Tactics for Cost Reduction and Innovation: Empirical Evidence at the Category Level

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Abstract

Firms frequently group similar products into 'sourcing categories' to realize synergy effects. Purchasing agents use various sourcing tactics to improve performance. However, tactics at the category level, addressing a group instead of a single product, have been neglected by supply management research. Consequently, this paper investigates which tactics contribute to a sourcing category's cost and innovation performance. Data on sourcing tactics and performance have been collected in a survey including 107 sourcing projects. Structural equation modelling has been used to empirically test for the influence of sourcing tactics on performance. The study extends previous conceptual studies by adding initial empirical evidence about the influence of sourcing tactics on performance. In contrast to previous studies, findings show that price evaluation has an important impact on innovation.

1 Introduction

Firms may differentiate hundreds of so called 'sourcing categories', e.g. 'metal sheets', 'leather', 'cables' etc., which group similar materials or services purchased from an overlapping group of suppliers (Hesping and Schiele, 2016; Cousins et al., 2008; Drake et al., 2013; Horn et al., 2013; Monczka et al., 2008). Each sourcing category requires a tailored set of tactics which have been named 'sourcing levers' (Hesping and Schiele, 2015a; Horn et al., 2013; Luzzini et al., 2012; Schiele et al., 2011a; Schuh et al., 2011; Schumacher et al., 2008). For example, if the sourcing category, 'leather' relies on a single supplier, the 'extension of supply base' lever might be used to increase competitive intensity to cut prices.

The aim of this paper is to investigate the relationships between sourcing levers and performance at the category level: Does the application of sourcing levers explain differences in a sourcing project's cost and innovation performance? To achieve this

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aim, literature on sourcing levers has been reviewed to form a conceptual framework. Subsequently, a measurement instrument has been developed to capture the extent of cost and innovation performance and sourcing lever application within 107 sourcing projects managed at the European headquarters of a large automotive OEM. Partial least squares (PLS) equation modelling has been used to test for the influence of sourcing levers on performance.

2 Conceptual Framework

Each sourcing lever consists of "a set of similar measures that are used to improve the firm's sourcing performance in a commodity group [or sourcing category]" (Schiele, 2007, p. 279). In contrast to strategic goals, sourcing levers do not provide a general orientation for supply management practices such as achieving annual cost saving targets (Schiele et al., 2011a). Sourcing levers describe a typology of activities through which the goals shall be realized (Hesping and Schiele, 2015b; Hess, 2010):

- 'Volume bundling' refers to the consolidation of demand and increasing the purchase volume for quotation (Karjalainen, 2011; Prince et al., 2013; Schoenherr and Mabert, 2008).
- 'Price evaluation' refers to forming price targets and analyzing suppliers' bids and cost structures (Ellram, 1996; Newman and Krehbiel, 2007; Romano and Formentini, 2012).
- 'Extension of supply base' refers to increasing the number of sources and bidders per request for quotation to raise bargaining power (Caniëls and Gelderman, 2007; Lonsdale, 2001; McMillan, 1990).
- 'Product optimization' refers to modifications to the design, functions and materials of the purchased items (Handfield et al., 1999; Khan et al., 2008; Luo et al., 2011; McGinnis and Vallopra, 1999; Smith, 1999; Van Hoek and Chapman, 2007; Wagner, 2012).
- 'Process optimization' refers to efficient and effective processes related to the buyer-seller interfaces (Foster Jr et al., 2011; Labro, 2006; Manrodt and Vitasek; Quintens et al., 2006).
- 'Optimization of supply relationship' refers to establishing and maintaining a long-term, mutually beneficial, privileged relationship between buyer and supplier (Adobor and McMullen, 2014; Blonska et al., 2013; Handfield et al., 2000; Hüttinger et al., 2012; Krause et al., 2007; Nagati and Rebolledo, 2013; Schiele et al., 2012; Wagner et al., 2002).

- 'Category-spanning optimization' refers to balancing trade-offs between multiple sourcing categories (e.g. design changes in a common platform) and to enforce mutual approaches from otherwise distinct sourcing teams (Driedonks, 2010; Schiele, 2007; Schumacher et al., 2008; Thomas et al., 2014).

3 Methodology

Most supply management functions are expected to take a dual role: fulfilling significant cost saving targets, while managing buyer-supplier relationships in a way that enhances innovativeness (Luzzini and Ronchi, 2011; Schiele, 2010; Schiele et al., 2011b). To reflect this dual role, literature distinguishes cost-oriented and innovation-oriented sourcing levers. Consequently, it has been hypothesized that:

- H1a: Cost-oriented sourcing levers have a positive impact on cost performance.
- H2a: Innovation-oriented sourcing levers have a positive impact on innovation performance.
- H1b: Cost-oriented sourcing levers have a negative impact on innovation performance.
- H2b: Innovation-oriented sourcing levers have a negative impact on cost performance.

4 Data Analysis and Validity

To test the hypotheses, a survey instrument has been developed to capture the knowledge of 'front-line' purchasing agents about 107 sourcing projects. Unit of analysis was the multitude of sourcing projects managed at the European headquarters of one large, global, automotive OEM. Each time a supply contract was awarded and registered in the IT-system the responsible category manager was visited by a researcher and the questionnaire was filled-in jointly.

The sourcing projects have been statistically tested for differences in sourcing lever application, cost and innovation performance outcomes using partial least squares (PLS) structural equation modelling and the SmartPLS 2.0 software (Ringle et al., 2005). All item-to-construct loadings were significant ($p < 0.001$) and well above the cut-off value of 0.7 indicating a substantial contribution. Cronbach's alpha and composite reliability CR statistics both well exceed the threshold value of 0.7 indicating internal consistency. In addition, both scales surpass the minimum value of 0.5 for AVE indicating convergent validity (see Table 2). The item loadings onto the corresponding construct showed no critical levels of cross-loadings while all square roots of the AVE are higher than the corresponding inter-construct correlations (Fornell-Larcker Criterion) indicating unidimensionality (Hair Jr. et al., 2013) (see Table 3).

For the sourcing levers' formative measurement models, convergent validity was used to test whether all relevant facets of the construct have been sufficiently covered by the selected formative indicators (Diamantopoulos et al., 2008; Hair Jr. et al., 2013). Global-items (single-items) have been added which respondents answered to indicate the essence of each sourcing lever construct on a seven-point Likert scale (1 = not used to 7 = extensively used): 'To summarize, to which extent have activities for [sourcing lever] been used in this souring project?'. Results show that all path coefficients between formative constructs (exogenous) and the corresponding global-item constructs (endogenous) are well above the threshold of 0.8 (Chin, 1998; Hair Jr. et al., 2013). All VIFs are well below the threshold of 3.3 indicating that formative indicators are well distinct and do not carry critical levels of redundant information (Diamantopoulos and Siguaw, 2006; Hair Jr. et al., 2013; Petter et al., 2007) (see Table 5).

To evaluate indicator relevance, bootstrapping with 5,000 random subsamples has been used (Ringle et al., 2005). Two indicators ('volumeB_1' and 'priceE_1') had to be dropped due to insignificant outer weight and low loading. Four further indicators ('volumeB_2' and 'volumeB_4', 'eSupplyBase_3' and 'categoryS_1') showed insignificant outer weights but were retained due to high and significant outer loadings (Hair Jr. et al., 2013). All other outer weights in the formative measurement models were significant, indicating a high relative contribution of the formative indicators (Hair Jr. et al., 2013). The remaining outer loadings were well above the threshold of 0.5 indicating also a high absolute contribution of the indicators (see Table 5).

5 Results and Discussion

The aim of the study was to test the effect of sourcing levers on cost and innovation performance. Therefore, results were obtained from ten different models (see Table 7). Model I to VII tested the effects of each sourcing lever separately. Model VIII and IX include the three cost-oriented and the four innovation-oriented sourcing levers. Finally, Model X tests the effects of all seven sourcing levers together. The coefficients of determination R^2 have been calculated to determine each model's predictive accuracy.

'Volume bundling', 'price evaluation' and 'extension of supply base' have been hypothesized to positively impact cost performance (H1a) and to negatively impact innovation performance (H1b). H1a was only partially supported. In all models, all three levers showed a positive effect on cost performance. However, for 'volume bundling' none of the effects was significant. The effect of 'price evaluation' on cost performance was only significant in Model II. 'Extension of supply base' was the sole lever that showed a significant effect on cost performance in all models in which it was included. H1b was only partially supported. 'Volume bundling' and 'extension of supply base' had a negative, but insignificant impact on innovation performance in Model X. In conclusion, no significant trade-off between cost and innovation performance could be found for these three levers. To the contrary, in Model X, 'price evaluation' even had a strongly significant, positive effect on innovation performance.

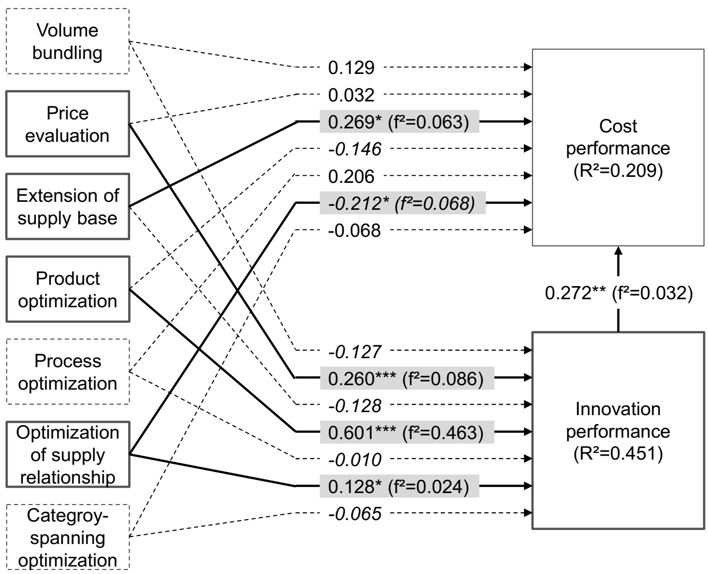
Different from the previous levers, 'product optimization', 'process optimization', 'optimization of supply relationship' and 'category-spanning optimization' were hypothesized to positively impact innovation performance (H2a) and to negatively impact cost performance (H2b). H2a was only partially supported. In the Models IV-VII, all four levers showed a positive and significant effect on innovation performance. However, in Model X, only 'product optimization' and 'optimization of supply relationship' show a significant positive effect on innovation performance. In the same models, the effect of 'process optimization' and 'category-spanning optimization' on innovation performance is insignificant. 'Category-spanning optimization' even shows a negative, although non-significant, effect on both, cost and innovation performance. H2b was only partially supported. In Model X, only 'optimization of supply relation relationships', showed a significant positive effect on innovation performance and at the same time a significant negative effect on cost performance. Although non-significant, in the same model, 'process optimization' even shows a positive impact on cost performance and a negative impact on innovation performance.

All sourcing levers combined together in the same model (Model X) explained only a small amount of variance in cost performance ($R^2 = 0.209$) and a moderate variance in innovation performance ($R^2 = 0.451$) (see Figure 1). Most levers show only a small effect size on cost and innovation performance. Only 'product optimization' shows a medium to high effect size ($f^2 = 0.463$; $q^2 = 0.311$) (see Table 6).

The findings indicate that cost performance has generally been larger in sourcing projects where sourcing teams extensively engaged in 'extension of supply base' by building up local and foreign sources of supply or extending capacities near the place of demand. Sourcing projects scored lower on cost performance when sourcing teams strongly invest in 'optimization of supply relationship', for example by increasing appeal with supplier to gain preferred access to scare resources or by engaging in joint supplier qualification (Hüttinger et al., 2014). In previous studies, 'volume bundling' and 'price evaluation' have been described to be rather adversarial, cost-oriented sourcing levers (Schiele et al., 2011a; Schuh et al., 2011; Schumacher et al., 2008). Therefore, it is surprising that 'volume bundling' and 'price evaluation' showed little effect on cost performance. Another interesting finding is the fact that innovation performance strongly contributed to cost performance. This indicates that even if sourcing levers have little direct effect on cost performance they might have a relevant indirect effect mediated by innovation performance.

In general, sourcing teams scored higher on innovation performance when they strongly engaged in 'product optimization' and 'optimization of supply relationship'. A surprising finding is that 'price evaluations' had a very highly significant positive impact on innovation performance. In the traditional understanding, information on prices and costs are mostly used to pressure suppliers' prices and leverage informational edge in negotiations (Ellram and Perrott Siferd, 1993; Miller and Kelle, 1998; Perdue and Summers, 1991; Rajagopal and Bernard, 1993). This study however indicates that 'price evaluations' contain further information that can be used to enhance innovation with suppliers.

Figure 1: *Structural model (Model X)*



** p ≤ 0.1; ** p ≤ 0.05; *** p ≤ 0.01; dashed arrows indicate non-significant relationships*

6 Contributions and Implications

The study's findings make several main contributions: First, it highlights the need for distinguishing multiple levels of performance. While previous studies mainly analyzed performance at the functional level and its contribution to the firm's financial or commercial performance, this study, as one of few, recognizes that firms frequently buy differently by category; i.e. a group of similar materials or services sourced from an overlapping number of suppliers. Second, the study provides evidence of the superior performance contribution of innovation. Findings confirm that innovation contributes strongly to cost performance. Third, findings highlight the importance of price evaluations in supply management. In the past, price analysis teams may have played an underrated role. Information gained from price evaluations may have been mainly used to pressure suppliers' prices and to gain informational edge for negotiations. However, these findings show that price evaluations may substantially contribute to innovation. Cost and value analysis might build trust into the value proposition and cost impact of unfamiliar, innovative products.

Overall, this study is one of the first to address findings for a sourcing category. The category level of analysis, grouping similar materials and services for synergy effects, offers multiple future research opportunities in purchasing and supply chain management. For example, literature on supply chain differentiation mostly focuses on the entire firm or a single product, proposing efficient or responsive supply chain choice depending on various contingencies (Hallavo, 2015; Selldin and Olhager, 2007; Sun et al., 2009). Future research might ask which supply chain choice is most suitable for an entire group of similar products influences.

Note

This study summarizes the findings of the following doctoral thesis:

- Hesping, F.H. (2015): Tactics at the category level of purchasing and supply management: sourcing levers, contingencies and performance. Thesis.

Various aspects of this work have been published in the following research papers:

- Hesping, F.H.; Schiele, H. (2016): Matching tactical sourcing levers with the Kraljič matrix: empirical evidence on purchasing portfolios, in: International Journal of Production Economics 177, pp. 101–117.
- Hesping, F.H.; Schiele, H. (2015a): Purchasing strategy development: A multi-level review, in: Journal of Purchasing and Supply Management 21 (2), pp. 138–150.
- Hesping, F.H.; Schiele, H. (2015b): Sourcing tactics to achieve cost savings: developing a formative method of measurement, in: International Journal of Procurement Management 9 (4), pp. 473–504.

Appendix

Table 1: *Reflective indicators – descriptive statistics*

Reflective constructs	Reflective indicators		Mean	Std. dev.
Cost performance	cost_1	It has been possible to achieve higher than average reductions in cost.	4.907	1.757
	cost_2	It has been possible to achieve more cost-effective than average total costs.	4.645	1.717
	cost_6	The reductions in cost achieved are considerably higher than expected.	4.439	1.808
	cost_7	The total costs achieved are considerably better value than expected.	4.355	1.776
Innovation performance	inno_1	It has been possible to achieve more product and process improvements than average.	2.738	1.616
	inno_2	It has been possible to identify more useful ideas for the improvement of the requested parts than average with the supplier.	2.692	1.598
	inno_6	It has been possible to identify progressive ideas or novel capacities in the supplier pool.	2.495	1.568
	inno_7	The product and process improvements achieved are considerably better than expected.	2.477	1.462
	inno_8	It has been possible to identify considerably more useful ideas for improvements of the requested parts than expected.	2.374	1.483

Seven-point Likert scale (1 = strongly disagree to 7 = strongly agree); n = 107

Table 2: *Reflective measurement models – outer loadings and scale reliability*

Dependent variables	Indicators	Outer loadings[a]	t-value	CB α	CR	AVE
Cost performance *based on Krause et al. (2001) and Terpend et al. (2011)*	cost_1	0.827	18.585	0.896	0.927	0.761
	cost_2	0.835	20.913			
	cost_3	0.903	33.053			
	cost_4	0.921	46.473			
Innovation performance *based on Azadegan and Dooley (2010), Schiele et al. (2011b) and Terpend et al. (2011)*	inno_1	0.881	19.473	0.938	0.953	0.802
	inno_2	0.908	40.212			
	inno_3	0.888	27.015			
	inno_4	0.880	21.586			
	Inno_5	0.920	46.386			

[a] *All outer loadings are significant at p < 0.001*

Table 3: *Discriminant validity – Fornell-Larcker Criterion*

Independent variables	A	B	C	D	C	F	G	H	I
A. Volume bundling	Formative								
B. Price evaluation	0.334	Formative							
C. Ext. of supply base	0.322	0.412	Formative						
D. Product optimization	0.322	0.255	0.242	Formative					
E. Process optimization	0.071	0.327	0.397	0.320	Formative				
F. Opt. of supply rel.	0.180	0.228	0.191	0.353	0.436	Formative			
G. Category-spanning optimization	0.220	0.288	0.186	0.400	0.374	0.240	Formative		
H. Cost performance	0.173	0.236	0.342	0.099	0.233	-0.017	0.049	**0.872**	
I. Innovation performance	0.120	0.325	0.092	0.612	0.239	0.333	0.226	0.197	**0.895**

Note: The square root of AVE values are shown on the diagonal and printed in bold (reflective constructs only)

Table 4: *Formative indicators – descriptive statistics*

Formative constructs	Formative indicators		Mean	Std. dev.
Volume bundling	volumeB_1[§]	Concentrate volumes on one or very few suppliers.	5.187	2.038
	volumeB_2	Bundling with subsidiaries and regions.	4.206	2.386
	volumeB_3	Linking new allocations with current series volumes.	4.449	2.291
	volumeB_4	Bundling of several requests into a package with a large volume.	4.019	2.442
	Global item	To summarize, to which extent have activities for 'volume bundling' been used in this souring project?	4.636	1.865
Price evaluation	priceE_1[§]	Determination of own price target for negotiation preparation.	5.234	1.783
	priceE_2	Gather more (also technically different) offers than is customary.	3.458	1.813
	priceE_3	Recalculation of the offered prices.	4.206	2.314
	Global item	To summarize, to which extent have activities for 'price evaluations' been used in this souring project?	4.692	1.526
Extension of supply base	eSupply-Base_1	Building up suppliers; e.g. by increasing volumes stepwise.	3.888	2.275
	eSupply-Base_2	Drive forward use of suppliers from cost-competitive countries.	3.168	2.284
	eSupply-Base_3	Drive forward (deep) localization, thereby expanding capacities near place of demand.	2.813	2.056
	Global item	To summarize, to which extent have activities for 'extension of supply base' been used in this souring project?	3.617	1.867
Product optimization	productOpt_1	Drive forward standardization of parts (reduction of variants).	2.720	1.975
	productOpt_2	Drive forward use of cost-effective technology/functions (technical simplification).	2.794	1.907
	productOpt_3	Early involvement in development teams to e.g. encourage product improvements with suppliers.	2.925	1.897
	productOpt_4	Request technical alternatives from suppliers, e.g. innovation/concept competition.	2.701	1.953
	Global item	To summarize, to which extent have activities for 'product optimization' been used in this souring project?	2.860	1.616
Process optimization	processOpt_1	Optimize (inbound) logistics to e.g. save on packaging or condense transport.	2.598	1.995
	processOpt_2	Quality dialogues with suppliers to e.g. avoid release costs and quality defects.	2.991	1.861
	processOpt_3	Initiate early capacity planning with suppliers to e.g. avoid bottlenecks and excessive capacities.	4.121	2.153
	Global item	To summarize, to which extent have activities for 'process optimization' been used in this souring project?	3.467	1.568
Optimization of supply relationship	osRelation_1	Increase appeal with suppliers (Preferred Customer) to e.g. gain preferred access to innovations or capacities.	3.308	1.860
	osRelation_2	Building up specific capabilities of suppliers; e.g. with joint supplier qualification.	3.243	1.780
	osRelation_3	Use individual contract conditions to e.g. arrange specific price amendments or incentives for suppliers.	2.776	2.062
	Global item	To summarize, to which extent have activities for 'optimization of supply relationship' been used in this souring project?	3.224	1.621
Category-spanning optimization	categoryS_1	Avoid conflicts with adjacent sourcing categories, e.g. in supplier strategy or inbound logistics.	2.271	1.836
	categoryS_2	Bundle volumes with adjacent sourcing categories, e.g. main and attachment parts.	2.093	1.825
	categoryS_3	Optimize technical aspects in collaboration with adjacent sourcing categories, e.g. promote cooperation between suppliers of common components.	2.103	1.648
	Global item	To summarize, to which extent have activities for 'category-spanning optimization' been used in this souring project?	2.206	1.675

[§] *Item dropped due to non-significant weight and low loading; Seven-point Likert scale (1 = not used to 7 = extensively used); n = 107*

Table 5: *Formative measurement models – Redundancy analysis, collinearity check, weights and loadings*

Independent variables	Indicators	Path coeff.[a]	VIF[b]	Outer weights	t value	p value	Sign.	Outer loadings	t value	p value	Sign.
Volume bundling	volumeB_1[§]	0.865	1.123	-	-	-	-	-	-	-	-
	volumeB_2		1.257	0.361	1.306	0.194	n.s.	0.625	2.341	0.021	**
	volumeB_3		1.237	0.552	1.844	0.068	*	0.780	3.082	0.003	***
	volumeB_4		1.421	0.429	1.623	0.107	n.s.	0.803	3.654	0.000	***
Price evaluation	priceE_1[§]	0.855	1.210	-	-	-	-	-	-	-	-
	priceE_2		1.157	0.683	5.216	0.000	***	0.850	9.180	0.000	***
	priceE_3		1.209	0.553	3.742	0.000	***	0.760	6.024	0.000	***
Extension of supply base	eSupplyBase_1	0.904	1.255	0.518	3.131	0.002	***	0.811	4.979	0.000	***
	eSupplyBase_2		1.303	0.433	2.206	0.030	**	0.778	4.363	0.000	***
	eSupplyBase_3		1.207	0.355	1.224	0.224	n.s.	0.683	2.828	0.006	***
Product optimization	productOpt_1	0.967	1.524	0.208	3.706	0.000	***	0.666	6.429	0.000	***
	productOpt_2		1.987	0.304	7.706	0.000	***	0.832	16.720	0.000	***
	productOpt_3		2.178	0.328	8.357	0.000	***	0.860	25.995	0.000	***
	productOpt_4		2.178	0.378	7.482	0.000	***	0.861	21.943	0.000	***
Process optimization	processOpt_1	0.857	1.262	0.335	1.953	0.053	*	0.680	4.123	0.000	***
	processOpt_2		1.531	0.537	4.737	0.000	***	0.873	12.661	0.000	***
	processOpt_3		1.414	0.394	2.808	0.006	***	0.770	7.367	0.000	***
Optimization of supply relationship	osRelation_1	0.954	1.716	0.383	3.950	0.000	***	0.840	9.678	0.000	***
	osRelation_2		1.624	0.570	3.897	0.000	***	0.895	11.235	0.000	***
	osRelation_3		1.202	0.276	1.678	0.096	*	0.614	3.637	0.000	***
Category-spanning optimization	categoryS_1	0.980	2.159	0.280	1.611	0.110	n.s.	0.848	7.001	0.000	***
	categoryS_2		2.302	0.302	2.181	0.031	**	0.868	7.312	0.000	***
	categoryS_3		2.518	0.531	2.716	0.008	***	0.943	8.782	0.000	***

[a] Path coefficient between exogenous formative and endogenous global item construct (measure for construct validity)
[b] Variance Inflation Factor (VIF) used for collinearity assessment in the formative measurement models
[§] Item dropped due to nonsignificant weight and low loading
** p ≤ 0.1; ** p ≤ 0.05; *** p ≤ 0.01; n.s. = non-significant (p > 0.1)*

Table 6: *Structural model – collinearity statistics and predictive accuracy*

	Collinearity statistics		Predictive accuracy			
			Cost performance		Innovation performance	
Independent variables	VIF 1st set[a]	VIF 2nd set[a]	f^2 effect size	q^2 effect size	f^2 effect size	q^2 effect size
Volume bundling	1.341	1.312	0.015	0.011	**0.022[S]**	0.016
Price evaluation	1.491	1.368	0.001	0.002	**0.086[S]**	**0.062[S]**
Ext. of supply base	1.449	1.419	**0.063[S]**	**0.043[S]**	**0.024[S]**	**0.034[S]**
Product optimization	2.056	1.399	0.013	0.004	**0.463[H]**	**0.311[M]**
Process optimization	1.621	1.621	**0.032[S]**	**0.021[S]**	0.000	0.000
Opt. of supply rel.	1.365	1.335	**0.042[S]**	**0.028[S]**	**0.024[S]**	0.014
Category-spanning opt.	1.345	1.337	0.003	**0.026[S]**	0.007	**0.025[S]**
Cost performance	1.820	-	**0.032[S]**	**0.025[S]**	-	-

[a] VIF = Variance Inflation Factor; 1[st] set: cost performance as dependent variable; 2[nd] set innovation performance as dependent variable
[H] high ($f^2.q^2 \geq 0.35$); [M] medium ($f^2.q^2 \geq 0.15$); [S] small ($f^2.q^2 \geq 0.02$)

Table 7: *PLS analysis*

	PLS Model																			
	I		II		III		IV		V		VI		VII		VIII		IX		X	
Independent variables	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP	CP	IP
Cost-oriented sourcing levers:																				
Volume bundling	0.197 (1.452) n.s.	0.111 (0.561) n.s.													0.047 (0.380) n.s.	0.017 (0.125) n.s.			0.129 (1.018) n.s.	-0.127 (1.489) n.s.
Price evaluation			**0.238 (2.696)** ***	**0.336 (3.024)** ***											0.101 (0.894) n.s.	**0.348 (3.090)** ***			0.032 (0.272) n.s.	**0.260 (3.246)** ***
Extension of supply base					**0.346 (3.816)** ***	0.132 (0.799) n.s.									**0.288 (2.358)** **	-0.045 (0.289) n.s.			**0.269 (1.874)** *	-0.128 (1.122) n.s.
Innovation-oriented sourcing levers:																				
Product optimization							0.170 (1.276) n.s.	**0.615 (9.109)** ***									0.104 (0.883) n.s.	**0.582 (6.411)** ***	-0.146 (1.224) n.s.	**0.601 (6.281)** ***
Process optimization									**0.234 (2.531)** **	**0.245 (2.473)** **							**0.300 (2.711)** ***	0.012 (0.092) n.s.	0.206 (1.623) n.s.	-0.010 (0.076) n.s.
Opt. of supply rel.											-0.130 (0.671) n.s.	**0.334 (3.769)** ***					-0.164 (1.359) n.s.	0.132 (1.346) n.s.	**-0.212 (1.844)** *	**0.128 (1.844)** *
Category-spanning opt.													0.083 (0.554) n.s.	**0.239 (2.458)** **			-0.074 (0.677) n.s.	-0.044 (0.400) n.s.	-0.068 (0.713) n.s.	-0.065 (0.634) n.s.
Performance:																				
Innovation performance																			**0.272 (2.375)** **	
R^2	0.077	0.014	0.056	0.113	0.120	0.017	0.029	0.378	0.055	0.060	0.017	0.112	0.007	0.057	0.131	0.114	0.081	0.395	**0.209**	0.451

CP = Cost performance; IP = Innovation performance
Path coefficients (t-values) *$p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$; n.s. = non-significant ($p > 0.1$)

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