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An investigation of the performance consequences of alignment and adaptability: contingency effects of decision autonomy and shared responsibility

Narongsak (Tek) Thongpapanl[1], Dirk De Clercq[2] and Dimo Dimov[3]

[1]Faculty of Business, Brock University, 500 Glenridge Avenue, St. Catharines, Ontario, Canada L2S 3A1. nthongpa@brocku.ca
[2]Faculty of Business, Brock University, 500 Glenridge Avenue, St. Catharines, Ontario, Canada L2S 3A1. ddeclercq@brocku.ca
[3]Newcastle University Business School, Newcastle University, St. James Boulevard, Newcastle Upon Tyne NE1 4JH. dimo.dimov@ncl.ac.uk

This research investigates the moderating role of organizations' structural context on the performance outcomes of the firm's alignment and adaptability pursuits. It focuses in particular on the role of decision autonomy and shared responsibility, and posits that these structural features exert opposing influences on the effect of alignment and adaptability on performance. Using a sample of more than 200 Canadian-based firms, this study finds that at higher levels of decision autonomy, the positive relationship between alignment and performance becomes weaker, and the positive relationship between adaptability and performance becomes stronger. Furthermore, at higher levels of shared responsibility, the positive relationship between adaptability and performance strengthens. Thus, the study offers structure-based explanations for the challenge that organizations face when they attempt to reap the benefits of alignment and adaptability simultaneously.

1. Introduction

Facing constantly changing environments, firms increasingly confront the need to both maintain convergence in their activities and allow for sufficient divergence to be able to respond to environmental changes (Ford and Ford, 1994; Lewis, 2000). Firms thus must address the challenge of engaging in two interrelated but non-substitutable goals (1) to innovate incrementally and maintain *alignment* or coherence among their current activities and (2) to innovate radically and foster *adaptation* or drastic reconfiguration of these activities (Gibson and Birkinshaw, 2004; Gupta et al., 2006; O'Connor and

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DeMartino, 2006; Verworn et al., 2008). Extant research has typically focused on discussions of whether firms should choose between alignment or adaptability, how firms can encourage alignment and adaptability concurrently (Gibson and Birkinshaw, 2004), or how firms can avoid being mediocre at both (Ghemawat and Ricart i Costa, 1993). In doing so, it has devoted less attention to how better performance outcomes can emerge from alignment and adaptability or more particularly, the specific conditions in which firms actually can realize benefits from each (Raisch and Birkinshaw, 2008). Thus, it is insufficiently clear how intra-organizational boundary conditions might affect the performance outcomes of alignment and adaptability, and perhaps impose contradictory influences on the two.

To address this gap, we investigate the critical role of organizations' structural context in shaping the outcomes of their alignment and adaptability pursuits. Two critical components of the firm's structural context are (1) the level of autonomy that organizational units enjoy in their decision making (Devinney, 1995; Leenders et al., 2007; Ortin Angel and Santamaria Sanchez, 2009) and (2) the extent to which performance attributions of the units' decisions are interconnected within the firm (Hill et al., 1992; Hauptman and Hirji, 1999; Xie et al., 2003). The enactments of these features constitute, respectively, the level of decision autonomy and shared responsibility. *Decision autonomy* refers to the extent to which decision making is decentralized such that individual units perceive that they have control over their impact on organizational outcomes (Takeuchi et al., 2008). *Shared responsibility* is the extent to which units' rewards depend on one another's performance (Xie et al., 2003). These two features thus echo two critical aspects of intra-organizational functioning: Decision autonomy determines how organizational units independently provide input into decision-making processes (Yukl and Fu, 1999; Takeuchi et al., 2008), and shared responsibility conveys the lack of such independence when it comes to evaluations of the units' collective output (Wageman, 1995; Xie et al., 2003). Thus, the two structural arrangements together provide a comprehensive picture of the level of integration among different organizational units, covering both the inputs and the outputs of decision making. We argue in turn that decision autonomy and shared responsibility exert opposing influences on the performance outcomes of a firm's alignment and adaptability ambitions, which enables us to highlight critical challenges inherent to the simultaneous pursuit of these ambitions.

We contribute to prior literature by investigating how specific structural arrangements interfere with the outcomes of alignment and adaptability in qualitatively different ways (Raisch and Birkinshaw, 2008). Extant technology and innovation management research has investigated how particular structural features – such as cross-functional teams (Barczak and Wilemon, 2003; Lopez Cabrales et al., 2008; de Visser et al., 2010) or internally tight units that are loosely coupled with one another (Leonard-Barton, 1995; O'Reilly and Tushman, 2004) – may be required when engaging in both alignment and adaptability. Similarly, broader management literature has focused on structural antecedents of the simultaneous pursuit of alignment and adaptability, such as the freedom of initiative at lower levels of the organization, combined with the establishment of clear performance standards (Gibson and Birkinshaw, 2004). Yet, prior research typically treats these contextual characteristics as independent predictors of the firm's innovative pursuits without considering their *concurrent* interplay with alignment and adaptability. This important omission does not recognize that their performance outcomes may be realized fully only to the extent that they are matched with appropriate structural characteristics and designs. Therefore, we adopt a contingency perspective (Olson et al., 1995; Song et al., 1998; Song and Xie, 2000; Wu et al., 2007) to explicate how an organization's structural context – as reflected in organizational units' decision autonomy and shared responsibility – might moderate the relationship between its alignment, and adaptability pursuits and performance.

2. Theory and hypotheses

2.1. Conceptual background

A nearly endless stream of research attributes performance advantages to both alignment and adaptability. Alignment ensures the coherence of activities throughout the organization with an emphasis on the incremental refinement of existing skills and capabilities to improve operational efficiency (Ghemawat and Ricart i Costa, 1993; Adler et al., 1999; Gibson and Birkinshaw, 2004). Higher levels of alignment, akin to the notion of incremental innovation (Tao et al., 2010), reflect an organization's capacity to undertake its current activities more efficiently rather than invest in radically new activities that may require the deconstruction of established procedures and rules (Porter, 1996). In contrast, adaptability pertains to a firm's capacity to reconfigure activities across the organization with an emphasis on experimentation with radically new innovative activities

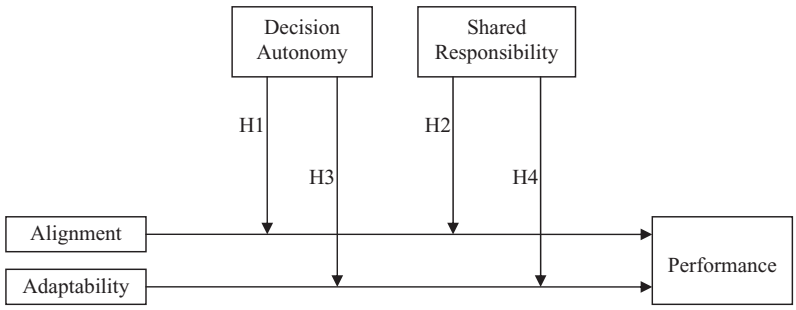

Figure 1. Moderating effects of decision autonomy and shared responsibility on the alignment/adaptability–performance relationship.

(Adler et al., 1999; Lopez Cabrales et al., 2008). The ability to reconfigure and regenerate activities across the organization decreases the likely manifestation of dysfunctional rigidities (Leonard-Barton, 1992) or the chance of falling into a competency trap when an environmental change erodes the value of the firm's current activities (Teece et al., 1997; Levitt and March, 1988; de Visser et al., 2010).

Both alignment and adaptability thus can be beneficial for the firm, yet their successful enactment may require different structural arrangements with unique impacts on the firm's organizational units in terms of both decision-making autonomy and shared responsibility for performance outcomes (Hauptman and Hirji, 1999; Raisch and Birkinshaw, 2008; Ortin Angel and Santamaria Sanchez, 2009). These structural considerations are critical because they speak directly to the level of integration that exists across organizational units. *Decision autonomy* (or decentralization) reflects the extent to which individual organizational units can provide discretionary input into decision making without direct inference by top management (Klein and Sorra, 1996). It is akin to the notion of organizational support, as reflected in top management's propensity to provide employees with access to resources and stimulate them to take initiatives (Ghoshal and Bartlett, 1994; Gibson and Birkinshaw, 2004). The counterpart of decision autonomy is centralization, or the degree to which departmental decisions must be approved initially by top management (Dyer and Song, 1998). *Shared responsibility* instead is enacted through the presence of a joint reward system that evaluates organizational units according to their contribution to collective output rather their own output only (Xie et al., 2003). This concept mirrors the presence of 'stretch' such that organizational units are encouraged to share a common ambition associated with the overall well-being of the organization rather than prioritizing their own interests (Gibson and Birkinshaw, 2004).

In what follows, we start from the intuitive premise that both alignment and adaptability can improve performance individually (March, 1991; Leonard-Barton, 1992; Adler et al., 1999); therefore, we focus on how the aforementioned structural contingencies might amplify or suppress these performance effects. Our conceptual model appears in Figure 1.

2.2. Alignment and performance

We first hypothesize that the alignment–performance relationship likely gets *suppressed* when organizational units enjoy higher levels of decision autonomy. In other words, the performance effects of alignment should be mitigated when decision making is more decentralized. Several arguments support this claim. First, the complexity associated with granting organizational units high levels of autonomy in their decision making may counteract the efficiency advantages that typically result from the pursuit of alignment (Raisch and Birkinshaw, 2008). For example, if organizational units independently can make decisions about which technical features to apply to existing products or how to serve existing markets differently, their efforts may decrease the performance potential inherent to top management's preset plans for coherent decisions across different units (Adler et al., 1999; Tao et al., 2010). Thus, autonomy may attenuate the performance outcomes that result from alignment.

Second and similarly, firms that pursue economies of scope through alignment may perform worse if they adopt an organizational structure characterized by a low degree of centralization (Hoskisson, 1987; Hill et al., 1992). For example, democratic decision-making processes aimed at incorporating a greater diversity of opinions through decentralization may lead to managerial burnout, because these processes are at odds with the strategic goals of efficiency and productivity, so they decrease the performance potential of such strategic goals (Schwartzman, 1989). Similarly, when organizational units are granted high levels of decision autonomy, different

units may enact different interpretations of their organization's strategic mission and undermine its coherence, such that the efficiency advantages expected from alignment-oriented activities are not fully realized (Jones and Schneider, 1984).

H1: *The relationship between the firm's alignment and performance is moderated by the level of decision autonomy granted to its organizational units, such that the relationship becomes suppressed at higher levels of decision autonomy.*

We further expect that the positive effect of the firm's alignment on performance becomes subdued when the responsibility for decision outcomes is shared across organizational units. Such shared responsibility typically exists when the rewards of a particular organizational unit depend on how their performance relates and contributes to that of other units (Xie et al., 2003; Lee and Ahn, 2007). Under conditions of high shared responsibility, the performance advantages stemming from the efficiencies implied by alignment may be realized with more difficulty because of the increasing costs associated with quantifying and qualifying each department's exact contribution to the efficiencies sought (Hill et al., 1992; Hauptman and Hirji, 1999; Xie et al., 2003). Similarly, extant research in strategy implementation indicates that firms that emphasize activity alignment may exhibit poorer performance when their reward systems address the interdependence of departmental contributions to organizational performance because the implementation costs associated with such a reward system tend to undermine the efficiency (and thus performance) benefits expected from alignment (Gupta and Govindarajan, 1986; Hill et al., 1992).

A joint reward system also may establish, somewhat paradoxically, a hierarchical status differential among organizational units, whereby some units appear more instrumental than others in their contributions to overall performance (Pearce, 1993). The resulting cliques can undermine the *coherence* and collaboration among organizational units, such that the efficiency advantages sought through alignment become smaller (Gibson and Birkinshaw, 2004). Along the same line, a joint reward system may encourage higher performing units to exert pressure on their lower performing counterparts to work harder (Drabman et al., 1974). The latter then feel tremendous scrutiny and anxiety and become less willing to look for efficiency advantages through alignment because such efficiencies also benefit the former actors (Ames, 1981). Finally, a joint reward system may encourage free-riding across organizational units (Albanese and Van Fleet, 1985), whereby particular units exploit the similarity (i.e., alignment) in activities to contribute less to cross-functional responsibilities while also assuming that they will receive rewards similar to those granted to their colleagues in other, harder working units (Lee and Ahn, 2007). Ultimately, such free-riding can create a downward motivational spiral across the organization (Wagner, 1995), such that the performance outcomes derived from alignment are subdued.

H2: *The relationship between the firm's alignment and performance is moderated by the level of shared responsibility carried by its organizational units, such that the relationship becomes suppressed at higher levels of shared responsibility.*

2.3. Adaptability and performance

We further hypothesize that the relationship between adaptability and performance is stronger at higher levels of decision autonomy. The successful implementation of adaptability demands that the organization and its members enter into new and unfamiliar domains of knowledge, yet there is no a priori guarantee that such knowledge can be easily understood, absorbed, or integrated across different organizational units (Cohen and Levinthal, 1990). In some cases, centralization forces might help ensure that organizational units free the resources needed to engage in new activities or limit resistance to their implementation (Prahalad and Hamel, 1990), yet we expect that the possibility for enhanced intra-organizational collaboration that stems from high autonomy supersedes this effect. Specifically, granting decision autonomy can motivate organizational units to do more than is required by their narrowly defined task descriptions, and actively participate in the distribution and cross-fertilization of new knowledge across departmental boundaries, which is strongly needed for the successful implementation of adaptation (Cohen and Levinthal, 1990; Klein, 1991; Song et al., 2006b). Put differently, by decentralizing decision making to organizational units, firms can enhance the performance potential inherent to adaptability because they increase the level of control that different units have to reach out to others in the organization during the development and commercialization of breakthrough technologies and radically new products.

Furthermore, decision autonomy may signal considerate treatment by top management and thus promote stronger commitment by individual units to their organization, which is particularly important for the implementation of activities that deviate from the firm's current activity set (Yukl and Fu, 1999; Song

et al., 2006b). When organizational units have an opportunity to voice opinions about how the reconfiguration of existing activities might be best implemented and receive consideration for their initiatives and efforts, they likely feel more encouraged to ensure that their efforts contribute to the goal of turning non-incrementally new ideas into increased performance (Burgelman, 1991; Daly and Geyer, 1994; Gibson and Birkinshaw, 2004). In contrast, strongly centralized decision making (or low decision autonomy) may stifle organizational units' willingness to go out of their way to collaborate with one another and commit to successfully implementing breakthrough ideas (Song and Dyer, 1995), which hampers the performance potential inherent to adaptability (Raisch and Birkinshaw, 2008). In all, a lack of decision autonomy may motivate organizational units to carry out only their assigned function-specific tasks, with little interest in sharing their opinions on how their own expertise might be best combined with that of other units to implement radically new activities effectively.

H3: *The relationship between the firm's adaptability and performance is moderated by the level of decision autonomy granted to its organizational units, such that the relationship becomes amplified at higher levels of decision autonomy.*

Finally, we argue that the performance effects of adaptability are stronger when individual organizational units enjoy shared responsibility for the organization's overall performance. Shared responsibility, achieved by the presence of a joint reward system, increases feelings of task and project ownership across the organization, such that different organizational units are more likely to consider how radically new ideas can be integrated effectively into the firm's current operating domains (Tushman and O'Reilly, 1996; McDonough, 2000; O'Reilly and Tushman, 2004). By emphasizing joint rather than individual rewards, top management can create buy-in among organizational units, who channel their efforts to successfully implement the firm's overall goal to innovate radically (Hauptman and Hirji, 1999), which implies a normative, *collective* form of control rather than a purely utilitarian one based on individual performance (Bloom, 1999; Collins and Clark, 2003). Because the reconfiguration of activities demands the integration of disparate knowledge across organizational unit boundaries (Floyd and Lane, 2000) and thus the transcendence of unit-specific interests (Collins and Smith, 2006), the success of adaptability implementation should be greater when the rewards of individual units depend on the collective performance of all units. In effect, group-based rewards enhance the successful implementation of complex, discontinuous project ideas (Chen and Lin, 2004; Lee and Ahn, 2007).

Furthermore, whereas individual organizational units may be myopic with regard to how the integration of knowledge across departmental borders can benefit the successful implementation of radical innovation (Hauptman and Hirji, 1999), top management likely has a better position from which to oversee and effectively reward novel ideas that require input from different organizational units (Smith and Tushman, 2005; Gilbert, 2006). Therefore, the implementation of adaptability may be enhanced by a joint reward system that offers greater flexibility in terms of the ways available to match the implementation of complex new tasks with appropriate rewards (Gomez-Mejia and Balkin, 1989).

H4: *The relationship between the firm's adaptability and performance is moderated by the level of shared responsibility carried by its organizational units, such that the relationship is amplified at higher levels of shared responsibility.*

3. Research methods

3.1. Sample and data collection

We tested our hypotheses with a sample of firms active in a variety of industrial sectors. We obtained, from a private market research company, a list of 1500 randomly selected Canadian firms, representative of the country's provinces, and industrial sectors. Similar to prior research (e.g., Simons and Peterson, 2000; Song et al., 2006b), we used a single-respondent design and obtained contact information for managers active in different organizational units, including R&D, engineering, marketing, and sales functions. We then sent a survey instrument to one randomly selected manager per firm. To pretest the survey and ensure that our questions were clear and understandable, we undertook informal interviews with six randomly chosen functional managers (three from R&D and three from marketing) who were not included in the initial sample and with whom we discussed the survey instrument, as well as the challenges associated with implementing alignment- and adaptability-oriented activities. Their input improved the readability and relevance of our survey instrument.

Our data collection relied on Dillman's (1978) total design method. We prepared a mailing packet containing (1) a cover letter addressed personally to one manager of the sampled firms, (2) a questionnaire, and (3) a postage-paid return envelope. Two

weeks after the initial electronic mailing, we conducted 'thank you' calls to those who had responded and reminder calls to those who had not. Four weeks after the initial mailing, we sent replacement questionnaires to non-respondents. Some initially selected firms were unfit for the final sample because they were not active any more, had moved and their new address could not be identified, or no longer employed the selected respondents. We ended up with 950 potential respondents and received 232 completed surveys for a response rate of 24%. The responding firms operate in a wide variety of sectors, including manufacturing, non-financial services, mining, construction, transportation, wholesale, retail, and finance. No substantial differences mark respondents and non-respondents, or early and late respondents (Armstrong and Overton, 1977).

Following prior research (Yli-Renko et al., 2001), we tested the validity of the study's key constructs by administering a follow-up survey 6 months after the initial one. The follow-up survey represented a shortened format of the original questionnaire; for each construct, we chose one proxy item that best represented the overall construct. We received 78 responses to the follow-up survey; all validation items had positive correlations with the original measures.

3.2. Measures of constructs

In Table 1, we list the measures used in our analysis, detailing their individual items, overall reliability estimates (Cronbach's alpha, composite reliability), average variance extracted (AVE), and correlations with their single-item counterparts from the follow-up survey. In line with our organizational-level focus, our dependent variable assesses the *firm's* performance at the time of data collection. Further, we assessed respondents' perceptions about (1) whether their firm's management systems support alignment and/or adaptability, (2) the level of decision autonomy granted to its organizational units, and (3) the level of shared responsibility carried by the units with respect to performance outputs – as pertaining to the firm's current or recent situation. We provide the correlations and descriptive statistics for the study variables in Table 2.

3.2.1. Performance

Our performance measure consists of an exhaustive list of nine indicators used in prior research (Li and Atuahene-Gima, 2001) to capture items such as return on investment and sales growth. For each indicator, respondents assessed their perceptions of the firm's performance relative to that of its principal competitors during the previous 3 years. The measure (alpha = 0.92), based on the average of the nine indicators, correlates positively with its single-item counterpart from the follow-up survey (r = 0.66, $P < 0.001$). We also collected performance data about firms' revenue growth and income growth from a secondary data source 1 year after the survey data was collected.

3.2.2. Alignment

We measure alignment with a three-item scale based on prior literature (Gibson and Birkinshaw, 2004). For example, respondents indicated the extent to which the firm's management systems work coherently to support the overall objectives of the company. These items reflect whether alignment behavior is a natural part of the day-to-day activities that take place in organizational units. The measure (alpha = 0.84) correlates positively with its single-item counterpart from the follow-up survey (r = 0.48, $P < 0.001$).

3.2.3. Adaptability

Following Gibson and Birkinshaw (2004), we measure adaptability with a three-item scale that assesses whether the firm's management systems, for example, are flexible enough to allow the firm to respond quickly to changes in the market. These items reflect whether adaptation-oriented behavior is a natural part of the day-to-day activities in organizational units. The measure (alpha = 0.89) correlates positively with the single item from the follow-up survey (r = 0.49, $P < 0.001$).

3.2.4. Decision autonomy

Following prior studies (e.g., Dyer and Song, 1998), we measure the level of decision autonomy with the three items that reflect the extent to which decision making is decentralized in the firm. The questions were reverse-coded. For example, we asked the respondents to what extent individual units would need to get permission from top management when they want to make a decision. The measure (alpha = 0.90) correlates positively with its counterpart from the follow-up survey (r = 0.49, $P < 0.001$).

3.2.5. Shared responsibility

We measure the level of shared responsibility with a three-item scale assessing the interdependence of organizational units' rewards (Xie et al., 2003). For

Table 1. Constructs and measurement items

	Factor Loading	*t*-Value
Performance (α = 0.92; CR = 0.92; AVE = 0.55)		
Return on investment	0.784	13.783
Return on sales	0.823	15.053
Profit growth	0.840[1]	
Return on assets	0.831	15.011
Overall efficiency of operations	0.623	10.047
Sales growth	0.669	11.326
Market share growth	0.634	11.390
Cash flow from operations	0.788	13.781
Firm's overall reputation	0.641	9.513
Alignment (α = 0.84; CR = 0.84; AVE = 0.64)		
The management systems in this company work coherently to support the overall objectives of the company.	0.842	11.882
The management systems in this company prevent us from wasting resources on unproductive activities.	0.732[1]	
People in this company work toward the same goals because our management systems avoid conflicting objectives.	0.823	11.992
Adaptability (α = 0.89; CR = 0.89; AVE = 0.73)		
The management systems in this company encourage people to challenge outmoded traditions/practices.	0.813[1]	
The management systems in this company are flexible enough to allow us to respond quickly to changes in our market.	0.883	14.856
The management systems in this organization evolve rapidly in response to shifts in our business priorities.	0.868	14.921
Decision Autonomy (α = 0.90; CR = 0.91; AVE = 0.79) (reverse coded)		
Please indicate your agreement or disagreement with the following statements regarding how your company functions internally:		
Even small matters have to be referred to someone higher up for a final answer.	0.877	18.780
Individual departments need to get permission from top management almost every time they want to do anything.	0.926[1]	
Individual departments are strongly discouraged from making their own decisions.	0.809	16.233
Shared Responsibility (α = 0.78; CR = 0.78; AVE = 0.54)		
Please indicate your agreement or disagreement with the following statements regarding how your company functions internally:		
Different departments share the rewards of a successfully commercialised new product.	0.755[1]	
Individual departments are evaluated on their joint performance instead of separate departmental performance.	0.670	9.348
Our senior management promotes cross-departmental team cohesion over separate departmental loyalty.	0.777	9.752

[1]Initial loading was fixed to 1 to set the scale of the construct.
Correlations with the single-item measures in the follow-up survey are as follows: performance (r = 0.66, $P < 0.001$), alignment (r = 0.48, $P < 0.001$), adaptability (r = 0.49, $P < 0.001$), decision autonomy (r = 0.49, $P < 0.001$), and shared responsibility (r = 0.46, $P < 0.001$).
CR, construct reliability; AVE, average variance extracted.

example, respondents indicated the extent to which individual units are evaluated on their joint performance instead of separate unit performance. The measure (alpha = 0.78) correlates positively with its single-item counterpart from the follow-up survey (r = 0.46, $P < 0.001$).

3.2.6. Control variables

We include several control variables to avoid model misspecification and take into account possible alternative explanations for variations in performance. Specifically, we include *firm size*, which we measure as a log transformation of the number of full-time

Table 2. Descriptive statistics and correlations ($n = 232$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Performance														
2. Alignment	0.428**													
3. Adaptability	0.352**	0.591**												
4. Decision autonomy	0.283**	0.280**	0.413**											
5. Shared responsibility	0.356**	0.571**	0.514**	0.345**										
6. Company size (log employees)	0.131*	0.059	–0.042	0.113	–0.042									
7. Company age (years)	–0.023	–0.013	–0.128	0.047	–0.051	0.522**								
8. Industry: manufacturing	0.036	0.054	0.038	–0.093	–0.049	0.108	0.091							
9. Industry: services	–0.063	–0.093	0.019	0.073	–0.003	–0.155*	–0.132*	–0.580**						
10. Industry: construction	0.177**	0.105	0.074	0.061	0.154*	0.037	0.046	–0.126	–0.081					
11. Industry: mining	–0.034	–0.066	–0.012	0.087	0.012	–0.064	–0.100	–0.307**	–0.198**	–0.043				
12. Industry: transportation	0.017	0.031	–0.052	–0.020	–0.017	0.097	0.014	–0.231**	–0.149*	–0.032	–0.079			
13. Industry: wholesale	0.043	0.136*	0.083	0.053	0.095	–0.069	–0.084	–0.191**	–0.123	–0.027	–0.065	–0.049		
14. Industry: retail	–0.024	–0.042	–0.094	–0.049	0.002	0.084	0.345**	–0.155*	–0.099	–0.022	–0.053	–0.040	–0.033	
Mean	3.519	3.223	3.384	3.897	3.269	5.647	32.871	0.470	0.270	0.020	0.090	0.060	0.040	0.030
Standard deviation	0.756	0.874	0.951	0.952	0.919	1.991	36.305	0.500	0.446	0.130	0.294	0.230	0.194	0.159

*$P < 0.05$; **$P < 0.01$.

employees and *firm age* measured as the number of years the firm has been in business. We also control for *industry sector*, including manufacturing [standard industrial classification (SIC) 20–39], nonfinancial services (SIC 70–89), mining (SIC 10–14), construction (SIC 15–17), transportation (SIC 40–49), wholesale (SIC 50–51), retail (SIC 52–59), and finance (SIC 60–67).

3.3. Measure reliability and validity

In line with Anderson and Gerbing (1988), we estimate a five-factor measurement model using AMOS 18. A confirmatory factor analysis (CFA) reveals factor loadings greater than .40, normalized residuals less than 2.58, and modification indices less than 3.84 (Anderson and Gerbing, 1988). These results suggest that no deletions of scale items are needed to improve model fit. We also note that the measurement model fits the data well: $\chi^2_{(179)} = 270.72$, goodness-of-fit index (GFI) = 0.90, Tucker–Lewis index (TLI) = 0.96, confirmatory fit index (CFI) = 0.97, and root mean squared error of approximation (RMSEA) = 0.05.

We affirm the convergent validity of our scales with the significant factor loadings in the measurement model ($t > 2.0$; Gerbing and Anderson, 1988) and the magnitude of our AVE estimates (equal to or greater than .50, Bagozzi and Yi, 1988). Several assessment criteria also support the discriminant validity of our constructs. None of the confidence intervals for the correlations between constructs includes 1.0 ($P < 0.05$) (Anderson and Gerbing, 1988), and the AVE estimates of the constructs are greater than the squared correlations between the corresponding pairs of constructs (Fornell and Larcker, 1981). In addition, we find significant differences between the unconstrained model and constrained model (Anderson and Gerbing, 1988) for all 10 pairs of constructs.[1]

We conduct several diagnostic analyses to rule out the possibility of common method bias in our results. First, the CFA for a single-factor model reveals a poor fit with the data ($\chi^2_{(189)} = 1414.80$, GFI = 0.56, TLI = 0.54, CFI = 0.60, RMSEA = 0.17) significantly worse ($\Delta\chi^2_{(10)} = 1144.08$, $P < 0.001$) than the fit of the aforementioned five-factor model. Second, we compare a post-hoc structural equation model that includes the interactions terms – equivalent to Model 4 in Table 3 – with a corresponding model that contains an added common method factor (Podsakoff et al., 2003; Song et al., 2006a). This analysis reveals

Table 3. Regression results (dependent variable: performance) ($n = 232$)

	Model 1	Model 2	Model 3	Model 4
Company size (log employees)	0.075*	0.063*	0.059*	0.067*
Company age (years)	–0.003$^+$	–0.002	–0.002	–0.002$^+$
Industry: manufacturing[1]	0.500	0.276	0.243	0.202
Industry: services	0.414	0.240	0.169	0.141
Industry: construction	1.484**	1.024*	0.901$^+$	0.792$^+$
Industry: mining	0.394	0.244	0.149	0.064
Industry: transportation	0.479	0.274	0.231	0.116
Industry: wholesale	0.643	0.234	0.162	0.140
Industry: retail	0.526	0.394	0.346	0.115
Alignment		0.272***	0.226***	0.208**
Adaptability		0.116*	0.055	0.131*
Decision autonomy			0.101*	0.110*
Shared responsibility			0.090	0.092
H1: Alignment × decision autonomy				–0.167**
H2: Alignment × shared responsibility				0.030
H3: Adaptability × decision autonomy				0.138**
H4: Adaptability × shared responsibility				0.132*
R^2	0.073	0.238	0.261	0.331
ΔR^2		0.165	0.023	0.070
		($P < 0.001$)	($P < 0.05$)	($P < 0.001$)

Notes: Unstandardized coefficients (two-tailed *P*-values).
[1]Base case = Finance industry.
***$P < 0.001$; **$P < 0.01$; *$P < .05$; $^+P < 0.10$.

very small differences in the fit indices between the 'hypothesized' model without the common method factor ($\chi^2_{(94)} = 146.00$, GFI = 0.94, TLI = 0.94, CFI = 0.96, RMSEA = 0.05) and the model that includes the common method factor ($\chi^2_{(93)} = 143.63$, GFI = 0.94, TLI = 0.94, CFI = 0.96, RMSEA = 0.05); moreover, the chi-square difference between the two models is not significant ($\Delta\chi^2_{(1)} = 2.37$; ns). We also observe only small changes in the size and significance of the paths across the two models. These results, together with arguments that common method bias is less prevalent in studies using highly educated respondents and multi-item scales (Bergkvist and Rossiter, 2007) and for moderating rather than main effects (Brockner et al., 1997; Simons and Peterson, 2000), alleviate possible concerns related to the use of a common respondent in our study.

4. Results

4.1. Main analyses

We use moderated hierarchical regression analysis to test our hypotheses and mean-center the interacting variables to minimize multicollinearity (Aiken and West, 1991). All variance inflation factor values are less than 3, suggesting that multicollinearity is not an issue (Neter et al., 1985). In Table 3, we provide the regression results. Model 1 contains only the control variables; Model 2 adds the direct effects of alignment and adaptability, Model 3 adds the direct effects of decision autonomy and shared responsibility, and Model 4 includes the two-way interaction terms. Model 4 reveals a significant improvement in model fit compared with Model 3, attesting to the importance of the interaction terms representing our hypotheses. In Model 2, consistent with the basic premise of our theoretical discussion, alignment and adaptability have positive effects on performance.

The results in Model 4 suggest a negative interaction effect between alignment and decision autonomy ($P < 0.01$). Figure 2 plots this interaction, indicating the effect of alignment on performance at high and low levels of decision autonomy (Aiken and West, 1991). This relationship is weaker when decision autonomy is high, in support of Hypothesis 1. In Hypothesis 2, we predict a negative interaction between alignment and shared responsibility. The interaction term is not significant, and we therefore find no support for this hypothesis.

The results for the two-way interactions that include adaptability are significant. The interaction of adaptability with decision autonomy is strongly positive ($P < 0.01$), thus lending support to Hypothesis 3; the interaction with shared responsibility is also positive ($P < 0.05$), in support of Hypothesis 4. The plot of the interaction between adaptability and decision autonomy in Figure 3 indicates a positive relationship between adaptability and performance at high levels of decision autonomy and (virtually) no relationship at low levels of decision autonomy. Figure 4 shows a similar pattern in that the relationship between adaptability and performance is positive at high levels of shared responsibility and neutral at low levels of shared responsibility.

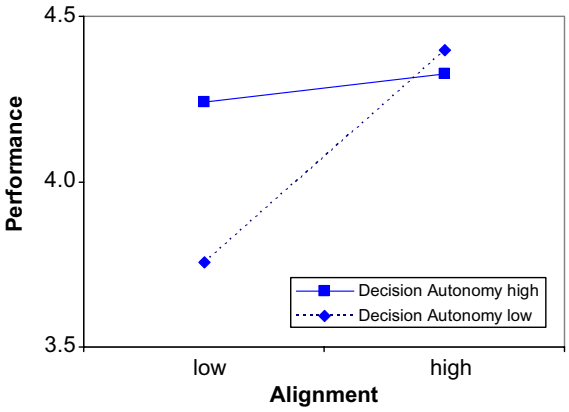

Figure 2. Moderating effect of decision autonomy on the alignment–performance relationship.

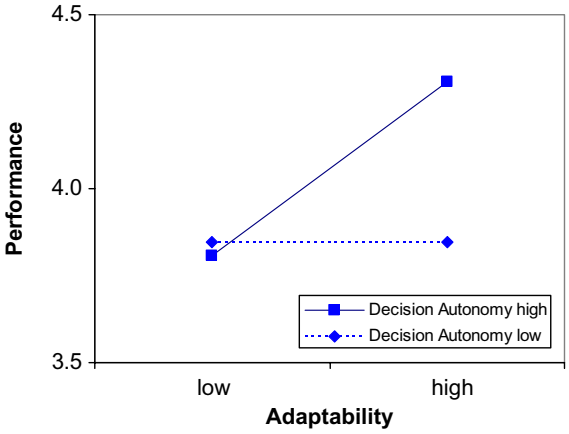

Figure 3. Moderating effect of decision autonomy on the adaptability–performance relationship.

4.2. Post-hoc analysis

To check for common method bias, we collected additional performance data from the Hoovers Online Prospector Database pertaining to firms' revenue growth (subsample of $n = 107$) and income growth (subsample of $n = 70$) in the year after the

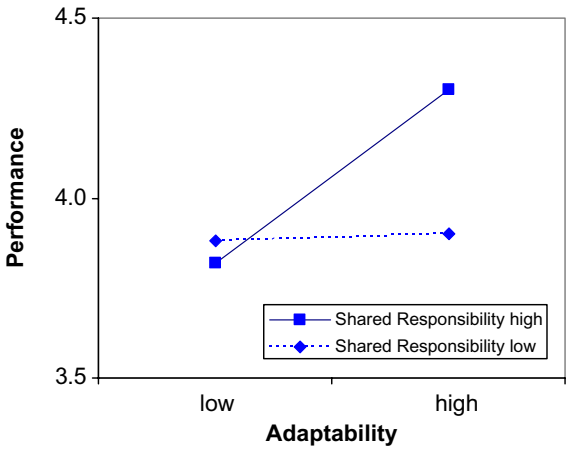

Figure 4. Moderating effect of shared responsibility on the adaptability–performance relationship.

original data collection. The results of these subsample analyses are consistent with those revealed by the full sample in Table 3: The moderating effect between alignment and decision autonomy is negative, and the moderating effects between adaptability on the one hand and decision autonomy and shared responsibility on the other hand are positive.[2]

To check if the hypothesized moderating effects are robust across different industries, we ran another regression, in addition to those reported in Table 3, in which we included the interaction terms of these industry dummies with alignment and adaptability. The results are similar in terms of the signs, magnitudes, and significance levels to those in Table 3.[3]

5. Discussion

5.1. Discussion of results

Organizational success achieved from the pursuit of incremental and radical innovation – or the associated notions of alignment and adaptability – requires that firms acknowledge the roles played by structural features, particularly the level of autonomy and interdependence of their departmental units (Hauptman and Hirji, 1999; Gibson and Birkinshaw, 2004; Raisch and Birkinshaw, 2008; Ortin Angel and Santamaria Sanchez, 2009). Prior literature has considered structural antecedents of the firm's alignment and adaptability pursuits (for an overview, see Raisch and Birkinshaw, 2008), yet a paucity of research addresses how the performance effects of these two forces may vary across structural contexts. The need to specify the structural boundary conditions in which these elements benefit the firm most thus is clear (Raisch and Birkinshaw, 2008; Mom et al., 2009; Sethi and Sethi, 2009), particularly because the successful implementation of alignment and adaptability may require different structural arrangements. Our results indicate that the alignment–performance relationship gets suppressed at high levels of decision autonomy; conversely, the adaptability–performance relationship gets amplified at high levels of decision autonomy and shared responsibility. These results offer several interesting implications for the theoretical development of research in technology and innovation management.

Decision autonomy both neutralizes the benefits of alignment and amplifies the benefits of adaptability. High autonomy can undermine the effectiveness of aligning the activities of different organizational units, including technology- and marketing-oriented ones to improve organizational efficiency, but it also can favor the performance of radically new, adaptive activities (Figures 2 and 3). Organizations that maintain a diverse portfolio of innovative activities (i.e., both incremental and radical) should adopt varying levels of decision autonomy, tuned to the different types of activities they pursue. Although such differentiation may be relatively easy to achieve when alignment and adaptability occur in structurally separate units (e.g., Tushman and O'Reilly, 1996), it becomes far more challenging in a situation of high 'contextual ambidexterity' (Gibson and Birkinshaw, 2004; Raisch and Birkinshaw, 2008), where alignment- and adaptability-oriented activities permeate the *entire* organization.

Thus, our findings contribute to research that points to the challenge of increasing performance when a firm pursues alignment and adaptability simultaneously (Raisch and Birkinshaw, 2008). Some researchers find a beneficial effect of such contextual ambidexterity (Gibson and Birkinshaw, 2004; He and Wong, 2004; Lubatkin et al., 2006), but others argue that firms should choose either alignment or adaptability to avoid being mediocre at both (Ghemawat and Ricart i Costa, 1993). Still, others raise doubts about the success associated with the simultaneous pursuit of alignment and adaptability (Van Looy et al., 2005). Our findings add to this debate by revealing that the two activity types can require different structural arrangements. The opposing influence of decision autonomy on the performance outcomes of alignment and adaptability that we find illustrates that firms could benefit if their organizational units are neither purely autonomous nor purely integrated, but rather adjust their levels to match the nature of the innovation activities they undertake (Westerman et al., 2006). That is, to increase firm performance, organizational units should enjoy limited autonomy for activities that require efficiency and coherence but

attain high autonomy when they must implement novel or radical ideas (Hill and Hoskisson, 1987; Hill et al., 1992). More generally, our research also highlights then that the tendency in ambidexterity research to combine alignment and adaptability into one superordinate construct (Gibson and Birkinshaw, 2004; He and Wong, 2004; Lubatkin et al., 2006; Cao et al., 2009) may mask the contrasting influence of structural arrangements, such as decision autonomy, on the effectiveness of the construct's underlying components.

Our findings with respect to the moderating role of shared responsibility differ slightly. The positive interaction effect between this structural arrangement and adaptability indicates that the implementation of adaptability-oriented activities fares better when the performance evaluation system stimulates the voluntary exchange of ideas across departmental borders – by making the rewards of individual units dependent on the performance of other units – instead of focusing on departmental interests only (Floyd and Lane, 2000; Collins and Smith, 2006). This result echoes successful transformation stories about companies that reward employees on the basis of not only departmental results but also aggregated, company-wide performance. For example, Analog Devices, a semiconductor designer and producer founded in 1965, maintained its viability while morphing through several technological generations and market shifts arguably because of its group-based incentive system and structure (Govindarajan and Trimble, 2005). Yet, we find no support for the argument that the performance benefits of alignment weaken when shared responsibility increases. Perhaps, shared responsibility (through a joint reward system) can offer useful benefits (rather than always be harmful, as we hypothesized) for firms that emphasize alignment and coherence within their activity set – particularly when the *nature* of their activities entails high levels of interdependence and thus requires coordination in organizational units' individual performance outcomes (Wageman, 1995; Sethi, 2000). Future research should consider explicitly the interplay between the inter-dependence of the performance evaluation system for individual departments and that of the firm's activity set, as well as its influence on the performance outcomes of alignment.

Finally, our results may indirectly reflect the critical role of *cross-functional collaboration* in the successful implementation of alignment- and adaptability-oriented activities. Prior research acknowledges that the successful enactment of these activities requires some intra-organizational collaboration (Jansen et al., 2006; Mom et al., 2009), but it fails to recognize that such collaboration may not occur automatically: Individual organizational units need to be motivated to engage and interact when necessary (Hauptman and Hirji, 1999). The structural features that we have studied may provide such motivation. For example, decision autonomy could inform perceptions that collaborating with other organizational units is *feasible* and within their control (Ajzen, 1985; Ambrose and Kulik, 1999). In turn, the *desirability* of cross-functional collaboration might be stimulated to the extent that a focal unit's rewards depend on the performance of other units, which increases the perceived need to leverage expertise across department borders. Future research should assess the level of such cross-functional collaboration directly and investigate its role in the effective implementation of alignment and adaptability, together with that of structural features.

5.2. *Limitations, future research directions, and practical implications*

This study has some limitations whose consideration may offer opportunities for further research. First, though we focus on two critical structural arrangements – decision autonomy and shared responsibility – the consideration of factors that capture the *social* nature of intra-organizational interactions, such as trust (Dayan et al., 2009) or commitment (Song et al., 2006b), could provide additional insights into how internal organizational conditions shape the performance effects of firms' alignment and adaptability pursuits.

Second, we asked respondents to reflect on the characteristics of their firm's management systems (alignment and adaptability) and structural features (decision autonomy and shared responsibility) in the context of its 'current or recent situation.' The 3-year time frame used for our performance measure thus means that our dependent variable may not be perfectly concurrent with the independent and moderating variables. It is worth noting though that we found a positive correlation between our performance measure, and the firms' revenue growth and income growth assessed 1 year after the survey. The regression results based on these growth measures are also consistent with those reported in Table 3. Nevertheless, the cross-sectional nature of our data demands caution before drawing causal inferences because the relationships we examine may be susceptible to reverse causality. Although our hypotheses emerge from a strong theoretical grounding, organizational units in high-performing firms, for example, could use slack resources to promote economies of scope through alignment or undertake more risky activities through adaptability. Further research should eluci-

date and distinguish among the various internal causal processes by studying the inter-relationships among alignment, adaptability, performance, and intra-organizational contingencies over time.

Third, our results are based on surveys of firms in Canada. Even though we do not expect much variation in the findings between Canadian and other Western contexts, cultural factors could interfere with the arguments we apply, particularly if the dominant national culture is at odds with the firm's internal position toward intra-organizational collaboration and exchange (Hofstede, 2001).

From a practical point of view, this study provides insights into how firms can optimize the successful development of new products and services through specific structural features. We do not subscribe to the idea of universal benefits of either decentralized decision making or shared responsibility across organizational units. Rather, we acknowledge the practical importance of establishing appropriate coordination between these features and the different foci of the firm's activities, such as activities aimed at incremental changes (alignment) versus radical changes (adaptability). To enjoy enhanced performance from incremental new products that align closely with previously accumulated knowledge and experience (Olson et al., 1995; Song and Thieme, 2009), organizations should adopt a centralized decision-making structure. In contrast, to leverage the performance potential inherent to developing breakthrough innovations – in which case organizational units likely are less familiar with new product ideas or less certain of the paths to success (O'Connor and DeMartino, 2006; Griffin et al., 2009) – the firm should combine a joint reward system with decentralized decision making (McCarthy et al., 2006), unless there is strong reason to expect that the latter would distract organizational units from sharing the critical resources needed to successfully implement breakthrough ideas (Prahalad and Hamel, 1990). More generally, this study helps top management better understand how particular features of organizational design can have contrasting effects on the ability to implement change and flexibility successfully while still maintaining a minimum level of continuity and stability (March, 1996). This realization is critically important because firms' competitive advantage relies heavily on their ability to adapt and transform themselves, yet they also must leverage 'the ongoing benefits of historically rooted efficiencies' (Smith and Tushman, 2005, p. 523).

To conclude, this study reveals the contingency effects of decision autonomy and shared responsibility on the relationship of alignment and adaptability with firm performance. In light of the tension between the performance implications of the firm's alignment and adaptability ambitions, we hope this study serves as a precursor of further research into the boundary conditions that might influence the effectiveness of these ambitions.

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Notes

1. To illustrate the discriminant validity of the independent and moderating variables, we find the following chi-square difference ($\Delta\chi^2(1)$ scores: 22.69 ($P < 0.001$) for alignment and adaptability, 41.48 ($P < 0.001$) for decision autonomy and shared responsibility, 65.03 ($P < 0.001$) for alignment and decision autonomy, 33.58 ($P < 0.001$) for alignment and shared responsibility, 46.20 ($P < 0.001$) for adaptability and decision autonomy, and 32.84 ($P < 0.001$) for adaptability and shared responsibility.
2. These results are not reported in full because of space constraints, but they are available on request.
3. We thank an anonymous reviewer for suggesting this robustness check.

Narongsak (Tek) Thongpapanl is an Associate Professor of Marketing and New Product Development at Brock University, Canada. He received his PhD in Management from the Lally School of Management and Technology (Rensselaer Polytechnic Institute). His main research and teaching interests include NPD, technology and innovation management, electronic commerce, and strategic marketing management in dynamic environments. His research has appeared in a number of academic journals including the *Journal of Product Innovation Management*, *Journal of Business Venturing*, *IEEE Transactions on Engineering Management*, *Journal of the Academy of Marketing Science*, and *Journal of Computer Information Systems*, among others. Currently, his research (funded by the Social Sciences and Humanities Research Council of Canada) investigates the exploration-exploitation tension that often presents problems in the implementation of both incremental and radical innovations, especially in highly dynamic settings.

Dirk De Clercq is Professor of Management at Brock University, Canada. He received his PhD in Business Administration from the University of Minnesota. His research has been published in *Journal of Management Studies*, *Journal of International Business Studies*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, *Journal of Product Innovation Management*, and *IEEE Transactions*

on Engineering Management, among others. His research interests are in entrepreneurship, innovation, venture capital, firm internationalization, and cross-country studies. He teaches in the areas of entrepreneurship and research methods.

Dimo Dimov is Professor of Entrepreneurship and Director of Doctoral Programmes at Newcastle University Business School, UK. He received his PhD in Management (Entrepreneurship) from London Business School. His research has been published in *Journal of Management Studies*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, *Journal of Product Innovation Management*, and *IEEE Transactions on Engineering Management*, among others. His research interests are in entrepreneurship, entrepreneurial finance, and innovation. He teaches in the areas of entrepreneurship, entrepreneurial finance, and research methods.