

The Application of an Outsourcing - Innovation Model

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Abstract: While the cost advantages associated with outsourcing are recognized, the impact that outsourcing may have on innovation performance depends on the strategic focus. One perspective suggests that firms outsourcing low value-adding activities will achieve higher innovation performance (that is, better designed or more technologically advanced products or more substantive process improvements) than firms that perform these activities in-house. Another view holds that firms that outsource high value-adding activities may have lower innovation performance than those firms that perform these activities in-house. Moreover, superior innovation performance can be achieved through the effective use of innovation, or dynamic, capabilities. This paper contributes to the outsourcing discourse by investigating the impact different outsourcing strategies can have on product innovation performance. An outsourcing- innovation (OI) model is proposed and applied to UK furniture manufacturing firms. The rationale for selecting one industry is advantageous because the investigation allows for a comparison of organizations performing similar business functions. A survey of 78 firms was undertaken. Dichotomous, ordinal and multi measure variables were formulated and ordinal logistic regression was used to test the model. The study revealed that (i) innovation performance did not improve after non-essential functions were outsourced; (ii) performing specific core activities does have a positive influence on innovation performance and (iii) the findings support previous documented relationships that the use of innovation management capabilities has a positive impact on product innovation performance. The findings are relevant to other manufacturing industries, which demonstrate similar innovation performance and outsourcing patterns. The paper also suggests that the OI Model can be developed to include offsetting and interaction of different factors.

Keywords: Outsourcing, Innovation Performance, Operations Strategy

1. Introduction

Outsourcing strategies are intrinsically tied to business performance. The short-term cost advantages arising from outsourcing are widely studied [5, 15, 35, 39, 51]. The consequences from outsourcing on non-financial performance objectives, are ambiguous, however. For example, different outsourcing strategies can have various effects on product innovation performance. Firms that outsource non-core activities can direct released resources towards innovation initiatives [52, 54]. Firms utilize superior supplier competence or collaboration on research and development projects can improve outcomes [53, 73]. Conversely, retaining critical activities can safeguard future opportunities [29, 57]). Finally, innovation performance may not improve when business objectives other than innovation

performance are prioritized [23, 41]. Divergent and often contradictory findings arising from these studies suggest that different outsourcing configurations have been investigated.

The effects that different outsourcing strategies may have on innovation performance inform the research question of this study. This paper contributes to the outsourcing discourse by investigating the impact different outsourcing strategies can have on product innovation performance. An outsourcing- innovation (OI) model is proposed and applied to UK furniture manufacturing firms. First, the study revealed that innovation performance did not improve after non-essential functions were outsourced. Second, the retention of specific operational functions were related to improved innovation performance. Furthermore, innovation management capabilities performed in-house also contributed to innovation. The paper concludes with suggestions to further develop the model.

2. Theoretical Framework

2.1. Outsourcing

Outsourcing entails the direct and indirect inputs from other organizations in the development, production and delivery of products or services. Outsourcing is defined as the, “process of transferring the responsibility for a specific business function from an employee group to a non-employee group” [85 p. 374]. Outsourcing is distinct from sub-contracting or spot market transactions, as firms have performed the function or have the potential to undertake the function in the immediate future. Gilley and Rasheed proposed that outsourcing incorporates either substitution or abstention criteria [23].

Substitution outsourcing occurs when a firm replaces internal functions through external transactions. Substituting functions or activities from internal control to an external entity contributes to the break-up of an existing vertically integrated value chain. The factors determining the permanent transfer of activities are demand expectations, transaction costs considerations and supplier competence. On the other hand, abstention outsourcing arises when a firm purchases goods or services, which have not previously been produced in-house. Abstention outsourcing differs from procurement in that, “the former (abstention) only occurs when the internalization of the good or service outsourced was within the acquiring firm’s managerial and/or financial capabilities” [23 p. 765]. Abstention outsourcing is tied to the resource base of the firm: the technological and organisational capabilities or the financial wherewithal to undertake activities are within the grasp of the firm; in other words, the firm can make it if it wants to. It is the decision to relinquish internal control of activities, which are within the firm’s means, that sets abstention outsourcing apart from purchasing. Outsourcing supplant existing or potential resources and capabilities, either through a substitute or abstention strategy.

2.2. Transaction Cost Economics and Resource-Based View

The decision to outsource is strategic if the substitution or abstention transaction is based, not on short-term capacity factors, but rather a long term transfer of activities to other firms offering lower costs or performance advantages. Strategic outsourcing is the organisational structure that emerges when a firm relies on other firms to provide core capabilities to produce the final goods or services. Strategic outsourcing is the purposeful mix of business outsourcing and in-house activities, which provide competitive advantage [52]. Transaction cost economics (TCE) and resource-based view (RBV) frameworks provide the theoretical foundation that can explain strategic outsourcing [41].

The TCE model provides a platform to explain different governance mechanisms. The cost of outsourcing consist of the direct payment for the activity, input or services and the associated transaction costs. Transactions costs consist of the costs that occur before the transaction (ex-ante) and the costs

associated after the transaction (ex-post) [81]. Ex-ante costs include the costs incurred during the seeking and vetting of suppliers, contract drafting, price negotiating, and the legal costs of safeguarding agreements. Ex-post costs are the costs incurred during the implementation of the transactions and the costs of monitoring and enforcing the transaction. The protection of intellectual property rights is a particularly expensive and time consuming ex-post cost [11].

From a resource-based perspective, performance differences can be explained by unique organizational resources and capabilities [2, 60, 79]. Firms succeed if the application of the resources are valuable, can be sustained and cannot be imitated by competitors [2]. Firms configure these resources to create competitive advantages, which reflect the capacity to reconfigure and utilise (other) resources successfully in a future offering [2, 62]. Resource sustainability is the manifestation of current value and the potential to realize future value. Potential value is partially dependent on dynamic capabilities [19, 72]. Capabilities support the upgrading of the organisational and technological bases and are associated with the evolutionary process of change, whether it is business improvements or the development of new products and services. The significance of resource assets and capabilities increase when firms evaluate decisions to outsource core activities.

The transaction cost and resource-based view frameworks provide complementary, and possible divergent, explanations for outsourcing decisions. [41, 82]. One strategic goal is to establish a governing structure that minimises transaction costs. Firms attempt to control activities in-house should asset specificity, and the potential for suppliers to pursue opportunistic paths, is high. Firms will outsource activities that if asset specificity is low and if orders are predictable. From a resource- based view perspective, firms outsource resource assets and capabilities that do provide little or no added value to sustained strategy [14, 24, 52]. If firms have greater capacity to affect change to strategic value adding activities, then it would be prudent to maintain hierarchal control, even with possible lower direct costs and lower transaction costs outsourcing could provide.

Outsourcing to firms that demonstrate superior competences can often incur additional transaction costs. Firm may have to develop learning competences to absorb internal and external knowledge creation processes when collaborating [12, 84]. Involving suppliers in the innovation process will require contracting competences and the adaptive capacity to assimilate technological knowledge [68]. An inverse relationship between the resource base and transaction costs considerations undoubtedly will arise [33]. Decisions are dynamic and, in some cases, firms will attempt to bring back activities that have been outsourced previously.

2.3. Outsourcing and Innovation

The most sought after outcome from an outsourcing strategy is improved financial performance. Cost advantages arise typically through outsourcing rather than vertical integration [5, 15, 35, 39, 51]. Outsourcing is an attractive

approach to improve the financial performance for most firms, especially in the short-run [27]. Strategic outsourcing can provide other advantages, which emphasise competence and capability factors. For example, outsourcing can provide firms with production flexibility [30]. Firms can change suppliers to take advantage of new technologies and better capabilities or more cost effective technologies. Supplier flexibility can enable firms to respond faster to market variations [17]. Outsourcing can also affect innovation performance.

The evidence of causal associations between outsourcing and innovation is mixed. One view holds that outsourcing has a positive effect on innovation performance [23, 52, 54]. Peripheral or non-core activities, which do not provide direct value to the products or services provided by firms, can be performed at a lower cost and at an equal or higher quality standard by other firms. Administrative tasks such as payroll, catering, and some logistics are examples of activities that are not core to most firms. Total costs will decrease so long as additional transaction costs incurred do not offset the savings gained from no longer performing the activity in-house. Outsourcing will reduce further investment in peripheral activities and, with lower fixed costs, lower break-even position should be attainable. Once freed of the costs associated with managing and investing in peripheral activities, firms can devote more resources towards innovation and other strategic activities [5]. Internal learning routines and extended innovation competences can be deepened by directing resources previously used by non-value adding functions [17, 35].

RP1: Outsourcing non-core functions will contribute to product innovation performance

An alternative perspective proposes that outsourcing core activities can weaken innovation performance [9, 23, 29, 57]. Core activities are those activities that add value to customers or users. For manufacturing firms, core activities include product development, production, marketing, and for some firms, distribution. The decision to outsource core activities can follow a TCE and RBV analysis of present performance. However, firms risk not recognizing opportunities if the outsourced activities are pertinent to an emerging technology base [23]. For example, outsourcing scanning and problem solving activities can lead firms to miss out on technological advances, which may lead to the depletion of research and development capacity [7, 9, 71]. Outsourcing production and assembly functions can be detrimental should suppliers gain technical knowledge and market relationship insights. Financial risk assessment techniques do not account for the evolutionary nature of technological developments, and favour incremental, less risky activities [16]. No single outsourcing strategy is recommended to support innovation and a middle path is advisable [9]. Nonetheless, outsourcing decisions should consider future innovation opportunities.

Strategic production and research and development activities should be retained to ensure future availability of technological capabilities. Outsourcing core activities may entail information leakages and supplier opportunism,

especially in science and technology intensive industries [29]. Outsourcing production was noted to place aircraft technology firms at a disadvantage, for example [50]. In the U.S. electronics contract manufacturing sector, investment in process improvement and product development was lower in firms that outsource production [48]. Outsourcing can lead to the hollowing of the technology base of firms. The second research proposition recognizes that firms hold specific core activities in-house to support their product innovation activities.

RP2: Retaining core operational functions will contribute to product innovation performance

Outsourcing activities from within the innovation process can also effect performance. Firms can draw on an array of deeper and different competences through open innovation [8]. Supplier expertise can provide additional and complementary technological competences, which can also free resources for new product development. For example, supplier outsourcing entails technology enablers such as component modularity and technology platforms for customization and agile strategies for example [56, 63]. Suppliers can provide superior component designs to new products [26]. Supplier integration in new product development initiatives can improve technology complexity and alleviate risk factors [26]. User or customer innovation approaches can foster idea generation and improve the developmental stages through active proto-typing [73].

Firms can benefit from external collaborations in technology and product development. Universities are sources for basic and applied research and development, particularly for firms in high technology sectors [38]. Intermediate organisations such as technology consultants and research institutes provide services to firms which lack resources and capabilities [4]. Problem solving and applied research services are provided by bridging organisations in focused technology fields [55]. Research and technology organisations (RTOs) can translate and adopt knowledge generated from university – industry – government collaborations for SMEs [40]. Outsourcing activities to organizations with deeper technological competences or superior design and creativity innovation processes can improve innovation performance. Substitution and abstention outsourcing, which pertains to innovation, will include contractual transactional costs.

RP3: Outsourcing innovation-related activities to collaborating organizations will contribute to product innovation performance

While outsourcing innovation activities to collaborators may benefit some firms, in-house innovation capabilities are critical throughout the innovation process. Firms that succeed at developing and launching new products or improving production processes will use innovation management competences and practices effectively [19, 58, 74]. Searching capabilities, whether they are to support external or open source scanning [8] or internal scanning [31] are necessary. Selection and prioritisation capabilities, including idea champions, provide firms with choices that steer resources

towards particular goals [31, 75]. Knowledge and competences are also required to interact with specific technology bases and support wider problem solving activities [1, 6, 19]. Firms have to keep abreast of new developments and technology capabilities, even if related activities are outsourced [7]. Enabling skilled workers to use information and communication technologies such as computer aided design (CAD) and enterprise resource planning (ERP) will improve product quality, lower development costs and accelerate the innovation process.

Managing the development stage entails structures and routines [6]. Implementation include project and cross-functional team structures and planning systems (e.g. stage gates) [10, 13]. Intra-organisational communication processes

share information among different functions [13, 25, 34, 58]. Routines to extend organizational learning include post project review, which can improve future innovation initiatives [3]. An innovation strategy coordinates and leads activities, and importantly, steers future scanning [46]. The evidence is not conclusive that outsourcing or performing innovation in-house is the preferred strategy, however [32, 66]. The positive association that arises from the retention of in-house innovation capabilities on innovation performance is the fourth research proposition:

RP4: Retaining innovation capabilities in-house will contribute to product innovation performance

Table 1 summarizes the outsourcing strategies, associated research propositions and relevant studies.

Table 1. Summary of the research propositions.

Strategy	Proposition	Studies
Outsource non-core functions	RP1: Outsourcing non-core functions contributes to product innovation performance	Bettis et al., 1992, Quinn and Hilmer, 1994, Quinn, 1999, Dess et al., 1995, Gilley and Rasheed, 2000, Kotabe and Murray, 2004
Retain core functions	RP2: Retaining core functions will contributes to product innovation performance	Chesbrough and Teece, 1996, Gilley and Rasheed, 2000, Hoecht and Trott, 2006, Rothaermel et al., 2006
Outsources activities to collaborators	RP3: Collaborations will contributes to product innovation performance	Thomke and von Hippel, 2002, Chesbrough and Crowther, 2006, Handfield et al. 1999; Leydesdorff and Meyer, 2006, Readman et al., 2018
Retain innovation capabilities	RP4 Retaining innovation competences will contributes to product innovation performance	Rothwell, 1994, Eisenhardt and Martin, 2000, Hsuan and Mahnke, 2011, Stanko and Calantone, 2011, Pisano, 2015.

The proposed outsourcing-innovation (OI) model is presented in Figure 1. The model includes the outsourcing strategies available to firms, which can influences product innovation performance. The framework can reveal trends in firms, industries and other organization typologies. Factors may differ among the comparatives and priorities change over time. The model also suggests that firms can consider more than one outsourcing strategies at any one time, i.e. interactions.

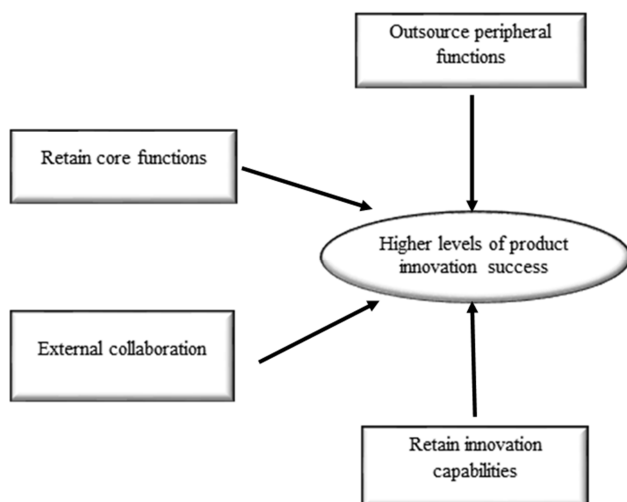


Figure 1. Proposed Outsourcing-Innovation (OI) Model.

3. Research Method

This study investigates the possible effects outsourcing

strategies have on product innovation. The inquiry focused on firms, which undertake comparable business activities and share a common understanding of innovation performance. Firms from an established industry will have the potential to pursue similar substitution or abstention outsourcing strategies. This assumption supports the outsourcing definition followed in other studies [for example, 23, 41].

3.1. Sample

The OI model was applied to UK furniture manufacturing firms for verification. Traditional manufacturing industries such as furniture, shoes and apparel entail design and incremental product innovation. The costs associated with new product development, as a proportion of total costs, have been lower in traditional manufacturing than in research-intensive industries [78]. Design innovation can include cosmetic, colour, and other visible features, which may offer qualitative improvement from previous designs. Incremental technological product innovation entails measurable improvements in components, modularity, and architectures and platforms [28]. Advanced technology firms, with high levels of engineering and applied science research activity, incur significant development costs and lowering these costs is a management priority [18]. Traditional manufacturers will also have established business functions, which facilitates a closed-question instrument.

Furniture manufacturing entails material inputs, manufacturing and distribution. Furniture manufacturers obtain wood and panel boards and other inputs such as machinery, adhesives and paint and varnishes from suppliers. Large

volume producers use batch and mass production processes, which include component and assembly technology enablers and guides. Customized or bespoke furniture producer follow made-to-order project and shop processes. The furniture industry draws on in-house and external design and marketing expertise. Depending on the market, the furniture then passes through various intermediary buying stages until it reaches the final customer or user.

The UK furniture product market is divided into household furniture (including garden furniture), kitchen furniture and office or contract furniture. Industry experts were involved in the formulation of the survey instrument, which supports the validity of the questions. Key informants can provide useful insights relevant to technology and industry inquiries and can increase the validity of the data [36]. Industry experts provided information about furniture manufacturing activities, value added configuration (and the appropriate terminology used in the industry. The questionnaire was piloted with three firms. The study used a stratified random sampling technique [21]. Two selection criterion were used: (i) firms are UK-based wooden furniture manufacturers and (ii) an employment band was used which biased medium and large firms. Medium and large firms are organized along large batch operation processes, which offers outsourcing potential while small manufacturers tend to produce bespoke furniture. The stratified sample election indicated that the sample should include 30 percent small firms, 40 percent medium size firms and 30 percent large firms.

In 2011 the UK Office of National Statistics listed 6,680 furniture manufacturers which included wooden furniture manufacturers and firms which manufacture furniture using metal, plastic and other non-wooden materials [45]. The furniture manufacturing category also includes installation, repair and finishing service activities, which were excluded in this study. According to industry experts, industry statistics over-estimate the number of functioning furniture manufacturers in the UK. Industry experts suggested that between 1,500 to 2,000 UK companies manufacture furniture for the mass-market. The Kompass Directory listed 1,500 companies based on the selection criteria. A further random sampling selection identified 500 firms. 78 firms responded to the questionnaire (a return rate of 15.6 per cent). Data were cleaned to ensure compatibility and usability, after which, 66 surveys were deemed useable from the original 500 invitations. The survey response rate was 13.2 per cent. The single informant profile comprised of owners and managing directors (70 per cent), marketing managers (9 per cent) and other senior managers (10 percent). Respondents indicated they had between 10 to 35 years of work experience.

This exploratory study has a number of limitations. The pilot survey included questions about partial outsourcing but the responses were confusing and no clear definition could be finalized. Therefore, outsourcing was measured as a binary: outsource or perform the functions/ activities in-house. Another concern was the small sample size, which can lead to Type II errors. Non-parametric tests were used to support

the analysis while ordinal logistic regression analysis tested the model, which allowed for dichotomous and ordinal variables. The survey consisted of four multi-measure variables and tests were conducted to support internal reliability. Further research in the development of multi-measure scales to support complex outsourcing decision would advance this field.

3.2. Survey Variables

The variables consisted of binary measures and multi-measures. Validity was ensured by using measures used in previous studies or formulating and testing questions with the assistance of industry experts.

Product innovation (dependent variable)

As a traditional manufacturing industry, furniture producers are more inclined to be design-led than in science-based research and development [78]. New materials have had an impact on product development but such developments have originated from supplier manufacturers. For example, wood panel boards, particularly medium density fibreboard (MDF), have replaced solid wood in some components of mass produced wooden furniture. Panel board developments include the resin, glue and veneer technologies. Design is the predominant product innovation strategy for furniture firms. New designs tend to be incremental alterations from previous designs and are influenced by product concepts from other industrial design industries. Design for manufacturing considerations influence the final product, especially for products slated for the mass product market [77].

Product innovation performance was measured by a three - point ordinal scale: successful, not successful/ abandoned and no activity. Respondents were asked to consider innovation activities over a three year period to cover possible time lags between outsourcing decisions and innovation outcomes. Similar time intervals and scales are used in innovation studies [44].

Business activities

Industry informants identified the value adding activities and supporting activities performed by furniture manufacturers. Activities include pre-production (sawmilling, preparing wood, etc.), product design, inbound logistics, component and parts production, assembly, administration, marketing and sales, after-sales support, and product distribution. According to industry sources, manufacturing costs (including materials) accounts for 45 percent of total production costs while manufacturing services (primarily product development and distribution) account for 15 percent of total costs. Firms on average charge 40 per cent to 80 per cent margins on total production costs to their immediate buyers [76]. Pre-production, part production and assembly were core activities based on cost. Design and marketing were also deemed to be core based on the interviews with industry experts. Firms indicated whether activities were performed in-house (only) or outsourced (partially or fully).

Outsourcing peripheral activities

The outsourcing peripheral variable was constructed

using two measures: (i) performing the activity in-house or outsource (as above) and (ii) the value firms attributed to each activity. Respondents ranked each activity out of a score of 10 (with one indicating a low contribution to value and 10 indicating a very significant contribution). The mean scores, derived from the individual responses, were normalized to 100. Core and peripheral activities are defined by the share that each activity contributes to the total value. Core activities are above the average value added and peripheral activities are below the average value added.

The average 'Outsourcing Intensity' index indicates the share of outsourced activities to the total number of activities performed in the value chain. This index measures the breadth of vertical integration and outsourcing [23, 27]. The range is 0 (firms that do not outsource) to 1 (firms which outsource all activities). The peripheral outsourcing intensity index is the share of peripheral activities outsourced to the total number of peripheral activities:

$$\text{Outsourcing intensity} = \frac{\text{Number of outsourced peripheral activities}}{\text{Total number of peripheral activities}}$$

4. Results

Ordinal logistic regression was applied to test the model; the ordinal outcome variable was product innovation performance. The explanatory variables were: customer focus strategy scale, outsource intensity of peripheral business functions index, external collaboration scale, internal innovation capabilities scales, and five core business functions (outsource or in-house). There were no significant interactions between customer focus strategy and the other explanatory variables. The model fit was significant, $\chi^2 = 19.4$ (df=9, n=66), $p < .05$, which indicated that the model can distinguish firms with different product innovation performance. The model accounted for 36 percent

(Nagelkerke pseudo r^2) of the total variance of product innovation performance. The goodness-of-fit test indicated that observed data were consistent with the fitted model (i.e. not significant). The test of parallel lines rejected the null hypothesis however, $\chi^2 = 23.81$ (df=9, n=66), $p < .01$. The rejection of the proportional odds assumption can occur when continuous explanatory variables are used in the model. Nonetheless, interpreting the results should be regarded with caution [43].

Table 2. Outsourcing-Innovation Model: Fitting Information.

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept only	82.760			
Final	63.387	19.373	9	*

* $p < .05$

Table 3. Outsourcing-Innovation Model: Pseudo R-Square.

Cox and Snell	.254
Nagelkerke	.356
McFadden	.234

Table 4. Outsourcing-Innovation Model: Goodness-of-Fit.

	Chi-Square	df	Sig.
Pearson	110.981	121	.732
Deviance	63.387	121	1.000

Table 5. Outsourcing-Innovation Model: Model 2 Test of Parallel Lines.

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	63.387			
General	39.582 ^a	23.805 ^b	9	**

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. The log-likelihood value cannot be further increased after maximum number of step-halving.

b. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

** $p < .01$

Table 6. Outsourcing-Innovation Model: Parameter Estimates.

		Est.	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Dependent = 1]	.599	2.399	.062	1	.803	-4.104	5.301
	[Dependent = 2]	1.008	2.401	.176	1	.675	-3.698	5.715
	Outsource peripheral	-2.667	2.059	1.677	1	.195	-6.702	1.369
	External collaboration	-.040	.149	.073	1	.787	-.333	.252
	Internal capabilities	.142	.071	4.012	1	*	.003	.281
	Customer strategy	.013	.062	.045	1	.832	-.108	.134
	Pre-prod -in-house	-2.043	1.498	1.859	1	.173	-4.979	.894
Location	Pre-prod -outsource	0	.	.	0	.	.	.
	Design - in-house	-1.452	1.300	1.248	1	.264	-4.000	1.095
	Design - outsource	0	.	.	0	.	.	.
	Parts - in-house	-1.523	.995	2.341	1	.126	-3.473	.428
	Parts - outsource	0	.	.	0	.	.	.
	Assembly - in-house	4.205	1.555	7.312	1	**	1.157	7.252
	Assembly - outsource	0	.	.	0	.	.	.
	Marketing - in-house	-1.438	1.358	1.121	1	.290	-4.100	1.224
	Marketing - outsource	0	.	.	0	.	.	.

a. This parameter is set to zero because it is redundant.

* $p < .05$; ** $p < .01$

The model parameters estimates are presented in Table 6. As noted earlier, the interactions were not significant and were not included in the model. The main effects for customer focus strategy were also not significant. The model failed to reject the null hypothesis for (RP1 outsourcing peripheral functions (and (RP3) external collaboration.

The null hypothesis for RP2 was rejected: the odds proportion ratio indicated that firms that performed the assembly function in-house were 67 times (exp 4.2, $df=$, $n=66$, $p<.01$) more likely to have higher product innovation performance than firms that outsourced the function. No other business function outsourcing strategy was significant. The null hypothesis for RP4 was also rejected: the odd proportion ratio stated that firms that performed (and retained) innovation capabilities to a greater extent are 1.4 times (exp.142, $df=1$, $n=66$, $p < .05$) more likely to achieve higher product innovation performance.

5. Discussion

Outsourcing arises from transaction cost and capability considerations [33, 41, 47]. This study focuses on the capability factors that could contribute to outsourcing and whether innovation performance has been effected. Previous studies reported that innovation performance can improve if the human and financial resources previously tied to performing peripheral functions are assigned to strategic functions [49, 52]. This investigation found that outsourcing peripheral activities was not associated with product innovation performance. Moreover, drawing on external competences and capabilities from suppliers or from collaborators does not lead to greater innovation performance.

In-house control of specific core operations was associated with innovation performance, however. Furniture manufacturers, which undertake core assembly activities, have greater success with product innovation endeavours than firms that outsource this core function. The findings support the points raised by Prencipe that strategic production activities should be retained to ensure continuous upgrading of technological capabilities [50]. The study also shows that the greater the application of in-house innovation capabilities, the greater the odds for product innovation performance. Firms that retain core operational functions necessitate control of technology competences, for instance [59]. Firms that follow an innovation strategy will succeed more time than not pursuing a strategy [46]. In-house operations, specifically assembly, coupled with internal innovation competences bring about greater product innovation performance in UK furniture manufacturing.

The findings assert that assembly activities were critical not only for production but also for product development. Furniture assembly interfaces with product design to ensure that appropriate product architecture enablers can be implemented to support different operation strategies. With the introduction of modularity and flat pack furniture

designs, firms manage operational trade-offs in volume orders, product variety and limited customization at the assembly stage. Design for manufacturing practices enable effective assembly of components, parts and modules [42]. Customers can configure or customised products using standard components or modular parts that can be interchanged at the assembly stage [37]. Product flexibility and design adaption becomes more difficult to implement if the assembly function is not performed in-house. Firms should retain some technical knowledge to ensure that the designs can be effectively manufactured, even if new product development or design is outsourced [69].

It is not uncommon for furniture manufacturers, regardless of firm size, to engage professional designers. The use of external designers satisfied the substitution or abstention definition of outsourcing [23]. Manufacturers outsource designs but will specify size, colour, wood type and other features. Furniture buyers (retailers and agents primarily) also provide designs to furniture manufacturers, usually selling products under the buyers or agents' brand-name. Manufacturers maintain technical and design competences even if using external designers. Designs have to undergo a number of modifications to ensure that the drawings or prototypes can be manufactured by batch or mass production processes. Firms will retain some product design competences even if the actual design function is outsourced.

As noted earlier, UK furniture manufacturers focus on one of three product markets: household, kitchen and office/contract furniture. Firms are embedded in a particular product market, which is driven by design experience and marketing relationship assets and not by a specific technological base or path [61, 65]. UK household furniture is sold through retail outlets primarily, which specialize in market niches. For example, high-value, craft built furniture will be sold by specialized furniture shops usually dedicated to a brand name or a particular style of furniture. Low to medium priced furniture, which is usually mass-produced, is sold through large multi-chain stores. Retail chain outlets may sell children's furniture, bedroom and living room furniture under one roof. Large retailers purchase directly from local and overseas manufacturers.

Demand for new kitchen furniture coincides with new housing demand. In the UK, new units are often sold to building contractors rather than to the final user. The "do-it-yourself" or refurbishing outlets cater to house owners seeking to upgrade existing kitchens. Mass produced kitchen furniture often require installers to fit the units. Office supply retailers sell office furniture for home use or small businesses. Business or government procurement of office furniture comes under the category of contract furniture. In the contract furniture market, buyers or end-users order directly from manufacturers. . The conduit between market signals and operations can fracture if operational competences are hollowed out by outsourcing. Successful furniture innovators also make use of market signals for new designs and assimilate concepts through critical operation

processes (i.e. assembly). Innovation performance can diminish if the capacity to assimilate market information at the operational level is lacking. Further research is suggested to explore the links between market signalling, outsourcing and innovation.

The outsourcing-innovation model can be developed further. The application of the framework in different industries and sectors may reveal a different set of explanatory factors. Collaborative relationships are an important factor that supports innovation in the creative industries, for example. Future research would also include the obstacles firms come across when undertaking innovation initiatives. The explanatory factors can also interact, which will require theoretical and empirical investigation. Firms may emphasize different factors under different circumstances, which limits the predictive potential of the model. The intention of the outsourcing-innovation framework proposed in this paper is to provide a taxonomy to inform strategy and industry organization analysis.

6. Conclusion

Why would firms outsource core activities if performance does not improve? Unclear or unintended outcomes can occur if firms emphasize either transaction costs or resource-based objectives at the expense of the other factor [41]. And even if resources and capabilities have been considered, the long term outcome is not always considered. For example, Storey et al reported that innovation was not a critical factor for firms that engage in temporary employment [67]. Transaction costs and capabilities can illuminate cost structures and current operational competences but not necessarily innovation capacity. Innovation performance should be included in the outsourcing deliberation otherwise diminished capacity may be the result.

Information asymmetry and management competences will inform decisions [70]. Firms evaluate the risks and uncertainties differently and the reliability of predications vary. The expected value from outsourcing is not always realized [20]. Outsourcing may have short term outcomes, for example a lower cost base, but there are also latent and longer term consequences. The factors underpinning the decisions to retain or outsource activities are costs and capabilities. The logic of the transaction cost framework often overwhelms capability factors [83]. While providing an invaluable framework, transaction cost analysis does have a normative worldview by prescribing appropriate market and hierarchy typologies. Decision tend to prioritize cost factors [22]. When these cost factors dominate strategy conversations, outsourcing can have a negative impact on innovation performance.

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