2018.
2.1 Abstract

Purpose – This study examines the effect of contractual and relational governance alternatives on offshore outsourcing innovation (OI) performance in SMEs.

Design/methodology/approach – Our conceptualised empirical investigation extends transaction cost economics (TCE) and the relational view of buyer-supplier dyads in the context of OI in SMEs. To test our hypotheses, we collected and analysed online survey data from 200 developed European SME manufacturers in Germany, Italy, the United Kingdom, and France engaged in existing OI relationships.

Findings – We develop four governance types involving contract complexity and relational trust - fit, firm, flexible, and fragile (4F). Our results suggest that: (1) SMEs choose to maximise and balance both contract complexity and relational trust to enhance OI performance, (2) complex contracts and extensive relational trust are necessary for the continuation of OI relationships, and (3) In addition, the robustness of governance mechanisms of OI can be strengthened through partnering factors (e.g. formal knowledge routines, supplier joint actions), which can significantly contribute to shaping the OI performance.

Originality – The 4F governance scenarios introduced in this study – fit, firm, flexible, and fragile emphasise the need for a combination of contract complexity and relational trust mechanisms in OI relationships. The 4F labelling has rich implications for practitioners on how interfirm OI relationships can be managed based on configurations of contractual and relational governance. The study also adds to our understanding of the differences between SMEs and large firms.
2.2 Introduction

Firms of all sizes are increasingly engaging in offshore outsourcing relationships as a strategic source of collaborative innovation (Whitley and Willcocks, 2011). In light of these offshore innovation activities, firms are gaining access to suppliers’ know-how, competitive advantage and are tapping into global markets of knowledge and talents (Bertrand and Mol, 2013; Lewin et al., 2009; Sartor and Beamish, 2014). The strong trend towards adopting offshore outsourcing innovation (OI) strategies has gained momentum since the early 2000s (Lewin et al., 2009). However, the phenomenon has received more research attention in the context of large firms than in the case of SMEs (Gusenbauer et al., 2015; Musteen and Ahsan, 2013). Studies that have researched SMEs’ innovation strategies have documented a growing trend towards involving offshore suppliers in their innovation process (Musteen and Ahsan, 2013; Rodriguez and Nieto, 2016). We envision OI as the act of transferring to the foreign supplier any element of the innovation process, including collaborative R&D, supplier involvement in new product development (NPD) and the commercialisation of innovations (Quinn, 2000; Gusenbauer et al., 2015).

Previous studies argued that SMEs engage in OI to compensate for in-house deficiencies in innovation resources, while large firms mainly outsource innovation offshore to complement their innovation activities (Lewin et al., 2009; von Haartman and Bengtsson, 2015). For example, Musteen and Ahsan (2013) proposed that SMEs are likely to benefit from OI, given their lack of internal resources. Moreover, research on innovation has shown that although SMEs have higher innovative productivity in terms of idea generation, they often lack adequate resources for the commercialisation of innovations which in turn motivates their OI behaviour (Lee et al., 2010). Offshore
outsourcing has been proven to improve SMEs’ innovation capabilities (van de Vrande et al., 2009); enhance their international competitiveness (Di Gregorio et al., 2009); and stimulate higher sales growth for SMEs when compared to in-country innovation outsourcing activities (Rodriguez and Nieto, 2016). Despite the benefits, the tasks required for OI management present SMEs with a trade-off between improving innovation performance and reducing costs (Bengtsson et al., 2009). While accessing suppliers' tacit knowledge via OI can improve SMEs' speed of innovation, it involves significant risk of sensitive knowledge spillover and loss of competitive advantage (Aubert et al., 2015; Gooroochurn and Hanley, 2007; Hoecht and Trott, 2006). Accordingly, the governance of such OI relationships is of paramount importance to SMEs given that: (1) outsourced innovations are uncertain (Stanko and Calantone, 2011); (2) offshore suppliers’ pose higher behavioural risks (Huq et al., 2014; Mykhaylenko et al., 2015); and (3) offshore countries have different business and institutional environments (Huq and Stevenson, 2018; Martínez-Noya and García-Canal, 2011; Sartor and Beamish, 2014).

Firms pursuing innovation through offshore outsourcing must devise useful interfirm governance to mitigate OI risks and improve its outcomes (Sumo et al., 2016a; Kulangara et al., 2016; van der Valk et al., 2016). Pittino and Mazzurana (2013) conclude that SMEs tend to rely on relational governance in innovation exploitation alliances, but they use both contractual and relational governance in case of exploration innovation alliances. Furthermore, Sumo et al. (2016a) document that both contracts and trust are necessary to achieve medium or high levels of innovation in buyer-supplier relationships. Our study extends this line of research by explicitly investigating how do contract
complexity and relational trust impact and interact in OI relationships by SMEs such that OI performance is improved? We conceptualise OI performance as the product and process innovations, and the new product speed to market resulting from the SME-offshore supplier dyadic exchange (Jane et al., 2012).

We specifically chose the context of buyer-supplier relationships in manufacturing SMEs. Offshore outsourcing relationships are a productive outsourcing model that has been studied adequately. Therefore, OI provides a rich medium to explore how such relationships are governed to enhance co-value creation and subsequently deliver innovations at the dyadic level (Laursen and Salter, 2006). Our study intends to make significant contributions to extant OI research on OI in the specific context of SMEs. First, keeping in mind that SMEs are not merely small versions of large firms (Gusenbauer et al., 2015), due to which results from OI studies that have examined governance types in large firms might not apply to SMEs. The present study reveals alternative governance types for OI relationships in SMEs. Specifically, the 4F governance scenarios fit, firm, flexible, and fragile introduced in this study emphasise the need for a combination of contract complexity and relational trust mechanisms. Second, our results highlight the importance of adopting and balancing both contractual and relational governance mechanisms for effective OI management. Despite SMEs' small size characteristics and insufficient resources, it appears that most of the SMEs follow large firms in devising dual interfirm governance. We argue that SMEs tend to leverage their high propensity to trust without falling into blind trust traps. Moreover, despite costs of crafting, enforcing, and adjusting OI complex contracts, SMEs will not venture unguarded into risky OI
relationships. Hence, this study also adds to our understanding of the differences between SMEs and large firms.

2.3 Theory and hypotheses

2.3.1 The nature of offshore outsourcing innovation

The distinctive characteristics of OI offer a conceivable approach to understand the mixed results in OI studies (Stanko and Calantone, 2011; Steinberg et al., 2017; van der Valk et al., 2016; Weigelt and Sarkar, 2012). First, it is necessary for firms pursuing innovation through offshore outsourcing to access tacit knowledge of suppliers, while typically offshore outsourcing is driven by cost, efficiency and economies of scale considerations (Gooroochurn and Hanley, 2007; Mykhaylenko et al., 2015). Second, OI is a coupled process; its success requires higher levels of cooperation between the offshore outsourcing partners than in the case of offshore outsourcing low-value activities (e.g. production) where disintegration is rather prominent (Gassmann et al., 2010; Palmie et al., 2016; Steinberg et al., 2017). Moreover, the strength of co-operative ties in OI is essential for effective knowledge exchange and collaborative innovation performance (Tomlinson, 2010; Koufteros et al., 2012).

In OI, firms face a fundamental paradoxical tension between offshore outsourcing efficiency (e.g. low uncertainty, process standardisation, and measurability), and innovation adaptability (e.g. risk taking, flexibility, and slack resources) (Weigelt and Sarkar, 2012). Through offshore outsourcing efficiency, firms monitor and control suppliers to achieve low transaction costs and economic gains. Alternatively, innovation adaptability entails having sufficient resources, decentralised governance structure and open knowledge sharing (Aubert et al., 2015). This paradox between offshore outsourcing
efficiency and innovation adaptability appears in OI relationships due to the contradictory elements of pairing offshore outsourcing with innovation which exist and persist over time (Aubert et al., 2015). Consequently, firms pursuing innovation through offshore outsourcing must establish governance mechanisms that satisfy a dual need for offshore outsourcing success and innovation capacity (Kloyer and Scholderer, 2012; Kulangara et al., 2016).

The OI literature advanced that firms pursuing innovation through offshore outsourcing are usually confronted with two contrasting approaches. The first approach is in favour of limiting suppliers’ involvement in the innovation process to non-core and low-cost innovative activities. The second approach, however, values supplier’s early involvement in the innovation process due to the supplier’s specific and strategic competencies as in the case of specialised first-tier suppliers in the automotive industries (Dyer, 1996; Sako, 1994).

The first approach is a common practice during the transformation of innovation knowledge into real innovation (e.g. offshore outsourcing design and prototyping services) (Roper et al., 2008). This approach is consistent with transaction cost economics (TCE). It explains innovation generation in buyer-supplier relationships as a function of adaptation costs (e.g. contract adjustments), safeguarding costs (e.g. curbing supplier opportunistic behaviour) and measurement costs (e.g. monitor contract implementation) (Stanko and Calantone, 2011). Accordingly, firms will favour a “buy” instead of a “make” strategy for as long as they can justify and afford transaction cost implications (Lai et al., 2009). The second approach to OI, structurally and systematically integrates suppliers in the innovation process. This approach however, comes at prohibitive transaction costs
and therefore, constitutes a breakdown of TCE's traditions (Stanko and Calantone, 2011). Hence, firms adopting this approach are motivated by survival or profitability considerations that are stronger than transaction cost economics (Gooroochurn and Hanley, 2007; Lavie, 2006).

The relational view offers an alternative conceptualisation for OI. In OI, the buyer firm gains access to suppliers' specialised resources and tacit knowledge which are usually difficult to produce internally and not readily available to buy through arm's length ties (Dyer and Singh, 1998). For example, Dyer (1996) documented that firms are continually using collaboration to expand their competencies. By integrating TCE and the relational view, a more realistic picture of interfirm OI governance emerges to show that a make/buy dichotomy is insufficient and instead a formal and informal hybrid governance structure is needed. Through the lenses of these theories, we focus on examining SMEs choices and application of effective contract complexity and relational trust governance to render their OI relationships more conducive to innovation. Accordingly, our proposed theoretical model of the study, as shown in Figure 2.1, postulates that OI performance is enhanced through effective dual governance of contract complexity and relational trust. Moreover, the present research model incorporates formal knowledge routines and supplier joint actions as partnering routines that contribute to product and process innovations as in the OI relationship.

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2.3.2 Contract complexity

Contracts are unavoidably complex in case of OI given the higher degrees of asset specificity, behavioural uncertainty, performance ambiguity and risks of outcome (Poppo and Zenger, 2002; Bidault and Castello, 2010). In this research, we define contract complexity as the formal buyer-supplier contract which details parties’ “roles and responsibilities, specifies procedures for monitoring and penalties for noncompliance, and, most importantly, determine outcomes or outputs to be delivered” (Poppo and Zenger, 2002 p708). Previous studies suggested that complex contracts scoping offshore outsourcing relationships for new product development (NPD) can enhance the performance of these relationships. For example, contracts are useful instruments to measure the performance output of the offshore supplier (Stanko and Calantone, 2011). Moreover, contracts can enhance OI performance by setting ex-ante objectives, which, in turn, help to keep suppliers motivated and focused on meeting the OI goals (Carson, 2007). Also, complex contracts of strategic offshore outsourcing act as an insurance
policy since they serve as legal safeguards against wrongdoing (Hoecht and Trott, 2006). In a recent study, van der Valk et al. (2016) found that complex contracts not only safeguard against ex-post performance issues but also are excellent facilitators of knowledge transfer and can improve innovation outcomes in buyer-supplier relationships. Moreover, SMEs could employ formal contracts in exploration innovation alliances as an essential control mechanism to compensate for their small scale vulnerability in foreign markets and dependencies on external suppliers (Pittino and Mazzurana, 2013). Therefore, we proposition our first hypothesis:

\[ H1: \text{Contract complexity in OI relationships positively affect OI performance in SMEs.} \]

2.3.3 Relational trust

In this research, we define relational trust as the trusting party’s (i.e. the SME offshore outsourcing firm) faith that the other party (i.e. the offshore supplier) in the OI relationship will act in favour of the offshore outsourcing firm’s welfare (Saparito et al., 2004; Ring and Van de Ven, 1994). To that extent, relational trust is a measure of benevolence or the non-calculative component of trust (Mayer and Davis, 1995). It reflects the level of an SME’s confidence that its offshore supplier will choose the collective-gains over self-gains when the possibility for opportunistic behaviour is present (Gulati and Sytch, 2008; Zaheer et al., 1998). The relational trust provides an effective means to manage the interdependence between the two firms, allowing effective pooling of complementary tacit knowledge resources under reduced fears from opportunism (Dyer and Singh, 1998). The relational trust also explains firms’ behaviour in making business decisions that impact their interfirm relationship outcomes beyond their contractual obligations.
(Saparito et al., 2004). For example, Bidault and Castello (2010) proposed that the interpersonal nature of relational trust highlights the role played by executives involved in managing interfirm innovation projects in how they adapt their decision-making process to accommodate various contingencies and risks of OI activities.

SMEs benefit more than large firms from relational trust-based interfirm relationships given the dominant role of SMEs’ entrepreneurs in managing these relationships (Laforet, 2008; Kulangara et al., 2016). For example, Pittino and Mazzurana (2013) found that trust, among other relational governance norms, is increasingly adopted by SME managers to control and coordinate innovation alliances, primarily due to their resource disadvantage in crafting and monitoring complex contracts. Also, relational trust enhances team spirits across buyer-supplier dyads, acts as a filter for information sharing, and reduces the effect of innovation ambiguities and risks (Kulangara et al., 2016). Summing up, relational trust can improve OI performance for SMEs. Thus, we propose the following hypothesis:

$$H2: \text{Relational trust in OI relationships positively affect OI performance in SMEs.}$$

2.3.4 The interaction between contract complexity and relational trust

Interfirm research has concluded that in managing buyer-supplier cooperative relationships firms cannot in practice rely exclusively on either contract complexity or relational trust (Poppo and Zenger, 2002; Ring and Van de Ven, 1994; Ring and Van de Ven, 1992). Also, the added complexity of managing OI relationships related to both behavioural and outcome risks seems to call for a purposeful combination of contract complexity and relational trust (Carson, 2007; Hoecht and Trott, 2006). It is well known that innovation requires tacit knowledge disclosure and highly specific investments with
significant hold-up risks (Gooroochurn and Hanley, 2007). Therefore, there is a greater need for contract complexity to motivate tacit knowledge exchange and innovation investment decisions (Gooroochurn and Hanley, 2007; Poppo and Zenger, 2002). At the same time since innovation is expensive, risky and uncertain, increased levels of relational trust emerge as a necessary condition to promote non-calculative investment behaviour (Kulangara et al., 2016; Poppo and Zenger, 2002).

Although the purpose of both formal and informal governance mechanisms is to control and coordinate costs and outcomes of exchange interactions, they both operate uniquely into achieving this purpose (Poppo and Zenger, 2002). Contract complexity employs legal means in the specification of contingencies, adaptation, and mitigation of opportunistic behaviour (Williamson, 1979; Williamson, 1991). On the other hand, relational trust utilises personality traits to guarantee the intent of mutuality, bilateralism, and continuation in the face of unforeseen contingencies (Bradach and Eccles, 1989; Zaheer et al., 1998). In summary, combining both mechanisms, not only compensates for contract incompleteness and avoids the dark side of relational trust (i.e. distrust), but also captures both mechanisms’ synergetic value through reduced control and coordination costs and improved OI performance (Poppo and Zenger, 2002). The present study subscribes to the line of research that supports the complementarity relationship between contract complexity and relational trust. Thus, we advance:

**H3: Contract complexity and relational trust act as complements in SMEs OI relationships.**
2.3.5 The moderating role of formal knowledge routines

Dyer and Singh (1998) proposed that alliance partners can generate rents by developing interfirm knowledge sharing routines. In a similar vein, Grant (1996) argued that in order to tackle the inherent difficulty of tacit knowledge transfer, firms follow a proactive approach through maximising the use of rules and routines to enhance joint learning and moderate alliance outcomes (Grant, 1996). We view formal knowledge routines as the structured processes that regulate and coordinate knowledge sharing between the offshore outsourcing SME and the offshore supplier (Roy and Sivakumar, 2011). Formal knowledge routines can include written rules and procedures for accessing, exploiting and protecting tacit knowledge in OI relationships (Noordhoff et al., 2011; Roy and Sivakumar, 2011). Formalised learning and communication interactions include joint project teams, formal visits and the use of shared information technology (IT) platform for knowledge sharing (Kwon and Suh, 2004; Janowicz-Panjaitan and Noorderhaven, 2008).

Accessing the offshore supplier’s tacit knowledge and pooling them with the offshore outsourcing SME’s tacit knowledge is a central premise of OI (Hoecht and Trott, 2006). OI grants SMEs access to skills and resources that reside with the offshore suppliers but strategically are essential for their own survival and growth (Rodriguez and Nieto, 2016). However, the trade-off between accessing the offshore suppliers’ tacit knowledge and the risk of the buyers’ tacit knowledge leakage is often a source of tension between governance efficiency and innovation performance in OI relationships (Aubert et al., 2015; Lai et al., 2009). For example, Roy and Sivakumar (2011) proposed that firms pursuing innovation through offshore outsourcing need to be aware of the implications
of their formal OI contracts on intellectual property (IP) management. On the one hand, complex contracts in OI can discourage suppliers from sharing their tacit knowledge and hence, derail the OI performance (Cui et al., 2009; Hoecht and Trott, 2006). On the other hand, a contractual allocation of IP rights to suppliers who contributed the most to innovation generation has a strong positive influence on the collaboration output (Kloyer and Scholderer, 2012). Consequently, formal knowledge routines can act as a formal cooperative catalyst of contract complexity by signalling both the buyer and the supplier top managements’ commitment to collaborate, thereby refining knowledge sharing and eventually leading to higher OI performance (Kloyer and Scholderer, 2012; Noordhoff et al., 2011; Bidault and Castello, 2010).

Relational trust literature has documented that trusting interfirm relationships is characterised by high levels of tacit knowledge exchange (Hansen, 1999; Levin and Cross, 2004). Therefore, formal knowledge routines can quantify the value of parties’ trustworthy behaviour through structural tacit knowledge exchange which institutionalises transparency and alleviates perceived risks of tacit knowledge misappropriation or “free-riding” behaviour (Mayer and Davis, 1995; Hansen, 1999; Levin and Cross, 2004). To this extent, formal knowledge routines are especially important for SMEs since, unlike large firms, they lack the management resources to build strong ties and a substantial stock of relational trust (Levin and Cross, 2004; Badir and O’Connor, 2015). Typically, SMEs tend to trust suppliers due to insufficient time and resources to assess suppliers’ trustworthiness (Pittino and Mazzurana, 2013). Moreover, managing the cross-border relationship is difficult for SMEs due to the physical, institutional and cultural distances with the foreign markets (Jane et al., 2012; Pawar et
Consequently, formal knowledge routines are likely to stimulate the role of relational trust in SMEs' OI relationships by levelling the tacit knowledge sharing and protection playfield with offshore suppliers (Baker et al., 2015); thereby ensuring a continuous and sustainable two-way flow of ideas which is crucial to OI success (van den Ende et al., 2015).

Summing up, it is likely that in the context of OI in SMEs, formal knowledge routines can act as a useful tool in managing contract complexity and relational trust by implementing these governance mechanisms under conditions of structured knowledge exchange to deliver high OI performance. The above discussion provides the foundation for the following hypotheses:

\[ \textit{H4a: Formal knowledge routines positively moderate the effect of contract complexity on OI performance in SME.} \]

\[ \textit{H4b: Formal knowledge routines positively moderate the effect of relational trust on OI performance in SME.} \]

2.3.6 The moderating role of supplier joint actions

As we discussed earlier, given the underlying complexity of OI transactions, the use of dual governance of contract complexity and relational trust is unavoidable (Poppo and Zenger, 2002). However, while these governance mechanisms act as devices for the control and coordination of buyer-supplier relationships, partnering norms such as joint actions act as strong incentives for buyers and suppliers to exercise control and coordination (Heide and John, 1990; Whipple et al., 2010; Flynn et al., 2010b; Kloyer et al., 2018). Specifically, supplier joint actions are likely to add higher value to the alignment and effectiveness of governance mechanisms in OI relationships (Mooi and
Ghosh, 2010; Kim et al., 2015). Offshore suppliers perceive such actions as strong indications of the buyer SMEs willingness to “give and take” and their consideration of the suppliers’ interests (Nyaga et al., 2010; Whipple et al., 2010; Liu et al., 2010).

Previous studies documented that rewarding suppliers for improved performance and outcomes can have a positive effect on the suppliers' efforts and behaviour towards the buyers' interests (Krause et al., 2000; Shepherd and DeTienne, 2005). In OI, such rewards could include the SME-supplier joint activities aimed at supplier development such as working with the supplier to reduce its costs, improve its quality and train its personnel (Chen et al., 2016a). Specifically, SMEs’ focused efforts to improve the offshore supplier profit and performance in the OI relationship can be more effective given the difficulty of performance measurement and the uncertainty of OI outcomes (Felin and Zenger, 2014; Lai et al., 2016; Mooi and Ghosh, 2010). Therefore, the incentivising nature of supplier joint actions can ensure the supplier efforts to fulfil complex contracts and encourage its contributions to OI performance (Mooi and Ghosh, 2010; Lui et al., 2010). In contrast, in the absence of such incentivising actions, suppliers are likely to fear SMEs' illegal behaviour and consequently, avoid contractual compliance by providing less than expected OI performance (Mooi and Ghosh, 2010).

Similarly, as supplier joint actions in OI become increasingly oriented towards securing economic gains for the offshore supplier, such interactions will moderate the impact of socialisation on OI performance (Lui et al., 2010; Kim et al., 2015). For example, working jointly with the offshore supplier innovation team during site visits, joint training programs and frequent technical meetings will encourage the offshore supplier’s desirable contributions to OI and can further enhance the effect of relational
trust on innovation (Jane et al., 2012; Kulangara et al., 2016). Also, following the rationale of trust research, intense and formalised social interactions through supplier joint actions increase the offshore supplier willingness to contribute to OI success even before building relational trust through long exchange history (Mayer and Davis, 1995; Levin and Cross, 2004). Moreover, through supplier joint actions, SMEs claim an attractive partnering stance which bolsters the offshore suppliers' perceptions of the SMEs trustworthiness and boost the degree of the offshore suppliers' commitment towards achieving OI success (Liu et al., 2012; Koufteros et al., 2012). In contrast, the lack of supplier joint actions will challenge the quality of relational capital in OI relationships and hinders the relationship chances of continuation and success (Lui et al., 2010). Following this reasoning, we forward the following hypotheses:

\[ H5a: \text{Supplier joint actions positively moderate the effect of contract complexity on OI performance in SME.} \]

\[ H5b: \text{Supplier joint actions positively moderate the effect of relational trust on OI performance in SME} \]

### 2.4 Methodology

This study is part of broader research that investigates OI relationships in SMEs, drawing from a data set of 200 developed country European SME manufacturers with active OI relationships. Offshore outsourcing relationships are well studied as a type of interfirm productive cooperation, and therefore, they offer an excellent opportunity to draw useful insights for research and practice in case of pursuing innovation through offshore outsourcing. We choose the buyer-supplier context since non-equity OI relationships can be more attractive to SMEs than captive relationships, given their limited resources...
Furthermore, previous studies argued that non-equity offshore outsourcing relationships adapt better than equity arrangements (Buvik and John, 2000) and move quickly into new markets and technologies (Quinn, 2000), as they assist buyers to share with suppliers risks of innovations (Hamel et al., 1989). For data collection, we used a cross-sectional survey in line with previous studies with similar sampling populations and context [e.g. Van de Vrande et al. (2009) which studied open innovation trends in SMEs in the Netherlands]. Our unit of analysis is the offshore outsourcing SME.

2.4.1 Sampling and data collection

We designed and administered the study’s survey using online survey tools that allowed us to collect data in a shorter time as well as at less cost. The survey targeted manufacturing SMEs in four developed European countries - Germany, Italy, the United Kingdom (UK) and France. According to the European economic statistics, the SMEs manufacturing sector in Europe included more than 2 million enterprises and generated €725 billion or 44.5% of the manufacturing sector value added in 2013 (Eurostat, 2016a). Furthermore, the European innovation data stated that 49.1% of all European enterprises had reported some form of innovation activity between 2012 and 2014 (Eurostat, 2017). The report added that the same percentage was consistent among the SMEs population.

To ensure that all respondents and firms are qualified in accordance with the study context, only firms that fit the European Union (EU) definition of SMEs (i.e., having a total number of employees between 10-249 and an annual turnover of more than €2 to €50 million) were included (European Commission, 2016a). Additionally, the survey excluded SMEs with captive or equity-based OI relationships, as the main aim of the
research is to examine OI in a buyer-supplier context. We involved top management respondents from SMEs buyer firms. Key executives, especially in case of SMEs, are usually in charge of establishing and managing strategic relationships given the tight management in SMEs and the complexity surrounding OI (Gusenbauer et al., 2015; Bidault and Castello, 2010). Furthermore, using key informants from the buyer side is a widely adopted practice in strategic management and operations research (Carr and Pearson, 1999; Paulraj et al., 2008). Our first sampling frame included 2,384 firms. A total of 1,466 firms were screened out since they did not meet the SME size criteria or the study criteria for non-equity OI governance mode, resulting in a final sampling frame of 918 firms. We instructed respondents to select a significant offshore supplier with whom they have an ongoing OI relationship to increase the validity of the respondents’ perceptual views about their offshore suppliers.

To ensure complete and good quality responses, we enabled the forced response option for all questions and added an attention check midway through the survey to ensure that respondents are paying sufficient attention. Furthermore, we automatically screened out all responses with a completion time less than 1/3 of the median time of all completed responses. After screening out incomplete responses and responses that failed quality checks, the final sample contained 200 firms, giving an effective response rate of 21.8%. The characteristics of the SMEs sample are listed in Table 2.1.
Table 2.1 SMEs sample characteristics

<table>
<thead>
<tr>
<th>Industry</th>
<th>Frequency</th>
<th>Technology Intensity*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic, paper, and rubber</td>
<td>32</td>
<td>Low</td>
<td>16.0</td>
</tr>
<tr>
<td>Textile and wearing apparel</td>
<td>32</td>
<td>Low</td>
<td>16.0</td>
</tr>
<tr>
<td>Food and beverages</td>
<td>23</td>
<td>Low</td>
<td>11.5</td>
</tr>
<tr>
<td>Machinery and mechanical equipment</td>
<td>24</td>
<td>Medium-High</td>
<td>12.0</td>
</tr>
<tr>
<td>Pharmaceutical and chemicals</td>
<td>20</td>
<td>High</td>
<td>10.0</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>20</td>
<td>Low</td>
<td>10.0</td>
</tr>
<tr>
<td>Metal and minerals</td>
<td>18</td>
<td>Low-Medium</td>
<td>9.0</td>
</tr>
<tr>
<td>Electrical and electronics</td>
<td>16</td>
<td>Medium-High</td>
<td>8.0</td>
</tr>
<tr>
<td>Coke and petroleum</td>
<td>10</td>
<td>Low-Medium</td>
<td>5.0</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>5</td>
<td>Low</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Title of respondents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chief executive officer</td>
<td>8</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>Managing director</td>
<td>69</td>
<td></td>
<td>34.5</td>
</tr>
<tr>
<td>Managing partner</td>
<td>94</td>
<td></td>
<td>47.0</td>
</tr>
<tr>
<td>General manager</td>
<td>25</td>
<td></td>
<td>12.5</td>
</tr>
<tr>
<td>Others (top management position)</td>
<td>4</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>50</td>
<td></td>
<td>25.0</td>
</tr>
<tr>
<td>Italy</td>
<td>50</td>
<td></td>
<td>25.0</td>
</tr>
<tr>
<td>United Kingdom (UK)</td>
<td>50</td>
<td></td>
<td>25.0</td>
</tr>
<tr>
<td>France</td>
<td>50</td>
<td></td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>91</td>
<td></td>
<td>45.5</td>
</tr>
<tr>
<td>Medium</td>
<td>109</td>
<td></td>
<td>54.5</td>
</tr>
</tbody>
</table>

*In accordance with OECD Directorate for Science, Technology, and Industry. Available at: https://www.oecd.org/sti/ind/48350231.pdf

2.4.2 Measures

We developed our cross-sectional survey using multiple-item measures based on extant research. The study's cross-sectional survey used a 7-point Likert scale with endpoints "1= strongly disagree" and "7= strongly agree". Before data collection, we sent the survey link to eight SMEs manufacturing executives and asked them to complete the survey. We then contacted them and requested their feedback about the survey language, structure, and coverage of the examined constructs. The final survey incorporated some changes based on the feedback we received from the expert practitioners.

"Contract complexity" was operationalised by four items (1) two items from (Poppo and Zenger, 2002) measuring the extent of contract length and customisation, and
(2) two items from (Ferguson et al., 2005) measuring the number of rules and regulations included in the contract and the contract’s degree of adaptability. We operationalised “relational trust” through four items measuring the offshore outsourcing SME perceptions on whether the offshore supplier keeps its promises, is sincere, is concerned about the offshore outsourcing SME’s welfare (Kwon and Suh, 2004), and has been evenhanded in its negotiations with the offshore outsourcing SME (Zaheer et al., 1998). We measured “formal knowledge routines” with four items examining the extent to which the offshore outsourcing SME relies extensively on contractual knowledge exchange rules, follows written procedures in most aspects of knowledge sharing (Noordhoff et al., 2011), establishes ground rules about knowledge exchange (Smeltzer, 1997), and uses a common IT software to control knowledge sharing (Kwon and Suh, 2004). We operationalised “supplier joint actions” using a three-item scale measuring the extent to which the offshore outsourcing SME is working with the offshore supplier to reduce its costs, improve its quality, and train its people (Joshi and Stump, 1999).

Finally, we measured OI performance using four-item scale measuring OI performance concerning new or enhanced products and processes, new product speed to market, and rate of patent applications (Rindfleisch and Moorman, 2001; Roy and Sivakumar, 2011; Jane et al., 2012)

2.4.3 Control variables

OI relationships are cooperative in nature, and hence they can evolve and grow from transactional (short term) to collaborative (long term) relationships through accumulation of relational trust and reduction of fears from opportunism (Vivek et al., 2009; Ring and Van de Ven, 1994; Ring and Van de Ven, 1992). Therefore, we identified relationship
longevity and respondent’s length of experience (manager tenure) with the SME offshore outsourcing firm as our first two control variables (Gulati and Sytch, 2008; Poppo and Zenger, 2002). We measured longevity and manager tenure as the natural logarithm (Lincoln and Guba, 1985) of years of dyadic relationship and manager’s years of experience respectively (Gulati and Sytch, 2008; Poppo and Zenger, 2002). Also, we controlled for three categorical variables of firm size (small or medium), SMEs’ country, and industry technology intensity following OECD technology intensity and industry classifications (OECD, 2011).

2.4.4 Common method bias

Since we collected data from a single respondent within each of the surveyed SMEs, we wanted to ensure that common method variance was not a concern. First, we conducted Harman's one-factor test (Podsakoff et al., 2003). According to this test, if a substantial amount of common method variance is present, then either (1) a single factor will emerge from the exploratory factor analysis (EFA) of all survey items, or (2) one general factor will account for most of the variance in the data set. In our case, the un-rotated factor analysis resulted in four distinct factors with Eigenvalue greater than one; while these four factors accounted for 64.3% of the variance, the first factor accounted for only 38.4% of the variance. As a second test, we ran a single factor confirmatory factor analysis (CFA). The resulted model fit indices for the single factor model comparative fit index (CFI) = 0.762, Tucker-Lewis index (TLI) =0.722, and root mean square error of approximation index (RMSEA) = 0.124 – were significantly worse than our proposed model (CFI = 0.949, TLI =0.933 and RMSEA = 0.061). Based on these two tests, we can safely conclude that common method bias might not be an issue (Sanchez and Brock, 1996).
Furthermore, in a recent study, Kull et al. (2018) argued that while single respondent survey is usually susceptible to biases, they are not very problematic in the case of SMEs, as the narrow management bandwidth in SMEs can help single-key respondent research to capture a wider picture of what is happening in these firms.

2.4.5 Confirmatory factor analysis

To establish the constructs of unidimensionality, reliability, and validity, we conducted CFA using AMOS 20.0. One of the loadings within each latent construct was constrained to a value of one, and an estimation output using maximum likelihood was produced with standardised estimates, residual moments, and modification indices. The fit of the CFA for the data was satisfactory with values for model fit indices; normed $X^2 = 1.75$ ($\leq 2.0$), $p<0.001$, goodness of fit (GFI) = 0.914, adjusted goodness of fit (AGFI) = 0.870, CFI = 0.949, TLI = 0.933, standardised root mean square residuals (SRMR) = 0.053; and RMSEA = 0.061.

We established discriminant validity by comparing the squared correlation between each pair of the constructs in our model to their average variance extracted (AVE) (Fornell and Larcker, 1981). According to this test, the AVE of any two constructs should be higher than the squared correlation between them. As evident from Table 2.2 and Appendix B, the correlation coefficients of all pairs of constructs are lower than the AVE values of the corresponding constructs. The highest squared correlation of 0.38 (correlation = 0.615) between relational trust and supplier joint actions is lower than their AVE values (i.e., 0.52 and 0.60, respectively). These results sufficiently establish that the theoretical constructs have discriminant validity.
To assess the reliability of the study’s constructs, we computed the composite reliability (CR) for all the constructs and found that it was more than 0.70, confirming that items within each construct captured more variance than the variance explained by the error components, and therefore, items are significantly related to their theoretical constructs (Bagozzi and Yi, 2012). Also, with Cronbach’s alpha for all constructs having a value of greater than or equal 0.7, the constructs’ reliability is re-confirmed. Additionally, computed AVE for all constructs, as shown in Appendix B, is more than or equal 0.50. Taken together, we can conclude that the constructs of the study exhibit acceptable convergent validity (Fornell and Larcker, 1981). Table 2.2 presents descriptive statistics and correlations among the constructs. During the CFA process, we dropped one item each from contract complexity, formal knowledge routines, relational trust and OI scales (Appendix B).

Table 2.2 Descriptive statistics and correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contract complexity</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Relational trust</td>
<td>0.465**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Formal knowledge routines</td>
<td>0.581**</td>
<td>0.571**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Supplier joint actions</td>
<td>0.476**</td>
<td>0.615**</td>
<td>0.507**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>5. Offshore outsourcing innovation</td>
<td>0.332**</td>
<td>0.345**</td>
<td>0.302**</td>
<td>0.316**</td>
<td>1.000</td>
</tr>
<tr>
<td>Mean</td>
<td>5.437</td>
<td>5.557</td>
<td>5.662</td>
<td>5.527</td>
<td>5.598</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.811</td>
<td>0.735</td>
<td>0.627</td>
<td>0.816</td>
<td>0.658</td>
</tr>
</tbody>
</table>

2.5 Results

2.5.1 Hypotheses testing

We tested our hypotheses using generalised linear regression analysis in SPSS Statistics v23. To determine if we have multicollinearity issues, we ran the SPSS collinearity
diagnostics test to calculate the variance inflation factor (VIF) for each independent/moderator variable in the tested model against another independent/moderator variables. As shown in Table 2.3, all VIFs are less than 10, indicating no consequential multicollinearity issues (O'Brien, 2007). Furthermore, to check normality and homoscedasticity assumptions of linear regression, we regressed the dependent variable (offshore outsourcing innovation performance) on all independent and moderator variables in the model (contract complexity, relational trust, formal knowledge routines and supplier joint actions). We plotted the standardised regression residuals for the Y-axis and standardised predicted values for the X-axis (Figure 2.2). Additionally, we plotted the histogram of the standardised residuals with frequency (Figure 2.3). As can be seen in Figure 2.2, the data shows a relatively constant vertical range, hence suggesting the data in our tested model meets the homoscedasticity assumption (i.e. heteroskedasticity is not present) (Osborne and Waters, 2002). Moreover, the histogram in Figure 2.3 shows a reasonably standard distribution curve (Osborne and Waters, 2002).

**Table 2.3 Multicollinearity Diagnostics – Variance Inflation Factor (VIF)**

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contract complexity</td>
<td>1.618</td>
<td>1.377</td>
<td>1.572</td>
<td></td>
</tr>
<tr>
<td>2. Relational trust</td>
<td>1.884</td>
<td>1.715</td>
<td>1.546</td>
<td></td>
</tr>
<tr>
<td>3. Formal knowledge routines</td>
<td>1.575</td>
<td>1.685</td>
<td>1.830</td>
<td></td>
</tr>
<tr>
<td>4. Supplier joint actions</td>
<td>1.708</td>
<td>1.442</td>
<td>1.738</td>
<td></td>
</tr>
</tbody>
</table>
Before creating the interaction terms, we mean centred the variables to reduce multicollinearity (Lee and Cavusgil, 2006). Table 2.4 contains the results for models 1–6. Model 1 tested all control variables in the model. Model 2 indicates a significant
positive relationship between contract complexity and OI performance (Beta = 0.168, p<0.05), hence, supporting hypothesis H1. Also, the results of model 2 support hypothesis H2 by showing that relational trust is significantly and positively associated with OI performance (Beta = 0.295, p<0.001).
Table 2.4 Results of direct, interaction effects and moderation effects

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Effect / standardized Coefficients</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager tenure</td>
<td>0.024</td>
<td>0.045</td>
<td>0.048</td>
<td>0.042</td>
<td>0.051</td>
<td>0.048</td>
<td></td>
</tr>
<tr>
<td>Relationship longevity</td>
<td>0.079</td>
<td>0.133</td>
<td>0.139</td>
<td>0.125</td>
<td>0.100</td>
<td>0.110</td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.046</td>
<td>-0.126</td>
<td>-0.129</td>
<td>-0.125</td>
<td>-0.133</td>
<td>-0.123</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>-0.224*</td>
<td>-0.192*</td>
<td>-0.161</td>
<td>-0.163*</td>
<td>-0.168*</td>
<td>-0.158</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>0.115</td>
<td>0.103</td>
<td>0.100</td>
<td>0.084</td>
<td>0.076</td>
<td>0.075</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.020</td>
<td>0.037</td>
<td>0.053</td>
<td>0.052</td>
<td>0.039</td>
<td>0.050</td>
<td></td>
</tr>
<tr>
<td>Low-medium technology</td>
<td>-0.095</td>
<td>-0.104</td>
<td>-0.095</td>
<td>-0.106</td>
<td>-0.100</td>
<td>-0.107</td>
<td></td>
</tr>
<tr>
<td>Medium-high technology</td>
<td>-0.122</td>
<td>-0.118</td>
<td>-0.127</td>
<td>-0.159*</td>
<td>-0.139*</td>
<td>-0.166*</td>
<td></td>
</tr>
<tr>
<td>High technology</td>
<td>0.087</td>
<td>0.036</td>
<td>0.019</td>
<td>0.018</td>
<td>0.020</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>Contract complexity</td>
<td>0.168*</td>
<td>0.234**</td>
<td>0.299**</td>
<td>0.189*</td>
<td>0.287**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relational trust</td>
<td>0.295**</td>
<td>0.378**</td>
<td>0.247**</td>
<td>0.227**</td>
<td>0.193</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract complexity x Relational trust</td>
<td></td>
<td>0.186*</td>
<td></td>
<td></td>
<td></td>
<td>0.049</td>
<td></td>
</tr>
<tr>
<td>Formal knowledge routines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.143</td>
<td></td>
</tr>
<tr>
<td>Contract complexity x Formal knowledge routines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.476*</td>
<td></td>
</tr>
<tr>
<td>Relational trust x Formal knowledge routines</td>
<td></td>
<td>-0.288</td>
<td></td>
<td></td>
<td></td>
<td>0.072</td>
<td></td>
</tr>
<tr>
<td>Supplier joint actions</td>
<td></td>
<td>0.147</td>
<td>0.141</td>
<td>0.143</td>
<td>0.072</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract complexity x Supplier joint actions</td>
<td></td>
<td>0.342**</td>
<td></td>
<td></td>
<td></td>
<td>0.098</td>
<td></td>
</tr>
<tr>
<td>Relational trust x Supplier joint actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.180</td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Adjusted (R²)</td>
<td>0.072</td>
<td>0.218</td>
<td>0.233</td>
<td>0.276</td>
<td>0.243</td>
<td>0.268</td>
<td></td>
</tr>
<tr>
<td>F- Stat</td>
<td>2.716**</td>
<td>6.050***</td>
<td>6.024***</td>
<td>5.366***</td>
<td>5.572***</td>
<td>5.045***</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05, **p < 0.01, ***p < 0.001
Furthermore, results in model 4 show a significant and positive moderation effect of formal knowledge routines on the impact of contract complexity on OI performance. The introduction of formal knowledge routines causes a stronger influence of contract complexity on OI performance (Beta = 0.299, P < 0.01) when compared to the direct effect of contract complexity (Beta = 0.168, p < 0.05), providing support for hypothesis H4a. However, the results do not support H4b, which proposed a positive moderating effect of formal knowledge routines on the relationship between relational trust and OI performance. Instead, we found an insignificant negative effect.

The results in model 5 support the positive moderation effect of supplier joint actions on the relationship between contract complexity and OI performance. The implementation of supplier joint actions seems to strengthen the influence of contract complexity on OI performance (Beta = 0.189, P < 0.05) when compared to the direct effect of contract complexity (Beta = 0.168, p < 0.05), providing support for hypothesis H5a. The results in model 5, however, reject H5b by finding negative insignificant moderation effect of supplier joint actions on the relationship between relational trust and OI performance. Finally, in model 6, we include all latent variables and moderators in the regression model. The results of model 6 confirm the prominent effect of formal knowledge routines as a positive moderator of the relationship between contract complexity and OI performance.

To shed further light on the moderation analyses results, Figure 2.4 displays three-dimensional (3D) surface plots of the second-degree polynomial (non-linear) interaction models of the moderators (formal knowledge routines and supplier joint actions) with contract complexity, relational trust and OI performance. As shown from the positive and
increasing slopes in Figure 2.4- (a) and (c), conditions of high formal knowledge routines and high supplier joint actions, positively impact the relationship between contract complexity and OI performance. However, the negative and decreasing slopes in Figure 2.4 (b) and (d) under conditions of high formal knowledge routines and high supplier joint actions indicate a negative moderation effect in case of relational trust.

![3D surface interaction plots of moderator variables with contract complexity, relational trust, and offshore outsourcing innovation (OI)](image)

**Figure 2. 4 3D surface interaction plots of moderator variables with contract complexity, relational trust, and offshore outsourcing innovation (OI)**

### 2.5.2 Complementarity test

To test for the complementarity relationship between contract complexity and relational trust, we used two different tests. The first test shown in Table 2.4 (model 3), follows the approach of Poppo and Zenger (2002), Lee and Cavusgil (2006) and Pittino and Mazzurana (2013) by introducing an interaction term (contract complexity x relational...
trust) in an OLS regression analysis after we mean centre the variables in the model to reduce multicollinearity (Lee and Cavusgil, 2006). The test evaluates the effect of the interaction term on OI performance; it also observes the effect of the marginal increase in contract complexity or relational trust on the direct effect of contract complexity and relational trust. As shown in Table 2.4 (model 3) the interaction effect of contract complexity and relational trust is significant (Beta = 0.183, p< 0.05). The introduction of the governance interaction term caused a change in R square of 1.7% and p<0.05. Also, it has a positive and significant effect on the strength of the effect of contract complexity (Beta = 0.234, p< 0.01) and relational trust (Beta = 0.378, p< 0.001) on OI performance, and hence, supports the complementarity of contract complexity and relational trust (H3).

We conducted a second test of complementarity. The second test follows a productivity approach in determining the effect of complementary practices on productivity performance. For example, Ichniowski et al. (1997) adopt this approach to study the impact of complementary human resources management and employment practices on productivity outcomes in steel finishing lines. Also, Cassiman and Veugelers (2006) follow the same model to analyse complementarity among innovation activities, focusing on internal R&D (make) and external knowledge acquisition (buy). To conduct this test, we first divided our sample into four sub-groups of governance types a) high contract complexity / high relational trust, b) high contract complexity / low relational trust, c) low contract complexity / high relational trust, and d) low contract complexity / low relational trust.

Moreover, to establish the four sub-groups, we created a dummy variable for each sub-group with value 1 for firms within the sample that rely strongly on contract
complexity/relational trust and 0 for firms that depend less on contract complexity/relational trust. First, we gave 1 for values above the mean and 0 to those equal or less than the mean. Second, we tested for the effect of contract complexity and relational trust complementarity in the measure of OI performance by running an equality test of means between sub-groups and within groups (Cassiman and Veugelers, 2006; Pittino and Mazzurana, 2013). The one-way ANOVA resulted in significant F statistics $F(3,196) = 15.890$, ($P<0.001$), suggesting that the complementarity condition between contract complexity and relational trust is met. Table 2.5 presents the results for the second complementarity test.

Table 2.5 The second test for complementarity between contract complexity and relational trust

<table>
<thead>
<tr>
<th>Sub-Group</th>
<th>Frequency / (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High contract complexity / High relational trust</td>
<td>96 (48%)</td>
</tr>
<tr>
<td>High contract complexity / Low relational trust</td>
<td>26 (13%)</td>
</tr>
<tr>
<td>Low contract complexity / High relational trust</td>
<td>37 (18.5%)</td>
</tr>
<tr>
<td>Low contract complexity / Low relational trust</td>
<td>41 (20.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>200 (100%)</td>
</tr>
</tbody>
</table>

One-way ANOVA

$F(3,196) = 15.89^{***}$

*p<0.05, **p<0.01, ***p<0.001

In Figure 2.3, we map our results for the four groups of different governance types (Table 4) using MATLAB (Mathworks-R2018a) with OI outcomes. We plotted OI results with the means of contract complexity and relational trust. The x-axis was used to plot the mean of contract complexity and the y-axis was utilised to plot the mean of relational trust and the distribution of OI results. As shown in Figure 2.4, a total of 84.4% of the SMEs’ managers who implemented high contract complexity and high relational trust reported
high OI performance (above the mean of OI in all results). Moreover, 78% of the SMEs in our study who exhibited a general propensity towards adopting a governance type with low contract complexity and low relational trust reported low OI performance (below the mean of OI in all results).

Figure 2. 5 Mapping offshore outsourcing innovation performance with means of contract complexity and relational trust

2.6 Discussion

2.6.1 Governance types in SMEs offshore outsourcing innovation relationships

Our results indicate that the majority of the SMEs' managers employ complex contracts and rely on relational trust to enhance OI performance. Although this result is broadly consistent with Poppo and Zenger (2002), it is less compatible with recent SMEs studies. For example, Pittino and Mazzurana (2013) concluded that SMEs are more inclined to rely only on relational governance in exploitation innovation alliances. Also, SMEs tend to use a combination of both contract and trust in case of pursuing medium-high
innovation levels in buyer-supplier relationships (van der Valk et al., 2016). However, most of the SMEs in our dataset appear to rely on a combination of high contract complexity and high relational trust for various OI outputs, including new or enhanced products and processes as well as new product speed to market.

Our results (See Figure 2.4) indicate that a combination that maximises and balances both contract complexity and relational trust mechanisms may represent the most effective governance type for the control and coordination of SMEs OI relationships. Additionally, this result informs us that when pursuing innovation through offshore outsourcing, SMEs behave consistently with large firms. In other words, SMEs implement dual-mode governance of contract complexity and relational trust to curb opportunism through formal ex-ante contractual control (Carson, 2007); as well as enable better tacit knowledge disclosure and mutual learning through a relational trust (Kulangara et al., 2016; Wang et al., 2011). Our two complementarity tests provide support to this conclusion by revealing that SME managers may complement the use of contract complexity with the use of relational trust to benefit from the synergetic advantages of both governance mechanisms in driving higher OI outcomes, while simultaneously promoting long term continuation of the relationship and safeguarding specific investments from premature and costly termination (Poppo and Zenger, 2002; Dyer and Singh, 1998).

Drawing upon these results we develop a 4F governance matrix of four different types as a) fit for high contract complexity/high relational trust, b) firm for high contract complexity/low relational trust, c) flexible for low contract complexity/high relational trust, and d) fragile for low contract complexity/low relational trust. In Figure 2.5 we
display the 4F governance matrix in four quadrants each with different capacity of *offshore outsourcing efficiency* (e.g. reducing costs, controlling opportunism, and achieving innovation targets) and *innovation adaptability* (e.g. navigating technological risks and market uncertainties of innovation outcomes).

The *fit* governance type represents the most efficient and adaptive alternative. Through high levels of contract complexity, the *fit* governance keeps tight control over transactions cost by detailing each party’s roles and responsibilities, specifying procedures to ensure compliance, and determining expected outcomes (Poppo and Zenger, 2002); moreover, contract complexity controls for suppliers’ opportunism.
through detailed legal consequences in case of IP violations (Kloyer and Scholderer, 2012). Similarly, through maximising relational trust, the fit governance emphasises parties’ willingness to cooperatively rely on relational trust to adapt with uncertainties and perceived risks of future OI outcomes (Dyer and Singh, 1998; Mayer and Davis, 1995). Accordingly, most SMEs in our dataset have chosen the fit type as their effective governance to deal with OI tasks and complexities.

In contrast, the fragile governance type is characterised by a lack of adequate contract complexity and relational trust. Consequently, the fragile governance lacks formal and informal interfirm systems to measure parties’ contractual compliance, performance efficiency and levels of commitment in the relationships. Also, fragile governance suffers from the absence of necessary adaptive responses to navigate the uncertainties and risks of innovation. Our results support this conclusion since only 9 SMEs (4.5% of the 200 SMEs in our sample) reported achieving high OI performance though adopting fragile governance. The other 69 SMEs (34.5% of the 200 SMEs in our sample) in the fragile group reported low OI performance. The question this result poses though is why an SME firm would select a fragile governance structure in managing an OI relationship? A possible answer could be that in their haste to exploit significant opportunities offered by fast technologies and emerging markets, SMEs might try to follow the steps of large firms in OI without having enough organisational resources to vet selected suppliers or control them. Consequently, they fall into the trap of blind trust. This rationale might explain the disappointing results and the higher failure rate of SMEs in many developed countries and across various industries (Terziovski, 2010).
Although the other two types of governance, namely the firm and the flexible, exhibit high adaptability or high efficiency respectively; they both are vulnerable to falling into the trap of the excessive reliance on contract complexity or relational trust. Often, tight contracts in the firm governance type engender rigidity between offshore outsourcing partners, which in turn restricts the generation of new ideas and obstructs the open flow of information (Carson, 2007; Hoecht and Trott, 2006). In the context of SMEs, overly cooked OI contracts are more prone to failure than success in delivering high OI performance, given the scarcity of time that SMEs owners/managers can devote to interpret, maintain and adjust complex contracts (Pittino and Mazzurana, 2013). Moreover, it is expected that the cost of legally enforcing of complex OI contracts will exceed the resources of SMEs, especially if the legal systems in the selected offshore country was weaker than the SME’s domestic legal system (Dickson et al., 2006).

Likewise, too much trust in the flexible governance type can harm the OI relationship. On the one hand, despite their mastery of relational governance, SMEs must be aware of their vulnerability while pursuing OI in terms of the potential risk of the offshore supplier misappropriating their tacit knowledge (O’Dwyer and O’Flynn, 2005). Additionally, conducting OI in offshore countries exposes the offshore outsourcing SMEs to foreign and possibly new contextual complexity (Pawar et al., 2018); and venturing-in contractually unguarded might not be prudent (Dickson and Weaver, 2011). On the other hand, too much trust can block good criticism, build up group thinking and consequently lead to missing innovation and efficiency targets (Bidault and Castello, 2010). Finally, both the firm and the flexible governance types fail to benefit from the synergetic complementarity of combining contract complexity with relational trust. For example,
complex contracts enhance trust building through legal and economic commitments, while relational trust allows contractual disputes resolution in the face of unforeseen contingencies (Poppo and Zenger, 2002).

### 2.6.2 The effects of formal knowledge routines and supplier joint actions

Our results show that engaging formal knowledge routines and supplier joint actions as a part of explicit partnering and cooperative norms can help in solving for the opposing tension between contract complexity and innovation performance in OI relationships (Aubert et al., 2015; Mooi and Ghosh, 2010; Kloyer et al., 2018). First, by addressing IP access, use and protection; formal knowledge routines can add value to contract complexity not only by explicitly addressing the SMEs concerns of IP potential leakage, but also by simultaneously expanding knowledge protection to include two-way knowledge accessing, sharing and application (Hoecht and Trott, 2006; Kloyer and Scholderer, 2012; Lai et al., 2009; Stanko and Calantone, 2011). This finding supports calls for investing in interfirm formal knowledge routines and supplier development (Lai et al., 2009; Henke Jr. and Zhang, 2010; Roy and Sivakumar, 2011; Kloyer and Scholderer, 2012; Felin and Zenger, 2014; Sumo et al., 2016a). Second, it appears that by implementing partnering tools such as supplier joint actions; SMEs claim a collaborative attitude and become more efficient in controlling and coordinating the offshore supplier behaviour. Consequently, the OI contracts become more efficient in driving increased suppliers’ compliance towards achieving higher innovation outcomes.

Contrary to our proposition, our results do not support the positive significant moderating effects of formal knowledge routines or supplier joint actions on the impact of relational trust on OI performance. Instead, negative insignificant moderating effects
are found. We hypothesised based on previous studies that formal knowledge routine and supplier joint actions increase the positive gains of collaborative innovation to OI partners, thus, stimulating the effect of relational trust in driving stronger OI performance (Hansen et al., 1992; Levin and Cross, 2004; Baker et al., 2015; van den Ende et al., 2015). We also conjectured that relational trust in OI relationships becomes more meaningful as a result of the dyad’s partnership posturing signalled through formal knowledge routines and supplier joint actions (Koufteros et al., 2012; Liu et al., 2015).

The competing effects of formal knowledge routines might explain this counter-intuitive finding. First, it could be that the regulatory nature of formal knowledge routines limits mutual disclosure and consequently, undermines the role of relational trust in generating innovative OI outcomes (Ritala et al., 2015). Likewise, despite the supplier's potential gains from supplier joint actions, they might not be considered high enough to motivate the supplier trusting behaviour. For example, Gilliland and Kim (2014) argued that in buyer-supplier relationships, the suppliers’ valuation of incentives accrued from joint actions is more important than the incentives themselves (Gilliland and Kim, 2014). Therefore, for any incentive to motivate OI performance, it needs to be high enough to win the supplier’s commitment (Gilliland and Kim, 2014).

Second, we purposefully measured the non-calculative component of trust (benevolence) to separate its contributions in OI outcomes from the calculative trust (e.g. a trustee's competence and integrity) (Saparito et al., 2004). However, the calculative trust which pertains to the SME buyer's confidence in the offshore supplier’s abilities and integrity to behave per acceptable principles might have responded differently to the implementation of formal knowledge routines and supplier joint actions (Mayer and
Davis, 1995; Levin and Cross, 2004). Third, despite parties’ high commitment to a win-win mentality via formal knowledge routines and supplier joint actions, the two factors might not be sufficient for strengthening the relationship between relational trust and OI performance (Prahinski and Bentonb, 2004). Other factors such as extensive exchange history in OI might also be required to enable the moderating influence of formal knowledge routines and supplier joint actions on relational trust (Gulati and Sytch, 2008; Noordhoff et al., 2011).

2.7 Conclusions and managerial implications

The present study extends extant research on contractual and relational governance of interfirm OI relationships. Implications from our research support that despite SMEs small size characteristics, they follow large firms' recipe of dual-mode governance of contract complexity and relational trust while managing their OI relationships. Moreover, SMEs success in OI relationships depends on the implementation of a fit governance structure (Carson, 2007; Gooroochurn and Hanley, 2007; Hoecht and Trott, 2006; Stanko and Calantone, 2011)). Also, by focusing on OI in a buyer-supplier context, we shed light on the high complexity surrounding OI control and coordination in non-equity relationships.

Findings from this research inform SMEs managers that in practice, SMEs exhibit propensity toward adopting fit governance of detailed contractual safeguards (contract complexity) and extensive socialisation (relational trust) in managing their OI relationships. Additionally, although the fit governance type represents an ideal case and hence, will be difficult to achieve and sustain, it is worthwhile for SME managers to invest in the relationship with the offshore supplier to emulate fit governance. Furthermore,
governance mechanisms can become more conducive to OI through partnering norms such as formal knowledge routines and supplier joint actions since they can substantially shape the exchange outcomes.

2.8 Limitations and future research

Our study has several limitations that would provide prospects for future research. First, we sampled our SMEs from the manufacturing population in Germany, Italy, UK, and France. Therefore, our results have limited generalisability. Future research can include samples from a broader set of a population in different countries and industries. Second, we conducted our study from the perspective of European SMEs buyers. It would be interesting to explore the offshore suppliers’ perspectives on effective governance structures in OI relationships. Third, we studied the moderation effects of formal knowledge routines and supplier joint actions; future research can address other factors such as goal compatibility (Wang et al., 2016), organisational similarity (Gulati and Sytch, 2008) or contracts types (Oshri et al., 2015). Other good avenues for future research would be to examine the impact of all the constructs in our model on firm, operational and financial performance. Also, an interesting argument up for future research would be whether SMEs should refrain from using OI given the difficulties surrounding the control and coordination of such innovation sourcing strategies. Furthermore, the irreversible negative effects of OI on SMEs competitive advantage in case of suppliers' free-riding behaviour can be scrutinised. Despite these limitations and strategic precautions of OI in SMEs, we believe that this study provides valuable insights into how SMEs can effectively deploy contract complexity and relational trust to foster OI success.
Chapter 3: Second Paper- Offshore outsourcing innovation: An empirical investigation of dyadic complementarity within SMEs


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3.1 Abstract

Despite scholarly agreement that complementary capabilities are essential to successful collaborations, little is known about how small and medium-sized enterprises (SMEs) manage collaborative innovation through offshore outsourcing. Besides, the innovation management literature remains generally silent about when supplier joint actions could work in enhancing offshore outsourcing innovation (OI) performance. The purpose of this study is twofold. First, we aim to delineate why the supplier’s asset specificity and goal compatibility cause supplier’s complementary capabilities in OI. Second, we empirically explore the role of supplier joint actions in enhancing OI performance. Our conceptualised empirical investigation extends the relational view of buyer-supplier dyads in the context of OI in SMEs. Based on data collected from 200 SMEs having active OI relationships spanning four developed European countries (Germany, Italy, the United Kingdom (UK), and France), our results propose that supplier’s complementary capabilities mediate the relationship between critical relational antecedents (supplier’s asset specificity and goal compatibility) and OI performance. It should be noted, however, that despite their incentivising power, supplier joint actions can be a “double-edged sword” in SMEs’ OI relationships. The empirical evidence from this study offers supplier’s asset specificity and goal computability as key relational mechanisms for SMEs to leverage supplier’s complementarity in OI relationships.

3.2 Introduction

Despite extensive research and general scholarly agreement that complementary capabilities are essential to successful offshore outsourcing innovation collaborations
(Jap, 1999; Nietoa and Santamaria, 2007; Rothaermel and Boeker, 2008; Mitsuhashi and Greve, 2009; Van Beers and Zand, 2014; Mindruta et al., 2016; Cobena et al., 2017), the role of suppliers’ complementary capabilities remains underexplored in the case of offshore outsourcing innovation (OI) in SMEs (Musteen and Ahsan, 2013; Gosenbauer et al., 2015). We envision OI as the act of transferring to the offshore supplier any element of the innovation process, including collaborative research and development (R&D), supplier involvement in new product development (NPD) and the commercialisation of innovations (Quinn, 2000; Gosenbauer et al., 2015). For example, consider the significant impact on new product and process innovations in manufacturing industries due to the rapid advancement in electronics and software technologies (Quinn, 2000; Nietoa and Santamaria, 2007). Moreover, the continuous rise in OI relationships since early 2000s has proven that OI allows buying firms to access and benefit from offshore suppliers and country-specific resources, such as specialised talents, technological advances, and low innovation costs (Lewin et al., 2009; Van Beers and Zand, 2014; Spithoven and Teirlinck, 2015). OI in SMEs is consistent with the relational view (Dyer and Singh, 1998) which purports SMEs to engage in OI strategies to substitute for in-house deficiencies in innovation resources and capabilities (Teece, 1986; Lewin et al., 2009; Spithoven and Teirlinck, 2015).

As a dyadic construct, complementary capabilities imply that distinctive capabilities of alliance partners are complementary in that their joint performance generates a value that is greater than each one by itself (Dyer and Singh, 1998; Jap, 1999; Sivadas and Dwyer, 2000; Sarkar et al., 2001; Lavie, 2006; Gulati et al., 2009; Enderwick and Buckley, 2017). For SMEs, OI provides access to skills and resources that reside with
the offshore supplier but are strategically essential for the SMEs survival and growth (Dussauge et al., 2000; Sarkar et al., 2001). Therefore, given the SMEs’ limited internal resources, supplier’s complementary capabilities can act as a shifting parameter from a “make” to a “buy” innovation strategy (De Vita et al., 2010; Spithoven and Teirlinck, 2015). However, to access the synergetic benefits of OI, SMEs should possess organisational capabilities to appropriate relational rents from leveraging the supplier’s complementary capabilities (Dyer and Singh, 1998). For example, to manage OI relationships, SMEs would need to allocate valuable management resources to coordinate OI projects across their national borders (Gusenbauer et al., 2015). Moreover, SMEs should recruit qualified boundary spanners to interact with the offshore suppliers and develop long-term interfirm relationships (van de Vrande et al., 2009; Munjal et al., 2018). Accordingly, SMEs must learn how to compensate for their resource disadvantage by increasing the scope and level of interaction with the offshore suppliers (van de Vrande et al., 2009; Munjal et al., 2018).

Notwithstanding these arguments, it is accepted that SMEs are not simply small versions of large firms (Gusenbauer et al., 2015). Consequently, SMEs’ distinctive size and managerial characteristics (e.g. resources disadvantages, entrepreneurial mindset, etc.) may influence their OI decisions and paths (Laforet, 2008; Lee et al., 2010; Gusenbauer et al., 2015). For example, previous studies argued that SMEs engage in offshore outsourcing innovation strategies to substitute for in-house deficiency in innovation resources, while large firms mainly offshore innovation to complement their innovation activities (Lewin et al., 2009; von Haartman and Bengtsson, 2015). Furthermore, innovation studies have shown that although SMEs have higher innovative
productivity than large firms in terms of idea generation, they often lack adequate resources for the commercialisation of innovations, which in turn, motivates their OI behaviour (Lee et al., 2010). Besides, SMEs use their relatively flat and flexible structure in motivating fast OI decisions (Marcati et al., 2008; Gusenbauer et al., 2015). These specific characteristics of SMEs could mean that they are more likely to benefit from OI than large firms due to resource shortcomings and higher propensity to explore new ideas (Mykhaylenko et al., 2015; Lee et al., 2010; Musteen and Ahsan, 2013). However, the same characteristics can hinder the successful selection of a suitable supplier for OI and limit the SMEs’ control over the OI performance (Quinn and Hilmer, 1994; Quinn, 2000; Gusenbauer et al., 2015). Considering these specific characteristics of SMEs, the present study aims to investigate the role that supplier’s asset specificity and goal compatibility play in allowing SMEs to exploit supplier’s complementary capabilities in OI relationships.

Additionally, SMEs are usually a weak representation of the focal firm in dyadic and network alliances (Julien, 1993; Albors-Garrigos et al., 2011). Compared to large firms, SMEs often have access to a smaller pool of small or less specialised suppliers to choose from (Mindruta et al., 2016; Koufteros et al., 2012). Also, SMEs have limited capacity concerning the number of OI relationships they can afford to establish and maintain (Mitsuhashi and Greve, 2009). Thus, aside from their limited choices and chances of finding the right offshore suppliers and locations for their OI endeavour, SMEs must also learn to master the art of collaborative innovation with offshore suppliers (Mitsuhashi and Greve, 2009; Gusenbauer et al., 2015).
The OI literature have recognised supplier’s asset specificity and goal compatibility as two relationship specific factors that explain the role of supplier’s complementary capabilities in generating relational rents from OI relationships (Joshi and Stump, 1999; Rotheaermel and Boeker, 2008; Mudambi and Tallman, 2010; Chiang et al., 2012; Stump and Heide, 1996; Jap, 1999; Wang et al., 2016). However, little empirical research has shown the links between supplier’s asset specificity and partners’ goal compatibility and the SMEs’ ability to leverage supplier’s complementary capabilities as a source of relational rent in OI relationships (Gusenbauer et al., 2015). Against this backdrop, in this study we aim to delineate: (1) why the supplier’s asset specificity and goal compatibility impact the supplier’s complementary capabilities, and (2) how the supplier’s complementary capabilities might affect the OI performance by SMEs.

Considerable supply chain literature suggested that rewarding suppliers by experimenting with them jointly (Villenaa et al., 2011); and training their teams during site visits (Modi and Mabert, 2007), help in motivating their cooperative behaviour and creativity (Villenaa et al., 2011). Other studies suggested that supplier incentives can be a “double-edged sword” in OI relationships (Gilliland and Kim, 2014). Despite these contrasting studies, the innovation management literature has given limited attention to the interplay between supplier joint actions and antecedents of dyadic performance, such as the supplier’s asset specificity and goal compatibility (Stump and Heide, 1996; Shepherd and DeTienne, 2005; Johnson and Medcof, 2007). Moreover, studies of buyer-supplier collaboration remain generally silent about the effectiveness of supplier joint actions in enhancing supplier performance (Gilliland and Kim, 2014). The purpose of this study is to address these gaps.
Our study intends to contribute to the SMEs and the OI research and practice by conceptualising and examining OI in SMEs from the theoretical perspective of the relational view (Dyer and Singh, 1998). An important contribution of this study is the identification of supplier's asset specificity and goal compatibility as essential antecedents of dyadic complementarity in SMEs’ OI relationships. Our empirical investigation provides evidence to support the theory that the supplier’s contributions through relationship-specific assets and OI partners’ goal compatibility are contingencies under which supplier’s complementary capabilities improve OI performance. Additionally, we reveal that despite their incentivising nature, supplier joint actions can have negative effects on tapping interfirm synergies in SMEs’ OI relationships.

3.3 Theory and hypotheses

3.3.1 Offshore outsourcing innovation in SMEs: The buyer-supplier alliance perspective

Extant literature has documented that OI is not a recent phenomenon; instead, it goes back to 1930s when large American and European firms relocated some of their R&D activities abroad (Ambos and Ambos, 2011). Moreover, captive OI dominated the early years of OI (Lewin et al., 2009). However, Hagedoorn (2002) showed that since early 1980s companies seem to increasingly prefer contractual partnerships for innovation over joint ventures. Consequently, the strong trend toward OI has been gaining momentum since the early 2000s (Lewin et al., 2009; Bertrand and Mol, 2013; Musteen and Ahsan, 2013). OI motivates firms attempts to tap into the offshore suppliers’ technological resources and the foreign markets for specialised talents (Quinn, 2000; Lewin et al., 2009). Also, firms are increasingly realising that OI can be a faster, cost-effective and low risk way to
innovation and sustained competitive advantage (Quinn, 2000; Sartor and Beamish, 2014; Gusenbauer et al., 2015; Jean et al., 2014).

Previous studies have also documented a growing shift in SMEs’ innovation strategies towards adopting OI practices through buyer-supplier relationships (Rothwell and Dodgson, 1991; Lewin et al., 2009; Gassmann et al., 2010; Musteen and Ahsan, 2013). For example, Di Gregorio et al. (2009) concluded that offshore outsourcing technical services are enhancing SMEs international competitiveness through opportunities to tap into talent pools of foreign suppliers. Musteen and Ahsan (2013) found that through OI, SMEs overcome human, social, and organizational capital deficiencies and improve their innovation performance. Another study by Rodriguez and Nieto (2016) concluded that offshore outsourcing R&D stimulates higher sales growth for SMEs than alternatives to domestic R&D offshore outsourcing.

OI is one variant of buyer-supplier relationships with a distinct emphasis on the transfer of part or all internal innovation tasks to an offshore supplier (Gusenbauer et al., 2015; Spithoven and Teirlinck, 2015). Moreover, OI relationships with offshore suppliers enable buyer SMEs to reduce risks of innovations, enhance product quality, and increase new products’ speed to market (Nietoa and Santamaria, 2007; Whitley and Willcocks, 2011). However, OI is distinct from traditional offshore outsourcing of non-core activities (e.g. offshore outsourcing production). First, there is a higher level of loss of control since it involves the sharing of specific tacit knowledge (Hoecht and Trott, 2006; Frishammar et al., 2015). Second, firms pursuing innovation through offshore outsourcing must develop inter-organisational capabilities to integrate suppliers’ tacit knowledge and valuable resources (Gooroochurn and Hanley, 2007; Mudambi and Tallman, 2010;
Enderwick and Buckley, 2017). On the contrary, in typical offshore outsourcing of non-core tasks, the emphasis is on disintegration, and cost savings. Third, OI requires the development of interdependent relationships through strategic collaboration, while the offshore outsourcing of non-core tasks focuses on labour distribution (Chen and Paulraj, 2004; Rothaermel and Boeker, 2008). To that end, OI requires substantial coordination efforts to facilitate the achievement of desired innovation outcomes (Jap, 1999; Nietoa and Santamaria, 2007; Palmie et al., 2016).

The OI research, argues that firms pursuing innovation through offshore outsourcing are usually motivated by survivability and profitability considerations that are stronger than transaction cost economics (TCE) (Teece, 1986; Dussauge et al., 2000; Gooroochurn and Hanley, 2007). Specifically, firms adopting OI as a “buy” innovation strategy, lose the advantages of the organisational control of the “make” innovation strategies (Teece, 1986; Stanko and Calantone, 2011); consequently, OI shifts the organisation behaviours and coordination mechanisms of innovation from the firm to the dyad (Chen and Paulraj, 2004). This conceptualisation of OI comprises various joint activities in a coordinated effort to create superior value for the dyad. Therefore in conceptualising OI, we follow the perspective of the relational view (Dyer and Singh, 1998). The central thesis of the relational view asserts that firms in dyadic alliances can accumulate relational rents by accessing and combining each other’s complementary idiosyncratic capabilities (Dyer and Singh, 1998). Therefore, OI, by definition, fosters joint innovation through bundling the offshore suppliers' specialised resources and tacit knowledge with the buyers’ complementary internal resources (Spithoven and Teirlinck, 2015; Enderwick and Buckley, 2017). OI allows the buyer SMEs to benefit from utilising
heterogeneous and immobile resources of the offshore suppliers under the dyad’s relaxed conditions of resource proprietary and imperfect mobility (Lavie, 2006; Van Beers and Zand, 2014).

3.3.2 Supplier’s complementary capabilities
In this study, we refer to the supplier’s complementary capabilities as the degree to which the SME buyer and the offshore supplier can combine the supplier’s distinct capabilities to jointly produce performance outcomes that are not achievable by either of the two acting individually (Dyer and Singh, 1998; Sarkar et al., 2001; Lavie, 2006). Consequently, the supplier’s complementary capability can be a source of relational value for SME buyers in OI relationships (Dyer and Singh 1998). For the purpose of our study, resources and capabilities are interchangeable. However, we deliberately highlight capabilities to incorporate a dynamic perspective in our analysis of OI relationships. A dynamic view seems more appropriate to understand how supplier’s complementary capabilities combine not only supplier’s distinctive attributes but also the SME-offshore supplier interactions to co-create super-additive value in OI (Nietoa and Santamaria, 2007; Mudambi and Tallman, 2010). Besides, given their limited resources, SMEs are required to integrate the technological advances of their suppliers into their products (Fernández-Olmos and Ramírez-Alesón, 2017). Therefore, when SMEs fail to generate strategic competitive advantage because of their limited capabilities, supplier’s complementary capabilities facilitate complex interfirm combination of the offshore supplier superior capabilities with the SMEs’ weaker capabilities (Rothaermel and Boeker, 2008; Mitsuhashi and Greve, 2009; von Haartman and Bengtsson, 2015; Cobena et al., 2017).
While the strategic interfirm literature documents that supplier’s complementary capabilities can be a source of OI viability and success, SMEs in dyadic OI relationships must be aware of the challenges they might face while pursuing relational gains from adding up supplier’s complementary capabilities (Dyer and Singh, 1998; Sivadas and Dwyer, 2000; Lavie, 2006; Jap, 1999). First, the SMEs must assess the potential complementarity of the offshore supplier before they make the supplier selection decision (Dyer and Singh, 1998). Second, the SMEs must build inter-organisational skills to permit the appropriation of synergetic value when accessing the supplier’s complementary capabilities (Sivadas and Dwyer, 2000; Lavie, 2006). These challenges are substantial in the case of SMEs due to their limited experience in foreign markets, imperfect resources to invest in search and evaluation of potential offshore suppliers, and their weaker position compared to large firms in global supply networks (Pawar et al., 2018).

In the following subsections, we explain the reasons why the supplier’s asset specificity and goal compatibility enhance supplier’s complementary capabilities, and how the supplier’s complementary capabilities then affect the performance of OI for SMEs. Further, we develop our proposed model of supplier’s complementary capabilities in SMEs’ OI relationships (Figure 3.1).
3.3.3 Supplier’s asset specificity and supplier’s complementary capabilities.

Supplier's asset specificity refers to the investments made to match the buyer’s specific requirements at the actual site, or in physical and human capabilities (e.g. installation of new design software, or updating a piece of existing production equipment with the latest technology) (Joshi and Stump, 1999). Such investments can be a viable route to enhance supplier’s complementary capabilities and lead to competitive interfirm performance (Dyer and Singh, 1998; Lavie, 2006). Specifically, the supplier’s asset specificity overcomes shortages in buyers’ resources by offering distinct capabilities (Teece, 1986). Previous studies document that supplier’s asset specificity fosters partners’ interdependence and hence, cultivate dyadic complementarities (Dussauge et al., 2000; Rothaermel and Boeker, 2008; Dyer, 1996). For example, Dyer (1996) concluded that suppliers’ specific investments in the auto industry are more likely to result in competitive advantage for automakers, particularly when tasks involved are characterised by a high
degree of interdependence, such as collaborative innovation (Dyer, 1996). Similarly, Rothaermel and Boeker (2008) found that specialised niches of biotechnology firms often lead to complementary effects when combined with pharmaceutical firms’ competences in administrative management, marketing, and distribution activities.

Supplier's asset specificity also entails assets' heterogeneity and immobility which are primary conditions for complementarity (Dyer and Singh, 1998; Lavie, 2006; Cobena et al., 2017). For example, in the context of O. However, relationship-specific assets expose offshore suppliers to the risk of buyers' opportunism. Therefore, offshore suppliers might shirk their future investments unless their buyers are willing to swap mutual hostages in return (Stump and Heide, 1996; Anderson and Jap, 2005; Poppo et al., 2008).

In case of SMEs, where OI is primarily motivated by shortages in internal resources, finding heterogeneous offshore suppliers who are willing to invest in new assets is highly relevant to achieving complementarity (Mitsuhashi and Greve, 2009). Also, the supplier's asset specificity signals the offshore supplier's commitment to invest in the relationship intentionally, and mobilise specialised capabilities for the collaboration’s benefit (Lavie, 2006). Finally, the supplier's asset specificity promotes supplier’s complementary capabilities to play the role of an effective governance mechanism in international buyer-supplier relationships over and above the usual contractual agreements (Bunyaratavej et al., 2007). Such a role facilitates a cooperative climate where the SME expects that the offshore supplier will share its specialised assets to enhance OI performance (Koufteros et al., 2012). Likewise, the offshore supplier expects his share of the benefit (e.g. promises of future orders) gained from the operationalised dyadic complementarity (Joshi and Stump, 1999; Mitsuhashi and Greve, 2009).
2009; Koufteros et al., 2012). Applying this rationale to supplier’s asset specificity in SMEs’ OI relationships, we propose the following hypothesis:

**Hypothesis (H1).** Supplier’s asset specificity is positively related to the supplier’s complementary capabilities in SMEs’ OI relationships.

### 3.3.4 Goal compatibility and supplier’s complementary capabilities.

Goal compatibility refers to the extent to which the goals and objectives of the SME buyer are aligned with the goals and objectives of the offshore supplier (Werder, 2005). For example, goal compatibility in OI buyer-supplier relationships can be perceived as the possibility of accomplishment of joint innovation creation (Jap, 1999; Sarkar et al., 2001). Additionally, goal compatibility in OI can be a shared vision that represents the collective goals of the partners (Wang et al., 2016). Dyer and Singh (1998) argue that finding a supplier with supplier’s complementary capabilities creates a potential for relational rents. However, such rents can be realised only if both parties have compatible goals that motivate them to consolidate supplier’s complementary capabilities. For example, Wang et al. (2016) studied 323 dyadic new product co-development (NPD) relationships in China and found that the more compatible the goals of the parties in these relationships, the more able were they to achieve complementary interfirm rents. According to Wang et al. (2016)’s study, compatible goals help partners to recognise their interdependence in NPD projects and consequently facilitate effective cooperation to achieve collaborative outcomes.

Also, from an organisation’s internal perspective, innovation teams are usually goal driven (Stanko and Calantone, 2011). For example, internal R&D teams typically have a common goal, and all individuals within that team behave in line with this goal
(Forsgren, 2002). Therefore, the innovation process emerges as a purposeful, adaptive and constructive process, resulting from the interaction between outcomes and goals (Poole and Van de Ven, 1995). The same contention can apply at the inter-organisational level, where interconnected organisations can act as a single collective entity to achieve desired outcomes if they have compatible goals (Poole and Van de Ven, 1995). On the other hand, since SMEs might not be able to develop the supplier’s complementary capabilities internally, goal compatibility is an attractive mechanism that ensures tapping potential rents of the offshore suppliers’ complementary capabilities (Lavie, 2006). Moreover, SME entrepreneurs make good use of goal compatibility as a motivational tool to form interdependencies, engender flexibility, and drive both parties’ contributions (Julien, 1993; Rothaermel and Boeker, 2008; Mitsuhashi and Greve, 2009). Contrarily, goal incompatibility between partners can impair collaboration, since it frustrates partners who become suspicious of each other’s opportunistic behaviour (Jap, 1999; Wang et al., 2016). Therefore, the strategic alliance research suggests that partners with competing goals should not enter into dyadic relationships, as such relationships are doomed to fail (Dyer and Singh, 1998; Jap, 1999). Following this discussion, we hypothesise that:

**Hypothesis (H2).** Goal compatibility is positively related to the supplier’s complementary capabilities in SMEs’ OI relationships.

### 3.3.5 Supplier’s complementary capabilities and OI performance.

The alliance literature established that relational rents are high in alliances between partners possessing complementary capabilities (Dyer and Singh, 1998; Sivadas and Dwyer, 2000; Lavie, 2006). Previous OI studies have shown that the supplier’s complementary capabilities is a relational antecedent of OI performance, and a primary
driver of OI decision (Nietoa and Santamaria, 2007; Rothaermel and Boeker, 2008). Moreover, recent studies noted that supplier’s complementary capabilities in dyadic alliances impact alliance formation and success (Van Beers and Zand, 2014; Mindruta et al., 2016; Cobena et al., 2017).

In OI, supplier’s complementary capabilities arise when the combination of different types of technological knowledge, R&D processes, or innovation commercialization capabilities of both partners lead to enhanced product and process innovations of the buyer’s firm (Mitsuhashi and Greve, 2009; Van Beers and Zand, 2014; Cobena et al., 2017). For example, offshore suppliers can provide technological knowledge on the production process innovations of SMEs (Van Beers and Zand, 2014). Also, offshore suppliers might be members of specialised clusters with access to a creative workforce (Lewin et al., 2009). Furthermore, SMEs can leverage offshore suppliers’ core strengths in R&D, engineering and production technologies in areas where they have deficiencies (Nietoa and Santamaria, 2007; Rothaermel and Boeker, 2008; Van Beers and Zand, 2014). Accordingly, supplier’s complementary capabilities may foster new learning opportunities for SMEs through collaboration with offshore suppliers who have a broader knowledge base about new technologies and markets than SMEs (Nietoa and Santamaria, 2007; Van Beers and Zand, 2014; Koufteros et al., 2012). Summing up, the supplier’s complementary capabilities facilitate a feasible OI route for SMEs to achieve a superior innovation performance at the competitive cost in offshore markets (Rothaermel and Boeker, 2008; Mitsuhashi and Greve, 2009; Cobena et al., 2017). Therefore, we hypothesise:
Hypothesis (H3). The supplier’s complementary capabilities are positively related to SMEs’ OI performance.

3.3.6 The mediation role of the supplier’s complementary capabilities.

So far, we argued that the supplier’s asset specificity and the partners’ goal compatibility nurture their suppliers’ complementary capabilities, which, in turn, become critical determinants of potential relational rent in OI relationships. These arguments mean that supplier’s complementary capabilities may also play a mediatory role in the relationship between relational antecedents and performance of OI relationships (Mitsuhashi and Greve, 2009; Cobena et al., 2017). The strategic alliance and supply chain literature established that interfirm diversity due to idiosyncratic investments as well as social and cultural similarities affects the alliance performance (Dyer, 1996; Jap, 1999; Sarkar et al., 2001; Jean et al., 2017). Both factors can reinforce the importance of supplier’s complementary capabilities. For instance, supplier’s asset specificity is an efficient way for a supplier to signal to the buyer its attractiveness as a potential collaborative partner, and, in doing so, the supplier is better positioned to explain the potential value of supplier’s complementary capabilities (Nietoa and Santamaria, 2007; Rotheaermel and Boeker, 2008; Van Beers and Zand, 2014). Also, the ensuing collective goals as well as a shared vision to achieve collaborative innovation outcomes can further foster a conducive climate of interfirm complementarity (Wang et al., 2016). Further, supplier’s asset specificity and goal compatibility are envisioned to act as valid proxies for supplier’s complementary capabilities (Jap, 1999; Sarkar et al., 2001; Mitsuhashi and Greve, 2009; Cobena et al., 2017).

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Also, supplier’s complementary capabilities can serve as an effective medium to transmit the economic effects of supplier's asset specificity and the social bonding effect of goal compatibility to OI performance (Mitsuhashi and Greve, 2009; Cobena et al., 2017). In summary, supplier’s complementary capabilities create added value through the combination of the offshore supplier idiosyncratic capabilities and the buyer-supplier interactions. Specifically, SMEs benefit from this mediatory role of supplier’s complementary capabilities in accruing relational rent from suppliers’ capabilities which the SMEs do not own or control (Mudambi and Tallman, 2010; Enderwick and Buckley, 2017). Furthermore, given distant offshore relations SMEs can utilise supplier's asset specificity and goal compatibility as relatively less expensive control mechanisms than for example face to face meetings. Therefore, we hypothesise:

**Hypothesis (H4a).** The supplier’s complementary capabilities will mediate the positive relationship between the supplier's asset specificity and OI performance.

**Hypothesis (H4b).** The supplier’s complementary capabilities will mediate the positive relationship between goal compatibility and OI performance.

### 3.3.7 The Moderating effects of supplier joint actions.

Although supplier's asset specificity and goal compatibility in OI relationships are critical drivers of performance and success, they are potentially significant sources of risks (Jap, 1999; Joshi and Stump, 1999; Wang et al., 2016; Rothenberg and Boeker, 2008; Mudambi and Tallman, 2010; Nyaga et al., 2010; Flynn et al., 2010a). For example, suppliers who invested heavily in relationship-specific assets are subject to substantial lock-in risks in case of buyers switching to other suppliers (Liu et al., 2012). Moreover, compatible goals often suffer from multiple and conflicting interpretations in interfirm relationships across
borders and among different teams and organisations (Gilliland and Kim, 2014; Kim et al., 2015; Chen et al., 2016b).

Previous studies have proposed that supplier joint actions aimed at supplier development are critical drivers of collaborative success (Nyaga et al., 2010; Flynn et al., 2010a; Huq et al., 2014). These include working with the supplier to reduce costs, improve quality, and train personnel. Supplier joint actions can act as effective incentives to focus the supplier’s efforts on the mutual benefits of superior exchange performance (Joshi and Stump, 1999; Heide and John, 1990). In addition, supplier joint actions not only encourage cooperative behaviour through “working together” to resolve disputes and coordinate collaborative activities (Nyaga et al., 2010), but also act as a non-contractual control mechanism to deter opportunism (Nyaga et al., 2010; Joshi and Stump, 1999; Liu et al., 2012).

Despite their limited financial resources to engage in vast and expensive supplier development programs like the ones Toyota implements with their suppliers (Lawson et al., 2015), SMEs can still benefit from the incentivising nature of low scale supplier joint actions to ensure the supplier’s dedicated efforts and contributions towards enhancing the OI performance (Lui et al., 2010; Mooi and Ghosh, 2010). For example, SMEs can help the offshore supplier to improve the utilisation and productivity of its specific assets through the use of information and communication technologies (ICT) electronic linkages to exchange information with the offshore supplier instead of prolonged site visits (Zhang et al., 2016). Consequently such inexpensive supplier joint actions can unleash for SMEs relational benefits from supplier’s specific asset (Shepherd and DeTienne, 2005; Johnson and Medcof, 2007; Sumo et al., 2016a; Nyaga et al., 2010). This means that supplier joint
actions enable SMEs to tap better into supplier’s asset specificity. In contrast, in the absence of such incentivising activities, suppliers are likely to fear the SMEs' opportunistic behaviour and consequently provide less than expected performance (Mooi and Ghosh, 2010).

Similarly, as supplier joint actions in OI become increasingly oriented towards securing economic gains for the offshore supplier, such interactions will positively moderate the impact of compatible goals on OI performance (Lui et al., 2010). For example, working jointly with the supplier’s innovation team during joint training programs, and frequent technical meetings though ICT linkages, will facilitate the offshore supplier alignment with the OI objectives and consequently enhances the effect of goal compatibility on OI performance (Jane et al., 2012; Kulangara et al., 2016; Zhang et al., 2016). Besides, through supplier joint actions, parties in OI relationships appear to value shared goals and hence, can derive higher relational rents (Liu et al., 2012). Consequently, through supplier joint action, SMEs increase the possibility of benefiting from goal compatibility in drawing better OI performance. In contrast, the lack of supplier joint actions will challenge the quality of shared social capital in OI relationships and hinder the chances of the continuation and success of the OI relationship (Lui et al., 2010; Jean et al., 2017). This discussion suggests the study’s final two hypotheses:

**Hypothesis (H5a).** Supplier joint actions positively moderate the relationship between the supplier’s asset specificity and OI performance.

**Hypothesis (H5a).** Supplier joint actions positively moderate the relationship between goal compatibility and OI performance.
3.4 Methodology

3.4.1 Sampling and data collection

This study is part of a broader research that investigates OI relationships in SMEs, drawing from a data set of 200 developed country European SME manufacturers with active OI relationships. We specifically choose OI in a buyer-supplier context. Offshore outsourcing relationships has been researched extensively as forms of fruitful interfirm cooperation (Bunyaratavej et al., 2007; Maskell et al., 2007). Accordingly, they offer an excellent opportunity to draw useful insights for research and practice in case of pursuing innovation through offshore outsourcing. Moreover, buyer-supplier or non-equity OI relationships can be more attractive to SMEs than captive relationships given their limited resources (Rodriguez and Nieto, 2016). Furthermore, previous studies argued that non-equity offshore outsourcing relationships adapts better than equity arrangements (Buvik and John, 2000) as they assist buyers to share with suppliers risks of innovations (Hamel et al., 1989), and move quickly into new markets and technologies (Quinn, 2000).

According to the European economic data, the SMEs manufacturing sector in Europe included more than 2 million firms and produced €725 billion or 44.5% of the manufacturing sector value added in 2013 (Eurostat, 2016a). Furthermore, in 2014, SMEs contributed 26.3% to the manufacturing sector value added in Germany, and from 10.5-14.5% in Italy, UK and France (Eurostat, 2017). Additionally, the European innovation data reported that 49.1% of all European SMEs had reported some form of innovation activity between 2012 and 2014 (Eurostat, 2017). For data collection, we used an online cross-sectional survey in line with previous studies with similar context (e.g. van de Vrander et al. 2009). Our initial sampling frame included 2,384 firms. The survey targeted
manufacturing SMEs from four developed European countries; Germany, Italy, UK and France with an existing OI relationship with a supplier located in a country different than the country of the SME (Bunyaratavej et al., 2007; Geishecker and Görg, 2013; Maskell et al., 2007). More than 50% of the supplier firms in our sample were in a different continent than Europe.

We screened out a total of 1,466 firms from the initial sample since they did not meet the SME size criteria or the study criteria for a buyer-supplier OI governance mode. The final sample size was 918 firms. All the SMEs in our sample fulfilled the EU definition of SMEs – i.e. each has a total number of employees between 10-249 and an annual turnover of more than €2 to €50 million (European Commission, 2016a). We excluded SMEs with captive OI since the primary goal of this research is to investigate OI in a buyer-supplier context. Moreover, the buyer-supplier context is more relevant to SMEs given their resource constraints, and their high-risk exposure of foreign direct investments (FDIs) compared to large firms (Rodriguez and Nieto, 2016; Gusenbauer et al., 2015).

To ensure complete responses, we activated the forced response option for all questions. Also, to encourage high-quality responses, we added an attention check midway through the survey to make sure that respondents are paying adequate attention. Further, we screened out all responses with a completion time less than 1/3 of the median time of all completed responses. After screening out incomplete responses and responses that failed quality checks, the final sample contained 200 firms, giving us an effective response rate of 21.8%. We surveyed top managers of SMEs. Key informants, especially in case of SMEs, are typically in charge of establishing and managing strategic
relationships, given the small management structure in SMEs and the challenges of managing OI relationships (Gusenbauer et al., 2015; Bidault and Castello, 2010).

Furthermore, surveying top executives (e.g. chief executive officer, managing partner) from the buyer side are a commonly adopted practice in supply chain and operations management research (Carr and Pearson, 1999; Paulraj et al., 2008). Our sample came from various manufacturing industries. The industry type of the 200 SME in the data set and respondent titles are listed in Table 3.1.

**Table 3.1 SMEs sample characteristics**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic, paper, and rubber</td>
<td>32</td>
<td>16.0%</td>
</tr>
<tr>
<td>Textile and wearing apparel</td>
<td>32</td>
<td>16.0%</td>
</tr>
<tr>
<td>Food and beverages</td>
<td>23</td>
<td>11.5%</td>
</tr>
<tr>
<td>Machinery and mechanical equipment</td>
<td>24</td>
<td>12.0%</td>
</tr>
<tr>
<td>Pharmaceutical and chemicals</td>
<td>20</td>
<td>10.0%</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>20</td>
<td>10.0%</td>
</tr>
<tr>
<td>Metal and minerals</td>
<td>18</td>
<td>9.0%</td>
</tr>
<tr>
<td>Electrical and electronics</td>
<td>16</td>
<td>8.0%</td>
</tr>
<tr>
<td>Coke and petroleum</td>
<td>10</td>
<td>5.0%</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>5</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title of respondents</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief executive officer</td>
<td>8</td>
<td>4.0%</td>
</tr>
<tr>
<td>Managing director</td>
<td>69</td>
<td>34.5%</td>
</tr>
<tr>
<td>Managing partner</td>
<td>94</td>
<td>47.0%</td>
</tr>
<tr>
<td>General manager</td>
<td>25</td>
<td>12.5%</td>
</tr>
<tr>
<td>Others (top management position)</td>
<td>4</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

**3.4.2 Survey development and measures**

Since our unit of analysis is the offshore outsourcing SME with existing OI relationship, we instructed the respondents to select a significant offshore supplier with whom they have an active OI relationship. Such a mindset helped us to increase the validity of respondents’ views about their offshore suppliers. We developed our survey instrument using multiple-item measures from published research. The study's survey used a 7-point
Likert scale with endpoints "1= strongly disagree" and "7= strongly agree". Before the commencement of the live data collection, we contacted eight manufacturing executives from SMEs spanning Italy, UK, Germany, and Spain, and asked them to complete the survey. We contacted them again to request their feedback about the questions in the survey, with respect to clarity, length, and coverage for the OI investigated topics. The final questionnaire included some modifications based on the comments we received from the manufacturing executives of the SMEs.

To measure “supplier’s asset specificity” we used four items from Joshi and Stump (1999). The items measured the extent to which the outsourced innovation tasks needed highly specified human and physical resources. Additionally, this construct also captured the extent to which the offshore supplier has made dedicated and specialised investments for the OI relationship, has tailored its product and process development programs to match the SME buyer requirements, and has committed specialized skills in training the SME buyer people. To measure “goal compatibility”, we used three items from Jap (1999) and Wang et al. (2016). The items measured the extent to which the SME and the offshore supplier have compatible goals, support each other's objectives, and share the same goals in the relationship. To measure “Supplier’s complementary capabilities” we applied four items which assess the extent to which the offshore supplier contributes different capabilities to the OI relationship, and has complementary strengths, the degree to which the offshore supplier has separate abilities when combined with the SME’s abilities enable the SME to achieve goals beyond its reach independently, and whether the joint R&D efforts benefit from their closeness to both firms’ current products and processes (Jap, 1999; Sivadas and Dwyer, 2000). To measure “supplier joint actions” we used a three-
item scale to assess the extent to which the SME is working with the offshore supplier to reduce its costs, improve its quality, and train its people (Joshi and Stump, 1999). Finally, we operationalised OI performance using a four-item scale, measuring OI performance concerning new or enhanced products and processes, new product speed to market, and rate of patent applications (Rindfleisch and Moorman, 2001; Roy and Sivakumar, 2011; Jane et al., 2012).

3.4.3 Data analysis

Common method bias

Since we collected data from a single informant within each SME in our sample, common method variance is of concern. To address this concern, we conducted two tests. First, we conducted the Harman's one-factor test (Podsakoff et al., 2003). According to this test, if a substantial amount of common method variance is present, then either (1) a single factor will emerge from the exploratory factor analysis (EFA) of all survey items, or (2) one general factor will account for most of the variance in the data set. In our case, the un-rotated principal component EFA based on Eigenvalue greater than one, revealed the presence of four distinct factors with Eigenvalue greater than one. The four factors together accounted for 64.36% of the variance. Further, the first factor accounted for 39.41% of the variance. Second, we ran a single factor confirmatory factor analysis (CFA) test. The model fit indices for the single factor CFA model conveyed a comparative fit index (CFI) = 0.751, Tucker-Lewis index (TLI) = 0.710, and root mean square error of approximation (RMSEA) = 0.128. All CFA model fit indices were significantly worse than our measurement model (as shown in Appendix C). Based on these two tests, we can conclude that common method bias might not be a concern in our dataset (Sanchez and
Brock, 1996). Furthermore, Kull et al. (2018) argued that the effect of a single-key respondent in SMEs research is not very problematic since the small management structure can help to capture a broader picture of what is happening in SMEs.

**Confirmatory factor analysis**

To investigate the unidimensionality, reliability, and validity of the theoretical constructs, we conducted a confirmatory factor analysis (CFA). One of the loadings within each of the study constructs was constrained to a value of one, and an estimation output using maximum likelihood was generated with standardised estimates, residual moments, and modification indices. The fit of the resulted CFA model was satisfactory with values for model fit indices - normed $X^2 = 1.99$ ($\leq 2.0$), $p<0.001$, $CFI = 0.934$, $TLI = 0.911$; standardised root mean square residuals (SRMR) = 0.053; and $RMSEA = 0.071$. We note that during the CFA process, we dropped one item each from supplier’s asset specificity, supplier’s complementary capabilities and OI scales to improve model fit.

To establish discriminant validity, we compared the squared correlation between every two constructs in our model with their average variance extracted (AVE) values (Fornell and Larcker, 1981). Examining the correlation coefficients given in Table 3.2 with the AVE values shown in Appendix C, we can conclude that none of the squared correlations is higher than the AVE of both the underlying constructs. The highest squared correlation of 0.403 between supplier’s asset specificity and OI performance was lower than the AVE for the two constructs 0.48 and 0.50, respectively. These results provide evidence of discriminant validity among proposed theoretical constructs. The descriptive statistics of the constructs and their correlations are shown in Table 3.2.
Table 3.2 Descriptive statistics and correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supplier’s asset specificity</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Goal compatibility</td>
<td>0.480**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Supplier’s complementary capabilities</td>
<td>0.597*</td>
<td>0.575**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Supplier joint actions</td>
<td>0.433**</td>
<td>0.461**</td>
<td>0.408**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>5. Offshore outsourcing innovation</td>
<td>0.635**</td>
<td>0.436**</td>
<td>0.527**</td>
<td>0.316**</td>
<td>1.000</td>
</tr>
<tr>
<td>Mean</td>
<td>5.528</td>
<td>5.613</td>
<td>5.613</td>
<td>5.527</td>
<td>5.598</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.656</td>
<td>0.675</td>
<td>0.630</td>
<td>0.816</td>
<td>0.658</td>
</tr>
</tbody>
</table>

**Correlation is significant at (p ≤ 0.01)**

To evaluate the reliability of the study’s constructs, we calculated composite reliability (CR) for all constructs. Results showed that all constructs had a CR value of greater than or equal to 0.70, confirming that items within each construct accounted for more variance than the variance explained by the error components; therefore, items are significantly related to their theoretical constructs (Bagozzi and Yi, 2012). Reliability of the constructs was established using internal consistency method via Cronbach’s alpha. All constructs showed Cronbach’s alpha value of greater than 0.70. Also, the AVE values (Appendix C) are more than or equal to 0.5 for all constructs, except supplier’s asset specificity and supplier’s complementary capabilities, whose AVE value is 0.48. Adequate convergent validity is therefore exhibited (Fornell and Larcker, 1981).

3.5 Results

To determine if we have multicollinearity issues, we ran the SPSS collinearity diagnostics test to calculate the variance inflation factor (VIF) for each independent/moderator variable in the tested model against another independent/moderator variables. As shown in Table 2.3, all VIFs are less than 10, indicating no consequential multicollinearity issues (O’Brien, 2007). Furthermore, to check normality and homoscedasticity assumptions of
linear regression, we regressed the dependent variable (offshore outsourcing innovation performance) on all independent and moderator variables in the model (contract complexity, relational trust, formal knowledge routines and supplier joint actions). We plotted the standardised regression residuals for the Y-axis and standardised predicted values for the X-axis (Figure 2.2). Additionally, we plotted the histogram of the standardised residuals with frequency (Figure 2.3). As can be seen in Figure 2.2, the data shows a relatively constant vertical range, hence suggesting the data in our tested model meets the homoscedasticity assumption (i.e. heteroskedasticity is not present) (Osborne and Waters, 2002). Moreover, the histogram in Figure 2.3 shows a reasonably standard distribution curve (Osborne and Waters, 2002).

Table 3. 3 Multicollinearity diagnostics – Variance Inflation Factor (VIF)

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supplier’s asset specificity</td>
<td>1.644</td>
<td>1.555</td>
<td>1.321</td>
<td></td>
</tr>
<tr>
<td>2. Goal compatibility</td>
<td>1.665</td>
<td>1.624</td>
<td>1.286</td>
<td></td>
</tr>
<tr>
<td>3. Supplier’s complementary capabilities</td>
<td>1.403</td>
<td>1.447</td>
<td>1.371</td>
<td></td>
</tr>
<tr>
<td>4. Supplier joint actions</td>
<td>1.624</td>
<td>1.562</td>
<td>1.868</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3.2 Checking the homoscedasticity assumption using the multiple regression standardized predicted and residual values

Figure 3.3 Histogram of standardised model residuals
Since our hypothesised model (see Figure 3.1) involves mediation and moderation hypotheses with one mediator, one moderator, and two independent variables, we used models 4 & 5 illustrated in Preacher and Hayes (2008). Hayes's Process v3.0 tool tests mediation and moderation hypotheses using bootstrapping, a computer-intensive resampling from the data set for thousands of times (e.g. 5000) to build confidence interval of the empirical estimation of the mediation and interaction effects between variables (Lockwood and MacKinnon, 1998). For our analysis, we used 5000 resampling iterations and a 95% confidence interval for the approximation of the indirect effect. Table 3.4 lists result from these tests. Table 3.4 also includes Sobel’s test as a second test for mediation effects.
Table 3.4 Results of direct, mediation and moderation effects

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Effect / Unstandardized Coefficients</th>
<th>Direct effect</th>
<th>Total Effect</th>
<th>Mediation</th>
<th>Moderation (Supplier's Asset Specificity x Supplier Joint Actions)</th>
<th>Moderation (Goal Compatibility x Supplier Joint Actions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(H1, H2)</td>
<td>b (t)</td>
<td>b (t)</td>
<td>b (t)</td>
<td>b (t)</td>
<td>b (t)</td>
</tr>
<tr>
<td>Supplier’s asset specificity → supplier’s complementary capabilities</td>
<td>0.403*** (7.020)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal compatibility → supplier’s complementary capabilities</td>
<td>0.351*** (6.310)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier’s asset specificity → offshore outsourcing innovation</td>
<td></td>
<td>0.555*** (8.977)</td>
<td>0.478*** (7.004)</td>
<td>0.455*** (6.283)</td>
<td>0.474*** (6.678)</td>
<td></td>
</tr>
<tr>
<td>Goal compatibility → offshore outsourcing innovation</td>
<td></td>
<td>0.169** (2.778)</td>
<td>0.099 (1.529)</td>
<td>0.061 (0.828)</td>
<td>0.075 (0.934)</td>
<td></td>
</tr>
<tr>
<td>Supplier’s complementary capabilities → offshore outsourcing innovation</td>
<td></td>
<td>0.192** (2.536)</td>
<td>0.194* (2.551)</td>
<td>0.191* (2.500)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier joint actions x Supplier’s asset specificity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.053 (-1.381)</td>
<td></td>
</tr>
<tr>
<td>Supplier joint actions x Goal compatibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0212 (-0.687)</td>
<td></td>
</tr>
<tr>
<td>Indirect effect (supplier’s asset specificity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.077</td>
<td></td>
</tr>
<tr>
<td>95% Confidence interval (supplier’s asset specificity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.005-0.163</td>
<td></td>
</tr>
<tr>
<td>Sobel test (supplier's asset specificity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.352*</td>
<td></td>
</tr>
<tr>
<td>Indirect effect (goal compatibility)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.068</td>
<td></td>
</tr>
<tr>
<td>95% Confidence interval (goal compatibility)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.006-0.133</td>
<td></td>
</tr>
<tr>
<td>Sobel test (goal compatibility)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.384*</td>
<td></td>
</tr>
<tr>
<td>Degrees of freedom (d.f.)</td>
<td>197</td>
<td>197</td>
<td>196</td>
<td>194</td>
<td>194</td>
<td></td>
</tr>
<tr>
<td>Variance Explained (R²)</td>
<td>0.465***</td>
<td>0.425***</td>
<td>0.444***</td>
<td>0.449***</td>
<td>0.445***</td>
<td></td>
</tr>
<tr>
<td>F-stats</td>
<td>85.488</td>
<td>72.911</td>
<td>52.091</td>
<td>31.649</td>
<td>31.133</td>
<td></td>
</tr>
</tbody>
</table>

t and F-values significance levels: *p < 0.05, **p < 0.01, ***p < 0.001
As shown in Table 3.4, the direct paths from supplier’s asset specificity ($b=0.403$, $t=7.020$, $p<0.001$) and goal compatibility ($b=0.351$, $t=6.310$, $p<0.001$) to the supplier’s complementary capabilities, were positive and statistically significant. Also, the path from the supplier’s complementary capabilities to OI performance ($b=0.192$, $t=2.536$, $p<0.01$) is positive and statistically significant. These results support our hypothesis H1, H2 and H3. Furthermore, as shown in Table 3.4 the total effect of supplier’s asset specificity ($b=0.555$, $t=8.977$, $p<0.001$) and goal compatibility ($b=0.169$, $t=2.778$, $p<0.01$) on OI performance is positive and significant. This result is consistent with the proposed mediation effect in our conceptual model (Preacher and Hayes, 2008).

To study the mediation effects further, we compare the results shown in Table 3.4 between the total effects of supplier’s asset specificity and goal compatibility on OI performance before and after we introduced supplier’s complementary capabilities. The comparison shows that the effect of supplier's asset specificity on OI performance ($b=0.555$, $t=8.977$, $p<0.001$) weakened ($b=0.478$, $t=7.004$, $p<0.001$). Likewise, the effect of goal compatibility on OI performance became insignificant ($b=0.099$, $t=1.592$, $p=0.128$). In summary, the results support the partial mediation of the supplier's asset specificity and full mediation of goal compatibility (H4a, H4b). Despite the robustness of Hayes's Process v3.0 tool approach in testing mediation hypotheses. We conducted Sobel test (Sobel, 1982; Sobel, 1986) as a second approach to re-confirm the proposed mediation effect of supplier’s complementary capabilities. Sobel’s approach involves computing the ratio of the indirect effect to its estimated standard error. As shown in Table 3.4, Sobel test results support mediation of supplier’s asset specificity ($z=2.352$, $p<0.05$), and goal
compatibility ($z=2.384$, $p<0.05$), due to the introduction of supplier’s complementary capabilities.

Contrary to our proposition, our result does not provide support for the positive moderation effect of supplier rewarding joint action on the relationship between supplier's asset specificity and OI performance ($b=-0.053$, $t=-1.381$, $p=0.17$) or between goal compatibility and OI performance ($b=-0.021$, $t=-0.687$, $p=0.49$). Instead, we found insignificant negative effects.

3.6 Discussion

Despite the broad scholarly consensus that supplier’s complementary capabilities in OI relationships are a determinant for collaboration and success, most of the empirical studies focused on studying the role of dyadic complementarities in OI in the context of large firms. In this study, we extended the relational view (Dyer and Singh, 1998) to the context of OI, and conducted a survey directly among SMEs. Our findings highlight the relevance of the supplier’s asset specificity and goal compatibility while assessing suppliers’ complementarity in OI relationships. We empirically examined the performance effects of the antecedents and outcomes of supplier’s complementary capabilities within the context of OI by SMEs. We affirmed that the supplier’s complementary capabilities are significantly related to OI performance. This finding, though consistent with the strategic-relational literature (Dyer and Singh, 1998; Lavie, 2006), contradicts the TCE’s traditions which postulate that firms will collaborate to acquire access to the supplier’s complementary capabilities of partners when the risks of collaboration are not too high (Nietoa and Santamaria, 2007).
It is important to note that although the application and effectiveness of the supplier’s asset specificity and goal compatibility in fostering supplier’s complementary capabilities are not limited to SMEs only, they are more in line with the SME entrepreneurs' interpersonal and relational competencies. Both are less expensive to measure, monitor and sufficient to incite the entrepreneurial mindset and the less risk averse behaviours associated with SMEs (Julien, 1993; Ferreira et al., 2018). Consequently, our empirical evidence offers supplier’s asset specificity and goal computability as essential relational mechanisms for SMEs to assess and leverage supplier’s complementarity in achieving sustained collaborative advantages in OI relationships.

Our results confirm that SMEs might rely on supplier’s asset specificity and goal compatibility to identify suppliers’ strategic complementarity. Also, the supplier's asset specificity and goal compatibility can act as alternative mechanisms to long partnering experience and rigorous suppliers’ search. This finding extends previous literature which documented that the supplier’s specialised investments prove to be an effective tool in the cultivation of alliances’ supplier’s complementary capabilities (Mudambi and Tallman, 2010). Such investments reflect the supplier's voluntary commitment to fulfil an SME’s specific requirements from the OI agreement (Sarkar et al., 2001; Lavie, 2006). Additionally, while the supplier's asset specificity is instrumental in building the physical context of the supplier’s complementary capabilities, goal compatibility weaves the social context of the supplier’s complementary capabilities in OI relationships. Goal compatibility can reduce partners' fears of opportunism and compel them to focus on achieving relational outcomes (De Vita et al., 2010; Mudambi and Tallman, 2010; Jean et
al., 2017). Besides, goal compatibility increases the causation power of interfirm complementarity in OI relationships not only due to its collaborative motivational dimension (Jap, 1999; Sarkar et al., 2001; Wang et al., 2016); but also due to its ability to blur firms’ boundaries and galvanize innovation teams at both sides as one internal team.

It appears that under high supplier’s asset specificity and high goal compatibility, SMEs can value and exploit the supplier’s complementary capabilities in OI despite a significant risk of sensitive knowledge spillover and loss of competitive advantage (Aubert et al., 2015; Gooroochurn and Hanley, 2007; Hoecht and Trott, 2006). Our empirical findings are in line with Lewin et al. (2009), who argue that access to qualified personnel, speed to market and cost savings are strong determinants of OI decisions. Moreover, our findings are also in keeping with Bertrand and Mol (2013), who concluded that benefits from accessing a broader range of innovation capabilities in OI outweigh looming risks, especially when compared with cost and risks of internal alternatives.

Our results show that the relationship between supplier’s asset specificity with OI performance is partially explained through supplier’s complementary capabilities. This finding suggests that the offshore supplier’s contributions in the form of specific investments may exert a direct effect on OI performance. Also, supplier’s specific investments – most likely to be specialised in case of OI in SMEs - foster building supplier’s complementary capabilities, which in turn, affect OI performance (Enderwick and Buckley, 2017). Therefore, both the direct and indirect effect of supplier’s asset specificity confirms the competitive edge of differentiated supplier’s investments in facilitating stronger performance in OI. Accordingly, supplier’s asset specificity works on its own as well as through the development of supplier’s complementary capabilities.
Findings from our research show that the relationship between goal compatibility and OI performance appears to occur mostly through supplier’s complementary capabilities. This result extends the strategic-relational research which consistently finds that social similarities such as goal compatibility are fundamental elements in fostering successful collaborative relationships (Dyer and Singh, 1998; Jap, 1999; Joshi and Stump, 1999). For SME entrepreneurs, goal compatibility acts as an informal control mechanism for maintaining a collaborative climate conducive to superior OI performance (Bougrain and Haudeville, 2002; Wang et al., 2016).

Interestingly, contrary to our proposition, our results do not support the positive moderating effects of supplier joint actions. We advanced our prediction following theoretical underpinnings that a collaborative relationship with joint activities builds trust between partners by providing assurances of nonopportunistic behaviour, allowing them to focus on the mutual benefits of superior interfirm performance (Joshi and Stump, 1999; Heide and John, 1990). Moreover, through supplier joint actions, suppliers receive financial benefits as an economic return on their specific investments and the unique adaptations they have made to their internal processes (Krause and Scannell, 2002; Modi and Mabert, 2007; Munjal et al., 2018). Furthermore, as a result of the supplier joint actions, suppliers perceive buyer firms as “fair” partners concerned with the suppliers’ goals and welfare (Liu et al., 2012). However, our results did not find the support of these relationships.

Some of the possible rationalisations for these contradictory finding is: First, despite supplier’s potential gains from joint actions, they do not qualify as equal hostages that balance supplier’s risks from dedicated and difficult to re-deploy specific assets. For
example, Anderson and Jap (2005) argued that only mutual specialised and unrecoverable investments could ensure that both partners have the same high stakes in the relationship. Second, supplier joint actions have no value for an invested supplier once the buyer decides to end the relationship. Third, suppliers’ valuation of incentives accrued from joint actions is more important than the incentives themselves (Gilliland and Kim, 2014). Therefore, for any incentive to motivate OI performance, it needs to be high enough to win the supplier’s compliance and commitment in OI relationships (Gilliland and Kim, 2014). Fourth, as incentives, supplier joint actions can also be context dependent, hence, their power and effectiveness are rather hinged on the scope of interfirm cooperation and the odds of continuation or termination of the OI relationship (Stump and Heide, 1996; Gilliland and Kim, 2014; Kim et al., 2015).

3.7 Conclusions and implications

In the OI context, SMEs appear to enjoy increased collaborative innovation success under conditions of high supplier’s asset specificity and high goal compatibility. We argue that both supplier’s asset specificity and goal compatibility reinforce the importance of supplier’s complementary capabilities. Our results confirm that the effect of dyadic complementarity on OI performance is further explained by the specialised capabilities brought by the supplier to the collaboration framework. Also, the positive association of goal compatibility with the OI performance appeared to occur largely through dyadic complementarity. The results of this study call for a deeper understanding of the nature and effect of supplier joint actions in OI relationships, especially in case of suppliers with high specific investment stakes. In other words, high supplier’s asset specificity may downplay the incentivising power of supplier joint actions.
Our research exposes the downside of SMEs limited resources which undermines their abilities to search and select champion offshore suppliers. However, SME managers may apply supplier’s asset specificity and goal compatibility as affordable ways to accrue relational rents in their OI relationships. Our framework provides SMEs’ managers with a basis for more effective management of collaborative OI dyads. For example, selecting offshore suppliers who are willing to invest and adapt to meet the SMEs’ goals from OI is highly relevant to achieve dyadic complementarity. Also, OI collaborations can benefit greatly from goal compatibility in encouraging the offshore supplier to pursue collective gains. Furthermore, SME managers should filter in that although supplier joint actions can be effective cooperation tools, they may always not work.

3.8 Limitations and future research

The present study has several limitations that would provide avenues for future research. First, we sampled our SMEs from the developed country manufacturers in Germany, Italy, UK, and France. It would be interesting to see if our findings are generalizable to different industries and geographies, including services and SMEs in developing countries. Second, despite the verified reliability of our findings, it is noteworthy that we relied on the SME’s perspectives and qualifications as a proxy for evaluating dyadic constructs. A direct investigation of the offshore suppliers’ perspectives could have enabled us to draw different conclusions (e.g. the non-supported moderating effect of the supplier joint actions). Also, extending suppliers joint activities to include other incentives such as profit sharing or assigning intellectual property rights of collective innovations might have revealed stronger effects of these incentives on OI performance. Third, drawing upon the less experienced than large firms position of SMEs in OI dyads, an exciting prospect of
future research will be to define the minimum resources and operational attributes that an offshore supplier must own to qualify as a robust collaborator for OI. Other good prospects for future research would be to compare the unique benefits of offshore outsourcing innovation with in-country outsourcing innovation. For example, will country-specific factors such as linguistic or cultural similarities make collaboration easier between countries in the context of OI? Also, an interesting avenue for future research would be to investigate whether SMEs should refrain from using OI given the difficulties surrounding the control and coordination of such innovation sourcing strategies, let alone the possibility of realising harmful consequences of OI in case of suppliers’ free-riding behaviour. Despite these limitations and generalisability precautions of OI in SMEs, we believe that this study contributes to the OI management literature in SMEs and enhances our understanding of how SMEs and large firms are different.
Chapter 4: Third Paper- Strengthening knowledge sharing in offshore outsourcing innovation: The role of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines

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4.1 Abstract

This study investigates the interplay between the internal knowledge creation capability, formal knowledge sharing routines and absorptive capacity in offshore outsourcing innovation (OI) of small and medium-sized enterprises (SMEs). We argue that SMEs undoubtedly carry their distinct characteristics of resource constraints and flexibility to the scope of knowledge sharing in OI. We capture the strength and the effectiveness of knowledge sharing using the SME’s satisfaction and OI performance as two outcome variables. Our study contributes to the supply chain innovation literature by empirically showing that through enhanced internal knowledge creation capability, absorptive capacity goes beyond merely accessing and assimilating the supplier’s knowledge to achieve relational innovation gains. We extend the evidence of the indirect effect of buyers’ internal knowledge creation capability on the likelihood of the continuation of OI relationships and their conduciveness to knowledge sharing. Furthermore, we shed light on the controversial role of formal knowledge sharing routines on the prospects of OI in SMEs.

4.2 Introduction

Knowledge disclosure and transfer through active knowledge sharing routines are critical for the success of offshore outsourcing innovation (OI). Therefore, studies of collaborative innovation within buyer-supplier dyads/networks have focused on the role of knowledge sharing as a primary mechanism for interorganisational learning (Dyer and Nobeoka, 2000; Azadegan et al., 2008a; Bengtsson et al., 2013; Hottenrott and Lopes-Bento, 2016). For example, Dyer and Nobeoka (2000), argued that active knowledge
sharing facilitates superior joint learning in the automotive supply chains, which in turn leads to higher innovation performance of the focal firms.

Moreover, the deliberate combination of internal and external research and development (R&D) has been described as a valuable strategy for achieving innovation (Cassiman and Veugelers, 2006). In light of limited financial and managerial resources, a similar impact of knowledge sharing could be realized in the context of SMEs, since their gains from OI are potentially higher than large firms (Hottenrott and Lopes-Bento, 2016). To clarify, in this study we define OI as the act of transferring to the foreign supplier any element of the innovation process, including collaborative R&D, supplier involvement in NPD and the commercialisation of innovations (Quinn, 2000; Gusenbauer et al., 2015).

Sharing innovation knowledge is difficult due to its non-codified nature as well as the risk of spillover (Kogut and Zander, 1992; Janowicz-Panjaitan and Noorderhaven, 2008; Ritala and Hurmelinna-Laukkanen, 2013; Ritala et al., 2015; Frishammar et al., 2015). Therefore, the cost of coordinating and monitoring knowledge sharing routines can be especially challenging for SMEs (Luo and Deng, 2009; Hottenrott and Lopes-Bento, 2016). In OI, SMEs are prominently motivated by their exploitation of the offshore suppliers’ intangible resources and knowledge (Inkpen and Crossan, 1995; Camisón and Forés, 2010; Bengtsson et al., 2013). Moreover, pursuing innovation through offshore outsourcing is arguably a task that is characterised by experimenting, risk-taking and unpredictable outcomes (Azadegan et al., 2008a; Wuyts and Dutta, 2014). Thus, in order to realize the benefits from the transferred innovation tasks to the offshore supplier, SMEs must have specific learning capabilities in place to leverage and integrate offshore
suppliers’ knowledge and consequently achieve innovation performance (Azadegan et al., 2008a; Camisón and Forés, 2010; Wuyts and Dutta, 2014).

Previous studies have concluded that absorptive capacity allows firms to link their internal knowledge base with the suppliers’ innovativeness (Cohen and Levinthal, 1990; Zahra and George, 2002; Bengtsson et al., 2013; Oke et al., 2013). For example, Azadegan et al. (2008a), investigated the influence of internal innovation climate on tapping innovation and knowledge from suppliers. Bengtsson et al. (2013) documented that building internal knowledge creation capability is positively associated with the integration of innovative suppliers’ knowledge. Other offshore outsourcing innovation studies concluded that internal knowledge creation promotes R&D offshore outsourcing (Grimpe and Kaiser, 2010), and mitigates the loss of learning and decay of competitive advantage as potential negative consequences of offshore outsourcing innovation (Becker and Zirpoli, 2017). In the context of OI, there is a need to investigate the impact of the interplay between internal knowledge creation capability and absorptive capacity on the offshore outsourcing SME’s ability to integrate the offshore supplier knowledge so as to achieve product and process innovations.

Extant literature have emphasised the central role of social interactions between boundary spanners of collaborating firms in achieving active knowledge sharing (Uzzi, 1997; Dyer and Nobeoka, 2000; Hardy et al., 2003; Luo and Deng, 2009; Johnson and Medcof, 2007; Jean et al., 2017; Dyer and Singh, 1998). For example, trust has been cited as one of the essential social mechanisms that moderate the relationship between accessing and benefiting from shared knowledge and innovation performance in collaborative relationships (Gulati, 1995; Gulati and Sytch, 2008; Voldnes et al., 2012;
Hu et al., 2012; Kulangara et al., 2016; Nielsen and Nielsen, 2009). Other studies recognise that formal and informal knowledge sharing routines are complementary and positively affect knowledge sharing (Janowicz-Panjaitan and Noorderhaven, 2008). Despite these studies, the role of formal knowledge sharing routines in OI is underexplored.

Furthermore, technology alliance literature reported mixed results on the implementation of formal knowledge sharing routines in offshore outsourcing innovation. While some studies found a positive impact of formal knowledge sharing policies and procedures on learning and outcomes of technological cooperation (Janowicz-Panjaitan and Noorderhaven, 2008; Van Beers and Zand, 2014), others documented that excessive formalized knowledge sharing routines can result in decreased and even adverse knowledge sharing outcomes (Yang et al., 2014). For example, Frishammar et al. (2015) concluded that in collaborative innovation exchanges, firms must consider several aspects of knowledge leakage, including the degrees of separation among partners, the criticality of knowledge, and the speed of knowledge transfer. Another recent study by Ritala et al. (2015) warned that engaging in external knowledge sharing increases the risk of intentional and unintentional knowledge leakage. Other studies have concluded that buyers’ satisfaction with their suppliers’ performance is usually linked to greater cooperation/collaboration in buyer-supplier relationships (Voldnes et al., 2012). Given this confusion and the trade-offs surrounding the use of formal knowledge sharing routines in OI relationships, it is worth investigating the effects of these routines further.

Against this backdrop, we surmise that SMEs undoubtedly carry their distinct characteristics of resource constraints and flexibility to the scope of knowledge sharing in
OI. Therefore, we expect SMEs to be less concerned about knowledge acquisition and more interested in knowledge application, than large firms. Consequently, SMEs will seek a quicker way of suppliers' knowledge application, which in turn highlights the importance of SMEs' internal knowledge creation capability and absorptive capacity as critical to achieve OI success. In the case of SMEs, the broader conceptualisation of internal knowledge creation capability beyond internal R&D activities, offers an excellent opportunity to explore and test the potential value of internal knowledge creation capability in increasing an SME’s absorptive capacity in OI relationships.

Furthermore, we capture the strength and effectiveness of knowledge sharing through SME's satisfaction and OI performance as two outcome variables. Satisfaction has been identified as a critical factor in the evaluation of supply chain relationships (Nyaga et al., 2010; Whipple et al., 2010). Since knowledge sharing is dynamic and continual, satisfaction becomes an indication of useful knowledge sharing and a strong commitment to achieving OI success despite the uncertainties and risks of innovation.

As shown in Figure 4.1, we propose that internal knowledge creation capability is positively related to the SME’s satisfaction and OI performance both directly and through absorptive capacity. Further, we examine the moderating effect of formal knowledge sharing routines on the relationship between absorptive capacity and the OI outcomes. Our study contributes to the supply chain innovation literature by empirically showing that, through internal knowledge creation capability, absorptive capacity goes beyond merely accessing and assimilating the supplier’s knowledge to achieve relational innovation gains. We extend the evidence of the indirect effect of buyers’ internal knowledge creation capability on the likelihood of the continuation of OI relationships.
and their conduciveness to knowledge sharing. Furthermore, we shed light on the controversial role of formal knowledge sharing routines on the prospects of OI in SMEs.

Figure 4. 1 Theoretical model

4.3 Theory and hypotheses

4.3.1 Knowledge sharing

The knowledge sharing phenomenon has its roots in the knowledge-based view literature (KBV) (Grant, 1996). By applying the rationale of KBV to strategic alliances, effective knowledge sharing becomes the basis for achieving innovative interfirm outcomes. Interfirm knowledge sharing lays emphasis on the interaction between different organisations that would not have occurred inside the boundaries of a firm (Inkpen and Crossan, 1995; Powell et al., 1996; Doz, 1996; Larsson et al., 1998; Dyer and Singh, 1998; Lane and Lubatkin, 1998). Also, interfirm knowledge sharing is different from other methods of learning which can occur when firms acquire knowledge from sources such as journals, seminars, and consultants, or through market transactions (Lane and Lubatkin,
Consequently, knowledge sharing is viewed as the collective acquisition of knowledge among two or more organisations (Larsson et al., 1998), and therefore, a critical source of sustainable collaborative advantage (Dyer and Singh, 1998; Lawson et al., 2015).

Grant (1996) proposes that knowledge transfer and appropriation is attainable through its application. Therefore, effective knowledge sharing is more likely to result in new knowledge creation and innovation. As such, OI can be viewed as a strategic vehicle for collaborative innovation (Powell et al., 1996). Through OI, the focal firm utilises information and communication technologies (ICT) to access suppliers’ technologies and knowledge bases and to coordinate highly dispersed innovation activities (Quinn, 2000). OI also helps the focal firm to build interactive learning capabilities with suppliers and facilitates knowledge sharing (Hardy et al., 2003). Some scholars contend that the development of knowledge sharing routines are preconditions for successful knowledge sharing in OI (Powell et al., 1996; Dyer and Singh, 1998; Larsson et al., 1998). Grant (1996) refers to these conditions as the integration mechanisms for knowledge transfer and application. Dyer and Singh (1998) refer to them as processes fostering knowledge transfer and integration across the firm’s boundaries.

Following the KBV theoretical perspective, we view OI as a learning collaboration that emphasises the importance of external knowledge sharing as a source of joint innovation. Consequently, the division and re-organisation of labour and tasks between the SME buyer and the offshore supplier in OI is central to knowledge sharing (Grant, 1996). However, while external knowledge sharing can facilitate new knowledge creation via effective knowledge transfer and integration (Hardy et al., 2003), it can also cause
leakage of knowledge and harm the focal SME (Ritala et al., 2015; Frishammar et al., 2015). Therefore, it is crucial for SMEs perusing innovation through offshore outsourcing to specifically develop internal knowledge creation capability and interfirm knowledge sharing management skills.

4.3.2 Internal knowledge creation capability

KBV has argued that an organisation’s efficiency in external knowledge absorption depends upon its ability to add new knowledge to existing knowledge (Grant, 1996). Recent studies concluded that absorptive capacity is not only a product of internal knowledge creation but also, the firm’s ability to transfer, transform and integrate suppliers’ knowledge (Grunwald and Kieser, 2007; Camisón and Forés, 2010; Grimpe and Kaiser, 2010; Ritala and Hurmelinna-Laukkanen, 2013). Following the original conceptualisation of absorptive capacity by Cohen and Levinthal (1990), these studies have repeatedly used internal knowledge creation as a necessary antecedent of the exploitation of external knowledge. However, most of these studies have operationalised internal knowledge creation capability by focusing on investments in internal R&D (Cassiman and Veugelers, 2006; Lin et al., 2012; Grimpe and Kaiser, 2010; Ritala and Hurmelinna-Laukkanen, 2013). Despite the empirical validity and measurement robustness of this approach, it misses other factors such as the organisation’s innovation culture, and intra-organisational learning and communication systems which help in building the firm’s learning capabilities and expand absorptive capacity beyond the effect of internal R&D expenditures (Zahra and George, 2002; Azadegan et al., 2008a; Camisón and Forés, 2010; Schildt et al., 2012; Wuyts and Dutta, 2014; Forés and Camisón, 2016; Bengtsson et al., 2013). Zahra and George (2002) view this expansion of internal
knowledge creation capability as the dynamic and continuous internal learning that enhances the firm’s absorptive capacity in exploiting and transforming external knowledge into a competitive advantage.

A few studies followed this line of reasoning from Zahra and George (2002). For example, Camisón and Forés (2010) argued that for firms to be able to integrate external knowledge from suppliers with different organisational cultures and learning systems, they must be able to understand, analyse and codify this knowledge before they can integrate it with their existing knowledge base. Therefore, developing such organisational capabilities and processes are vital to strengthening their absorptive capacity (Camisón and Forés, 2010). Another study by Wuyts and Dutta (2014) documented that experience in internal knowledge creation serves as a source for development of absorptive capacity, since such firms could build an internal capability to leverage suppliers’ knowledge in generating superior products.

Given that internal R&D activities are less formally structured in the case of SMEs (Rothwell and Dodgson, 1991), internal knowledge creation capability encompasses – in addition to R&D activities – an innovation culture, and innovation-oriented learning and communication systems. SMEs with internal knowledge creation capabilities can develop their absorptive capacity and thereby lower the cost and managerial resources required in coordinating knowledge sharing in OI (Grimpe and Kaiser, 2010). In contrast, SMEs who lack internal knowledge creation capability may struggle to achieve the required level of absorptive capacity to leverage external knowledge resources, despite gaining access to these resources through OI (Yang et al., 2014). We formalise the above argument in the following hypothesis:
Hypothesis (H1). The higher the SME's internal knowledge creation capability, the higher its absorptive capacity.

4.3.3 Absorptive capacity

KBV purports that the efficiency of an organisation to transfer and apply external knowledge is determined by its absorptive capacity (Grant, 1996). This argumentation is mostly true in the case of OI in SMEs, since their OI strategies are motivated by a lack of internal innovation resources (Lewin et al., 2009). Therefore, OI within SMEs implies that there are significant differences in knowledge bases and organisational routines between the SME and the offshore supplier (Lane and Lubatkin, 1998). The implicit assumption is that the offshore supplier can perform the outsourced innovation tasks better, faster and cheaper than the SME (Quinn and Hilmer, 1994). The effectiveness of OI for an SME is then reflected in its ability to transfer and apply the offshore supplier knowledge to achieve product and process innovations (Grant, 1996; Quinn, 2000). In innovation offshore outsourcing, absorptive capacity is the dynamic capability that allows the SME to create value from the OI relationship (Ritala and Hurmelinna-Laukkanen, 2013). This view of absorptive capacity highlights the interactive aspects of knowledge sharing in OI (Dyer and Singh, 1998; Janowicz-Panjaitan and Noorderhaven, 2008; Grimpe and Kaiser, 2010). Accordingly, SMEs with high absorptive capacity could participate in an intensive knowledge sharing process as the precondition to achieving OI success (Grunwald and Kieser, 2007; Forés and Camisón, 2016).

In addition, SMEs with high absorptive capacity can understand the supplier’s knowledge and its applicability (Camisón and Forés, 2010; Ritala and Hurmelinna-Laukkanen, 2013). They engage in active communication with the offshore supplier
through information sharing, feedback loops and problem-solving, to maximise the potential benefits from the incoming knowledge (Ritala and Hurmelinna-Laukkanen, 2013). Similarly, SMEs with high absorptive capacity are expected to have the ability to integrate the absorbed knowledge from the offshore supplier into product and process innovations (Camisón and Forés, 2010; Grimpe and Kaiser, 2010). As a dynamic capability, absorptive capacity is proven critical for OI performance, since it is linked to renewing and refining the firm’s internal knowledge stock and at the same time incorporating the supplier’s knowledge for new knowledge creation (Schilke and Goerzen, 2010; Schildt et al., 2012).

KBV proposes that interfirm communication is fundamentally essential to achieving knowledge transferability between firms (Grant, 1996). In a similar vein, given the emphasis on active communication and knowledge sharing in OI relationships, high absorptive capacity serves as a critical antecedent to the SME's satisfaction with the outcomes of the knowledge sharing process (Voldnes et al., 2012; Ashok et al., 2018; Paulraj et al., 2008). The interactive element of absorptive capacity grants the SME access, not only to the offshore supplier’s knowledge, but also its people, culture and knowledge structure (Dyer and Singh, 1998; Janowicz-Panjaitan and Noorderhaven, 2008; Grimpe and Kaiser, 2010). Consequently, absorptive capacity expresses the SME’s motivation to continue learning from its offshore supplier as long as good quality communication and knowledge sharing are offered by the supplier (Grunwald and Kieser, 2007). Although the SME's satisfaction is not a sufficient condition for generating high OI performance, it is a necessary condition for maintaining the relationship and ensuring an effective knowledge sharing process.
In contrast, low absorptive capacity might lead to low OI performance and the SME’s dissatisfaction. For example, SMEs that lack the internal knowledge creation capability to sense and value external knowledge, will most likely not be able to generate relational gains from the OI relationships (Forés and Camisón, 2016). Grimpe and Kaiser (2010) suggested that the adverse effects of over-outsourcing innovation are occurring because firms fail to exploit external knowledge. Also, SMEs who lack constant awareness of their offshore supplier knowledge base, or cannot speak the supplier’s technical language, are likely to assume a passive or silent role in managing the knowledge sharing process in OI (Grunwald and Kieser, 2007; Voldnes et al., 2012). Consequently, these SMEs can become prematurely dissatisfied with the OI relationship since they fail to develop sufficient absorptive capacity to communicate their feedback or discontent with the offshore supplier’s performance (Ashok et al., 2018). Thus, we propose:

**Hypothesis (H2a).** In OI relationships, the SME’s absorptive capacity is positively associated with OI performance.

**Hypothesis (H2b).** In OI relationships, the SME’s absorptive capacity is positively associated with the SME’s satisfaction.

### 4.3.4 The mediating role of absorptive capacity

KBV advances that the integrative capabilities of the firm to transfer and apply external knowledge is associated with its internal knowledge creation capability (Grant, 1996). As an organisational device, internal knowledge creation capability is associated with OI relationship outcomes. For example, Cassiman and Veugelers (2006) argued that good makers of knowledge could also be good outsourcers of innovation, given their ability to
achieve direct assimilation of external knowledge without the full acquisition of this knowledge. Wuyts and Dutta (2014) argued that internal knowledge creation capability is a direct route to superior product innovations in technology alliances. Moreover, internal knowledge creation capability builds the firm’s integrative capabilities and enhance the effectiveness of R&D offshore outsourcing (Grimpe and Kaiser, 2010; Bengtsson et al., 2013). Additionally, internal knowledge creation capability can tentatively lead to increasing the SME’s absorptive capacity in a way that increases OI performance and the SME’s satisfaction.

The above arguments show that internal knowledge creation cultivates absorptive capacity, which, in turn, allows the offshore outsourcing SME to identify valuable supplier knowledge and transform it into innovation gains. The same arguments explain how and why absorptive capacity mediates the positive effect of the SME’s internal knowledge creation capability on its satisfaction with the OI relationship and the offshore supplier’s performance. For example, Camisón and Forés (2010) argued that although external knowledge can be a primary source for innovation, it is better utilised when internal knowledge is used to access external knowledge before the firm can successfully apply the external knowledge to create value.

We view the SME’s satisfaction as an intention to continue an OI relationship. That intention is a function of the SME’s internal knowledge creation capability. For example, in the context of OI, the SME's satisfaction can be viewed as an indicative outcome compared to OI performance which is the ultimate outcome. Therefore, the ability of absorptive capacity to transmit the impact of internal knowledge creation capability on the SME’s satisfaction can be more than the impact in the case of OI
outcomes. Ashok et al. (2018) support this rationale by arguing that achieving a buyer's satisfaction requires less internal resource than delivering innovation. Furthermore, the mediation analysis we propose in this study provides a check on whether internal knowledge creation capability can lead to the desired OI outcomes. For instance, internal R&D activities not only create firm-specific knowledge but also build the firm’s capability to combine and apply external knowledge (Grimpe and Kaiser, 2010). Therefore, the mediating role of absorptive capacity focuses on components of the internal knowledge creation capability that need to be developed or improved. We aim to establish that absorptive capacity plays a mediation role above and beyond that of accessing and assimilating the offshore supplier’s knowledge. Consequently, in the context of OI, the more substantial the internal knowledge creation capability, the higher the likelihood that combinations with external knowledge will be more valuable (Grimpe and Kaiser, 2010). Thus, we propose:

**Hypothesis (H3a).** Internal knowledge creation capability is positively associated with SME’s satisfaction and OI performance.

**Hypothesis (H3b).** Absorptive capacity mediates the impact of internal knowledge creation capability on SME’s satisfaction.

**Hypothesis (H3c).** Absorptive capacity mediates the impact of internal knowledge creation capability on OI performance.

### 4.3.5 The moderating effect of formal knowledge sharing routines

KBV argues that in order to tackle the inherent difficulty of knowledge transfer, firms follow a proactive approach through maximising the use of rules and routines to enhance joint learning and to moderate alliance outcomes (Grant, 1996). In a similar vein, Dyer
and Singh (1998) proposed that alliance partners can generate rents by developing interfirm knowledge sharing routines. In the context of OI, knowledge sharing routines are viewed as formal and informal interactions between partners that facilitate knowledge exchanges (Quinn, 2000; Janowicz-Panjaitan and Noorderhaven, 2008). Previous research emphasised the central role of social interactions between boundary spanners of collaborating firms in achieving active knowledge sharing (Luo and Deng, 2009; Janowicz-Panjaitan and Noorderhaven, 2008; Hardy et al., 2003; Dyer and Nobeoka, 2000; Jean et al., 2017). However, the present study empirically examines the moderating effect of formal knowledge sharing routines on the relationship between absorptive capacity and the OI relationship outcomes. We view formal knowledge sharing routines as the structured processes that regulate and coordinate knowledge sharing between the SME and the offshore supplier (Roy and Sivakumar, 2011).

Formal knowledge sharing routines establish a set of rules and procedures to ensure efficient transfer and integration of partners’ knowledge in OI relationships (Grant, 1996). One such routine could be written rules and procedures for accessing, exploiting and protecting knowledge in OI relationships (Noordhoff et al., 2011; Roy and Sivakumar, 2011). Others comprise the formalised learning and communication interactions, including joint project teams, formal visits and the use of shared information technology (IT) platform for knowledge sharing (Kwon and Suh, 2004; Janowicz-Panjaitan and Noorderhaven, 2008). Consequently, formal knowledge sharing routines can stimulate knowledge sharing through automatic interactions and communication activities such as using a shared information system to record and update the progress of joint innovation projects (Kwon and Suh, 2004). By regulating the knowledge sharing process, partners
can create an environment conducive to knowledge sharing through the deliberate uncovering and combination of knowledge (Noordhoff et al., 2011).

Formal knowledge sharing routines can simultaneously address knowledge transfer and protection in OI (Roy and Sivakumar, 2011). As a result, they can magnify the gains accrued from leveraging the role of absorptive capacity in the form of improved SME’s satisfaction and superior OI performance. For example, Ritala et al. (2015) demonstrated that one way to allow the focal firm to leverage its absorptive capacity in collaborative innovation is through tightening and specifying a formalised framework that makes its employees aware of the risks of knowledge leakage. Therefore, formal knowledge sharing routines are more crucial to SMEs than large firms, due to SMEs limited experience in external collaborations (Ritala et al., 2015). Thus, we forward the following hypotheses for formal testing:

**Hypothesis (H4a).** Formal knowledge sharing routines moderate the positive effect of absorptive capacity on SME’s satisfaction.

**Hypothesis (H4b).** Formal knowledge sharing routines moderate the positive effect of absorptive capacity on OI performance.

### 4.4 Methodology

#### 4.4.1 Sampling and data collection

This study is part of broader research that investigates OI relationships in SMEs, drawing from a data set of 200 developed country European SME manufacturers with existing OI relationships. We specifically choose the buyer-supplier context, since non-equity OI relationships can be more attractive to SMEs than captive relationships given their limited resources (Rodriguez and Nieto, 2016). Furthermore, previous studies argued that non-
equity offshore outsourcing relationships adapt better than equity arrangements (Buvik and John, 2000) as here the buyers share the risks of innovation with the supplier (Hamel et al., 1989), and move quickly into new markets and technologies (Quinn, 2000).

For data collection, we used a cross-sectional online survey in line with previous studies with similar sampling populations and context [e.g., Van de Vrande et al. (2009) which studied open innovation trends in SMEs in the Netherlands]. Our unit of analysis is the SME buyer firm. The survey targeted manufacturing SMEs in four developed European countries - Germany, Italy, the United Kingdom (UK) and France. According to the European economic statistics, the SME manufacturing sector in Europe included more than 2 million enterprises and generated €725 billion or 44.5% of the manufacturing sector’s value added in 2013 (Eurostat, 2016b). Furthermore, the European innovation data stated that 49.1% of all European enterprises had reported some form of innovation activity between 2012 and 2014 (Eurostat, 2017). The report added that the same percentage was consistent among the SME population.

Our initial sampling frame included 2,384 firms. We screened out a total of 1,466 firms since they did not meet the SME size criteria or the study criteria for a buyer-supplier OI governance mode. We used the EU definition of SMEs – i.e., firms that have a total number of employees between 10-249 and an annual turnover of more than €2 to €50 million (European Commission, 2016a). Additionally, we excluded SMEs with captive OI since the study aim is to investigate OI in a buyer-supplier context. The buyer-supplier context is more relevant to SMEs due to their high-risk of exposure to foreign direct investments (Rodriguez and Nieto, 2016; Gusembauer et al., 2015). The final sample size was 918 firms.
We surveyed top management respondents from SME buyer firms (e.g. chief executive officer, managing partner). Due to the tight scale of management in SMEs and the complexity surrounding OI, it is usually the key executives of the SME who are in charge of establishing and managing strategic relationships (Gusenbauer et al., 2015; Bidault and Castello, 2010). Furthermore, using key informants from the buyer side is a widely adopted practice in supply chain and innovation (e.g. NPD) research (Carr and Pearson, 1999; Paulraj et al., 2008; Lawson et al., 2015). To ensure complete and good quality responses, we activated the forced response option for all questions. To encourage high-quality responses, we added an attention check midway through the survey to make sure that respondents are paying adequate attention.

Further, we screened out all responses with a completion time less than 1/3 of the median time of all completed responses. After screening out incomplete responses and responses that failed quality checks, the final sample contained 200 firms, giving us an effective response rate of 21.8%. The characteristics of the SMEs sample are listed in Table 4.1.
Table 4.1 SMEs sample characteristics

<table>
<thead>
<tr>
<th>Industry</th>
<th>Frequency</th>
<th>Technology Intensity*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic, paper, and rubber</td>
<td>32</td>
<td>Low</td>
<td>16.0</td>
</tr>
<tr>
<td>Textile and wearing apparel</td>
<td>32</td>
<td>Low</td>
<td>16.0</td>
</tr>
<tr>
<td>Food and beverages</td>
<td>23</td>
<td>Low</td>
<td>11.5</td>
</tr>
<tr>
<td>Machinery and mechanical equipment</td>
<td>24</td>
<td>Medium-High</td>
<td>12.0</td>
</tr>
<tr>
<td>Pharmaceutical and chemicals</td>
<td>20</td>
<td>High</td>
<td>10.0</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>20</td>
<td>Low</td>
<td>10.0</td>
</tr>
<tr>
<td>Metal and minerals</td>
<td>18</td>
<td>Low-Medium</td>
<td>9.0</td>
</tr>
<tr>
<td>Electrical and electronics</td>
<td>16</td>
<td>Medium-High</td>
<td>8.0</td>
</tr>
<tr>
<td>Coke and petroleum</td>
<td>10</td>
<td>Low-Medium</td>
<td>5.0</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>5</td>
<td>Low</td>
<td>2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title of respondents</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief executive officer</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>Managing director</td>
<td>69</td>
<td>34.5</td>
</tr>
<tr>
<td>Managing partner</td>
<td>94</td>
<td>47.0</td>
</tr>
<tr>
<td>General manager</td>
<td>25</td>
<td>12.5</td>
</tr>
<tr>
<td>Others (top management position)</td>
<td>4</td>
<td>2.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>50</td>
<td>25.0</td>
</tr>
<tr>
<td>Italy</td>
<td>50</td>
<td>25.0</td>
</tr>
<tr>
<td>United Kingdom (UK)</td>
<td>50</td>
<td>25.0</td>
</tr>
<tr>
<td>France</td>
<td>50</td>
<td>25.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>91</td>
<td>45.5</td>
</tr>
<tr>
<td>Medium</td>
<td>109</td>
<td>54.5</td>
</tr>
</tbody>
</table>


### 4.4.2 Survey development

We instructed our respondents to select a significant offshore supplier with whom they have an existing OI relationship. Such outlook helped us to increase the validity of our respondents’ views. We developed our survey instrument using multiple-item measures from published research. The study's survey used a 7-point Likert scale with endpoints "1= strongly disagree" and "7= strongly agree" for absorptive capacity, formal knowledge sharing routines, SME’s satisfaction, and OI performance. For internal knowledge...
creation capability, we used a 5-point Likert scale with endpoints “1 = much worse than our competitors” and “5 = much better than our competitors”. Before the commencement of data collection, we sent the survey to eight executives from manufacturing SMEs based in Italy, the UK, Germany, and Spain and asked them to complete the survey. We contacted them again to request their feedback about the survey questions’ clarity, length, and coverage for the OI investigated topics. The final survey included some modifications based on the comments that we received.

Measures
To measure “internal knowledge creation capability”, we used four items from (Forés and Camisón, 2016), which argues that in the case of SMEs where R&D investments are less evident, internal knowledge creation capability can be captured and analysed through aspects related to the learning and discovery of new knowledge within the firm. The selected items compare the respondent's SME with its competitors concerning employees' commitment to innovation, firm's capability to integrate employees with organisational learning objectives, management’s adoption of change, and the extent of R&D resource allocation. For “absorptive capacity”, we used four items from Forés and Camisón (2016) with focus on the SME’s capabilities to discover, exploit, and apply the offshore supplier's knowledge towards achieving product and process innovations. We measured “formal knowledge sharing routines” with four items examining the extent to which the offshore outsourcing SME relies on contractual knowledge exchange rules, follows written procedures in most aspects of knowledge sharing (Noordhoff et al., 2011), establishes ground rules about knowledge exchange (Smeltzer, 1997), and uses a common IT software to control knowledge sharing (Kwon and Suh, 2004). To measure “SME’s
satisfaction” we used a three-item scale measuring the offshore outsourcing SME's satisfaction level with the ongoing OI relationship and its intention to continue the relationship in the future (Kwon and Suh, 2004; Batt, 2003; Heide, 2003). Finally, we operationalised OI performance using a four-item scale measuring OI performance in terms of new or enhanced products and processes, new product speed to market, and rate of patent applications (Rindfleisch and Moorman, 2001; Roy and Sivakumar, 2011; Jane et al., 2012).

**Control variables**

The study controls for both firm-specific characteristics (size, manager tenure, and technological intensity) and the OI relationship longevity. We measured manager tenure and relationship longevity as the natural logarithm (Lincoln and Guba, 1985) of the dyadic manager’s years of experience and relationship respectively (Gulati and Sytch, 2008; Poppo and Zenger, 2002). Firm size was measured as a categorical variable (small or medium), while for industry technology intensity, we followed categories from the OECD technology intensity and industry classifications (OECD, 2011).

**4.4.3 Data analysis**

**Common method bias**

To ensure that common method variance was not a concern, we conducted Harman's one-factor test (Podsakoff et al., 2003). If common method variance is substantial, then either a single factor will emerge from the factor analysis or one factor will account for most of the variance. Here, the un-rotated factor analysis resulted in four distinct factors with Eigenvalue greater than one. While these four factors together accounted for 63.24% of
the variance, the first factor accounted for only 37.07% of the variance. As a second test, we ran a single factor confirmatory factor analysis (CFA). The resultant model fit indices for the single factor model, having comparative fit index (CFI) = 0.717, Tucker-Lewis index (TLI) = 0.720, and root mean square error of approximation (RMSEA) = 0.132, were significantly worse than our proposed model (CFI = 0.932, TLI = 0.911 and RMSEA = 0.068). Based on these two tests, we can safely conclude that common method bias is probably not an issue (Sanchez and Brock, 1996). Furthermore, Kull et al. (2018) argue that while a single respondent survey is usually susceptible to biases, they are not very problematic in the case of SMEs. The narrow management bandwidth in case of SMEs can help single-key respondent research to capture a wider picture of what is happening in these firms (Kull et al., 2018).

**Confirmatory factor analysis**

To establish the constructs of unidimensionality, reliability, and validity, we conducted CFA using AMOS 20.0. One of the loadings within each latent construct was constrained to a value of one, and an estimation output using maximum likelihood was produced with standardised estimates, residual moments, and modification indices. The fit of the CFA for the data was satisfactory with values for model fit indices; normed $X^2 = 1.93$ ($\leq 2.0$), CFI = 0.932, TLI = 0.911, standardised root mean square residual (SRMR) = 0.066; and RMSEA = 0.068. We established the constructs’ discriminant validity by comparing the squared correlation between each pair of the constructs in our model to their average variance extracted (AVE) (Fornell and Larcker, 1981). According to this test, the AVE of any two constructs should be higher than the squared correlation between them. As evident from Table 4.1 and Appendix D, the squared correlation coefficients of all pairs
of constructs are lower than the AVE values of the corresponding constructs. The highest
squared correlation of 0.361 (correlation = 0.601) between absorptive capacity and SME’s
satisfaction is lower than their AVE values (i.e., 0.52 and 0.59 respectively). These results
sufficiently establish that the theoretical constructs have discriminant validity.

Table 4. 2 Descriptive statistics and correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Internal Knowledge Creation Capability</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Absorptive Capacity</td>
<td>0.471*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Formal Knowledge Sharing Routines</td>
<td>0.230**</td>
<td>0.435**</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SME’s Satisfaction</td>
<td>0.330**</td>
<td>0.601**</td>
<td>0.417**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>5. Offshore outsourcing innovation</td>
<td>0.397**</td>
<td>0.598**</td>
<td>0.363**</td>
<td>0.503**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Mean                                      3.762     5.602     5.662     5.710     5.633
Standard deviation                         0.636     0.651     0.627     0.617     0.634

** Correlation is significant at (p ≤ 0.01)

To assess the reliability of the study’s constructs, we calculated the composite
reliability (CR) for all the constructs and found that it was more than 0.70, confirming
that items within each construct captured more variance than the variance explained by
the error components, and therefore, items are significantly related to their theoretical
constructs (Bagozzi and Yi, 2012). Also, with Cronbach’s alpha for all constructs being
greater than or equal to 0.7, the constructs’ reliability is re-confirmed. Also, computed
AVE for all constructs, as shown in Appendix D is greater than or equal to 0.50. Taken
together, we can conclude that the constructs of the study exhibit acceptable convergent
validity (Fornell and Larcker, 1981).

4.5 Results

To determine if we have multicollinearity issues, we ran the SPSS collinearity diagnostics
test to calculate the variance inflation factor (VIF) for each independent/moderator
variable in the tested model against another independent/moderator variables. As shown in Table 2.3, all VIFs are less than 10, indicating no consequential multicollinearity issues (O'Brien, 2007). Furthermore, to check normality and homoscedasticity assumptions of linear regression, we regressed the dependent variable (offshore outsourcing innovation performance) on all independent and moderator variables in the model (contract complexity, relational trust, formal knowledge routines and supplier joint actions). We plotted the standardised regression residuals for the Y-axis and standardised predicted values for the X-axis (Figure 2.2). Additionally, we plotted the histogram of the standardised residuals with frequency (Figure 2.3). As can be seen in Figure 2.2, the data shows a relatively constant vertical range, hence suggesting the data in our tested model meets the homoscedasticity assumption (i.e. heteroskedasticity is not present) (Osborne and Waters, 2002). Moreover, the histogram in Figure 2.3 shows a reasonably standard distribution curve (Osborne and Waters, 2002).

**Table 4.3 Multicollinearity diagnostics – Variance Inflation Factor (VIF)**

<table>
<thead>
<tr>
<th>Construct</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Internal knowledge creation capability</td>
<td></td>
<td></td>
<td>1.234</td>
</tr>
<tr>
<td>2. Absorptive capacity</td>
<td>1.056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Formal knowledge sharing routines</td>
<td></td>
<td>1.285</td>
<td></td>
</tr>
</tbody>
</table>
To test our hypotheses, we ran five separate analyses using Hayes’s Process v3.0 in SPSS. As shown in analysis-1 (Table 4.4) the path from internal knowledge creation capability to absorptive capacity is positive and statistically significant ($b=0.502, t=7.638,$
which supports hypothesis H1. Also, the path from the absorptive capacity to SME's satisfaction is significant \((b=0.565, t=9.203, p<0.001)\), and supports H2a. To test the mediation hypothesis (H3b), we applied the Baron and Kenny (1986) approach. We compare the results shown in analysis-2 in Table-4.4 between the total effects of internal knowledge creation capability on SME’s satisfaction before and after we introduced absorptive capacity. The comparison shows that the effect of internal knowledge creation capability on SME’s satisfaction became insignificant \((b=0.018, t=0.282, \text{n.s.})\). This result supports the full mediating role of absorptive capacity for the effect of internal knowledge creation capability on SME’s satisfaction. To reconfirm this result, we ran Sobel’s test; as shown in analysis-2 (Table 4.4); Sobel’s test result supports the mediation of internal knowledge creation capability via absorptive capacity \((z=5.870, p<0.001)\).

In analysis-3 (Table 4.4), we repeated the same tests from analysis-2 by replacing SME’s satisfaction with OI performance, as the dependent variable. As shown in analysis 3, the path from the absorptive capacity to OI performance is significant \((b=0.534, t=8.351, p<0.001)\), supporting H2b. However, the total effect of internal knowledge creation capability on OI performance \((b=0.401, t=5.013, p<0.001)\) was weakened through the introduction of absorptive capacity to \((b=0.133, t=2.003, p<0.05)\). This result supports a partial mediating role of absorptive capacity for the effect of internal knowledge creation capability on OI performance (H3c). Finally, Sobel (1982)’s test reconfirmed this partial mediating role of absorptive capacity for the effect of internal knowledge creation capability \((z=5.635, p<0.001)\).
Table 4.4 Results of direct, mediation and moderation effects

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>(H1)</th>
<th>(H2a, H3a, H3b)</th>
<th>(H2b, H3c)</th>
<th>(H4a)</th>
<th>(H4b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect / Unstandardized Coefficients</td>
<td>( b ) (( t ))</td>
<td>( b ) (( t ))</td>
<td>( b ) (( t ))</td>
<td>( b ) (( t ))</td>
<td>( b ) (( t ))</td>
</tr>
<tr>
<td>Internal Knowledge Creation Capability ( \rightarrow ) Absorptive Capacity</td>
<td>0.502*** (7.638)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manager Tenure</td>
<td>-0.618 (-0.874)</td>
<td>-0.056 (-0.929)</td>
<td>0.050 (0.801)</td>
<td>-0.035 (-0.613)</td>
<td>0.065 (1.066)</td>
</tr>
<tr>
<td>Relationship Longevity</td>
<td>-0.149 (-1.540)</td>
<td>0.123 (1.489)</td>
<td>0.038 (0.449)</td>
<td>0.063 (0.802)</td>
<td>-0.006 (-0.065)</td>
</tr>
<tr>
<td>Size</td>
<td>0.0634 (0.761)</td>
<td>0.018 (0.258)</td>
<td>-0.021 (-0.287)</td>
<td>0.019 (0.287)</td>
<td>-0.020 (-0.274)</td>
</tr>
<tr>
<td>Low-Medium Technology</td>
<td>-0.197 (-1.569)</td>
<td>0.195 (1.811)</td>
<td>0.135 (1.204)</td>
<td>0.095 (0.925)</td>
<td>0.065 (0.590)</td>
</tr>
<tr>
<td>Medium-High Technology</td>
<td>-0.0424 (-0.394)</td>
<td>0.221 (2.417)*</td>
<td>-0.080 (-0.838)</td>
<td>0.195 (2.286)*</td>
<td>-0.100 (-1.066)</td>
</tr>
<tr>
<td>High Technology</td>
<td>0.018 (0.126)</td>
<td>0.143 (1.791)</td>
<td>0.057 (0.448)</td>
<td>0.130 (0.448)</td>
<td>0.047 (0.383)</td>
</tr>
<tr>
<td>Absorptive Capacity ( \rightarrow ) SME’s Satisfaction</td>
<td>0.565 (9.203)***</td>
<td></td>
<td></td>
<td>0.322 (4.459)***</td>
<td></td>
</tr>
<tr>
<td>Internal Knowledge Creation Capability ( \rightarrow ) Absorptive</td>
<td>0.018 (0.282)</td>
<td></td>
<td></td>
<td>0.050 (0.835)</td>
<td></td>
</tr>
<tr>
<td>Capacity ( \rightarrow ) SME’s Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effect (Internal Knowledge Creation Capability ( \rightarrow )</td>
<td>0.301 (4.502)***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SME’s Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional Indirect Effect (Internal Knowledge Creation Capability ( \rightarrow ) SME’s Satisfaction)</td>
<td>0.212^a</td>
<td></td>
<td></td>
<td>0.057^b</td>
<td></td>
</tr>
<tr>
<td>95% C.I. (Internal Knowledge Creation Capability ( \rightarrow ) SME’s Satisfaction)</td>
<td>(0.111-0.333)</td>
<td></td>
<td></td>
<td>(0.005-0.222)</td>
<td></td>
</tr>
<tr>
<td>Sobel Test (Internal Knowledge Creation Capability ( \rightarrow ) SME’s Satisfaction)</td>
<td>(5.870) ***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorptive Capacity ( \rightarrow ) Offshore outsourcing innovation</td>
<td>0.534 (8.351)***</td>
<td></td>
<td></td>
<td>0.362 (4.620)***</td>
<td></td>
</tr>
<tr>
<td>Analysis 1</td>
<td>Analysis 2</td>
<td>Analysis 3</td>
<td>Analysis 4</td>
<td>Analysis 5</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td></td>
</tr>
</tbody>
</table>

### Hypothesis (H1) (H2a, H3a, H3b) (H2b, H3c) (H4a) (H4b)

<table>
<thead>
<tr>
<th>Effect / Unstandardized Coefficients</th>
<th>b (t)</th>
<th>b (t)</th>
<th>b (t)</th>
<th>b (t)</th>
<th>b (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Knowledge Creation Capability → Absorptive Capacity → Offshore outsourcing innovation</td>
<td>0.133 (2.003)*</td>
<td>0.157 (2.402)*</td>
<td>0.164 (2.807)**</td>
<td>0.146 (-3.062)**</td>
<td></td>
</tr>
<tr>
<td>Total Effect (Internal Knowledge Creation Capability → Offshore outsourcing innovation)</td>
<td>0.401 (5.013)***</td>
<td>0.388 (3.883)***</td>
<td>0.488 (4.883)***</td>
<td>0.427 (4.273)***</td>
<td></td>
</tr>
<tr>
<td>Conditional Indirect Effect (Internal Knowledge Creation Capability → Offshore outsourcing innovation)</td>
<td>0.216a</td>
<td>0.145b</td>
<td>0.164 (2.807)**</td>
<td>0.146 (-3.062)**</td>
<td></td>
</tr>
<tr>
<td>95% C.I. (Internal Knowledge Creation Capability → Offshore outsourcing innovation)</td>
<td>(0.116-0.315)</td>
<td>(0.062-0.243)</td>
<td>(0.116-0.315)</td>
<td>(0.062-0.243)</td>
<td></td>
</tr>
<tr>
<td>Sobel Test (Internal Knowledge Creation Capability → Offshore outsourcing innovation)</td>
<td>(5.635)***</td>
<td>(5.635)***</td>
<td>(5.635)***</td>
<td>(5.635)***</td>
<td></td>
</tr>
<tr>
<td>Degrees of Freedom</td>
<td>192</td>
<td>191</td>
<td>191</td>
<td>189</td>
<td>189</td>
</tr>
<tr>
<td>Variance Explained (R²)</td>
<td>0.257***</td>
<td>0.405***</td>
<td>0.388***</td>
<td>0.488***</td>
<td>0.427***</td>
</tr>
<tr>
<td>F-stats</td>
<td>9.466</td>
<td>16.262</td>
<td>15.153</td>
<td>17.988</td>
<td>14.102</td>
</tr>
</tbody>
</table>

t and F-values significance levels: *p < 0.05, **p < 0.01, ***p < 0.001

a Low formal knowledge sharing routines

b High formal knowledge sharing routine
To test the moderation role of formal knowledge sharing routines, we ran analyses 4 and 5 with the SME’s satisfaction and the OI performance as the dependent variable, respectively. Contrary to our proposition, our result does not provide support for the positive moderation effect of formal knowledge sharing routines. Instead, a negative and significant moderating effect is found. As shown in the results of analysis 4 (Table 4.4), formal knowledge sharing routines negatively and significantly moderate the effect of absorptive capacity on the SME’s satisfaction ($b=-0.201, t=-4.582, p<0.001$). Also, the results of analysis 5 (Table 4.4) confirm the negative moderation role of formal knowledge sharing routines for the effect of absorptive capacity in case of OI performance as the outcome variable ($b=-0.146, t=-3.062, p<0.01$).

To illustrate the interpretation of the moderating effects of formal knowledge sharing routines, we graphically plotted the interactions of absorptive capacity and formal knowledge sharing routines with SME’s satisfaction and OI performance in Figure 4.4-a & b. Finally, it should be noted that except for the medium-high technological industry; our control variables do not result in significant associations with the SMEs’ satisfaction or the OI performance (see Table 4.4).
Additionally, we conducted a conditional indirect effect test. Results from this test show that the indirect effects were consistent with the interpretation that internal knowledge creation capability increases absorptive capacity, which in turn increases the SME’s satisfaction and OI performance (Table 4.4). Furthermore, the mediation role of absorptive capacity is negatively moderated by formal knowledge sharing routines. In other words, the mediation effect of absorptive capacity is potentially conditional on the value of formal knowledge sharing routines (Preacher et al., 2007). In Figure 4.5-a & b, the conditional indirect effect of internal knowledge creation on the SME’s satisfaction and OI performance via absorptive capacity is plotted versus formal knowledge sharing routines. According to the plots, the indirect effect is significant and decreases with an increase in the value of formal knowledge sharing routines.
4.6 Discussion and conclusion

Building on the KBV (Grant, 1996), this study contributes to the knowledge sharing literature (Lane and Lubatkin, 1998; Larsson et al., 1998; Powell et al., 1996). We examined the effects and interactions of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines on the SME’s satisfaction and OI performance. Results from our mediation analysis show that the relationship between the internal knowledge creation capability and the SME’s satisfaction is fully explained through absorptive capacity.

Consequently, internal knowledge creation capability as a first order firm-specific learning attribute is linked with the SME’s satisfaction through absorptive capacity as a second order firm-specific attribute. This finding contributes to the absorptive capacity literature (Lane and Lubatkin, 1998; Cohen and Levinthal, 1990), by highlighting that learning in the interorganisational context of OI results from the interactions between
partners' internal knowledge bases through absorptive capacity. Therefore, the SME’s satisfaction as a positive outcome of the OI relationship is reflecting the SME’s contentment with the OI relationship and the offshore supplier performance.

Our finding suggests that the relationship between the internal knowledge creation capability and OI performance is partially explained through absorptive capacity. This finding extends previous studies [e.g. Cassiman and Veugelers (2006); Camisón and Forés (2010) and Grimpe and Kaiser (2010)] which proposed that internally created knowledge can lead to a positive OI performance directly when combined with the offshore supplier’s incoming knowledge, and indirectly through the generation of the buyer’s absorptive capacity. Our result validates the proposition of Grimpe and Kaiser (2010) that internal R&D activities are capable of motivating higher R&D offshore outsourcing since they help increase the effectiveness of the firm’s absorptive capacity in achieving innovation from integrating internal knowledge with external knowledge. Moreover, our results extend recent studies which document that SMEs, which are usually resource constrained, are likely to benefit more than large firms from OI, through higher knowledge sharing with offshore suppliers, provided they can build internal capabilities to integrate the suppliers’ innovative knowledge (Bengtsson et al., 2013; Hottenrott and Lopes-Bento, 2016; Baker et al., 2016).

The lack of empirical support in our analysis for the decisive moderating role of formal knowledge sharing routines on the effects of absorptive capacity could be the most interesting finding of the present study. Although, this finding seems contradictory to the KBV rationale of maximizing the use of formal routines in achieving effective interfirm knowledge transfer (Grant, 1996), the explanation of this contradictory result may rest in
the opposing effects of formal knowledge sharing routines in promoting knowledge transfer and protection at the same time. For example, while the SMEs will be anxious to formalise routines to facilitate enough knowledge transfer, the regulatory nature of such routines can limit mutual disclosure. Accordingly, it is useful to remain within the KBV perspectives when considering these competing effects as they point out the inadequacy of formal knowledge sharing routines in achieving the same level of efficiency in knowledge transfer, application and appropriation in the context of the same OI relationship. For example, Janowicz-Panjaitan and Noorderhaven (2008) found that an excessive degree of structured knowledge exchange can result in decreased knowledge sharing results. Our moderated mediation analysis supports this finding by showing that the buffering effect of the SME’s absorptive capacity on the OI satisfaction and innovative outcomes is hampered by formal knowledge sharing routines. In other words, buyers with high capability to absorb the supplier’s knowledge are likely to generate fewer gains from OI as a result of implementing formal knowledge sharing mechanisms. Studies regarding the risks of knowledge loss for innovating firms in alliances assert this result (Ritala et al., 2015).

Another plausible explanation could be that despite the efficiency of formal knowledge sharing routines as a cost effective mechanism for interorganisational learning (Grant, 1996), it might be challenging for SMEs to allocate the required resources to establish and maintain such structured routines. Indeed, it is possible that SMEs will rely more on informal mechanisms in provoking knowledge sharing in OI through emerging social and interpersonal interactions (Jean et al., 2017). Furthermore, since SMEs are generally restricted to contractual OI relationships, finding an optimal balance between
formal and informal knowledge sharing routines is of greater complexity for them, than in the case of large firms. Finally, our results underscore the need for a thorough understanding of the moderating effects of formal knowledge sharing routines on the relationship between absorptive capacity and OI performance.

4.7 Managerial implications

The links between internal knowledge creation, absorptive capacity, formal knowledge sharing routines and OI success is relevant to SME’s innovation sourcing and management practices. Results from this study have important implications for SME managers, especially those involved in orchestrating OI strategies and relationships. First, our findings demonstrate that SMEs who invest in building internal knowledge creation capability can substitute for constraints in in-house innovation resources by developing a stronger absorptive capacity. This result could help SME managers better allocate their limited resources while learning and innovating with offshore suppliers. Second, our study shows that the SMEs with no or little experience in OI should be aware of the opposing roles that formal knowledge sharing routines might play in OI relationships. Although formal knowledge sharing routines are proven to be effective in specifying and coordinating knowledge transfer and protection in external collaborations, they might reduce the potential for knowledge transfer, which is critical to OI satisfaction and success.

4.8 Limitations and future research

The present study has several limitations that could provide avenues for future research. First, we surveyed SMEs from the developed country manufacturers in Germany, Italy, the UK, and France. Future studies might expand the same framework to different
industries and geographies, including services and SMEs in developing countries. Second, despite the verified reliability of our findings, it is noteworthy that we relied on the SME’s perspectives and qualifications as a proxy for evaluating dyadic outcomes. A direct investigation of the offshore suppliers’ perspectives could have enabled us to draw different conclusions (e.g. the rejected moderating effect of formal knowledge sharing routines). Third, drawing upon the weaker position of SMEs than large firms as the focal firm in OI dyads, an exciting prospect of future research will be to define the minimum knowledge and specialisation attributes that an offshore supplier must own to qualify as a robust collaborator for OI. Despite these limitations and generalisability precautions of OI in SMEs, we believe that this study contributes to the supply chain innovation literature and enhances our understanding of how SMEs and large firms are different.
Chapter 5: Conclusions and Implications

5.1 Summary

Pursuing innovation through offshore outsourcing complicates buyer-supplier relationships. In terms of interorganisational relationships, OI offers buyer SMEs the benefits of improving their innovation performance. However, at the same time, SMEs must consider the challenges of controlling and coordinating innovation activities through OI. To shed light on the complexities and trade-offs surrounding the management of OI relationships, this research empirically examined the links between dyadic mechanisms (governance, complementarity, and knowledge sharing), and OI performance in SMEs. The novel aspect of the empirical investigation of this research was in addressing the challenges SMEs face while managing ongoing OI relationships while simultaneously trying to maximise the benefits from offshore outsourcing innovation tasks. The present research contributes to the existing body of knowledge in supply chain management and innovation management research by developing the 4F governance model- fit, firm, flexible and fragile. The vital element of the 4F model is its ability to address the complications of control and coordination of OI relationships. The research findings demonstrate that it becomes essential for SMEs that aim to succeed in OI to learn how to leverage offshore suppliers’ complementary capabilities. Moreover, the research’s empirical evidence encourages SMEs to innovate internally to be successful in external knowledge sharing and interactions with offshore suppliers.

Several overall conclusions can be drawn from this research. The first conclusion is that OI differs from typical offshore outsourcing not just in terms of motives and characteristics, but also the extent of dyadic interactions required which could in turn
impact the outcomes of the OI relationships. This finding highlights the need for a combination of contract complexity and relational trust to enhance OI performance. A second conclusion is that the outcome of OI depends on how SMEs choose to access and leverage the supplier's complementary capabilities. SMEs who utilise the supplier's asset specificity and goal compatibility can gain more relational rents from OI relationships. A third conclusion is that OI implies a trade-off between knowledge transfer and knowledge leakage. SMEs that apply their internal knowledge creation capability may be in a better position to absorb and integrate suppliers’ innovative knowledge. However, formal knowledge sharing routines can hinder knowledge transfer and hence, derail OI success. Therefore, further analysis of formal knowledge sharing routines is required to mitigate this trade-off between knowledge transfer and knowledge leakage in OI relationships.

In this concluding chapter, (1) the validity of the research design and results are presented, (2) a critical evaluation of the research results in providing answers to the research questions as well as the theoretical contributions are discussed, (3) contributions to knowledge of the three individual papers are highlighted, (4) the managerial implications of the overall research are also discussed, and (5) the research limitations and future research directions are outlined.

### 5.2 Research validation

A key concern with quantitative research is that measurement is reliable, valid and generalisable. Meredith (1998) argues that obtaining valid empirical generalizations in quantitative studies depends on the use of rigorous sampling procedures and providing a reliable source of information for the constructs to be measured. To address these two concerns, first, the research carefully sampled from well-specified and representative
SME populations. The research sample was drawn from manufacturing SME populations in four developed European countries (Italy, Germany, the UK, and France). Moreover, all the SMEs in the dataset complied with the EU definition of SMEs; i.e. had a total number of employees between 10-249, and an annual turnover of €10 - €50 million (European Commission, 2016). Additionally, the analysis only included SMEs with non-captive OI relationships since the main aim of the research is to examine offshore outsourcing innovation in a buyer-supplier context. The inclusion of SMEs from four developed European countries improved the empirical generalisability of the research findings. Second, to ensure constructs’ validity, all measures were extracted from well cited studies that were published in highly ranked Academic of Business Schools (ABS) journals, including Strategic Management Journal, Journal of Operations Management, Decision Sciences, Journal of Product Innovation Management, Journal of Supply Chain Management, Journal of Marketing and Journal of the Academy of Marketing Science. Moreover, before the administration of the survey, the survey was validated by practitioners. Eight manufacturing executives from SMEs spanning Italy, UK, Germany, and Spain were asked to complete the survey and provide feedback about the questions’ clarity, length, and coverage of the measured OI constructs. The final survey included modifications based on the comments received from the SME practitioners.

Additionally, each of the three papers studied conceptualised models with a minimum of four independent variables and a minimum of three measurement items per construct (Baumgartner and Homburg, 1996). Also, all hypothesised relationships between the independent variables and the outcome variables, as well as among independent variables, in case of moderation and mediation hypotheses, were justified
using existing theories and previous studies from strategic alliance literature. This approach increased the level of confidence that the independent variables will impact the outcome variables in the studied models (Meredith, 1998). Moreover, for better assurance in the statistical significance of the results, the research models controlled for a range of control variables, including the SME size (small/medium), technology intensity (low/low-medium/medium-high/high), manager tenure and the longevity of the OI relationship.

In addition to the above validation steps in the survey design stage, several other validation steps were implemented during the data analysis stage, including running Harman's one-factor test and CFA test to eliminate concerns around common method bias (Podsakoff et al., 2003), confirming good fit of tested models by conducting CFA and calculating model fit indices (e.g. CFI, TLI, RMSEA, etc.), and ensuring constructs’ reliability by calculating Cronbach Alpha values, and composite reliability values for all measured constructs. Moreover, to validate statistical inferences, all conducted statistical analyses to test the hypothesised relationships included an initial analysis with only the control variables and a final analysis, including all control and independent variables in the models. Finally, the research received academic validation through four conference participations and one second round of reviews for the second paper from a peer-reviewed journal:

1) First paper- Offshore outsourcing innovation by SMEs: A 4F Perspective of Governance
2) Second paper- Offshore outsourcing innovation: An empirical investigation of dyadic complementarity within SMEs
   - Journal of Business Research, second round of reviews, August 2019
3) Third paper- Strengthening knowledge sharing in offshore outsourcing innovation:
   The role of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines
   - The 10th European Decision Sciences Conference (EDSI) 25th in Nottingham, June 2018.
   - International Journal of Operations and Production Management, under review, May 2020

5.3 Critical evaluation and theoretical implications

The theoretical perspectives and the conceptualised models introduced in the literature review sections in chapters 1 through 4 of this research had some limitations. These limitations are related to addressing the challenges faced by SMEs due to the complications and the managerial aspects of ongoing OI relationships. While these limitations should be kept in mind, the developed models could provide a holistic picture of the management of OI relationships within SMEs. Consequently, at a given time in the implementation and management phase of OI relationships, findings from this research offer possible solutions that could lead to effective management of such OI. The overall
findings of this research answered the overarching research question by highlighting to SMEs the importance of implementing key relational mechanisms in managing OI relationships and their impact on the OI outcomes. Another interesting aspect of the findings is that they pinpoint how SMEs should allocate their limited resources to address the major challenges encountered while managing OI relationships.

Through relationship focus, the research answered the main research question: How can SMEs manage OI relationships to enhance OI performance? The research identified a set of nine interconnecting factors that explain the power of buyer-supplier relationships in building effective OI collaboration: 1) contract complexity, 2) relational trust, 3) supplier joint action, 4) formal knowledge sharing routines, 5) supplier’s asset specificity, 6) goal compatibility 7) supplier’s complementary capabilities, 8) internal knowledge creation capability, and 9) absorptive capacity. The research provided theoretical arguments to specify relationships between these dimensions. The empirical examinations of those relationships revealed in greater details how the relational view’s (Dyer and Singh, 1998) four determinants (relation-specific assets, knowledge-sharing routines, complementary resources and capabilities and effective governance) interact to generate relational gains for SMEs from OI activities. Moreover, the research provided empirical evidence of the OI performance implications based on conceptualisation and testing of relationships between the nine intertwined factors while managing OI relationships.

The research findings contribute to the corpus of strategic purchasing management literature (Mohr and Spekman, 1994; Monczka et al., 1998; Carr and Pearson, 1999, Shin at al., 2000; Chen et al., 2004; Paulraj and Chen, 2007; Cao and Zhang, 2011; Wagner
and Bode, 2014) by systematically explaining how SMEs enhance OI performance through managing the control and interactions with offshore suppliers. More precisely, the present research expands the work of Mohr and Spekman (1994) and Monczka et al. (1998) by showing that the relational view assumptions and logic for cooperative relationships can be applied to the context of OI in case of SMEs. For example, Mohr and Spekman (1994) suggested that a framework that balances formal and informal interactions between alliance partners is useful to partnership success. Additionally, Monczka et al. (1998) documented that trust and commitment of partners to do what they agree to do are key to building successful buyer-supplier alliances. Results from this research reinforced this line of research by concluding that SMEs can improve OI performance by applying a hybrid governance of formal (i.e. contract complexity) and informal (i.e. relational trust) mechanisms. In terms of buyer-supplier interactions (i.e. formal knowledge sharing routines and supplier joint actions) the research findings extend previous research which highlighted the moderating effects of communications, information sharing and joint working with suppliers on fostering strategic supply chain management capabilities (Mohr and Spekman, 1994; Paulraj and Chen, 2007). For example, tools such as information technology software can improve the cost, coordination, and quality of knowledge transfer in OI relationships (Paulraj and Chen, 2007). Furthermore, proactive engagement in joint working with suppliers send important signals to suppliers and help in the alignment of governance with buyers’ expectations from the OI relationship (Cao and Zhang, 2011).

The strategic supply chain management research has helped managers to understand the value of relationship specific investments for joint innovation
collaborations (Wagner and Bode, 2014; Lawson et al., 2015). For example, Wagner and Bode (2014) reported that suppliers who have made specific investments with the buying firm are motivated to share their innovations. This inflow of innovations from suppliers to buyers builds up absorptive capacity and fosters the transfer and application of suppliers’ innovative outputs (Cao and Zhang, 2011). Results from this research mirror these findings and add support in the case of OI. Furthermore, previous supply chain collaboration studies have highlighted the importance of aligning partners’ goals with expected benefits while entering a strategic buyer-supplier alliance (Mohr and Spekman, 1994; Carr and Pearson, 1999; Cao and Zhang, 2011; Wagner and Bode, 2014). For example, Chen et al. (2004) and Cao and Zhang, (2011) argued that supply chain collaboration can be an effective means of transferring knowledge and capabilities across dyadic relationships if both partners were working to achieve mutual goals. This research complements this finding by showing that goal compatibility in OI relationships is completely mediated by supplier’s complementary capabilities. In other words, goal compatibility has no direct effect on OI performance. So, SMEs can achieve the impact of goal compatibility in OI only through leveraging synergies from the supplier’s complementary capabilities.

Additionally, the results of this research show that the proactive formal mechanisms (e.g. contract complexity, formal knowledge sharing routines) and the informal interactions (e.g. relational trust, goal compatibility and supplier joint actions) that occur between the offshore outsourcing SME and the offshore supplier can play an essential role in prompting the SME’s ability to exploit the offshore supplier’s stock of knowledge and resources to appropriate relational rents and ultimately enhance the overall
OI performance. Furthermore, although the OI literature has extensively studied the underlying motives of OI decisions (Calantone and Stanko, 2007; Lewin et al., 2009; Nieto and Rodriguez, 2011; Bertrand and Mol, 2013), there is little empirical research to show the interplay between dyadic mechanisms and their impact on the overall performance of OI within SMEs (Gusenbauer et al., 2015). This research responded to calls that have stressed the need for empirical research that examines OI in SMEs (Musteen and Ahsan, 2013; Gusenbauer et al., 2015). Moreover, supply chain innovation researchers have specifically invited further research efforts to investigate formal or informal relational mechanisms in the context of supplier innovation sharing (Wagner and Bode, 2014) to see which of these mechanisms can successfully foster suppliers’ creativity and technological contributions (Lawson et al., 2015). In this way, results from this research demonstrated that although SMEs’ resource shortcomings and flexible structure can motivate their OI decisions, SMEs’ success in OI is hinged on their efforts to apply inexpensive formal and informal interfirm mechanisms. In the absence or lack of these efforts, findings from this research also provide indications about what could be the underlying reasons for underperforming and failed OI relationships.

The research adds to the strategic supply chain management literature by showing that for an SME to have a better chance succeeding in OI relationships, it must develop specific skills in managing the control and interactions with offshore suppliers (Mohr and Spekman, 1994; Cao and Zhang, 2011). SMEs need to adequately allocate their limited resources to structure and implement formal and informal mechanisms that support working with offshore suppliers to achieve relational innovation rewards. Overall, the results from this research provide support for Dyer and Singh's (1998) relational view,
where effective dyadic governance, supplier's complementary capabilities and interfirm knowledge sharing are among the sources of achieving a competitive, collaborative advantage in OI relationships. Findings from this research provide support to the notion that existing general theories can be adapted to the context of SMEs and still offer valid solutions to smaller firms as well as important implications to the SMEs’ practice and future research. For example, results from this research show that the specific characteristics of SMEs could mean that SMEs are likely to benefit from OI more than large firms due to their resource shortcomings and higher managerial flexibility. This result echoed the relational view’s postposition that focal firms can appropriate strategic relational rents from relationships with alliances’ partners that own and control a breadth of specialised resources and capabilities which, the focal firm lacks internally (Dyer and Singh, 1998). However, the same SMEs’ characteristics of small-scale resources and flexibility can hinder the successful selection of suitable suppliers for OI and limit the SMEs’ control over the suppliers’ performance. This finding adheres to the TCE’s proposition which established that due to bilateral dependency in complex exchange agreements (e.g. OI), focal firms are continuously trying to balance between maintaining autonomy (i.e. make) and minimising transaction costs (i.e. buy) of contract adjustments, curbing suppliers’ opportunistic behaviour and monitoring contracts implementation (Williamson, 1991; Williamson, 1999). In the next sections, the contributions of the three individual papers are highlighted.
5.4 Contributions to knowledge

5.4.1 First paper- Offshore outsourcing innovation by SMEs: A 4F perspective of Governance

The first paper investigated how SMEs implement contract complexity and relational trust governance to enhance innovation performance within OI relationships. The paper provided empirical evidence that majority of the SMEs in the dataset (48%) appear to rely on a combination of high contract complexity and high relational trust as the most effective governance for the control and coordination of OI relationships. Drawing upon this evidence, the paper proposed a (4F) perspective of governance with four labels - fit, firm, flexible, and fragile.

The first paper answered the first sub-research question (RQ1): How do SMEs implement contract complexity and relational trust governance to enhance the innovation performance of OI relationships? by developing the 4F governance framework. The 4F framework builds upon the notion that complex contracts and relational trust are complements in OI relationships (Poppo and Zenger, 2002). The vital element of the 4F governance framework is its ability to inform SMEs that a combination of contract complexity and relational trust might be needed to achieve efficiency and flexibility in OI. Inspired by the results of this research, the fit governance encourages SMEs to benefit and adapt in OI relationships while moving between cost reductions to gaining from external resources. However, due to resource constraints it might not be possible for all SMEs to achieve a fit governance and they end up in the firm, flexible or fragile quadrants of the 4F model (Figure 2.4). Consequently, the 4F model may be useful in highlighting to SMEs the time and resources needed to achieve a fit governance. For example,
relational mechanisms such as supplier joint actions and formal knowledge sharing routines may be a faster and easier way to achieve a *fit*.

The first paper contributes to research on OI in the context of SMEs by demonstrating that SMEs are not simply small versions of large firms (Gusenbauer et al., 2015). Therefore, results from offshore outsourcing innovation studies that have examined OI governance types in large firms might not apply to SMEs. Thus, the paper adds to the literature on OI in SMEs by revealing alternative governance types of OI relationships. Moreover, the first paper extends the interfirm research on contractual and relational governance of interfirm OI exchanges by arguing that success in OI depends on the implementation of a *fit* governance structure (Carson, 2007; Gooroochurn and Hanley, 2007; Hoecht and Trott, 2006; Stanko and Calantone, 2011). Also, by focusing on OI in a buyer-supplier context, the paper sheds light on the high complexity surrounding OI control and coordination in non-equity relationships.

### 5.4.2 Second paper- Offshore outsourcing innovation: An empirical investigation of dyadic complementarity within SMEs

The second paper examined how the supplier’s asset specificity and goal compatibility can cause supplier’s complementary capabilities and consequently affect the performance of OI relationships. In answering the second sub research question (RQ2): To what extent do the supplier’s asset specificity and goal compatibility cause the supplier’s complementary capabilities in OI relationships? the second paper builds upon Dyer and Singh’s (1998) extension of RBV that purports that a firm can create economic gains through leveraging supplier’s relationship specific investments and complementary capabilities. Despite SMEs’ limited resources in picking and choosing the best offshore
suppliers, the complementarity model in the second paper relies on key relational mechanisms, namely supplier’s asset specificity and goal compatibility to make use of collaboration and leverage supplier’s synergies in OI relationships. Following this view, it becomes essential as SMEs engage in OI that they develop interorganisational skills to encourage supplier’s specific investments in the OI relationship. Moreover, given that supplier’s innovative resources and capabilities are often complex and socially embedded (Uzzi, 1997; Madhok, 2006), SMEs can rely on common goals to reduce suppliers’ fears of opportunism and induce them to share knowledge and focus on achieving the OI tasks.

Furthermore, although, the second paper’s complementarity model failed to provide support for the incentivising role of supplier joint actions, this contradictory result could reverse if such actions carried economic value beyond the mere good intention measures that were applied in this research. For example, Wagner and Bode (2014) documented that to motivate suppliers to invest in buyer–supplier relationships and share product innovation information, buying firms should grant longer-term contracts. Moreover, the second paper contributed to the open debate on the role of supplier joint actions in stimulating collaboration and performance of OI relationships (Anderson and Jap, 2005; Gilliland and Kim, 2014; Villenaa et al., 2011; Kim et al., 2015). On the one hand, supplier joint actions can act as powerful incentives in unleashing relational rents from the supplier’s specific asset and partners’ shared goals (Joshi and Stump, 1999; Whipple et al., 2010; Nyaga et al., 2010). On the other hand, however, for any incentive to motivate suppliers’ performance, it needs to be high enough to win the supplier’s compliance and commitment in OI relationships (Gilliland and Kim, 2014). Moreover, supplier joint actions will have no value for an invested supplier once the buyer decides
to end the relationship (Stump and Heide, 1996; Anderson and Jap, 2005; Poppo et al., 2008).

5.4.3 Third paper- Strengthening knowledge sharing in offshore outsourcing innovation: The role of internal knowledge creation capability, absorptive capacity and formal knowledge sharing routines

The third paper investigated knowledge sharing in SMEs’ OI relationships. The paper examined how SMEs apply internal knowledge creation capability, formal knowledge sharing routines and absorptive capacity to render their OI relationships more conducive to joint innovation. Findings from the third paper extended the research that examined SMEs’ challenges in combining internal and external knowledge (Rothwell and Dodgson, 1991; Fairlough, 1994; van de Vrande et al., 2009). For example, an SME’s absorptive capacity is assumed to be weaker than the absorptive capacity of a large firm (Gusenbauer et al., 2015). The empirical evidence of the third paper contributed to this line of research by concluding that SMEs who invest in developing their internal knowledge creation capability are more likely to attain a stronger role of absorptive capacity in exploiting OI relationships. The results from the third paper suggested that internal knowledge creation capability can indirectly lead to a higher OI performance through the generation of buyer SMEs’ absorptive capacity.

Furthermore, the third paper answered the third sub research question (RQ3): by investigating a model of knowledge sharing in OI relationships. The model extends the KBV which considers knowledge as the most significant resource a firm can have, to the dyadic level (Grant, 1996; Grant and Baden-Fuller, 2004). The implied success criterion in the investigated model is that the more knowledge the SME and the offshore supplier share across their boundaries the greater the possibilities for OI success. However, since
knowledge resources are informally and individually embedded within the firm (Kogut and Zander, 1992), and offshored innovation tasks are complex, knowledge sharing in OI relationships is often problematic. It is therefore important that the management of knowledge sharing in OI be aligned with the complexity of the offshored innovation tasks. Following this view the conceptualised model in the third paper supported the close connection between the internal capability of the SME to learn and create knowledge and its ability to leverage absorptive capacity in exploiting the offshore supplier’s knowledge resources. Consequently, the model suggested that internal knowledge creation capability and absorptive capacity can complement each other in enhancing OI performance.

Additionally, the model relied on the proactive approach by SMEs to establish formal knowledge sharing routines to facilitate knowledge transfer and application. The results, however, contradicted this proposition by showing negative impacts of formal knowledge sharing routines. It is believed that these negative impacts in achieving desired learning synergies through formal knowledge sharing routines could be due to the risk of losing core knowledge or losing control over the knowledge sharing process once it is formalised. While contradictory, this finding demonstrates that in contrast to large firms, drawing up formal rules and procedures to organize and control the knowledge sharing process in OI relationships, does not seem to be an easy task for SMEs. In other words, by revealing that SMEs face a dilemma in striking an optimal balance between the coordination and control of knowledge sharing in OI relationships, this important conclusion adds to the existing body of research that studied the trade-off between knowledge sharing and knowledge leakage in strategic alliances (Ritala et al., 2015; Frishammar et al., 2015; Lai et al., 2009).
5.5 Managerial implications

Managing OI relationships carries significant challenges to SMEs, including constructing reliable contractual agreements, managing dyadic activities, as well as recruiting resources to share knowledge and leverage the supplier's complementary capabilities effectively. This research exposed the downside of SMEs limited resources by highlighting these challenges, which surround the management of OI relationships. Therefore, findings from this research have several relevant implications for practitioners. For example, the 4F governance model provides a useful tool to SMEs' managers to direct their limited resources towards optimising fit governance of high relational trust and complex contracts. Therefore, an SME can utilise the 4F model to determine what type of governance is implemented at any point of time in its OI relationships. The SME then can move from fragile, firm, or flexible governance to fit governance as it shifts its focus from low transaction cost, strict control, or trust-based relationship to achieving strategic innovation gains. Figure 5.1 illustrates how SMEs can use the 4F model in practice while they are managing OI relationships. The fit governance, however, represents an ideal case and therefore, it will be difficult to achieve and sustain in practice. Consequently, the 4F model becomes useful by highlighting to SMEs the shortcomings of other governance types and pinpointing how they should allocate their limited resources to govern better their OI relationships such that OI performance is improved.
Furthermore, while SMEs managers might value relational norms more than detailed and formal contracts given their interpersonal relational competences, results from this research warn them of falling into blind trust traps. Only 43% or 16 of the SMEs in our sample who implemented flexible governance (relational trust-based) reported high OI performance. While a large majority of 84% or 81 of the SMEs in our sample who implemented fit governance reported high OI performance.

Despite SMEs limited resources to conduct an extensive supplier selection process, SME managers may apply supplier's asset specificity and goal compatibility as affordable ways to leverage suppliers' complementarity and accrue relational rents from OI relationships. For example, selecting offshore suppliers who are willing to invest and adapt to meet the SME's goals from the OI relationship is highly relevant for OI success.
Also, SMEs can make good use of goal compatibility as a motivational tool to form interdependencies, engender flexibility, and drive the offshore supplier contributions to the OI relationship.

Results from this research confirm that OI relationships facilitate for SMEs the access to offshore suppliers' innovation knowledge. It is essential, however, that managers of SMEs focus on creating and retaining knowledge internally to achieve success in a combination of various elements of accessed knowledge. Therefore, SMEs with who possess innovative capabilities can better integrate different kinds of external knowledge. In this manner, tacit knowledge (know-how), an essential type of offshore suppliers' innovation knowledge becomes accessible and understandable for the buyer SME. Moreover, knowledge sharing in OI relationships is not only about the content being exchanged but also about the interactions and the compatibility of partners that facilitate such exchange. Therefore, addressing leakage concerns and employing safe and efficient channels for knowledge sharing through the formal and informal day to day routines and various forms of communications such as the use of ICTs.

This research is about the buyer proactivity and interpretation of the challenges faced in the management of OI. Therefore, SME managers must think carefully about incentivising the offshore supplier collaboration behaviour via tools such as supplier joint actions. For example, SMEs must determine what type of supplier joint actions might encourage the offshore supplier to collaborate more and subsequently use the appropriate level of these actions to drive relational rents from the OI relationship. Also, managers of SMEs must consider the risk of imitation, which could harm the buyer SME
competitive advantage and consequently try to find the optimal degree of knowledge transfer, which, requires significant managerial skills.

5.6 Limitations and future research

Notwithstanding the contributions from the results of this research, three main limitations must be acknowledged. First, all the respondents in the dataset were sampled from populations of the manufacturing SMEs in Germany, Italy, the United Kingdom and France. Also, they all have an existing OI relationship with a supplier located in a different country; more than 50% of the supplier firms in our sample were in a different continent than Europe. Therefore, results from this research may be bound to the geographical and industrial limitations of this sampling frame. The results encourage replication studies across different countries and Industrial sectors. For example, it will be interesting to examine whether the same results could hold for in-country outsourcing innovation relationships within Germany, Italy, the United Kingdom and France.

Second, the present research suffers from two methodological limitations: (a) although the first and the second paper studied the impact of different independent variables, the same dependent variable (offshore outsourcing innovation performance) was used in these two papers. Despite the rationale that this approach reflects the interest in studying several relationships between nine independent constructs and one primary dependent variable, including different dependent variables would have improved the internal validity and consistency of the results and accordingly improved statistical inferences. The third paper included another dependent variable (SME's satisfaction) as one outcome of the OI relationship in addition to OI performance. The third paper included another dependent variable (SME's satisfaction) as one outcome of the OI
relationship in addition to OI performance. (b) The research focuses on cross-sectional data to estimate the impact of several dyadic contingencies on relational performance by using statistical analysis. While this approach pointed to higher relational rents obtained by collaborative OI, one cannot exclude the dynamic nature of interfirm relationships. OI relationships are not static; they may experience tactical and strategic shifts due to relational dynamics as well as market changes. Consequently, OI relationships could follow evolving patterns where experience changes over time, which in turn may affect the reliability of the cross-sectional approximation of the effects of governance, complementarity and knowledge sharing mechanisms on the OI performance (Dyer et al., 2018). To address these issues, a promising avenue for future research could explore constructing a longitudinal study to test an inter-temporal based framework that would allow capturing the dynamic properties of OI relationships.

Third, the data relied solely on the SME buyers' perception of the OI relationship as a proxy for dyadic constructs as well as suppliers' specific investments and suppliers' complementarity. While such an approach may represent a potential source of response bias, using key informants from the buyer side is widely used in supply chain and innovation (e.g. NPD) research (Carr and Pearson, 1999; Paulraj et al., 2008; Lawson et al., 2015). For example, Poppo and Zenger (2002) argued that buyers' and suppliers' perception of interfirm relationships appear to be entirely consistent. Despite these arguments, future research efforts could include the collection of data from respondents in the supplier firms. Such a direct investigation of the offshore suppliers' perception could draw different conclusions (e.g. the non-supported moderating effect of supplier joint
actions in the second paper and the negative moderating effect of formal knowledge-sharing routines in the third paper).

The general underlying assumptions of SMEs' specific managerial characteristics (e.g. resource limitations and flexibility) have motivated this research to study hypothesised relationships that might have been considered in the context of large firms. However, findings from this research point out that dyadic governance, complementarity, and knowledge sharing could enhance OI performance for SMEs. Moreover, these relational mechanisms may also increase the risk of losing knowledge if the offshore suppliers took advantage of the SME. Therefore, an exciting avenue for future research would be to investigate whether SMEs should refrain from using OI given the difficulties surrounding the control and coordination of OI, let alone the harmful consequences of OI in case of suppliers' free-riding behaviour. For example, further research can assist SMEs to weigh the expected positives of OI against the expected negatives by conducting longitudinal quantitative studies using difference scores or polynomial regression analyses and compare expected gains of OI before establishing the OI relationship and the actual outcomes from the same OI relationship after 1-3 years.

Although the findings of this research could be influenced by the context of offshore outsourcing innovation by SMEs that was considered, it gives firms of all size a good insight into the management of offshore outsourcing complex tasks such as innovation. The tested models of governance, complementarity and knowledge sharing applied existing theories and management problems like those previously studied in the strategic alliance management literature. Therefore, findings from this research could give firms, both from different cultures as well as industries, an insight into addressing some
of the major relational challenges of OI as well as minimising the associated risks. Consequently, this research could help firms to understand how to reach their desired OI goals and avoid mistakes that could lead to OI failure. Hence, building upon the results from this research, future research could explore comparing the unique benefits of OI with in-country outsourcing innovation relationships. For example, will country-specific factors such as linguistic or cultural similarities/differences make collaboration easier or more difficult between countries in the context of OI? Another useful direction for future research would be to examine the impact of the studied constructs in our conceptualised models on SMEs' operational and financial performance.
References


Fornell, C. & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research, 18*(3), 382-388.


https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1111&context=pare


Appendices

Appendix A – The research survey instrument

SMEs Offshore outsourcing innovation

Survey Instrument (Final)

January / 2018

Welcome to the small-medium sized enterprises (SMEs) study survey. This survey will take less than 20 minutes to complete. All your responses will be treated confidentially and only presented anonymously. If you would like to withdraw from the survey at any time, without any consequences to you, you may do so by simply closing the survey window.

Section A: Respondent’s Firm Qualification Criteria

Q1 How many employees do your firm has?

☐ Less than 10 employees

☐ From 10-49 employees

☐ From 50-249 employees

☐ More than 250 employees
Q2 What is the average annual turnover of your firm?

- ≤ €2 million
- More than €2 million - €10 million
- More than €10 million - €50 million
- More than €50 million

Q3 Please state if your firm is currently using offshore outsourcing of innovation?

- Yes
- No

Q4 Please select the offshore outsourcing innovation governance mode:

- Non-equity relationships
- Equity sharing relationships

Section B: Firm and Respondent Details

Q5 What is your current job title?

- CEO
- Managing Director
- Managing Partner
- General Manager
- Other, please specify-----------------------------

Q6 How many years of working experience you have with your current firm?

-----------------------------
Q7 Please select your firm's home country?

- France
- Germany
- Italy
- United Kingdom

Q8 What is the age of your firm (in number of years)?

-----------------------------

Q9 Please select from the list below your firm main manufacturing industry.

- Manufacture of food products
- Manufacture of beverages
- Manufacture of tobacco products
- Manufacture of textiles
- Manufacture of wearing apparel
- Manufacture of leather and related products
- Manufacture of wood and wood products and cork, except furniture; manufacture of articles of straw and plaiting material
- Manufacture of furniture
- Manufacture of paper and paper products
- Printing and reproduction of recorded media
- Manufacture of coke and refined petroleum products
- Manufacture of chemicals and chemical products
- Manufacture of basic pharmaceutical products and pharmaceutical preparations
- Manufacture of rubber and plastic products
- Manufacture of other non-metallic products
- Manufacture of basic metals
- Manufacture of fabricated metal products except machinery and equipment
Manufacture of computer, electronic and optical products
Manufacture of electrical equipment
Manufacture of machinery and equipment n.e.c.
Manufacture of motor vehicles, trailers, and semi-trailers
Manufacture of other transport equipment
Other manufacturing

Q10 Would you classify your firm as an exporter?

○ Yes
○ No

Section C: Offshore outsourcing innovation

Q11 Please answer the following questions Q12-Q36 about an existing offshore outsourcing innovation relationship with one of your major offshore suppliers, thereafter, referred to as the offshore supplier.

Q12 Which of the following industries most closely matches the offshore supplier?

○ Manufacturing (products)
○ Manufacturing Technology (equipment and processes)
○ Information Technology
○ Engineering, scientific, or technical services
○ Other, please specify

---------------------------------------------

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Q13 In addition to offshore outsourcing innovation, please select the function(s) your firm is offshore outsourcing to the Offshore Supplier? You can select all applicable answers.

- Engineering services such as design
- Production services, including, manufacturing, assembly, testing and packaging
- Information technology (IT) services
- Human resources (HR) services
- Finance and accounting services
- Marketing and/or sales services
- Warehousing and inventory management services
- Procurement and supply chain management services
- Inspection services
- Installation and after sales services

Others, please specify, ----------------------------------------

Q14 What is the country of your offshore supplier (drop down list of all countries)?

------------------------------------------
Section D: Contract Complexity

Q15 We have signed a formal contract with the offshore supplier

- Yes
- No

Q16 Our formal contract with the offshore supplier:

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Is long and extensive</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) Is highly customized and required considerable legal work</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) Includes rules and regulations to govern our relationship with the offshore supplier</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) Adapted to our firm's specific needs.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Section E: Supplier Joint Actions

Q17

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) We work jointly with the offshore supplier to reduce its costs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) We work jointly with the offshore supplier to improve its quality</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) We work jointly the offshore supplier on training its people</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

Q18 Formal Knowledge Sharing Routines

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) We rely extensively on contractual rules controlling day-to-day knowledge sharing with the offshore supplier.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) We follow written procedures in most aspects of knowledge</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Item</td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Somewhat disagree</td>
<td>Neither agree nor disagree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-------------------</td>
<td>---------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>sharing with the <strong>offshore supplier</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Our relationship with the <strong>offshore supplier</strong> has well established ground rules about knowledge sharing</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) We use a common IT (software) to control and coordinate innovation knowledge sharing with the <strong>offshore supplier</strong>.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**Q 19 Section G: Relational Trust**

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The <strong>offshore supplier</strong> usually keeps the promises that it makes to our firm</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) We can count on the</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Item</td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Somewhat disagree</td>
<td>Neither agree nor disagree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-------------------</td>
<td>---------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>offshore supplier to be sincere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) When making important decisions, the offshore supplier is concerned about our welfare</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) The offshore supplier has always been evenhanded in its negotiations with our firm</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**Section H: Relationship Longevity**

Q20 How many years since you start dealing with the offshore supplier?

-----------------------------------------------

Q21 How many years since you start offshore outsourcing innovation to the offshore supplier?

-----------------------------------------------
Q22 SME’s Satisfaction

<table>
<thead>
<tr>
<th>item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) We intend to continue the relationship with the offshore supplier</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) We are satisfied with the offshore supplier performance</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) We are very pleased with our working relationship with the offshore supplier</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) Generally, we are very satisfied with our overall relationship with the offshore supplier</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

Section I: Goal Compatibility

Q23 Our firm and the offshore supplier...

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Have compatible goals</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) Support each other's objectives</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) Share the same goals in the relationship</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
**Q24 Section J: Absorptive Capacity**

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) We are oriented towards discovering the offshore supplier knowledge opportunities</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) We have the capability to adapt technologies designed by the offshore supplier to our needs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) We have the capability to use and exploit the offshore supplier new knowledge in the workplace and respond quickly to business environment changes</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) We have the capability to put the offshore supplier technological knowledge into product and process patents</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**Section K: Internal Knowledge Creation Capability**

Q25 What is your firm average annual R&D spending as a percentage of annual sales?
Q26 In comparison with our competitors, our firm strength in the …

<table>
<thead>
<tr>
<th>Item</th>
<th>Much worse than our competitors</th>
<th>worse than our competitors</th>
<th>On a Par with our competitors</th>
<th>Better than our competitors</th>
<th>Much Better than our competitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Degree of employees' commitment to innovation at a personal level.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) Firm's capability to integrate its employees with the organizational objectives of knowledge creation and learning</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) Degree to which managers consider change as natural and desirable</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) Firm's capability to efficiently assign resources to the R&amp;D department</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Q27 Section L: Supplier's Complementary Capabilities

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The offshore supplier contributes different capabilities to our relationship</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) The offshore supplier has complementary strengths that are useful to our relationship</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) The offshore supplier has separate abilities that, when combined with our abilities enable us to achieve goals beyond our reach independently</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>e) The R&amp;D efforts benefit from their closeness to both firms’ current products and processes</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Section M: Supplier's Asset Specificity

Q28 Our innovation requirements need highly specified human and physical resources.

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

Q29 The offshore supplier has:

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Made significant investment in specialized human and physical resources dedicated to our relationship</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) Tailored its product and process development programs to match our requirements.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) Committed specialized skills in training our people</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Section N: Offshore outsourcing innovation Performance

Q30 As a result of our relationship with the offshore supplier, we have…

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Created new products and/or enhanced our current products</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) Created new processes and/or improved our current processes</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>c) Increased our new product speed to market</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>d) Increased our patent application rate</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Appendix B– First paper (measures and CFA analysis)

<table>
<thead>
<tr>
<th>Construct (Cronbach's alpha, composite reliability (CR), average variance extracted (AVE))</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract complexity (α = 0.78; CR = 0.79; AVE = 0.56)</td>
<td></td>
</tr>
<tr>
<td>a) Our formal contract with the offshore supplier is long and extensive.</td>
<td>0.86</td>
</tr>
<tr>
<td>b) Our formal contract with the offshore supplier is highly customized and required considerable legal work.</td>
<td>0.62</td>
</tr>
<tr>
<td>c) Our formal contract includes rules and regulations to govern our relationship.</td>
<td>0.75</td>
</tr>
<tr>
<td>d) Our formal contract with the offshore supplier is adapted to our firm's specific needs.</td>
<td></td>
</tr>
<tr>
<td>Relational trust (α = 0.73; CR = 0.77; AVE = 0.53)</td>
<td></td>
</tr>
<tr>
<td>a) The offshore supplier usually keeps the promises that it makes to our firm.</td>
<td>0.92</td>
</tr>
<tr>
<td>b) We can count on the offshore supplier to be sincere.</td>
<td>0.62</td>
</tr>
<tr>
<td>c) When making important decisions, the offshore supplier is concerned about our welfare.</td>
<td>0.61</td>
</tr>
<tr>
<td>d) The offshore supplier has always been even-handed in its negotiations with our firm.</td>
<td></td>
</tr>
<tr>
<td>Formal knowledge routines (α = 0.73; CR = 0.74; AVE = 0.50)</td>
<td></td>
</tr>
<tr>
<td>a) We rely extensively on contractual rules in controlling day-to-day knowledge sharing with the offshore supplier.</td>
<td>0.82</td>
</tr>
<tr>
<td>b) We follow written procedures in most aspects of knowledge sharing with the offshore supplier.</td>
<td></td>
</tr>
<tr>
<td>c) Our relationship with the offshore supplier has well-established ground rules about knowledge sharing.</td>
<td>0.65</td>
</tr>
<tr>
<td>d) We use a common IT (software) to control and coordinate innovation knowledge sharing with the offshore supplier.</td>
<td>0.62</td>
</tr>
<tr>
<td>Supplier joint actions (α = 0.74; CR = 0.76; AVE = 0.52)</td>
<td></td>
</tr>
<tr>
<td>a) We work jointly with the offshore supplier to reduce its costs</td>
<td>0.90</td>
</tr>
<tr>
<td>b) We work jointly with the offshore supplier to improve its quality</td>
<td>0.60</td>
</tr>
<tr>
<td>c) We work jointly with the offshore supplier on training its people</td>
<td>0.63</td>
</tr>
<tr>
<td>Offshore outsourcing innovation performance (α = 0.70; CR = 0.75; AVE = 0.51)</td>
<td></td>
</tr>
<tr>
<td>a) As a result of our relationship with the offshore supplier, we have created new products or enhanced our current products.</td>
<td>0.94</td>
</tr>
<tr>
<td>b) As a result of our relationship with the offshore supplier, we have created new processes or improved our current processes.</td>
<td>0.63</td>
</tr>
<tr>
<td>c) As a result of our relationship with the offshore supplier, we have increased our new product speed to market.</td>
<td>0.50</td>
</tr>
<tr>
<td>d) As a result of our relationship with the offshore supplier, we have increased our patent application rate.</td>
<td></td>
</tr>
</tbody>
</table>

Model fit indices: Normed $X^2 = 1.75$ ($\leq 2.0$), $p < 0.001$, goodness of fit (GFI) = 0.914, adjusted goodness of fit (AGFI) = 0.870, comparative fit index (CFI) = 0.949, Tucker-Lewis index (TLI) = 0.933, standardised root mean square residuals (SRMR) = 0.053 and root mean square error of approximation index (RMSEA) = 0.061. Note *Item dropped after CFA.
Appendix C– Second paper (measures and CFA analysis)

Construct (Cronbach’s alpha, composite reliability (CR), average variance extracted (AVE))

### Supplier’s Asset Specificity ($\alpha = 0.71; \text{CR} = 0.73; \text{AVE} = 0.48$)

<table>
<thead>
<tr>
<th>Item</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Our innovation requirements need highly specified human and physical resources</td>
<td>0.62</td>
</tr>
<tr>
<td>b) The offshore supplier has made significant investments in specialized human and physical resources dedicated to our relationship</td>
<td>0.81</td>
</tr>
<tr>
<td>c) The offshore supplier has tailored its product and process development programs to match our requirements.</td>
<td>0.63</td>
</tr>
<tr>
<td>d) The offshore supplier has committed specialized skills in training our people*</td>
<td></td>
</tr>
</tbody>
</table>

### Goal Compatibility ($\alpha = 0.71; \text{CR} = 0.78; \text{AVE} = 0.55$)

<table>
<thead>
<tr>
<th>Item</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Our firm and the offshore supplier have compatible goals</td>
<td>0.89</td>
</tr>
<tr>
<td>b) Our firm and the offshore supplier support each other’s objectives</td>
<td>0.57</td>
</tr>
<tr>
<td>c) Our firm and the offshore supplier share the same goals in the relationship</td>
<td>0.74</td>
</tr>
</tbody>
</table>

### Supplier’s Complementary Capabilities ($\alpha = 0.74; \text{CR} = 0.70; \text{AVE} = 0.48$)

<table>
<thead>
<tr>
<th>Item</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The offshore supplier contributes different capabilities to our relationship</td>
<td>0.81</td>
</tr>
<tr>
<td>b) The offshore supplier has complementary strengths that are useful to our relationship*</td>
<td></td>
</tr>
<tr>
<td>c) The offshore supplier has separate abilities that, when combined with our abilities enable us to achieve goals beyond our reach independently</td>
<td>0.66</td>
</tr>
<tr>
<td>d) The R&amp;D efforts benefit from their closeness to both firms’ current products and processes</td>
<td>0.58</td>
</tr>
</tbody>
</table>

### Supplier joint actions ($\alpha = 0.74; \text{CR} = 0.76; \text{AVE} = 0.53$)

<table>
<thead>
<tr>
<th>Item</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) We work jointly with the offshore supplier to reduce its costs</td>
<td>0.91</td>
</tr>
<tr>
<td>b) We work jointly with the offshore supplier to improve its quality</td>
<td>0.59</td>
</tr>
<tr>
<td>c) We work jointly with the offshore supplier on training its people</td>
<td>0.64</td>
</tr>
</tbody>
</table>

### Offshore outsourcing innovation performance ($\alpha = 0.73; \text{CR} = 0.74; \text{AVE} = 0.50$)

<table>
<thead>
<tr>
<th>Item</th>
<th>AMOS item loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) As a result of our relationship with the offshore supplier, we have created new products and/or enhanced our current products.</td>
<td>0.87</td>
</tr>
<tr>
<td>b) As a result of our relationship with the offshore supplier, we have created new processes and/or improved our current processes.</td>
<td>0.67</td>
</tr>
<tr>
<td>c) As a result of our relationship with the offshore supplier, we have increased our new product speed to market.*</td>
<td></td>
</tr>
<tr>
<td>d) As a result of our relationship with the offshore supplier, we have increased our patent application rate.*</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Model fit indices: Normed $X^2 = 1.99 \leq 2.0$, $p < 0.001$, comparative fit index (CFI) = 0.934, Tucker-Lewis index (TLI) = 0.911, standardised root mean square residuals (SRMR) = 0.053 and root mean square error of approximation (RMSEA) = 0.071. Note*Item dropped after CFA
Construct [Cronbach's alpha, composite reliability (CR), average variance extracted (AVE)]

**Internal Knowledge Creation Capability (α = 0.71; CR = 0.74; AVE = 0.5)**
In comparison with our competitors, Our firm strength in the:

| a) Degree of employees' commitment to innovation at a personal level* | 0.59 |
| b) Firm's capability to integrate its employees with the organizational objectives of knowledge creation and learning | 0.63 |
| c) Degree to which managers consider change as natural and desirable. | 0.86 |
| d) Firm's capability to efficiently assign resources to the R&D department | |

**Absorptive Capacity (α = 0.76; CR = 0.77; AVE = 0.52)**

| a) We are oriented towards discovering the offshore supplier knowledge opportunities | 0.79 |
| b) We have the capability to use and exploit the offshore supplier new knowledge in the workplace and respond quickly to business environment changes | 0.70 |
| c) We have the capability to adapt technologies designed by the offshore supplier to our particular needs* | |
| d) We have the capability to put the offshore supplier technological knowledge into product and process patents | 0.68 |

**Formal Knowledge Sharing Routines (α = 0.73; CR = 0.74; AVE = 0.5)**

| a) We rely extensively on contractual rules in controlling day-to-day knowledge sharing with the offshore supplier. | 0.79 |
| b) We follow written procedures in most aspects of knowledge sharing with the offshore supplier. | 0.71 |
| c) Our relationship with the offshore supplier has well established ground rules about knowledge sharing. | 0.60 |
| d) We use a common IT (software) to control and coordinate innovation knowledge sharing with the offshore supplier. | |

**SME's Satisfaction (α = 0.79; CR = 0.81; AVE = 0.59)**

| a) We intend to continue the relationship with the offshore supplier. | 0.91 |
| b) We are satisfied with the offshore supplier performance. | 0.76 |
| c) We are very pleased with our working relationship with the offshore supplier. | 0.60 |
| d) Generally, we are very satisfied with our overall relationship with the offshore supplier. | |

**Offshore outsourcing innovation performance (α = 0.70; CR = 0.74; AVE = 0.5)**

| a) As a result of our relationship with the offshore supplier, we have created new products and/or enhanced our current products. | 0.91 |
| b) As a result of our relationship with the offshore supplier, we have created new processes and/or improved our current processes. | 0.64 |
| c) As a result of our relationship with the offshore supplier, we have Increased our new product speed to market. | 0.52 |
| d) As a result of our relationship with the offshore supplier, we have Increased our patent application rate. | |

Model fit indices: Normed X² = 1.93 (≤2.0), p <0.001, comparative fit index (CFI) = 0.932, Tucker-Lewis index (TLI) =0.911, standardised root mean square residuals (SRMR) = 0.066 and root mean square error of approximation (RMSEA) = 0.068.

Note*Item dropped after CFA
Appendix E – Matlab code for Figure 2.2 – First paper

**Figure (a)**

```matlab
x=xlsread('polygrapha.xlsx','A3:A202');
y=xlsread('polygrapha.xlsx','B3:B202');
z=xlsread('polygrapha.xlsx','C3:C202');
fitsurface=fit([x,y],z,'poly22') % p00 + p10*x + p01*y + p20*x^2 + p11*x*y + p02*y^2
figure(a)
plot(fitsurface, [x,y],z), xlabel('Contract Complexity'), ylabel('Formal Knowledge Routines'), zlabel('OI')
```

**Figure (b)**

```matlab
x=xlsread('polygrapha.xlsx','A3:A202');
y=xlsread('polygrapha.xlsx','B3:B202');
z=xlsread('polygrapha.xlsx','C3:C202');
fitsurface=fit([x,y],z,'poly22') % p00 + p10*x + p01*y + p20*x^2 + p11*x*y + p02*y^2
figure(a)
plot(fitsurface, [x,y],z), xlabel('Relational Trust'), ylabel('Formal Knowledge Routines'), zlabel('OI')
```

**Figure (c)**

```matlab
x=xlsread('polygrapha.xlsx','A3:A202');
y=xlsread('polygrapha.xlsx','B3:B202');
z=xlsread('polygrapha.xlsx','C3:C202');
fitsurface=fit([x,y],z,'poly22') % p00 + p10*x + p01*y + p20*x^2 + p11*x*y + p02*y^2
figure(a)
plot(fitsurface, [x,y],z), xlabel('Contract Complexity'), ylabel('Supplier Joint Actions'), zlabel('OI')
```

**Figure (d)**

```matlab
x=xlsread('polygrapha.xlsx','A3:A202');
y=xlsread('polygrapha.xlsx','B3:B202');
z=xlsread('polygrapha.xlsx','C3:C202');
fitsurface=fit([x,y],z,'poly22') % p00 + p10*x + p01*y + p20*x^2 + p11*x*y + p02*y^2
figure(a)
plot(fitsurface, [x,y],z), xlabel('Relational Trust'), ylabel('Supplier Joint Actions'), zlabel('OI')
```
Appendix F – Matlab code for Figure 2.3 – First paper

clc
close all
innov=xlsread('graph.xlsx');
innov(innov(1:200),:);
index=innov(:,1);
contract=innov(:,2);
trust=innov(:,3);
innov=innov(:,4);
mean_contract=mean(contract);
mean_trust=mean(trust);
a_ind=contract>mean_contract;
b_ind=trust>mean_trust;
R1=find(a_ind==1 & b_ind==1);
R2=find(a_ind==0 & b_ind==1);
R3=find(a_ind==1 & b_ind==0);
R4=find(a_ind==0 & b_ind==0);
plot(contract,trust,'ro','MarkerSize',8)
hold on
plot(mean_trust*ones(size(contract)),contract,'linewidth',2)
plot(trust,mean_contract*ones(size(trust)),'k-','linewidth',2)
axis([0,8,0,8])
grid on
xlabel('Contract Complexity'), ylabel('Relational Trust')
text(7.7, num2str(length(R1)),'FontSize',12)
text(1.7, num2str(length(R2)),'FontSize',12)
text(1.1, num2str(length(R4)),'FontSize',12)
text(7.1, num2str(length(R3)),'FontSize',12)
text(6.2, '\<mean of Contract Complexity','FontSize',12)
text(2.5,7.7, '\<mean of Relational Trust','FontSize',12)