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Alignment's nomological network: Theory and evaluation

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ABSTRACT

While the importance of IT-business alignment is rarely questioned, a strong theoretical foundation of alignment's nomological network has not been developed or tested. This has generated a debate on why tighter alignment may or may not lead to higher levels of firm performance. To further understand the alignment-performance relationship, we used meta-analytic structural equation modeling techniques to probe the inter-relationships found in 78 independent data sets drawn from the literature. We find intellectual alignment influences operational alignment, identify a more nuanced understanding of the performance constructs, and offer insight into how governance structure and social alignment influence intellectual and operational alignment.

1. Introduction

Information technology (IT) executives have considered IT–business alignment (hereafter referred to as alignment) a top priority for over 30 years [1]. Responding to the concerns of practitioners, scholars have extensively studied the relationship between alignment and firm performance to try capturing the value that IT generates for firms [2]. Despite the research effort for over 30 years, a strong theoretical foundation that explains and predicts when and how alignment leads to increased performance (e.g., profitability) [3] or decreased performance (e.g., inflexibility) is absent [4]. A recent meta-analysis suggests a need to acquire a more nuanced understanding of the alignment paradox [5]. With high corrected population correlation point estimates between alignment types and overlapping credibility intervals for many alignment–performance relationships, Gerow et al. [5] called for the development of systematic, theory-based explanations for if, when, and why unique relationships exist between alignment and performance. Given alignment's potential positive outcomes for firms [6], ongoing practitioner interest in the topic [1], and the uncertainty of the unique relationships between alignment and performance [5], our broad objective is *to present theoretical arguments that offer a more nuanced understanding of the alignment–performance relationship*. Therefore, we address the following series of research questions:

1) How should we represent or conceptualize alignment? Although alignment has been studied extensively, one possible source of contradictory findings is that scholars use inconsistent definitions of alignment [7]. For example, some indicate "alignment" as the link between IT and business strategies [8], while others define it as the fit between IT and business infrastructures and processes [9]. The existing empirical alignment research does not always specify the alignment dimension; rendering it difficult to aggregate findings across studies. As the meta-analysis by Gerow et al. [5] indicates that the existing research can be mapped to specific alignment dimensions, which may be unique, this study extends the alignment literature by evaluating empirical evidence for the importance of uniquely defining and examining the alignment types.

2) What is the effect of alignment on firm performance? Firm performance is a broadly used term and therefore is not often consistently operationalized across studies [10]. Could different alignment dimensions relate to different types of firm performance? If alignment is key to firms getting the most out of their IT investments [11], it is important for us to understand the nuances of how alignment's dimensions relate to firm performance. As the meta-analysis by Gerow et al. [5] provides evidence that direct relationships between each alignment–performance relationship can be examined individually and could be unique in some instances (e.g., customer benefit with intellectual and operational alignment), we extend their work by evaluating whether indirect relationships exist between alignment and performance, offering a more nuanced configuration of the performance constructs and empirically examining the unique relationships between the alignment and performance types.

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0378-7206/

3) Do other factors help explain the relationship between alignment and firm performance? Empirical studies have been conducted regarding how different factors facilitate alignment [2]. However, scant research has systematically examined the larger nomological network surrounding alignment and firm performance or examined contingencies that shape the strength of those relationships [7]. While the Gerow et al. [5] meta-analysis offers a comprehensive overview of the commonly studied alignment model variables, we extend their work by studying governance structure and social alignment as drivers of alignment.

Precisely, this study investigates the Gerow et al. [5] meta-analysis by developing theoretical explanations for the relationships between alignment, performance, and alignment's antecedents. Thus, it contributes to alignment research in three ways. First, we propose and empirically validate that intellectual and operational alignment should be addressed uniquely and simultaneously, as the former influences the latter. Second, we argue and find that intellectual and operational alignment are uniquely related to the different types of firm performance and that the alignment–financial performance relationship is mediated by customer benefit. Third, we propose understanding the social-operational alignment relationship is as important as understanding the social–intellectual alignment relationship.

In order to address our research questions, we evaluate the alignment literature in two steps. In the first step, we conduct a *narrative review* of the alignment literature. In particular, we discuss key theories used in the IT literature to define and understand alignment. On the basis of our review, we propose a model of alignment's nomological network. In the second step, we conduct a *meta-analytic structural equation modeling (MASEM) analysis* of the literature. We describe our MASEM procedure and evaluate the magnitude of the relationships between alignment and other constructs in our model. We conclude this study with a discussion of the findings of our narrative review and MASEM, present their implications for research and practice, and highlight opportunities for future research.

2. Narrative review and theoretical development

We broadly review alignment research as a means to extract a literature-based nomological network of relationships that connects alignment to its antecedents and consequences. First, we offer a narrative review of the literature that identifies alignment's dimensions, defines the most frequently investigated forms of firm performance, and explains the relationships between these constructs. Then, we discuss major theoretical perspectives that inform our understanding of alignment's nomological network as a means to develop a testable structural equation model that connects alignment to firm performance.

2.1. Alignment and its dimensions

We address our first research question, *How should we represent or conceptualize alignment?*, by defining alignment as the fit[1] between the needs, demands, goals, objectives, and/or structures of business strategy, IT strategy, business infrastructure and processes, and/or IT infrastructure and processes such that management of business and IT remain in harmony [15,16]. More specifically, there are two main types of alignment commonly discussed in the literature: intellectual and operational. Intellectual alignment is "the degree to which the mission, objectives, and plans contained in the business strategy are shared and supported by the IS strategy" [17 pp. 27]. Operational alignment is "the link between organizational infrastructure and processes and I/S infrastructure and processes" [15 pp. 476]. The evolution of intellectual and operational alignments is described below.

2.2. Intellectual alignment

In the 1970s, King's [18] seminal work directed attention to examining consistencies between the strategic, *external* levels of business and IT. He defined alignment as the link of "the organization's 'strategy set' to an MIS 'strategy set'" (pp. 27). In other words, King focused on a one-way link such that IT strategy should support the business strategy. In the following decades, researchers further refined this definition of "strategy sets" by including "missions, objectives, and strategies" [19 pp. 3], plans/planning [8,20], and orientation [21,22]. Some researchers also emphasized a two-way link between IT and business strategies such that IT strategy may change business strategy, particularly through IT-based strategic initiatives [23,24], or should be fused with business strategy to create differential value [25]. By these later definitions, alignment is considered a goal to pursue/achieve rather than a by-product of good IT strategic creation or implementation [6,20].

Not unlike the definition, terminology that describes the "link" introduced by King [18] has grown more nuanced since the 1970s. More recently, terms such as "alignment" [20,21,26], "interrelated" [8], and "harmony" [22] describe this link [27 pp. 51]. These terms have been used to describe how firms bring their IT and business strategies (i.e., missions, objectives, plans, or orientations) into agreement (i.e., linking, aligning, interrelating, or harmonizing). Therefore, this type of alignment is referred to as strategic or *intellectual alignment* [2,28,29], which is "the degree to which the mission, objectives, and plans contained in the business strategy are shared and supported by the IS strategy" [17 pp. 27].

2.3. Operational alignment

In the early 1990s, IT strategy researchers expanded their focus to also consider the "corresponding *internal* domains" of alignment [15 pp. 476]. Among the first to do so, Lee and Leifer [30] considered alignment between the business and IT infrastructures [similar terminology has been used by 9, 31, 32]. Such "infrastructures" refer to the internal design of the business or IT including policies (e.g., employee hiring or security), procedures (e.g., customer service or scheduling), personnel (e.g., existing employees), systems (e.g., hardware and software), and structure (e.g., centralization vs. decentralization) [15]. Researchers expanded this conceptualization to also include internal activities and processes [33,34] such as work flow, product/IT development, customer service, or data center operations [15]. Rather than aligning distinct sets of strategies, this study suggests that this type of alignment depends on management's ability to integrate the infrastructures and processes of the business operations and IT.

Refinements of Lee and Leifer's [30] reference to alignment occurred in the 2010s. Examples include terms such as "coordinating" [33], "fit" [9,31], "integration" [35], and "extent of adoption" [34]. Similarly to intellectual alignment researchers, operational alignment researchers suggest business and IT infrastructures and processes should be integrated such that alignment is a goal to be achieved rather than a by-product of good IT implementation [9]. Across studies, theories and terms

[1] We acknowledge that both "fit" and "alignment" have been well researched in the organizational theory literature [12–14]. Fit is broadly defined as the "the match between two or more factors" [12 pp. 537] and alignment is broadly defined as "the degree to which the needs, demands, goals, objectives, and/or structures of one component are consistent with the needs, demands, goals, objectives, and/or structures of another component" [14 pp. 119]. For the purposes of this research, we adopt the narrow definition of alignment from Henderson and Venkatraman [15] and use fit as one of the many synonyms of alignment.

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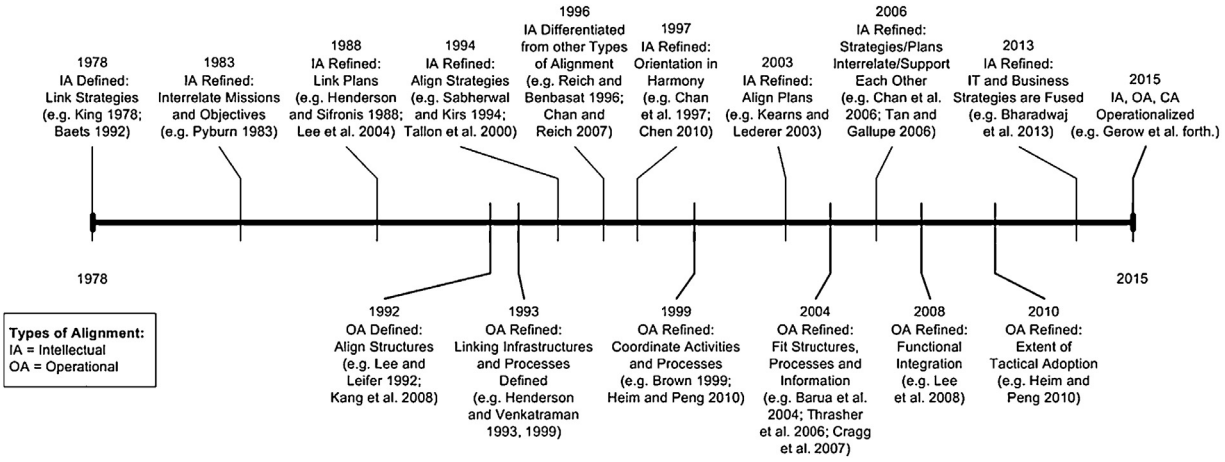

Fig. 1. Alignment timeline.

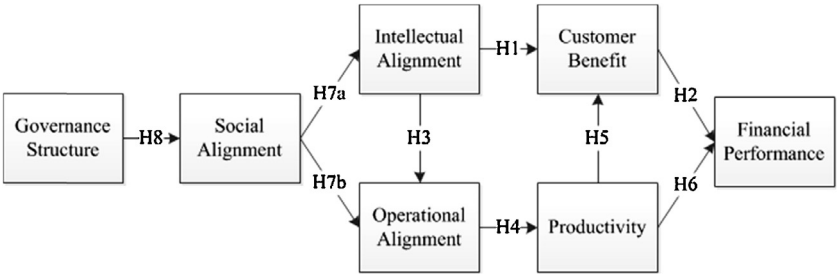

Fig. 2. Proposed model.

addressed similar aspects of *operational alignment* which is defined as "the link between organizational infrastructure and processes and I/S infrastructure and processes" [15 pp. 476].

Our review of the alignment literature demonstrates that the alignment construct's definition and operationalization has evolved over the past 30 years (Fig. 1). Early research on alignment focused specifically on the concept of aligning the strategies of IT and business. As the research on IT strategy matured, academics expanded research to include examining the alignment of infrastructures, activities, and processes. More recently, researchers have started examining multiple alignment types simultaneously [36]. Our research focuses on examining relationships from alignment to firm performance.

2.4. Defining firm performance

We address our second research question, *What is the effect of alignment on firm performance?*, by first defining performance in terms of three overarching types: financial performance, productivity, and customer benefit [37]. While the IT value literature uses multiple performance categories [38,39], these broad categories are commonly used in IT research [39,40]. Financial performance refers to the firm's ability to "gain competitive advantage and therefore higher profits or stock values" [37 pp. 123]. Productivity refers to the measure of the contribution of various inputs to the total output (e.g., gross marginal product and reduced inventories) [37,39]. Customer benefit includes the conferred cost savings of a given purchase as well as the established, sustained, and improved relationship with the company overall [26,37].

Given the considerable literature support for a positive alignment–performance relationship, yet the sometimes contradictory findings (i.e., the alignment paradox), we predict that the different alignment dimensions may be uniquely related to each performance type. These relationships are illustrated in Fig. 2 and our model is explained below.

2.5. Intellectual alignment with the performance types

When pursuing intellectual alignment, firms are primarily focused on external strategies associated with IT. In other words, firms develop strategies ensuring that customers will purchase their products more than those of their competitors (consider Neiman Marcus' mission: "Neiman Marcus Stores will be the premier luxury retailer recognized for merchandise leadership and superior customer service. We will offer the finest fashion and quality products in an exceptional environment"[2]). This typically involves enhancing their image as a quality provider through customer intimacy, innovation, product development, and brand management [26,37]. IT supports this by providing firms with the capacity to pursue more customer-facing initiatives such as automating and managing relationships through the customer life cycle [41]. For example, customer relationship management (CRM) systems store detailed information about the customer from numerous channels to build customer intimacy so that every business department has a thorough understanding of the customer's purchasing habits and preferences [42]. Ideally, understanding the customer and then more effectively meeting customer needs than competitors will lead to higher customer satisfaction (i.e., customer benefit) and, ultimately, will provide a competitive advantage and higher revenue growth (i.e., financial performance) [41].

Previous research suggests that intellectual alignment can create a sustainable competitive advantage because it helps firms

[2] Quote from http://retailindustry.about.com/od/famousretailers/p/neimanmarcuspro.htm downloaded 20130605. This reflects their complete Corporate Mission on their website: http://www.neimanmarcuscareers.com/story/mission.shtml downloaded 20130605.

assimilate and utilize their IT capabilities in a unique way [20,43]. If this alignment is accomplished in a manner superior to competitors or if competitors cannot duplicate these capabilities [41], firms may observe improvements in their customer relationships (i.e., customer benefit) and, ultimately, higher market share and revenue growth (i.e., financial performance) [26,41]. In particular, research indicates that firms which foster higher levels of intellectual alignment achieved a higher long-term profitability, availability of financial resources, and sales growth than those with lower IT alignment (i.e., they have a unique advantage by developing intellectual alignment) [44]. Thus, we posit that firms pursuing intellectual alignment will be better positioned to attain higher levels of customer satisfaction (i.e., customer benefit) [45] and, in turn, create a competitive advantage [46] and achieve superior financial performance [11]. Hence, we propose the following hypotheses:

H1. Firms with higher levels of intellectual alignment will be associated with higher levels of customer benefit.

H2. Firms with higher levels of customer benefit will be associated with higher levels of financial performance.

2.6. Operational alignment with the performance types

Some firms may choose a strategy that involves improving their internal capabilities by aligning their complementary IT and organizational resources [15]. Ultimately, this allows firms to offer customers lower prices and to beat their competition through low-cost leadership (consider Walmart's mission: "Saving people money so they can live better"[3]). Unlike firms that strictly pursue intellectual alignment, these firms emphasize productivity by focusing more specifically on operational excellence, efficiency, and economies of scale [17]. Such firms can use IT to streamline or automate business processes, control inventory, and coordinate the supply chain [41]. For example, enterprise resource planning (ERP) or supply chain management (SCM) systems are used by many firms to implement industry best practices. These systems help firms improve their supply chain efficiencies (i.e., productivity) [47] and, ultimately, offer lower prices to customers (i.e., customer benefit) and enhance the firm's sustained low-cost leadership (i.e., financial performance) if competitors fail to achieve the same level of efficiencies [37].

In particular, operational alignment may help the firm accelerate its development process and reduce its development costs (e.g., administrative expenses) and customer acquisition costs (i.e., productivity) [41]. In turn, this may help the firm achieve new product success because customers can purchase their products more quickly and at a lower price (i.e., customer benefit). This may be particularly true if the competitors find it difficult to replicate IT processes that are well integrated with firm-specific processes which reflect the company's culture, history, and experience [34]. Ultimately, a firm that has established a culture of information sharing and coordination between its business functions (e.g., manufacturing and sales) is more likely to align its goals and activities. This results in stakeholders having a better understanding of the limitations and capabilities of each department; in turn, the firm will be more likely than its competitors to respond quickly and effectively to new opportunities in the marketplace (i.e., competitive advantage and financial performance) [41]. Hence, we propose the following hypotheses:

H3. Intellectual alignment will be associated with operational alignment.

[3] Quote from http://corporate.walmart.com/our-story/ downloaded 20130605.

H4. Firms with higher levels of operational alignment will be associated with higher levels of productivity.

H5. Firms with higher levels of productivity will be associated with higher levels of customer benefit.

H6. Firms with higher levels of productivity will be associated with higher levels of financial performance.

2.7. Theoretical perspectives in the alignment literature

In order to address our third research question, *Do other factors help explain the relationship between alignment and firm performance?*, we consider the resource-based view (RBV) of the firm as a theoretical perspective that is commonly discussed in the alignment literature to support antecedents of the alignment–performance relationship (Fig. 2).

RBV [48] evaluates how the unique combinations of IT resources, business resources, and knowledge facilitate alignment and, in turn, drive firm performance. RBV also analyzes a firm based on its tangible or intangible assets (i.e., resources) that are "tied semipermanently to the firm" [49 pp. 172]. RBV posits that a firm achieves sustained competitive advantage when it possesses valuable and rare resources and protects these resources against imitation, transfer, and substitution [48,50]. RBV provides the theoretical logic linking alignment to firm performance, as alignment is an asset (capability) resulting from several different factors and is critical for firm performance [20]. IT strategy researchers have used RBV to direct attention to two major constructs that explain firms' alignment capabilities: social alignment and governance structures.

Social alignment is "the state in which business and IT executives within an organizational unit understand and are committed to the business and IT mission, objectives, and plans" [29 pp. 82]. While intellectual and operational alignment are defined by the tangible links (i.e., it is possible to observe the cross-references) between business and IT strategies and infrastructure/processes, social alignment is intangible, provided it is defined by the coordination, communication, understanding, trust, and/or social capital that occurs between people [28,51,52]. This indicates that social alignment reflects the intention of two or more people to work together to collectively build trust and learn how to exchange knowledge so they can coordinate with each other [7,52]. When executives are socially aligned, they are able to share higher levels of knowledge such as discussing business requirements in the context of the appropriate use of IT or considering the role of IT in the organization as either a supporter or driver of the business [10,53]. By sharing this knowledge, business and IT can integrate their goals and procedures to more effectively develop and use IT [7,10,43].

For developing strategies in today's dynamic and uncertain environments, integrating perspectives from several different actors is critical; therefore, we predict that social alignment contributes to intellectual alignment because business and IT executives who clearly communicate their respective strategies and goals for IT are more likely to reciprocally impact the other [6,7,52]. Similarly, process-level implementation is difficult, particularly with limited resources; therefore, communication and integration across functional boundaries can foster mutual support and commitment that could ensure alignment success, establish effective IT development and use practices, and, ultimately, generate inimitable IT assets [10,54,55]. Thus, we predict that social alignment contributes to operational alignment because leaders who understand their process-level systems (e.g., ERP) and formulate clear objectives for these systems are more likely to encourage and pursue internal alignment [10,29,32]. Hence, we propose the following hypotheses:

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Table 1
Hypotheses results for MASEM.

Hypothesis	Findings
H1: Firms with higher levels of intellectual alignment will be associated with higher levels of customer benefit.	Supported
H2: Firms with higher levels of customer benefit will be associated with higher levels of financial performance.	Supported
H3: Intellectual alignment will be associated with operational alignment.	Supported
H4: Firms with higher levels of operational alignment will be associated with higher levels of productivity.	Supported
H5: Firms with higher levels of productivity will be associated with higher levels of customer benefit.	Supported
H6: Firms with higher levels of productivity will be associated with higher levels of financial performance.	Not Supported
H7: Higher levels of social alignment will be associated with higher levels of a: intellectual b: operational alignment.	H7a Supported
H8: Centralized governance structures will be associated with higher levels of social alignment.	Supported

H7. Higher levels of social alignment will be associated with higher levels of

H7a. intellectual alignment.

H7b. operational alignment.

While social alignment considers the commitment and shared understanding or knowledge between business and IT [52], governance addresses the organizational role of IT (i.e., "the accountability framework") [56,57 pp. 68].[4] The firm's governance structure is a resource or capability that the firm can use to exploit its opportunities and create alignment [43]. It includes concepts such as structural compatibility and the structure of authority in the organization [32] and is "characterized by [a firm's] level of decentralization, formalization, and complexity" [58 pp. 130].[5] This discussion examines the person in charge of managing IT resources–the central organization or the functional/user departments [59]. An effective governance structure can help facilitate better communication and understanding between business and IT employees [60], ensure correct IT priorities are established [61], and establish credibility and trust between business and IT employees [62]. Less-effective governance structures can result in poor communication and reluctance of business and IT employees to work together [60]. Because centralization of IT decisions may facilitate the interaction between IT and business managers such that they are more likely to have a better mutual understanding, we expect that a centralized governance structure will provide an opportunity for a higher level of social alignment [63]. Hence, we propose the following hypotheses:

H8. Centralized governance structures will be associated with higher levels of social alignment.

3. MASEM procedure

Following Webster and Watson [64] and the techniques of Hunter and Schmidt [65], we searched in journals, conference proceedings, and dissertations to identify empirical studies on alignment through June 2013[6]. In order to be included in this research work, the study had to have at least one dimension of alignment as defined by Henderson and Venkatraman [15,16], be conducted at the firm level, provide a correlation between alignment and one of our other variables, and provide an independent data set (e.g., not used in an earlier publication). For each study, we coded basic article information (e.g., author, year, and article type), the type of alignment, and relevant statistics (e.g., correlations, reliabilities, and sample sizes). This resulted in a total of 71 papers, or 78 individual data sets, for the meta-analysis (information on sample sizes and their sources can be found in Appendix A, which identifies the six papers that included two or more studies). Of these papers, 53 were journal articles, 11 were dissertations, and seven were conference papers.

We used the Hunter–Schmidt approach to meta-analysis [65] and ran the analysis using the Schmidt–Le program [66]. The resultant meta-analytically derived correlation matrix was also used in ref. [5]. In this study, we used EQS 6.1 for Windows [67] to statistically examine this matrix and test our model with MASEM [68]. We also used IBM's SPSS Statistics Version 20 to run *t*-tests to compare the corrected population correlation estimates for constructs in our model.

4. Results

Our meta-analysis of the data resulted in corrected population correlation point estimates as shown in Appendix B. Before using this correlation matrix as input for our MASEM, we calculated the harmonic mean using Eq. (1) [69]:

$$\text{Harmonic Mean} = N/(1/a_1 + 1/a_2 + \cdots + 1/a_N) \quad (1)$$[7]

Using the harmonic mean of 36 for the number of cases, we evaluated the hypotheses in our model (Fig. 2). Given our small sample size, it is possible to falsely reject our model; therefore, we reanalyzed the model and used an acceptable fit index for the standardized root-mean-square residual (SRMR) as <0.08 and an acceptable fit index for the comparative fit index (CFI) as >0.95 to evaluate the model fit [70,71]. Results of the MASEM showed that our model fit the data (SRMR = 0.16, CFI = 0.94, $\chi^2 = 12.57$, df = 12). In addition, the results revealed significant relationships between intellectual alignment and customer benefit ($\beta = 0.38$; H1), customer benefit and financial performance ($\beta = 0.49$; H2), intellectual and operational alignments ($\beta = 0.86$; H3), operational alignment and productivity ($\beta = 0.45$; H4), productivity and customer benefit ($\beta = 0.40$; H5), social and intellectual alignments ($\beta = 0.70$; H7a), and governance structure and social alignment ($\beta = 0.76$; H8). The results are shown in Table 1 and Fig. 3.

We also tested a partially mediated model where we included links from intellectual and operational alignment to all performance types and from governance structure directly to intellectual alignment. Results of the MASEM showed that our model weakly fit the data (SRMR = 0.15, CFI = 0.81, $\chi^2 = 8.46$, df = 7). The insignificant chi-square difference test for the partially mediated model compared to the fully mediated model indicates that the two models fit the data equally well ($\Delta\chi^2 = 4.11$, Δdf = 5, p = n.s.). In order to check our findings, we also performed Sobel's [72] test for mediation

[4] Thanks to an anonymous reviewer for making this distinction.
[5] Of the 14 primary studies that included governance structure in their correlations with alignment, 10 modeled governance structure as an antecedent of alignment. Therefore, we argue the treatment of governance structure as an antecedent is consistent with the literature.
[6] We used keywords such as "alignment," "strategic alignment," and "IT–business alignment" to search for all relevant articles in electronic databases such as Academic Search Premier, Business Source Premier, and Science Direct.
[7] N = number of studies; a = original study sample size.

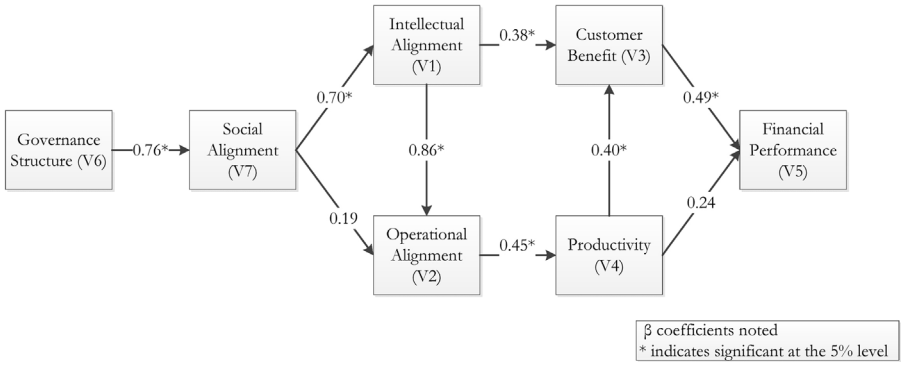

Fig. 3. MASEM results.

using the approach of Baron & Kenny [73] and found that only the relationship between governance structure and intellectual alignment is mediated by social alignment (Appendix C).

We used *t*-tests to compare the corrected population correlation estimates of our alignment–performance relationships [74]. Comparing intellectual and operational alignment across the three performance types, we found that the relationship between operational alignment and customer benefit was significantly higher ($\widehat{\rho} = 0.54$) than that between intellectual alignment and customer benefit ($\widehat{\rho} = 0.27$). We also used *t*-tests to compare the corrected population correlation estimates between alignment and the other variables. For governance structure, we found a significantly higher correlation for intellectual alignment ($\widehat{\rho} = 0.64$) than operational alignment ($\widehat{\rho} = 0.28$).

5. Limitations

Before discussing our findings, we acknowledge the limitations of this study. First, we found only a few studies for several relationships in our correlation matrix (i.e., small meta-analysis sample size) and a large proportion of these studies considered only a small number of organizations (i.e., small harmonic mean for the MASEM). Interpreting significance levels in meta-analysis should be approached with caution, particularly when sample sizes are not large [65]. While we would have preferred to include more studies in our analysis, to the best of our knowledge, we captured all relevant alignment studies. This suggests that our test is comprehensive albeit weaker due to the lack of research in some areas of alignment's nomological network. In regard to the small sample size for the MASEM, we tested the model using simple average *n* (151) and a modified harmonic mean (83), where studies with sample size < 10 were removed from the calculation[8] [8 with six firms, 75 with nine firms, and 76 with one firm]. We found similar fit statistics for the simple average *n* (SRMR = 0.16, CFI = 0.93, $\chi^2 = 69.27$, df = 12) and modified harmonic mean (SRMR = 0.16, CFI = 0.93, $\chi^2 = 37.87$, df = 12), but the hypotheses would all be supported using the simple average *n* and all the hypotheses except H7b would be supported using the modified harmonic mean. Because the harmonic mean is typically used by MASEM researchers as the more conservative approach, we believe that our presented results are appropriate. We hope this weakness will inspire researchers to explore these relationships more in the future.

Second, recent studies have questioned the Baron and Kenny approach to testing mediation [77,78], but we could not use a product of coefficients strategy [79] as we are working with aggregate data that are not suitable for resampling (i.e., we only have correlations between variables, so we do not have three variables for the bootstrapping) and we do not have the minimum sample size of 25 recommended for using this strategy [79 pp. 725].

Finally, we approached alignment as a targeted outcome or static end-state to support the extant literature. While the dynamic view of alignment ("alignment is not an event but a process of continuous adaptation and change" [15 pp. 473]) has assumed prominence in the literature due to its relevance for understanding rapidly changing contemporary environments [80,81], very few studies have examined it empirically [82]. A recent publication [83] was only able to identify two studies that evaluated alignment as a dynamic process [84,85]. Given its importance but dearth of empirical support, we encourage future researchers to consider the dynamic nature of the alignment types both theoretically and empirically. Two main frameworks that could be used for this theoretical development exist: the dynamic capabilities framework and the coevolutionary perspective.

Dynamic capability refers to "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments...[in order] to achieve new and innovative forms of competitive advantage" [86 pp. 516]. In particular, this perspective emphasizes that managerial capabilities, such as alignment, must be developed intentionally over time rather than being acquired [6]. Thus, alignment can be used to maintain flexibility in the firm's business/IT strategies and processes in response to environmental changes [6].

Coevolution is "the joint outcome of managerial intentionality, environment, and institutional effects...[such that] change may occur in all interacting populations of organizations" [87 pp. 526]. In particular, this perspective emphasizes that business and IT must continually adjust to each other, resulting in alignment that is often complex and undefined [42]. Thus, firms need to address any misfit between IT and business by continually refining and fine-tuning their business and IT strategies and processes [82]. In sum, the dynamic capabilities and coevolution perspectives suggest that firms need to constantly adjust to the changing business environment by developing the capability to adapt and match strategies to processes. By doing so, firms may realize an "alignment over time" [81 pp. 745], referred to as dynamic alignment.

6. Discussion

We summarize our key findings and research and practice implications in Table 2. We use the table to frame our discussion of the three research questions.

6.1. Research question 1: how should we represent or conceptualize alignment?

Alignment has been treated as a general, overarching term with multiple conceptualizations and definitions. This has led to a

[8] We also ran this with sample sizes < 30 removed from the calculation (seven total studies dropped; *n* = 108) with the same results except for CFI = 0.92.

Table 2
Key findings and research and practice implications.

Research question	Findings	Past research	Future research	Implications for practice
How should we represent or conceptualize alignment?	• intellectual and operational alignment are unique, where the former influences the latter	• unclear differentiation between the dimensions of alignment where all were frequently combined into a single construct (i.e., "alignment" or "strategic alignment") • intellectual and operational alignment are highly correlated so they may not be distinct empirically [5]	• specify the distinct type of alignment under evaluation • specifically consider operational alignment, individually and with intellectual alignment • empirically examine cross-domain and dynamic alignment	• aligning strategies can have a positive influence on the alignment of infrastructures and processes
What is the effect of alignment on firm performance?	• intellectual alignment directly influences customer benefit and indirectly influences productivity and financial performance • operational alignment directly influences productivity and indirectly influences customer benefit and financial performance	• referred to the broad concepts of "alignment" and "firm performance" without clearly defining the specific question • potentially unique relationships are identified with customer benefit but no other performance type [5]	• clearly define the alignment dimensions and performance types being studied • examine the productivity–financial performance relationship more closely to check if and why it is insignificant when operationally aligned	• in order to increase customer benefit, and ultimately financial performance, firms can align either their IT and business strategies or their IT and business infrastructures and processes • in order to increase productivity, and ultimately customer benefit, firms should align their IT and business infrastructures and processes
Do other factors help explain the relationship between alignment and firm performance?	• a centralized governance structure is more highly associated with tighter social alignment • social alignment is positively associated with intellectual alignment but not operational alignment	• emphasized the social alignment relationship with intellectual alignment • intellectual and operational alignment are uniquely related to governance structure but may not be uniquely related to social alignment [5]	• determine if and why social alignment does not influence operational alignment	• in order to improve the alignment of IT and business strategies, IT and business executives should commit to a more complete understanding of each other's domains • in order to improve social alignment, firms can consider implementing a centralized governance structure to facilitate consistency in communication and collaboration

perceived inconsistency in alignment's nomological network. In trying to identify a clear definition of the alignment construct, we found that most alignment definitions in the literature can refer to the fit between either the business and IT strategic domains–*intellectual alignment* or the business and IT infrastructures and processes–*operational alignment*. We revealed in this study that these different definitions matter, particularly when considering different types of performance (see Research Question 2 below). When researchers do not clearly specify the alignment type, it can make it difficult to consistently interpret the results across studies. As the prior inconsistencies map consistently onto our dimensions of alignment, this reveals the problem with failing to define alignment clearly. If previous definitions did not map consistently, we would challenge the dimensions themselves. In sum, we propose that future research will yield a more consistent representation of alignment as long as the alignment type is clearly specified. In order to enable consistent interpretation across studies, we offered crisp definitions of each dimension, mapped the existing literature according to the appropriate dimension, and then analyzed a research model tying alignment's dimensions to constructs in alignment's nomological network.

While the recently published alignment meta-analysis [5] suggests that this unique consideration of alignment types is important, the authors did not provide theoretical explanation for this uniqueness nor did their results (with high correlations and overlapping credibility intervals) provide convincing evidence of the distinctions. We answered the call of these authors to further examine alignment's nomological network with results that have three important implications for future research. First, by theoretically distinguishing and empirically illustrating meaningful differences between intellectual and operational alignment, we provided evidence that it is necessary for future researchers to specify the type of alignment being studied. By doing so, researchers will more effectively connect their work with the existing literature and will more likely make consistent interpretations in future work that examines alignment. Second, more researchers should specifically consider operational alignment (either individually or with intellectual alignment) as this alignment type is neglected when compared with intellectual alignment. Finally, since we found very few studies that empirically examined cross-domain alignment ("the degree of fit and integration among business strategy, IT strategy, business infrastructure, and IT infrastructure" [2 pp. 300], [15]) or dynamic alignment, we recommend future researchers use longitudinal research to determine whether firms are able to continually adapt their strategies and processes to achieve alignment over the long term (e.g., alignment maturity as discussed in ref. [6]). This is particularly critical as today's environments tend to be uncertain and dynamic. While firms that have achieved alignment are aware they have to continue innovating and adjusting to their environment to maintain their competitive advantage (e.g., organizational ambidexterity or agility) [88], IT cannot always be adapted to changing business processes as legacy systems might preclude dynamic alignment. This suggests firms responding to environmental changes require dynamic intellectual alignment to ensure the IT strategy can adjust to the aspirational business strategy, dynamic operational alignment to create flexibility and responsiveness, and dynamic cross-domain alignment to create the dynamic capability to execute, transform, and remain agile.

6.2. Research question 2: what is the effect of alignment on firm performance?

After delineating the dimensions of alignment, we also examined alignment's connections to multiple types of firm performance. Notably, firm performance can refer to *financial*

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success of the firm, *productivity* improvements, or enhanced *customer benefits*. By examining each relationship individually, we found that alignment is important for firm success and that academics' investment in predicting and understanding alignment's implications is well placed. While this confirms the findings of Gerow et al. [5] that there are potentially unique relationships between the alignment and performance types, our study provides a deeper insight by indicating that not all alignment types directly influence every type of firm performance. This suggests that researchers need to carefully consider the firm performance type they are including in their model when determining whether alignment is "successful" as "success" (or at least the level of success) appears to be dependent on both the alignment and performance type. It may be prudent for future researchers to include firm performance types other than the commonly used financial performance because our research suggests that productivity and customer benefit act as mediators between alignment and financial performance.

6.3. Research question 3: do other factors help explain the relationship between alignment and firm performance?

Using RBV, we theorized the impact of other factors on the alignment–performance relationships. While the Gerow et al. [5] meta-analysis considered direct relationships between the alignment types and governance structure, we proposed and tested social alignment as a mediator of this relationship. Our results were consistent with the previous findings that a more centralized governance structure is more highly associated with a tighter social alignment [60] and social alignment has a positive relationship with intellectual alignment [7]. However, we found a negative and insignificant relationship between social alignment and operational alignment. While we argued that there should be a positive relationship and recent research has found evidence to support this relationship [10], other researchers have suggested that social alignment alone is insufficient for ascertaining and predicting successful implementation [28]. In addition, the alignment of top executives may be irrelevant if aligning project managers is more critical for achieving operational alignment [55]. Therefore, we encourage future researchers to specifically address the translation of external goals into internal processes (e.g., cross-domain alignment).

7. Conclusion

Through a review of 30 years of alignment research, we proposed and examined unique relationships between alignment: intellectual and operational; firm performance: customer benefit, productivity, and financial performance; and context constructs: governance structure and social alignment. We found that intellectual alignment influences operational alignment, the alignment types have unique relationships with the different performance types, and social alignment influences intellectual alignment but may not influence operational alignment.

This study provides a number of implications for future research. First, researchers should not treat alignment or performance monolithically but need to specify the *dimensions* of alignment and firm performance examined in the study; failure to do this could obscure important relationships in the understanding of alignment and its impact on firm performance as our research offers a more *nuanced configuration* of the alignment–performance constructs. Second, *dynamic alignment* needs to be evaluated empirically, particularly given the ever-changing nature of business. Finally, researchers need to examine the conditions under which *social alignment* influences the different alignment types because this study shows that social alignment may not influence operational alignment.

Appendix A. Studies included in the meta-analysis

Study (source)	Sample size (s)
Armstrong and Sambamurthy 1999 [1]	153
Barua et al. 2004 [2]	1076
Bergeron et al. 2001 [3]	110
Bharadwaj et al. 2007 [4]	169
Byrd et al. 2006 [5]	84
Cataldo et al. 2012 [6]	38
Celuch et al. 2007 [7]	160
Chan et al. 2006 [8]	226, 244
Chatzoglou et al. 2011 [9]	295
Chen 2010 [10]	22
Chen and Tsou 2007 [11]	124
Chung et al. 2003 [12]	191
Cragg et al. 2002 [13]	256
Croteau and Raymond 2004 [14]	104
Fink and Neumann 2009 [15]	293
Gottschalk and Solli-Saether 2001 [16]	41
Heim and Peng 2010 [17]	238
Hong and Kim 2002 [18]	34
Hooper 2006 [19]	175
Huang 2012 [20]	109
Huang 2009 [21]	209
Hung et al. 2010 [22]	355
Kang et al. 2008 [23]	116
Kanooni 2009 [24]	126
Kearns and Lederer 2000 [25]	268
Kearns and Lederer 2003 [26]	161
Kearns and Lederer 2004 [27]	161
Kearns and Sabherwal 2006 [28]	273
Kearns 2006 [29]	20, 141
Kempaiah 2008 [30]	15
Khadem 2007 [31]	321
Kunnathur and Shi 2001 [32]	90
Lai et al. 2009 [33]	166
Lee et al. 2004 [34]	57
Lee et al. 2008 [35]	12
Li et al. 2006 [36]	49
Ling et al. 2009 [37]	72
Luftman et al. 2008 [38]	138
Masa'deh et al. 2010 [39]	180
(Masa'deh and Shannak 2012 [40]	160
Morris 2006 [41]	102
Nash 2006 [42]	9
Newkirk and Lederer 2006a [43]	161
Newkirk and Lederer 2006b [44]	161
Newkirk et al. 2008 [45]	161
Powell 1992 [46]	113
Preston and Karahanna 2009 [47]	243
Raymond and Bergeron 2008 [48]	107
Rhodes et al. 2011[49]	261
Rigoni et al. 2010 [50]	72
Rivard et al. 2006 [51]	96
Saaksjarvi 2000 [52]	33, 91
Sabegh and Motlagh 2012 [53]	136
Sabherwal and Chan 2001 [54]	62, 164, 226
Sanchez Ortiz 2003 [55]	1
Schwarz et al. 2010 [56]	58
Segars and Grover 1998 [57]	253
Stoel 2006 [58]	69
Taipala 2008 [59]	72, 76
Tallon 2000 [60]	63
Tallon et al. 2000 [61]	304
Tallon 2007 [62]	241
Tallon and Pinsonneault 2011 [63]	241
Tan and Gallupe 2006 [64]	6
Teo and King 1996 [65]	157
Teo and King 1997 [66]	157
Teo and King 1999 [67]	157
Tiwana and Konsynski 2010 [68]	90
Wang and Tai 2003 [69]	156
Yayla 2008 [70]	33, 169
Zhu et al. 2009 [71]	65

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Appendix B. Corrected population correlation point estimates for alignment's nomological network

	Intellectual alignment	Operational alignment	Customer benefit	Productivity	Financial performance	Governance structure
Operational alignment	0.7164 (0.50, 0.94) k = 10; N = 1728					
Customer benefit	0.2693 (0.06, 0.48) k = 4; N = 699	0.5373 (0.41, 0.67) k = 6; N = 2094				
Productivity	0.4505 (−0.03, 0.93) k = 12; N = 1581	0.4354 (0.17, 0.70) k = 7; N = 989	0.5244 (0.11, 0.93) k = 5; N = 990			
Financial performance	0.4192 (0.13, 0.70) k = 24; N = 3727	0.3603 (0.14, 0.58) k = 10; N = 2608	0.5123 (0.19, 0.84) k = 9; N = 2768	0.5533 (0.42, 0.68) k = 7; N = 1452)		
Governance structure	0.6426 (0.63, 0.65) k = 12; N = 1386	0.2791 (0.04, 0.52) k = 2; N = 351	−0.0340 (−0.03, −0.03) k = 1; N = 238	0.2542 (0.03, 0.48) k = 3; N = 667	0.2637 (−0.14, 0.67) k = 8; N = 1308	
Social alignment	0.6509 (0.36, 0.94) k = 30; N = 4126	0.6973 (0.41, 0.98) k = 11; N = 1834	0.4915 (0.42, 0.56) k = 4; N = 732	0.5318 (0.30, 0.76) k = 11; N = 1711	0.4261 (0.06, 0.79) k = 18; N = 3044	0.4740 (0.10, 0.85) k = 10; N = 1403

Values in parentheses = 80% credibility intervals.[9]
k = number of studies.[10]
N = total sample size for all studies included in the analysis harmonic mean[11] = 35.7792 (rounded up to 36).

Appendix C. Sobel test

Relationship (System type)	z value[12]	p value	a	b	s_a	s_b
Intellectual Alignment → Customer Benefit → Financial Performance*	−0.54	0.29	−0.15	0.41	0.26	0.22
Intellectual Alignment → Operational Alignment → Productivity	0.29	0.39	0.51	0.09	0.18	0.33
Operational Alignment → Productivity → Customer Benefit*	0.28	0.39	0.09	0.30	0.33	0.19
Operational Alignment → Productivity → Financial Performance	0.28	0.39	0.09	0.29	0.33	0.20
Governance Structure → Social Alignment → Intellectual Alignment	1.78	0.04	0.67	0.45	0.19	0.22

a = unstandardized beta coefficient of the independent variable to the mediator variable (in a simple model testing only these relationships); b = unstandardized beta coefficient of the mediator variable to the dependent variable (in a full model including the independent variable, mediators, and dependent variables); s = standard error of the beta coefficient.
* Interpreted with caution due to insignificant findings for the relationship between customer benefit and the other two types of performance.

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[9] We choose to focus on credibility intervals as opposed to confidence intervals, because using credibility intervals is more consistent with a random effects model in which moderators can be present to influence population parameters, whereas the confidence intervals are intervals around the mean which are not meant to convey the variability in population effects as clearly as the credibility intervals [72,73].

[10] $k < 10$ can create a greater sense of uncertainty in interpreting our conclusions [74]. This is a fairly stringent minimum k value, so we ran an ex ante power analysis to determine if we could less cautiously interpret our results [75]. Our analysis shows that we have sufficient sample sizes for all relationships. Nevertheless, for relationships with k values < 4, we acknowledge that we cannot be sure that these few studies actually represent the population as a whole and that the corrected population correlation point estimate resulting from the meta-analysis may, in fact, be higher or lower than that indicated by our results. Nonetheless, our k is consistent with other firm-level meta-analyses that report similarly small k values when splitting their data into subcategories [76].

[11] $N/(1/a_1 + 1/a_2 + \cdots + 1/a_N)$, where N = number of studies and a = original study sample size [77].

[12] $z\ value = (a^*b)/\sqrt{(b^{2^*} s_a{}^2 + a^{2^*} s_b{}^2)}$.

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